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7th World Congress on Prevention of Diabetes and its Complications

11 to 14, November 2012
Madrid, Spain

ABSTRACT BOOK

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7th World Congress
on Prevention of Diabetes and its Complications
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Madrid, Spain

ABSTRACT BOOK

Main organizing institutions:

GOBIERNO DE ESPAÑA
MINISTERIO DE SANIDAD, SERVICIOS SOCIALES E IGUALDAD
SaludMadrid
REAL ACADEMIA NACIONAL DE MEDICINA
International Diabetes Federation

7th World Congress
on Prevention of Diabetes and its Complications
11 to 14, November 2012
Madrid, Spain

Prevention of Diabetes and Its Complications – A Success Story!

Diabetes is one of the fastest growing public health problems worldwide. It affects all populations and is increasing everywhere. It causes severe complications and shortens life expectancy significantly. Treatment of diabetes is usually life-long, and therefore expensive. However, there are good news: diabetes and its complications are preventable! By preventing diabetes all the suffering related to this disease and unnecessary costs associated with it can be avoided.

The World Congress on Prevention of Diabetes and Its Complications is a global forum where experts on diabetes and prevention meet and all participants can enjoy high quality scientific discussions on principles of diabetes prevention and listen to the experiences from diabetes prevention programmes that have been implemented in various countries. The World Congress of Diabetes and Its Complications has taken place regularly since 1996 when the first historic Congress took place in Copenhagen, Denmark. It then traveled to Fiuggi (Rome), Italy, Hong Kong, Chennai, India, Helsinki, Finland and Dresden, Germany. During these years increasing evidence on the potential for prevention of type 2 diabetes has been obtained, included pharmacologic treatment, and the knowledge on the prevention of complications of diabetes has been strengthened.

It is now the time to take the next step with the 7th World Congress on Prevention of Diabetes and Its Complications to be held in Madrid, Spain in November 2012. As the earlier Congresses, the coming Congress will combine theory and practice, and will form a forum to disseminate new information, to learn from best practices and to have constructive debates around one of the most important public health issues, the prevention of diabetes and its complications. Although we can declare today that the work targeted to the prevention of diabetes and its complications has been a true success story, there is still a long way to go and many lessons to be learned. The history of public health is full of success stories – let's make sure that the prevention of diabetes and its complications will be one of them!

This conference is also a good opportunity to present and discuss your research works, meet with colleagues and friends from all over the world, and enjoy the pleasant mild climate and the many attractions of the beautiful city of Madrid.

We look forward to seeing you in Madrid!

Jaakko Tuomilehto
Co-President, 7th WCDP
Founder of the World Congress on Prevention of Diabetes and its Complications

Manuel Serrano Ríos
Honorary President

Rafael Gabriel
Co-President, 7th WCDP

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FIRST DAY - NOVEMBER 12, 2012

09:30 - 11:00 ORAL COMMUNICATIONS

Track 1: Session 1.1.1.
Mitochondria and 5- Aminiolevulinic acid (5-ALA) in type 2 diabetes

Endocrinological approach to improve mitochondrial dysfunction in diadetes mellitus and "metabolic domino"

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Background. We have proposed the clinical concept of "Metabolic Domino" to illustrate the whole picture of the cause, pathophysiology and complications of metabolic syndrome. Deposition of "visceral fat" is recognized to be the cause of insulin resistance, which induces metabolic syndrome. At this early stage, atherosclerosis has already begun before the onset of diabetes mellitus. When diabetes develops after impairment of insulin secretion, atherosclerosis has already advanced and cardiovascular events, such as ischemic heart disease and cerebrovascular disorder can occur at any time. In contrast, diabetic microangiopathies (neuropathy, nephropathy and retinopathy) occur several to ten years after the onset of diabetes. "Tumbling down" of all "dominos" means end organ damages, such as heart failure, dementia, limb amputation, hemodialysis or blindness. As for the driving force of Metabolic Domino, we focus upon mitochondrial dysfunction, which results in decrease of ATP generation and increase of oxidative stress. The organs which consume much energy and require lots of blood supply are the most vulnerable for mitochondrial dysfunction. Such organs are recognized to be the kidney and the gut, both of which are engaged in the process of (re)absorption and the skeletal muscle/the heart which exert contraction/relaxation activity. In order to decelerate the progression of Metabolic Domino, we are investigating the action on mitochondrial function of angiotensin II and natriuretic peptides secreted from the heart, the key hormones for cardiovascular and renal homeostasis and ghrelin, which is secreted from the stomach to regulate development/growth and energy metabolism.

Methods. In vivo experiments are performed using brain natriuretic peptide (BNP)- and cyclic GMP-dependent protein kinase- overexpressing transgenic mice and ghrelin receptor (growth hormone secretagogue receptor; GHSR) knock-out mice. Direct actions of the hormones are examined by the administration of the peptides to cultured myocytes or renal tubular cells.

Results. Ang II causes the decrease of mitochondrial number through activation of both type 1 and type 2 angiotensin receptors, which can be relevant for the suppression of new onset of diabetes by angiotensin receptor blockers. Natriuretic peptides induce mitochondrial biogenesis by upregulation of PGC1 and suppress development of obesity and impairment of glucose tolerance by high fat diet. Ghrelin increases mitochondrial number and reduces oxidative stress by augmentation of UCP2 expression.

Conclusions. Cardiovascular- and gut hormones could be applicable to the treatment of Metabolic Domino.

The effect of aminolevulinic acid on aerobic metabolism in mitochondria

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Background. Aminolevulinic acid (ALA) is a precursor of heme that is fundamentally important in aerobic energy metabolism. Among the enzymes involved in aerobic energy metabolism, cytochrome c oxidase (COX) is crucial. In this study, the effect of ALA on cytochrome c oxidase activity was measured.

Methods. c57BL/6N species of mice were administered ALA orally for 15 weeks. After ALA administration, mice were sacrificed and livers were obtained.

Results. COX activity in mitochondria from ALA-administered mouse livers was 1.5-fold higher than that in mitochondria from PBS-administered mouse livers ($P < 0.05$). Furthermore, ATP levels in ALA-administered mouse livers were much higher than those in PBS-administered mouse livers. These data suggest that oral administration of ALA promotes aerobic energy metabolism, especially COX activity.

Conclusions. This is the first report of a drug that functions in aerobic energy metabolism directly. Since

COX activity is decreased in various diseases and aging, the pharmacological effects of ALA will be expanding.

Use of the dietary supplement 5-aminiolevulinic acid (5-ala) and its relationship with glucose levels and hemoglobin a1c among individuals with pre-diabetes

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Background. 154 males and females ages 40-70 years, with evidence of pre-diabetes: Hemoglobin A1c (HbA1c) 5.8%-7.0% at the screening visit.

Objectives. This study examined the association between 5-Aminolevulinic acid (5-ALA) and glucose tolerance.

Methods. A double blinded, randomized prospective parallel-group comparison study.

Results. Among individuals taking 5-ALA supplements for 12 weeks, 2 hours post OGTT glucose levels declined significantly compared to those not taking the supplement (P=0.02). The relationships were stronger among those with baseline glucose intolerance, or 2 hours post OGTT glucose measurements greater than 140 mg/dl (P=0.005 and P=0.02 for the low and high dose group, respectively). Similar trends were observed for HbA1c but results were of borderline significance (P=0.07). No untoward effects were reported.

Conclusions. Further studies are indicated. The potential benefits of 5-ALA dietary supplementation are affirmed by this investigation.

Suppression of both the fasting and postprandial plasma glucose levels by 5-aminolevulinic acid

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Background. Glycaemic control is critical to prevent the onset of type 2 diabetes mellitus. We investigated the combined effects of 5-aminolevulinic acid phosphate (ALA-P) and iron on the glycaemic control in pre-diabetic subjects as a novel preventive therapeutic strategy against the onset of type 2 diabetes mellitus.

Methods. Pre-diabetic subjects were randomly assigned to four groups receiving one of three doses ALA-P or a placebo, orally once a day over a 12 week period. The change of the fasting plasma glucose, HbA1c and glycoalbumin levels were analyzed as primary end point

Results. Five mg ALA-P plus 18mg iron and 15mg ALA-P plus 1.8mg iron reduced the fasting glucose level with mean reductions of 0.21 mmol/L and 0.21mml/L and with mean differences from placebo of 0.12mmol/L and 0.13mmol/L, respectively. Fifteen mg ALA-P plus 1.8mg iron decreased serum glycoalbumin and 2h-OGTT levels more than the placebo.

Conclusions. ALA-P together with iron safely improves the fasting plasma glucose and glucose intolerance levels in pre-diabetic subjects, demonstrating that this combination treatment is a novel approach to the prevention of type 2 diabetes mellitus.

Possibility of 5-aminolevulinic acid for nutritional supplement; suppression of visceral fat accumulation in rats

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Background. 5-Aminolevulinic acid (ALA) is a precursor of heme that is fundamentally important in energy metabolism. This study was conducted to examine the physiological effects of ALA on energy metabolism and body fat accumulation in rats.

Methods. Six-week-old Sprague-Dawley male rats were divided into 3 groups and fed 20% casein diets containing 0% (C, n = 7), 0.002% (2A, n = 8), or 0.02% (20A, n = 8) of ALA for 14 days. After 14 days, samples of interscapular brown adipose tissue (BAT) and visceral white adipose tissue (WAT) were collected and weighed. In order to investigate the energy metabolism, oxygen consumption was measured using an indirect calorimeter on day 14. The expression of the uncoupling protein (UCP) 1, the key molecules in the energy metabolic process, in BAT was determined by qRT-PCR.

Results. There were no differences shown in body weight and the food intake between the three groups. However, the weight of visceral WAT, but not BAT, decreased significantly in a ALA dose dependent manner ($P < 0.05$). In contrast, the total oxygen consumption tended to increase and the levels of UCP1 mRNA and UCP1 protein in BAT increased significantly in a ALA dose dependent manner ($P < 0.05$).

Conclusions. These results demonstrated that dietary supplementation of ALA may contribute to the promotion of energy metabolism and prevent the development of visceral WAT accumulation by up-regulation of UCP1 in BAT.

Track 3: Session 1.3.1
Nutrition and Diabetes Prevention

The impact of high-fiber, low-fat diet in prevention of type 2 diabetes with lifestyle

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Background. Rapid change in lifestyle in both developed and developing communities, lead to progressively increased prevalence of diabetes.

Objectives. Our study aimed to search the effect of high-fiber and low-fat nutrition and regular physical activity to prevent diabetes in high risk individuals, and also to determine the effects of such a nutrition on high sensitive-C reactive protein (hs-CRP) and resistin which are some of well-known inflammation markers.

Methods. A group of 67 prediabetic individuals participated in our study, and followed throughout nine months. Individuals who actively participated in more than 1/3 of the training sessions have been evaluated as active group, those who could not attended to at least 1/3 of sessions have been evaluated as less active (control) group. The participants have received a specific training program to lose at least by 5% of actual weight, to increase fiber and decrease fat consumption, and to increase regular physical activity by at least 5 days a week and 30 min per day or in total 150 min per week.

Results. At the end of the study, rate of the weight losers 5% or more were found significantly higher in the active group compared to the control group (42.0% vs. 11.1%, $p<0.05$). Although there was no significant difference in physical and laboratory features between the groups, more people in the active group had improved glucose tolerance. When the groups were evaluated separately, compared to baseline in the active group significant decreases were found in weight, body mass index, waist and hip circumference, body fat ratio, diastolic blood pressure (BP), fasting blood glucose (FBG), OGTT 2-h blood glucose (2h-BG) and 2-h insulin (2-hI), hs-CRP and resistin levels. Moreover, there was a trend to decrease insulin resistance (HOMA-IR), and increase in insulin sensitivity (HOMA-S) in this group. In contrast, in the control group a significant decrease was found in waist and hip circumference, systolic BP, 2-hBG and 2-hI levels, and also a trend to decrease in resistin levels.

Conclusions. Taking into consideration that the duration of the follow-up was too short, these results suggested that the risk of type 2 diabetes can be decreased by changing life style and the difference between the groups may become more evident after longer follow-up.

Greater fruit and vegetable intake is associated with reduced glycaemic parameters

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Background. Dietary recommendations for the prevention of Type 2 Diabetes Mellitus (T2DM) include the message to consume 400g fruit and vegetables per day. Lifestyle modification studies aimed at the prevention of T2DM have also included recommendations to increase fruit and vegetable intake in the diet, yet little data exists to support this recommendation. A recent systematic review found no significant benefits for greater consumption of fruit and vegetables for the prevention of T2DM. However this meta-analysis was based on observational studies which assessed diet by food frequency questionnaire. Accurate measurement of habitual diet is difficult. Errors due to self report can be eliminated by the use of nutritional biomarkers and vitamin C consistently demonstrates a high correlation to fruit and vegetable intake.

Objectives. We aimed to measure plasma vitamin C as a biomarker for fruit and vegetable intake in individuals identified at high risk of T2DM. Fruit and vegetables are often thought to confer benefit due to their antioxidant capacity, thus we also measured urinary F2-isoprostanes as a marker for oxidative stress.

Methods. Participants recruited from a high risk population as part of a T2DM prevention trial, (n=2,101) provided fasting blood samples for the quantification of plasma vitamin C. Vitamin C was stabilised using metaphosphoric acid then stored at -80°C and analysed on a Cobas FARA centrifuge with fluorescent attachment. A spot urine sample was provided for the measurement of F2-isoprostanes and analysis was carried out using time resolved fluorescence automatic immunoassay system. We compared glycaemic parameters by the increments of the standard deviation of plasma vitamin C using multiple regression models.

Results. Mean plasma vitamin C of participants was 39.3µmol/l (SD 21.8). Female participants (39%) had greater plasma vitamin C than males (61%), (42.6µmol/l (SD 21.9) vs. 37.2µmol/l (SD 21.5) $p = \leq 0.0001$). Mean HbA1c, fasting and 2 hour glucose were 5.9% (SD 0.5), 5.3mmol/l (SD 0.8) and 6.7mmol/l (SD 2.6) respectively. 1 SD plasma vitamin C (21.8µmol/l) was significantly and inversely associated with HbA1c, fasting and 2 hour blood glucose ($p = \leq 0.0001$). Relationships remained significant after adjustment for demographic variables and confounding factors, (HbA1c = -0.04%, p=0.001, fasting glucose = -0.05mmol/l, p=0.005 and 2 hour glucose = -0.22mmol/l, $p = \leq 0.0001$). No significant association was observed between plasma vitamin C and urinary F2-isoprostanes.

Conclusions. Results suggest that increasing fruit and vegetable intake can contribute to improvements in glucose regulation. An increase of 1SD (21.8µmol/l), equivalent to roughly one orange would be considered a small change that individuals can make to improve HbA1c, fasting and 2 hour glucose. No association was observed between plasma vitamin C and oxidative stress, as assessed by urinary F2-isoprostanes, suggesting the role of fruit and vegetables in glucose regulation is not solely due to their antioxidant ability. Further research is warranted to investigate the role of fruit and vegetables and the prevention of T2DM.

Effect of Ramadan fasting diet on postprandial metabolism among patients with Type 2 diabetes in Sidi-Bel-Abbes (West Algeria)

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Background. Postprandial hyperlipidemia is a common feature in type 2 diabetes.

Objectives. Our purpose was to assess the effect of diet composition during Ramadan fasting on anthropometric and postprandial lipemia among 125 patients with type 2 diabetes.

Methods. The study was scheduled over two periods: before (T0) and during (T1) Ramadan 2011, in Hassani Abdelkader University Hospital, Ex Gambetta Diabetes Centre in Sidi-Bel- Abbes city, and a private cabinet in Oran city. 125 patients diagnosed with type 2 diabetes were selected. The nutrient intake was evaluated by means of a 3-days food record during the two periods. Anthropometric parameters: weight, height, waist and hip circumferences, body mass index (BMI), and waist-hip ratio (WHR) were recorded. The measure of fasting and prandial serum glucose, lipid components (total cholesterol, triglycerides, HDL-cholesterol, LDL- cholesterol) were used to present the biological results.

Results. A significant weight loss (-2.45% $p<0.0001$) correlated to the decrease of meal frequency was found. Unbalanced values have been noticed with an increase of postprandial glycemia (10.8%: $p<0.0001$) and lipid disorders marked by a decrease of HDL-c rate (< 40 mg/dL) and an increase in TC (> 250 mg/dL), LDL-C (> 130 mg/dL) and triglycerides (300 mg/dL). A high consumption of fat food and a lack of medication monitoring adapted to the needs of patients who want to fast safely can be the main cause of such disorder.

Conclusions. Ramadan fasting will constitute a real challenge for patients with type 2 diabetes who want to fast particularly if appropriate instructions concerning diet and medication regimen are missed.

Track 4: Session 1.4.1
Role of technology in the prevention of diabetes and its complications

Potentials of (new) media for health communication in the field of diabetes prevention

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Background. The successful breakthrough of digital technologies into nearly every private and public domain also entails changes for the field of health communication. In the field of diabetes prevention, the integration of new media has not reached the same level as in everyday life. Oomen-Early and Burke (p. 189) describe the challenges for the field: "Preparing health educators in today's technology-driven society requires faculty to adopt new teaching strategies which motivate and engage the Web 2.0 generation".

Objectives. The goal of this presentation is to give an overview of the opportunities of new media for health communication approaches for targeting risk groups and the general population in the field of diabetes prevention. It should encourage institutions and health experts to use the new technologies for their work in the field of diabetes prevention and to prepare health personnel for the challenges and opportunities in a technology-driven world. It is most beneficial, if not necessary for health educators to get used to the media that the target groups in diabetes prevention use on a daily basis.

Methods. This chapter gives an overview of the different health communication approaches with an emphasis on web 2.0/social software applications including the latest research results and their possible implementation for the work of health educators. The most innovative and useful new technologies like mobiles, serious games, blogs, wikis, podcasts, social networks, twitter and other web based applications as well as concepts for "old" media, like the entertainment education approach for television shows shall be described. A brief outline of exemplary projects in the field of diabetes prevention using new media for health communication based on a PubMed search will be provided.

Results. Recommendations for a possible implementation of the described technologies in the work for diabetes prevention experts will be described.

Conclusions. The use of media offers vast opportunities to support and promote the work in the field of diabetes prevention. These media can be used to inform, promote, raise awareness and target health behavior change in the overall population and risk groups in the field of diabetes prevention. Health educators should improve their media literacy to be able to work effectively with new media.

11.30 - 13.00 Oral Communications

Track 4: Session 1.4.2
Risk scores/prediction/screening

Comparison of point of care diabetes screening methods in an at-risk Greek population

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Background. Screening at risk subjects for prediabetes and type 2 diabetes is an important step in primary prevention and secondary intervention efforts. Methods that are noninvasive, nonfasting, simple and provide immediate results reduce barriers and may encourage more at risk individuals to be screened.

Objectives. We examined the accuracy of random capillary glucose (RCG) and two noninvasive screening methods, SCOUT DS and the ADA diabetes risk test (DRT) for detecting increasing levels of dysglycemia as defined by A1C in a Greek population that had risk factors for but not an existing diagnosis of type 2 diabetes.

Methods. Subjects at risk for prediabetes and type 2 diabetes were recruited at 2 clinical sites in Athens, Greece for a single nonfasting visit. Each subject had measurements of height, weight and waist circumference. A diabetes score was calculated from skin fluorescence measured on the left forearm with SCOUT DS.

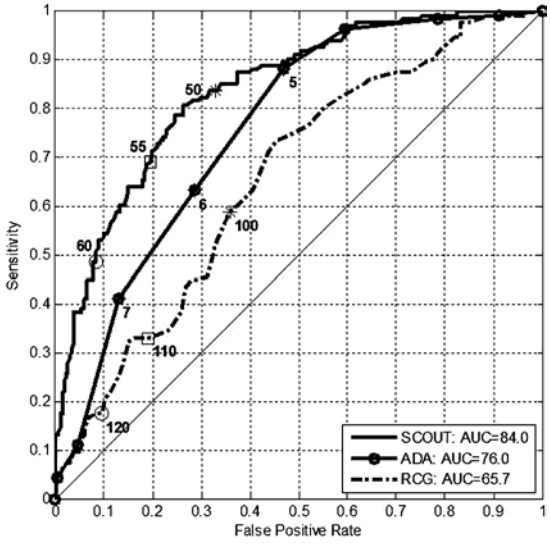

Figure.—Comparison of Point of Care Diabetes Screening Methods in an At-Risk Greek Population.

A finger prick was done to measure RCG (OneTouch Ultra) and A1C (DCA Vantage). Health history questionnaires were completed for the DRT. A1C was the reference and dysglycemia states of ≥ 5.7%, ≥ 6.0% and ≥ 6.5% were defined.

Results. 398 of 409 subjects had complete data for analysis with means for age, BMI, and waist of 52 yrs, 27 kg/m2 and 90 cm. 51% were male. Demographic factors that were significantly associated with dysglycemica included age, BMI, waist and first degree relative with diabetes. Prevalence of A1C ≥ 5.7%, ≥ 6.0% and ≥ 6.5% were 54%, 34% and 12%, respectively. Screening test threshold sensitivity (SENS), specificity (SPEC) and receiver operator characteristic (ROC) areas under the curve (AUC) for detection of increasing levels of dysglycemia are shown in Table 1. The SCOUT, DRT and RCG ROC curves for detection of A1C ≥ 6.0% are shown in Figure 1.

Conclusions. SCOUT DS had significantly greater AUC for all 3 levels of dysglycemia relative to the ADA DRT and RCG. For all three levels of A1C define dysglycemia, the SCOUT DS screening threshold of 50 AU was significantly higher in SENS relative to the RCG threshold of 100 mg/dL with comparable SPEC and had comparable SENS relative to the ADA DRT with signicantly better SPEC. The superior accuracy and noninvasive nature of the SCOUT DS may make it an attractive option for diabetes screening.

A systematic review of screening and recruitment strategies which engage high-risk participants into lifestyle programs that prevent or delay type 2 diabetes: what are the most effective strategies?

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Background. Type 2 diabetes is a major public health problem. There is strong and consistent evidence from randomised controlled trials that it can be prevented or delayed through lifestyle modification. The challenge is to screen and recruit high-risk participants. The most effective strategies for screening and recruiting high-risk participants into lifestyle modification programs have not been identified.

Objectives. To determine the most effective screening and recruitment strategies which engage high-risk participants who can benefit the most from lifestyle programs that prevent or delay type 2 diabetes.

Methods. A comprehensive, systematic database search for manuscriptps was conducted from 1990 until April 2012 using computerised databases which

TABLE.—*Comparison of Point of Care Diabetes Screening Methods in an At-Risk Greek Population.*

		A1C ≥ 5.7%			A1C ≥ 6.0%			A1C ≥ 6.5%		
	Threshold	SENS	SPEC	AUC	SENS	SPEC	AUC	SENS	SPEC	AUC
SCOUT DS	50 AU	.738 [.676-.793]	.772 [.706-.826]	.821 [.763-.879]	.838 [.767-.891]	.672 [.613-.726]	.840 [.779-.901]	.980 [.893-.996]	.564 [.512-.616]	.904 [.816-.992]
ADA DRT	5	.804 [.745--.851]	.614 [.542-.681]	.753 [.695-.811]	.882 [.817-.926]	.531 [.470-.590]	.760 [.699-.821]	.980 [.893-.996]	.441 [.390-.494]	.805 [.717-.893]
RCG	100 mg/dL	.519 [.452-.585]	.658 [.586-.722]	.632 [.574-.690]	.588 [.504-.667]	.641 [.581-.697]	.657 [.596-.718]	.735 [.597-.838]	.605 [.552-.654]	.723 [.635-.811]

included Medline and PreMedline, CINAHL, EMBASE, PsychINFO and also a manual search of review articles. The broad search terms were ' type 2 diabetes', 'prevention', 'exercise' and 'diet'. Two assessors (AG and PV) independently extracted data from primary articles and resolved discrepencies by consensus.

Results. The search identified 6258 papers which were assessed for inclusion, resulting in 274 papers. The 141 unique studies identified were from 25 countries and all focussed on lifestyle modification programs which focussed on diet and exercise in participants at high risk of type 2 diabetes. The studies included 45 randomised controlled trials, 37 translational studies, 32 cross-sectional studies, 10 before and after studies with matched control groups and 18 before and after studies without controls. Thirty-nine of the studies targeted selected high-risk groups (the majority from the United States). A range of eligibility criteria have been used to determine high-risk participants such as elevated blood glucose levels, risk scores or selected risk factors. A diverse range of strategies have been used to target high-risk participants which can be broadly categorised into targeted, opportunistic or whole of community/population approaches. The settings have included workplaces, educational institutions, primary health care and community events. Primary health care was by far the most common setting to target high-risk participants. Peer-led approaches are beginning to show substantial promise. Few studies adequately reported or evaluated screening and recruitment strategies and even less assessed cost effectiveness. There is promising evidence for 'whole of community' approaches which include social marketing, multiple settings, and the use of information technology such as phone and web-based strategies. Small-scale studies have used financial incentives with mixed results.

Conclusions. The most effective screening and recruitment strategies for high-risk participants are not yet well understood. It is appears to be dependent on the context, the setting and the target group. Whole of community approaches show promise. Further research is required to determine the most effective screening and recruitment strategies to engage high-risk participants in diabetes prevention programs

Risk equations for the development of worsened glucose status and type 2 diabetes mellitus in a Swedish population

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Background. Type 2 diabetes (T2D) is a severe disease with a considerable impact on people's wellbeing. The natural history of T2D describes the process of the development from normal glucose tolerance (NGT) via so-called pre-diabetic states, impaired fasting glucose (IFG) and impaired glucose tolerance (IGT) or a combination of both, to T2D.

Objectives. The objective of this study is to estimate risk equations that predict transition probabilities from NGT to pre-diabetic states and from pre-diabetic states to T2D.

Methods. Individuals who participated in the Västerbotten Intervention Program (VIP), Sweden, at least twice between 1990 and 2009 were included in the analysis. The time difference between the two examinations in VIP was always 10 years. Fourteen potential risk factors for the development of a worse glucose state (pre-diabetes or T2D) were initially investigated. Analysis was conducted in two steps. First, factor analysis was used to find candidate variables; and second, logistic regression was employed to quantify the influence of the candidate variables.

Results. In total, 29 937 individuals participated at least twice in the VIP between 1985 and 2009. Factor analysis for the risk factors determined to include the variables sex, age, education, perceived health, triglyceride, blood pressure, BMI, smoking, physical activity, snus, nutrition and heredity in the model and to exclude the variable alcohol from the model. Six risk equations were developed. The equations show that different risk factors have different impacts on the development of a worsened glucose status and T2D. The results of stepwise logistic regression will be presented.

Conclusions. The described analysis reports the development of risk equations from healthy (NGT) to pre-diabetic states and from pre-diabetes states to T2D within 10 years in a Swedish population. The equations could be used to identify individuals with increased risk to develop any of the three pre-diabetic states or T2D and to adapt adequate prevention strategies.

Cross-sectional analysis of the Japanese Diabetes Risk Score in 4017 Japanese people and its clinical interpretation

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Background. The Finnish Diabetes Risk Score (FINDRISC) is a questionnaire for detecting European people at high risk of developing type 2 diabetes and those with undiagnosed type 2 diabetes. Recent studies report that fatty liver is a risk factor for developing type 2 diabetes and it should be detected and treated.

Objectives. The aim of this study is to evaluate efficacy of the diabetes risk score in Japanese people by cross-sectional analysis. We investigated relationships among variables including the diabetes risk score and fatty liver markers.

Methods. We conducted Japanese Diabetes Risk Score (JPDRISC) by modifying FINDRISC, in reference to the IDF criteria for Asia-specific metabolic syndrome in terms of waist circumference. We assigned it to 4017

Japanese people who underwent annual medical check-up including blood sampling and ultrasonography examination. They are accumulated as typical examples of regional populations. We excluded 111 people treated with antidiabetic agents and investigated 3906 people (2494 men, 1412 women; age, 44±9 years; BMI 22.8±3.4 kg/square meter). Fatty Liver Ultrasonography (FLUS) scores were also assigned as follows: 2 points, subjects with moderate or severe fatty liver; 1 point, those with mild fatty liver; 0 points, those with normal liver. In this study, we diagnosed diabetes by FPG 6.8 mmol/l (126mg/dl) or over, HbA1c (NGSP) 6.5% or over and/or past history of diabetes in those who were not treated with antidiabetic agents. We had information about family history of diabetes in parent and brother/sister as well as the original FINDRISC. Although information about family history of other relatives (child, grandparent, aunt, uncle and first cousin) was also included into the original FINDRISC, we do not have it. That is our limitation and we had to assess our study-specific cut point to detect diabetes.

Results. Total JPDRISC significantly ($p<0.0001$, all) correlated with HbA1c, FPG, FIRI, FLUS score, ALT, cholinesterase, systolic and diastolic pressure (r=0.34, r=0.34, r=0.34, r=0.35, r=0.20, r=0.23, r=0.31 and r=0.31 respectively). In the ROC analysis, the study specific cut point to detect diabetic patients, who were not treated with antidiabetic agents, was 6.5 points (sensitivity 72%, specificity 77%, AUC 0.83). FIRI significantly ($p<0.0001$, both) correlated with ALT and FLUS score (r=0.52, r=0.54, respectively). FIRI also significantly ($p<0.001$) correlated with FPG but the correlation coefficient was lower than those (r=0.32). Interestingly, in linear regression analysis, FLUS score (beta=0.35 and $p<0.001$), ALT (beta=0.25 and $p<0.001$), waist circumference (beta=0.20 and p=0.040) and urinary albumin excretion (beta=0.21 and $p<0.001$) were independent determinants of FIRI, while FPG, HbA1c and JPDRISC were not. Because FIRI was insufficiently compensated and progressively decreased in the most of subjects, who were not treated with antidiabetic agents, and whose FPG was from 5.5mmol/l (100mg/dl) to 7.6mmol/l (140mg/dl).

Conclusions. The JPDRISC is useful in Japanese people to detect overt fatty liver in ultrasonography as well as increase in HbA1c and FPG. We also conclude that FIRI is primarily associated with fatty liver, and it should be a target of treatment for insulin preservation.

The Australian type 2 diabetes risk tool (AUSDRISK): what contributes to the overall risk score?

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Background. Identifying individuals at high-risk of developing diabetes, followed by lifestyle intervention, is an important strategy in preventing type 2 diabetes. There are several published risk assessment tools for predicting diabetes. The Australian risk assessment tool (AUSDRISK), developed from Australian Diabetes, Obesity and Lifestyle study (AusDiab) data, predicts five year diabetes risk.

Objectives. To evaluate the contribution of the different component questions to the overall AUSDRISK risk score across risk categories.

Methods. 1074 AUSDRISK assessments were analysed from participants in the community-based Sydney Diabetes Prevention Program. Participants aged 50-65 years were recruited through primary health care physicians. Descriptive analysis was used to determine the percentage contribution of the 11 AUSDRISK risk variables to the overall risk score for low risk (score ≤ 11), intermediate risk (score 12-14) and high risk individuals (score ≥15). Statistical significance was assessed using a one-way ANOVA with Post-Hoc contrasts used to determine significance. Receiver-operating characteristic (ROC) curves were used to highlight the discriminatory power of the 11 variables.

Results. Age group, waist measurement and history of high blood glucose were the leading contributors in the high-risk group, with the percentage contribution to the final score being 31.3%, 27.3% and 11.5% respectively. The contribution of waist measurement and history of high blood glucose increased with increasing risk score, whereas the contribution of age group decreased. Ethnicity, country of birth, use of blood pressure medication and smoking did not differ across the range of risk categories. Waist circumference provided the greatest discriminatory power with an area under the receiver-operating characteristic curve (AUC) of 0.85. Utilising age, waist circumference and history of high blood glucose in a model to discriminate high risk provided an AUC of 0.93. The substitution of exercise, the variable with the third highest AUC, for age into this 3 variable model provided equal discriminative ability. Utilising waist circumference and history of blood glucose provided similar discriminative ability with an AUC of 0.92.

Conclusions. Age group, waist measurement and history of high blood glucose were the leading contributors to the future risk of diabetes contributing 70.1% of overall risk in the high-risk group. The inclusion of waist measurement and history of high blood glucose provided similar discriminatory power than if age or exercise were added to this model. The risk score could possibly be simplified by eliminating some questions which make little contribution to quantifying overall risk.

Validation of the FINDRISC questionnaire in the Spanish population: the VIVA (variability of insulin with visceral adiposity) cohort study.

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Objectives. To describe the utility of the FINDRISC questionnaire as a risk predictor for Type 2 Diabetes (T2D) in the Spanish population.

TABLE.—*VIVA R. Madero.*

Ntiles	PObs	PPred	PObs	PPred
of FR	8-item FR		7-item FR	
1		0.0563	0.8100	0.0476
2		0.0766	0.9873	0.0915
3		0.1193	0.9987	0.1063
4		0.1207	0.9999	0.1856
5		0.2809	1.0000	0.2120

Methods. Population-based cohort study (1766 individuals 34-64 years; 58% women), randomly selected in 1997 and free of diabetes at baseline (FPG< 7.0 mmol/L and 2-h PG<11.1mmol/L and no treatment with any anti-diabetic medicine). Mean follow-up 11.5 years. New cases (incident) of T2D were defined by WHO criteria: FPG> 7.0 mmol/L or 2-h PG>11.1mmol/L or initiation of any anti-diabetic treatment during the follow-up. Two FINDRISC scores (FR) versions, the 8-item FR and the 7-item FR (without information on family history of diabetes) were analyzed. The probability of T2D was estimated using logistic regression analysis. The discriminatory power of the FR scale was calculated by the AUC analysis, for different cutoffs. Calibration analyses for the 8-item FR and 7-item FR models were performed grouping the FR score in 5 groups to calculate the observed: predicted probability ratio.

Results. The follow-up (OGTT, and clinical information on anti-diabetic treatment) was completed in 1.397 subjects (79%). Discriminatory power of the 7-item FR test by ROC analysis was: 0.662 (95%CI: 0.621, 0.703), and 0.689 (95%CI: 0.645, 0 .733) for the 8-item FR. The table shows the 10-year observed: predicted probability ratio of T2D grouped in 5 Ntiles.

Conclusions. The usefulness of the FR, both 7-item and 8-item, to predict T2D is discrete and overestimates the risk T2D in our population. The application of FR in a logistic model to our data, without using the FR cutoffs, might improve the predictive probability. Adjusting the weights of the variables in our data probably would improve its predictive ability.

Tolerance test with a standard breakfast food *versus* classic test of oral glucose tolerance in people at high risk for type 2 diabetes

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Objective. To compare the response of the pancreatic beta-cell to glucose levels after a tolerance test with standard breakfast, and to the WHO standard oral glucose tolerance test (OGTT).

Participant centres: Primary Care centers of Madrid, Castilla la Mancha (Cuenca) and Castilla y Leon (Segovia, Arévalo and Gredos –Ávila-).

Methods. Persons 45 to 70 years old whith a FINDRISC score higher than 14; During a week each participant was assigned to two different interventions: Intervention 1: standard OGTT, Intervention 2: breakfast tolerance test (BTT).

Results. 190 individuals were included: 18.5% in Madrid, 27.8% in Castilla-La-Mancha and 53.6% in Castilla-León.Three scheduled intervention visits were performed with an average duration of 5 days and a mean interval of 1.2 days between visits. The mean age (SD) of the study population was 57.3 (8.6) years; (61% women); 89.4% were overweight (34.7%) or obese (54.7%); 45.2% used antihypertensives; 75% had a family history of diabetes; 33% self-reported fruit or vegetables everyday intake, and only 37% practiced 30 minutes or more of daily physical activity.

After OGTT, the mean 2-h plasma glucose level was 127mg/dl (SD 53.67) and 107.36 mg/dl (SD 32.63) after 2-h BTT. Twenty subjects (11%) were diagnosed of type 2 diabetes (T2D) by OGTT and 13 were by BTT. Only 10 subjects (50%) were classified as T2D by both tests. 38 people were diagnosed of glucose intolerance (IGT) by the OGTT and 13 by the BTT, but only 3 were classified as IGT by both tests. The Pearson´s coefficients between OGTT and BTT were 0.84 and 0.54 for fasting glucose and 2-h glucose respectivelly. Sensitivity of BTT versus OGTT to diagnose T2D was 50%; specificity 98%; positive predictive value (PPV) was 76%, and negative predictive value (NPV) 84%.

Conclusion. Using the WHO diagnostic criteria, the BTT is very useful to rule-out diabetes in high-risk subjects (specificity 98%), but its sensitivity is only 50% to detect diabetes. BTT´s thresholds need to be explored to test the validity of BTT vs OGTT for the diagnosis of T2D.

Screening for diabetes in a mediterranean region: a whole population study. The ESCARVAL study

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Background. Testing to detect type 2 diabetes and assess risk for future diabetes in asymptomatic people should be considered. According to 2012 American Diabetes Association Guideline, testing for diabetes should begin at age 45 years. The Valencian Region

TABLE I.—*Screening for diabetes in a mediterranean region a whole population study. The escarval study.*

	Total N=2730450	Screening Yes N=870405 (31.9%)	Screening No N=1860045 (68.1%)	Adjusted OR
Has The Physician Done The Course?:				
Yes	283037 (10.4)	138204 (48.8)	144833 (51.2)	2.13
No	2447413 (89.6)	732201 (29.9)	1715212 (70.1)	
Gender:				
Male	1260003 (46.1)	359059 (28.5)	900944 (71.5)	0.759
Female	1470447 (53.9)	511346 (34.8)	959101 (65.2)	
Atrial Fibrillation:				
Yes	51731 (1.9)	28330 (54.8)	23401 (45.2)	1.250
No	2678719 (98.1)	842075 (31.4)	1836644 (68.6)	
Hypertension:				
Yes	790143 (28.9)	440701 (55.8)	349442 (44.2)	1.911
No	1940307 (71.1)	429704 (22.1)	1510603 (77.9)	
Dyslipidemia:				
Yes	665561 (24.4)	446503 (67.1)	219058 (32.9)	4.390
No	2064889 (75.6)	423902 (20.5)	1640987 (79.5)	
Cardiovascular Event:				
Yes	3979 (5.0)	74086 (54.2)	62642 (45.8)	1.084
No	2593722 (95.0)	796319 (30.7)	1797403 (69.3)	
Number Of Visits	0.7 (1.4)	1.5 (1.9)	0.2 (0.9)	2.134
Age (Years)	65.5 (14.4)	63.7 (12.6)	66.3 (15.2)	0.759

is a Mediterranean region in the east of Spain with a population of 5.120.343 inhabitants. The health system has universal coverage and primary care is of free access with a patient's list for every family physician. There is a unique insurance number per patient and a unique electronic health record for primary and secondary ambulatory care for all valencian population. Whole population studies allow us to know the real clinical practice instead of ideal clinical practice from clinical trials. Escarval (EStudio CARdiometabolico VALenciano) is a research and teaching program for 800 primary care professionals (PCP) about cardiovascular and diabetes. A one year online continuing medical education (CME) course has been made about these topics.

Objectives. To analyze the prevalence of diabetes screening in a broad population in a Mediterranean European region. To identify associated factors. To analyze the influence of a one year online course about cardiovascular and diabetes prevention.

Methods. Electronic health records from all population in Valencian Region (5.120.343) were analyzed selecting people without a previous diagnostic of diabetes and over 45 years old (2730450). Associated factors influencing diabetes screening were analyzed including if the online course was made or not by the PCP. Screening was made by fasting (defined as no caloric intake for at least 8 h) plasma glucose. A logisitic regression was applied.

Results. 31.9% of population over 45 years has been screened (n=870405). The associated factors were: Has the Physician Done the Course? (OR 2.13); Male (OR 0.75), Age (0.75), Atrial Fibrillation (OR 1.25), Hypertension (1.91), Dyslipidemia (4,39), Cardiovascular Event (1.08), and Number Of Visits (2.13). See Table I.

Conclusions. The prevalence of diabetes screening was 31.9% in population over 45 years (n=870405). Screening was made more frequently by PCP that has been done a CME course. Also in women, patients with cardiovascular risk factors (atrial fibrillation, hypertension, dyslipidemia, cardiovascular event) and people with more frequency of visits to their PCP.

Diabetes risk score for undiagnosed diabetes in African populations

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Background. Diabetes prevalence is increasing worldwide. Increased burden of diabetes and recent developments in treatment and prevention of diabetes and cardiovascular complications present opportunities for screening of people at risk of diabetes in order to implement disease-modifying intervention and prevent long-term complications. Diabetes risk scores are a feasible option as a baseline screening tool. No diabetes score exist for the African population.

Objectives. The aim of this study was to develop and validate a simple inexpensive score for identifying individuals with undiagnosed diabetes in the African context.

Methods. A population based sample of 5193 individuals aged 15years and above from diabetes surveys in Tanzania, Senegal and Guinea was used

to develop the score. New cases of diabetes were defined using fasting glucose measurements. Binary Logistic regression model coefficients were used to assign individual score for the predictor variables in the model.

Results. Age, hypertension and waist circumference were the variables included in the final model. The model has an area under the ROC curve (AUC) of 0.83 (95% CI 0.82 to 0.84). A meta-analysis of applying the score at individual country data yielded a summary ROC curve with an AUC of 0.8 (95% CI 0.74-0.85) and an inconsistency score (I2) of 0%.

Conclusions. We present the first ever diabetes score derived from Africa. It is a simple inexpensive tool for identifying individuals with undiagnosed diabetes in African settings. Further work is needed to externally validate the score.

13.00 - 14.30 Posters

Posters Session 1.1 General

Poster no. 1. — Systematic review and meta-analysis of insulin therapy and risk of cancer

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Background. Recent epidemiological studies suggest that treatment with insulin may promote cancer growth.

Objectives. The present systematic review and meta-analysis of published observational studies was conducted to assess the risk of cancer during treatment with insulin.

Methods. A search of online database through January 2011 was performed, and examined the reference lists of pertinent articles, limited to observational studies in humans. Summary relative risks (RRs) with 95% confidence intervals (CIs) were calculated with a random-effects model. The 15 eligible studies (5 case-control and 10 cohort studies), included 562,043 participants and 14,085 cases of cancer.

Results. Insulin treatment was associated with an increased risk of overall cancer (summary RR (95% CI) 1.39 (1.14, 1.70). Summary RR (95% CI) for case-control studies was 1.83 (0.99, 3.38), whereas RR for cohort studies was 1.28 (1.03, 1.59). These results were consistent between studies conducted in the United States and in Europe. For studies included combined type1 and type 2 diabetes the summary estimate was stronger than studies included only type 2 DM. The association between insulin treatment and cancer was stronger for pancreatic cancer (summary RR (95% CI) = 4.78 (3.12, 7.32)) than for colorectal cancer (1.50 (1.08, 2.08)). Insulin treatment was not associated with breast, prostate and hepatocelluar cancer and their effect estimates were not statistically significant.

Conclusions. Our findings support an association between insulin use and increased risk of overall, pancreatic and colorectal cancer.

Poster no. 2. — Type 2 diabetes and cancer development

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Background. The frequent coexistence of the cancer in patient with diabetes had been observed in the early 20th century when no knowledge of the pathophysiology of diabetes or cancer was available. Diabetes is a chronic, complex and multi factorial metabolic disorder with severe progressive complications which may involve multiple body organs. On the other hand cancers are chronic, progressive and often fatal. Many factors are common in diabetes and cancer and influence the risk of both, including age, sex, ethnicity, socioeconomic status, obesity, diet, smoking history, and physical activity level. In addition several potential confounders directly related to the diabetes such as obesity, the quality of metabolic control, drugs used for treatment, and diet, may influence the association between diabetes and cancer. Published numbers and figures show that cancer, obesity and diabetes are undoubtedly large-scale epidemics. If we accept the relation between diabetes and cancer, those numbers would be worse! That is because of most underdiagnosed diabetes cases which are about 3-5% of the adult population. Thus, it will increase the cancer risk in the normal population. Therefore knowledge of both cancer and diabetes and the complex association and interaction between them is very important issue in early prevention and further treatment.

Objectives. In the present study, we review available evidence concerning the association between diabetes and cancer, the different aspects of diabetes and diabetes treatment which may influence this association, and the possible mechanisms involved.

Methods. We searched the MEDLINE/EMBASE databases using combinations of the keywords risk factor(s), cancer, diabetes, obesity, hyperglycemia, glucose metabolism, hyperinsulinemia, etc., for articles published until May, 2012. We included epidemiological studies, clinical trials, experimental animal studies, meta-analysis, and reports that were published in English.

Results. The risk for several cancers, including cancers of the pancreas, liver, colorectal, breast, urinary tract, and endometrium, is increased in patients with DM. All meta-analyses showed an increased relative risk for cancer in diabetic men, except studies of prostate cancer, in which a protective effect was observed. The relationship between diabetes and cancer appears to be complex, and at present, a clear temporal relationship between the two conditions cannot be defined. DM also impacts negatively on cancer-related survival outcomes and cancer screening rates.

Conclusions. Overall, the available evidences showed an increased risk of developing certain types of cancers and worse prognosis after cancer diagnosis in diabetic patients. Diabetic conditions are com-

plex and the biology of the cancers is diverse and several mechanisms may be involved in their association. Therefore, there is still no clear answer to many questions regarding the association of diabetes with an increased risk of cancer initiation and progression. However, diabetic patients should be subjected to enhanced diagnostics available for the cancers, screening measures, the development of risk assessment tools, and consideration of cancer prevention strategies. Also, the risk of cancer and its occurrence in the selection of appropriate treatment for diabetic patients should be considered.

Poster no. 3. — Prognosis of wound healing in diabetic foot patients

Tatiana Zelenina, Natalia Vorokhobina, Natalia Belevantseva, Alexandr Zemlyanoy, Alexandr Zelenin

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Background. Diabetic peripheral sensory-motor and autonomic neuropathy both associate with early morbidity and mortality in diabetic patients. Moreover both of them are involved in the development and progression of diabetic foot tissue loss. More than 60 % of diabetic foot patients are known to require surgery operations and foot amputations. Prolonged spontaneous wounds healing associate with risk of reinfection and new operations.

Objectives. We hypothesized that diabetic neuropathy involves in process of wounds healing and decided to estimate risk factors of healing delay and role of diabetic neuropathy.

Methods. We examined 108 diabetic outpatients after foot surgery and partial foot amputations. The mean age was 60.0±1.3 yrs, mean duration of diabetes was 12.9±1.5 yrs. HbA1c level was 9.10±0.47%. All of them had open wound and were treated at the Center and received standardized therapy. We excluded patients with critical limb ischemia (ABPI < 0,5). The participants underwent a neurological examination and set off cardiovascular autonomic functional tests. Cardiac autonomic neuropathy was defined as the presence of two or more abnormal tests. We assessed the time for wound closure. We suggested that wounds healed at 12 weeks would be a good result, at 24 weeks – satisfactory result and more when 24 weeks-failure of healing. Some factors like age, gender, diabetes duration, glucose control, presence of chronic diabetic complications (peripheral sensory-motor neuropathy, autonomic neuropathy, nephropathy), were expected to influence the process of healing. We also believed that local factors (such as size, depth of lesion, infection, localization of the wound) would be greatly involved in process of wound healing.

Results. The mean time of wound healing was 12.7±1.55 weeks. The presence of infection and osteomylitis were detected in 45 cases (44.1%) and 19 (18.1%) cases respectively. The mean size of wound was 17.0±2.82 cm², and mean time of wounds presence before appeal to the Center turned out to be about 130±2.8 weeks. We found CAN as well as sever or moderate sensory-motor neuropathy in all diabetic foot patients. Analyzing variants we found that local parameters were major factors for delay of neuropathic wound healing. Than we managed to distinguish such factors applying classification trees method. The osteomielitis was the most impotence parameter. The second one was diabetic foot infection. Size (more than 10 sm²), location of the wound (forefoot or plantar face) and time before referral to the Center (more than 9 weeks) were also great determinants of delay of wound healing. There weren't associations of age, gender, duration of diabetes, HbA1c% with time of completed healing. Notably severe sensory-motor neuropathy and that much importantly damage of cardiac autonomic function (decrease of the handgrip tests results (8,4±1,05 mmHg and 11,2±1,02 mmHg in patients with delay of wound healing and satisfactory results respectively), Valsalva index (1,26±0,06 and 1,4±0,05 respectively ($p<0,05$)) turned out to be also significant predictors of delay healing.

Conclusions. Prognosis of wound healing in diabetic patients first of all depended on local wound parameters such as depth of damage, infection, size and forefoot localization. Specialized medical care could greatly improve the results of healing. Peripheral sensory-motor and autonomic neuropathy were involved in the process of wound healing along with local factors. The early diagnosis and treatment of these diabetic complications will prevent diabetic foot damage and delay of wound healing.

Poster no. 4. — The effect of individualized educational intervention in people with type 2 diabetes at risk foot ulceration

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Background. The most common foot complications in patients with diabetes (DM) are neuropathy (NP) and peripheral vascular disease (PVD), these are also risk factors for ulceration; the foot ulceration causes costs, disability, and impact on quality of life. It is known that those who have poor hygiene and not caring about your feet have 2.3 times more risk of ulceration. It shows the need for individualized educational programs to prevent foot ulceration.

Objectives. To evaluate the effect of an individualized educational intervention on a) Risk factors knowledge and foot-care, b) Foot self-care practices, c) Glycemic control and d) Degree of risk of foot ulceration of the participants in the experimental group at baseline and 3 months follow-up compared with a control group.

Methods. It was an experimental design; sample size was 76 patients with type 2 diabetes, categorized at risk of

ulceration from 0 to 2 according to the International Working Group on the Diabetic Foot, without physical limitations that would prevent their participation in the study. The patients were randomized into 2 groups: experimental group (36) and control group (40). Data Analysis: Student.

Results. The average age of the sample was 59.6 years (SD=11.2), 72% were women, mean schooling of 5.3 years. Average 9.4 years of diabetes evolution (SD=6.9), 38% had presence of complications, of which 46% had hypertension. 67% were at risk of ulceration. The intervention improve the mean scores of knowledge and self-care practices of feet in the experimental group *vs.* control group (p=.001).There were no significant differences by group in risk ulceration of foot and glycosylated hemoglobin levels.

Conclusions. Individualized education programs are effective to meet goals for the short and medium term (to increase knowledge and achieve behavior change). Follow up is required to verify the long-term effectiveness in clinical indicators and health status, because it could not be assessed statistically significant change in these indicators.

Poster no. 5. — Tempe increases the beta cell Function of the NONcNZO10LtJ diabetic induced mice

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Background. Tempe an Indonesian fermented soy cake had been consumed by the Javanese for 2000 years. The prevalence of T2D was considered lowest in Indonesia, especially in the era before the '80s when fast food restaurants were rare. Reports from East Asian countries, especially Korea, disclosed the possibility of fermented soy food in the prevention of T2D.

Objectives. The mechanism of how soy cake could prevent diabetes was not clear. In this study we tried to explore the potential of tempe in increasing insulin biosynthesis and secretion.

Methods. As many as 30 NONcNZO10LtJ mice were randomly allocated into 3 groups, namely the Control group fed with only 5K20 mice food, the T15% fed with 85% 5K20 added with 15% tempe (w/w), and the T30% fed with 70% 5K20 mixed with 30% tempe. After 18 weeks treatment period, the mice were sacrificed for lab workout, such as RPG with glucometer, plasma insulin concentration with ELISA, expressions of FoxO1, PDX1 and Insulin2 with real time RT PCR.

Results. In the Control group the results disclosed increased RPG, reduced plasma insulin concentration, increased expression of FoxO1, and reduced expressions of PDX1 and mRNA-Insulin2. On the contrary, the T15% and T30% groups, disclosed reduced RPG, increased insulin concentration, reduced FoxO1, increased PDX1 and mRNA-Insulin2 expressions.

Conclusions. Our data clearly showed that tempe could increase both insulin biosynthesis and secretion. Therefore tempe may be used as a functional food to prevent T2D.

Poster no. 6. — Serum adiponectin and resistin levels in different categories of glucose tolerance

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Background. Visceral fat is now recognized as an endocrine organ producing a number of molecules collectively named adipokines. Adiponectin and resistin are two of the major representatives of the adipokines and alterations in their circulating levels have been reported to be implicated in the development of insulin resistance, diabetes and cardiovascular disease.

Objectives. The aim of the present study was to assess sympathetic (SNS) and parasympathetic nervous system (PSNS) activity in patients at different stages of altered glucose metabolism - prediabetes - impaired fasting glucose (IFG) and impaired glucose tolerance (IGT), and newly-diagnosed type 2 diabetes (NDD).

Methods. A total of 83 subjects, of mean age 48.25x16.0 years and mean BMI 31.2±6.2 kg/m2 were involved in a cross-sectional study. The patients were divided in 3 groups according to their glucose tolerance - 38 with normal glucose tolerance (NGT), 31 with prediabetes (IFG and IGT), and 14 with NDD. Glucose tolerance was studied during OGTT, applying 2006 WHO criteria. SNS and PSNS activity was assessed by autonomic nervous system (ANS) monitoring technology ANSAR ANX 3.0 based on spectral analysis of heart-rate variability (HRV) with concurrent spectral analysis of respiratory activity at resting as the independent means of identifying PSNS (vagal) activity in the HRV spectrum - Respiratory Frequency area (RFa) and using the remaining portion of the low frequency region for evaluating SNS activity - Low Frequency area (LFa), and measuring the balance between both ANS branches using the following clinical tests: 1) deep breathing (E/I ratio), 2) Valsalva and 3) standing from a seated position (30:15 ratio) tests.

Results. The two groups with glucose intolerance – prediabetes and NDD, presented a significant decline in both SNS (p=0.02 and p=0.01, respectively) and PSNS (p=0.004 and p=0.01, respectively) activity as compared to the group with NGT. Despite the trend toward lower LFa and RFa values with the progression from prediabetes to NDD, the difference was not statistically significant. The groups with impaired glucose tolerance showed a significant deterioration in the clinical tests. Abnormal E/I ratio was found in 29.03% of subjects with prediabetes, 35.71% of those with NDD and 5.26% of NGT group. Valsalva test was impaired in 45.16% of prediabetes, 28.57% of NDD and 44.73% of NGT group. Abnormal 30:15 ratio was observed in 19.35% of prediabetes group, 42.85% of NDD and 13.15% of NGT group. One abnormal test was demonstrated in 31.57% of NGT group, in 29.03% of prediabetes group, and in 14.28% of NDD group. Al-

teration in two tests was found in 10.52% of NGT group, in 22.58% of prediabetes group, and in 14.28% of NDD group. Abnormalities in all three tests were established in 6.45% of prediabetes group, in 21.42% of NDD group in comparison to 2.63% in the group with NGT.

Conclusions. Our results demonstrate that both SNS and PSNS activities are diminished even at the early stages of altered glucose homeostasis - prediabetes and NDD, and the ANS imbalance accelerates with the worsening of glucose tolerance.

Poster no. 7. — Progression to impaired glucose metabolism in normal glucose tolerant people during 8 years follow up in urban population

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Background. Worldwide the prevalence of type 2 diabetes is increasing at an alarming rate. Early identification of people at risk is very important for prevention purposes.

Objectives. To determine the progression rate to impaired fasting glucose (IFG), impaired glucose tolerance (IGT), and diabetes (DM2) in normal glucose tolerant (NGT) people during 8 years follow up study using WHO 1999 criteria and new criteria of IFG (IFG 5,6 -fasting glucose 5,6-6,9 mmol/l)

Methods. This is an eight year prospective study in a randomly selected urban population aged >=40 years living in Krakow, Poland. 1752 persons had NGT .based on WHO 1999 criteria, 564 (32,2% of invited)of them (209 men and 355 women, aged mean 60,7, SD=9,2) attended the follow-up assessment.. Subjects underwent a physical examination including weight/height, waist circumference, biochemical examination including glucose, insulin in 0', 120' OGTT and questionnaire examination concerning CVD health history and family history of type 2 diabetes.

Results. The prevalence of DM2, IFG and IGT according to WHO 1999 criteria in examined population with baseline NGT was 4.43%, 3.37% and 9.93% respectively. The prevalence of IFG (IFG 5,6) using new criteria, was 13.48%. Lowering cutoff point for IFG caused 10.11% increase in the prevalence of IFG. Among people with diagnosed diabetes, 56% had newly diagnosed diabetes during the control study, in 44% participants diabetes was diagnosed in the period between the baseline and control study. The prevalence of DM2 and IGT/IFG was increasing with increasing age and BMI categories ($p<0,05$). The lowest obesity prevalence both baseline and after follow up was found in those who remained NGT.

Conclusions. In the studied baseline NGT population after 8 years of follow up high progression rate to impaired glucose metabolism was found. The implementation of new IFG diagnostic criteria increased the prevalence of IFG by 10,1%. The prevalence of impaired glucose metabolism was increasing with age and BMI categories, therefore prevention of diabetes initiatives should focus on normal body weight preservation.

Poster no. 8. — Serum adipsin and visfatin levels in patients with type 2 diabetes in the fasting state

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Background. Type 2 diabetes is characterized by insulin resistance and impaired insulin secretion. Considerable evidence implicates altered fat topography and defects in adipocyte metabolism in the pathogenesis of type 2 diabetes

Objectives. In order to elucidate the interrelationship of adipokines in glucose hemiostasis ,we determined the concentration of visfatin and adipsin in blood samples in patients with type 2 diabetes and age-matched controls in the fasting state.

Methods. For that reason ,we enrolled 37 patients with known type 2 diabetes -21 males and 16 females, aged 62,95±15,72 years and 43 controls- 28 males and 15 females, aged 60,79±12,67 years. Blood samples were collected after an overnight fast and routine biochemical parameters such as glucose, cholesterol, HDL, LDL, triglycerides along with Hb1Ac ,insulin and c-peptide were also determined in all samples. Circulating visfatin and adipsin were measured by enzyme-linked immunosorbent assay

Results. According to our results, circulating adipsin was decreased in diabetes compare to normal controls (Adipsin diabetics :74.30 ± 2.057 pg/ml versus normals: 117.1 ± 0.8089 pg/ml,$p<0,0001$) .Moreover adipsin was inversely correlated with fasting glucose levels($r=-0,619$),In diabetics ,positive correlation was detected between fasting glucose levels , triglycerides ($r=0,610$) and total lipids ($r=0,506$).As expected cholesterol levels showed positive correlation with LDL cholesterol ($r=0,887$)and total lipids ($r=0,540$)in the diabetic group. On the other hand , circulating visfatin was increased significantly in diabetics compare to normal controls(Visfatin –diabetics: 4.968 ± 0.3516 ng/ml versus normals : 2.891 ± 0.09405 ng/ml). No other correlation between visphatin and measured metabolic parameter was detected.

Conclusions. The distinct metabolic profile of the adipokines adipsin and visfatin in patients with type 2 diabetes enhance the potential role of the adipose tissue in the modulation of energy balance and glucose hemiostasis.

Poster no. 9. — Barriers for self-care: are the diabetes education programs effective?

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Background. Diverse studies point out the benefit of Diabetes Education Programs (D.E.P.) in improving

metabolic control in patients with diabetes. However the influences of other parameters which allow us understand why these effects are short term and their role on patients´ self-care skills are less known. By the other side, developing a DEP has a lot of human, economic and time costs. Due to that, a prior objective is to explore empirically which kind of programs are truly efficient, and useful to modify patients' coping and management of illness.

Objectives. The aim was to study the barriers for self-care in diabetic type 1 patients. They took part in two different programs of diabetes education. The first one was intensive (3 days) with practical sessions, and the second was standard (with no practice of learned skills and separated theoretical sessions, every two weeks).

Methods. A total of 36 patients participate in study. Group 1 (Intensive Program) was composed by n=29 and Group 2 (Standard Program) was composed by n=7. It was a cuasi-experimental pretest-postest design with 6 month follow-up. Barriers to self-care were assessed with Diabetes Care Profile (Fitzgerald et al, 1996) at the beginning, at the end, and at 6 month after the intervention both in intensive and standard program. Barriers measurement consist on 25 items which assess four areas where barriers could appear: exercise, self-analysis, diet and use of insulin.

Results. The results indicated all group were similar by sex (G1: male (47,4%), female (52,6%)-G2: male (57,9%), female (42,1%), age (G1: Mean=33,98, S.d.=13,25 G2: Mean=37,63, S.d.=14,19; T=-1,10, n.s.) and illness evolution time (years G1: Mean=14,7, S.d.=10,42 G2: Mean=15,53 S.d.=16,45; T=-0,20, n.s.). The Anova results indicated both group improved HbA1c pre-folow up (F=34,75, p=0,00) but only Intensive Program group increased their theoretical knowledge (F=5,31, p=0,023). Despite of this, there were different changes by time (pre-post-follow up) in interaction with type of program (intensive-standard) in some barriers. The significant changes were on the barriers of effort (F=6,71, p=0,002), time (F=5,01, p=0,01), knowledge (F=3,15, p=0,05) and difficulty (F=4,77, p=0,012). For effort it seems that intensive/practice program effects at third day (post-test) were lower but increased at long term much more than standard program when compared (F=4,52, p=0,015).

Conclusions. This study have proved again the main role of Diabetes Education Programs improving biological parameters (HbA1c) and knowledge about illness in patients. This is, indeed, the first step to achieve illness self-care, self-managment, and therapeutical adherence. This study have taken into account other important factors as barriers, self-efficacy, skills for self-care, patients satisfaction, illness adjustment, etc., and their possibilities of being modified by a intensive-practical DEP. Despite not all barriers were changed (some of them were no frequent or were difficult to modified because programs weren't focused specifically on them) results of this preliminary study noted the need to explore and treat self-management related aspects. Finally, the implementation of intensive intervention protocols where patients could practice their learned skills seems useful and should be considered.

Poster no. 10. — The faith healing advocacy: an emerging implication in the complication of type 1 diabetes mellitus in some christians

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Background. There is an emerging plethora of calls for faith healing by some members of the clergy in Zambia. Faith healing is a rigorously deliberated prayer sacrament in which eminent members of the church, pray for the souls (people) afflicted with different kinds of chronically unremitting diseases in order to exorcize the implicated evil spirits or forces of darkness from them. Healing thence is provided to the affected individuals. The faith healing concept categorically implores the prayed-over believers to curtail their prescribed course of orthodox medical treatment for whatever ailment they may have, and that is inclusive of type 1 diabetes mellitus (DM). A retrospective study on reported incidents of cessation of insulin injection by type 1 DM patients following faith healing sessions in some church organizations was carried out from February-June 2012 in Lusaka, Zambia.

Objectives. The study was carried out to determine the extent of concept of faith healing among the Christian DM patients, and its influence on the use of insulin for daily injection.

Methods. The data on the levels of inculcation of the concept of faith healing in type 1 DM patients and incidents of consequences of termination of injection of insulin were obtained from their confidants. The confidants were either close same sex church mates for unmarried DM patients and marriage partners for those that were married. The data on the sequel of insulin injection stoppage were recorded as were documented in the patient clinical details section of the laboratory forms on which formal hospital investigations were written. The consequences of stopping insulin medication for type 1 DM were measured using the general linear model from grade 1 representing the minimum clinical presentation, through grades 2, 3, 4, up to 5 that denoted the severest form of DM condition.

Results. They were 15 incidents involving DM patients (Men, n= 8, of age 6-48 yrs, Women, n=7, aged 11-39 yrs) stopping insulin medication at one stage after faith healing. Their duration of DM ranged from 2-32 years (mean 12.5 years) and that of body mass index (BMI) from 18.5-27.5. The period of church service hood of DM patients in different denominations was from 3-11 years. The 3 (20%) men and 1 (6.7%) woman presented with grade 5, while 1 (6.7%) man and 2 (13.3%) women had grade 4. Two men (13.3%) and 1 (6.7%) woman got grade 3, while 1 (6.7%) man and 1 (6.7%) woman presented with grade 2. One man (6.7%) and 2 (13.3%) women had grade 1.

Conclusions. The concept of faith healing seems to be well concretized in the Christian world but can circumstantially evoke its own medical challenges with varied degree of consequences. Whilst appreciating the potency of spirituality in the healing process of some medical challenges, well established treatment regime such as insulin for type 1 DM must not be negated in any way in order to avert resultant complications.

Poster no. 11. — Periodontal health of children with type1 diabetes mellitus

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Background. The most prevalent periodontal disease (PD) among children is gingivitis, and it is usually becomes more severe in adolescence.If gingivitis was not treated and properly managed it may progress to periodontitis. Patients diagnosed with diabetes mellitus (DM) are considered as a high-risk group with greater susceptibility to severe forms of periodontal destruction that may lead to tooth loss.Several studies have demonstrated that the prevalence, severity, and progression of periodontal disease are significantly increased in patients with diabetes.

Objectives. The aim of this study was to evaluate periodontal health in children diagnosed with type1 diabetes mellitus.

Methods. Periodontal health was clinically examined and compared in 95 children diagnosed with type1 diabetes and 61 healthy control subjects (4-14 year-old). Plaque index, gingival index, clinical attachment loss and bleeding on probing were assessed on the 6 Ramfjord index teeth. Diabetes history was recorded based on information provided by the physician. Diabetes history included: date of diagnosis, diabetes duration, age at diagnosis, and latest glycosylated hemoglobin HbA1c. Data was analyzed using the Statistical Package for Social Science software (SPSS, Chicago, IL), version 18. "Periodontitis" was defined as at least one site with clinical attachment loss >2mm on at least two teeth.

Results. (65%) of the diabetic children had poor compliance to dental care. The children with type1 diabetes mellitus had significantly higher plaque index, gingival index and bleeding on probing than control subjects (P< 0.001). In diabetic group, periodontitis was significantly associated with longer duration of diabetes (OR=2.230; CI: 1.308-3.801; P=0.003), and older age at diagnosis of diabetes (OR=1.838; CI: 1.091-3.096; P=0.022).

Conclusions. Periodontal diseases in young patients with type1 diabetes were more evident than in those without diabetes. Data showed that diabetes duration might play a significant role on the progression of periodontal disease in diabetic children. The results highlight the need for frequent supportive oral and periodontal care for children diagnosed with diabetes mellitus. Acknowledgment: This study was supported by Kuwait University (research grant No. RD 01/09).

Poster Session 1.2
Controversies of glucose control on microvascular complications

Poster no. 12. — Diabetes mellitus in men: a sexual health concern

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Background. Diabetes Mellitus affects many systems of human body and one of them is reproductive system. Sexual health can be affected by treatment and disease itself. Though side effects and complications are treated once they appear but detection of these complications before they occur or at early stage is more important. Sexual health is usually overlooked by health care team in diabetic patients. Diabetes is disastrous to sexual health of male diabetic patients. It can cause erectile dysfunction, testosterone or androgen deficiency, retrograde ejaculation, inflammation of penis (balanitis), lack of libido in male patients.

Objectives. The objective of this study was to analyze the effect of diabetes on sexual health of male diabetic patients.

Methods. Systematic review of 7 articles from 1997-2008 gathered through electronic media device.

Results. Diabetes mellitus can result several sexual dysfunctions in male which includes erectile dysfunction, testosterone or androgen deficiency, retrograde ejaculation, balanitis and lack of libido. Sexual health complications can occur in all types of diabetes mellitus. Sexual health complications are associated with diabetic neuropathy.

Conclusions. Sexual health complications in diabetic patients are common. The awareness of these complications to health care team is vital. It will help healthcare team members to identify these complications in patients. Secondly it will help healthcare team to grab before a complication occurs and suggest treatment and prevention from further worsening. The assessment of male diabetic patients should include thorough sexual health evaluation.

Poster no. 13. — Predictors of glucose disorders in patients with acute coronary syndrome in a cardiac rehabilitation program

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Background. There is a high prevalence of glucose disorders in patients with ischemic heart disease. To identify and treat glucose disorders or risk factors related becomes relevant towards the prognosis in secondary prevention programs.

Objectives. We determined the prevalence of glucose disorders in a group of patients enrolled in a cardiac rehabilitation program (CRP) due to recent acute coronary syndrome (ACS).

Methods. A total of 225 patients with recent ACS (mean age 57.4 years, 86% males) were analyzed. To establish the diagnosis of glucose disorders, we reviewed the results of the blood samples taken during in-hospitalization and 4 to 6 weeks after the acute episode during the CRP.

Results. 27% of the patients had previous diagnosis of diabetes mellitus (DM), 5% were diagnosed during

TABLE.—*Predictors of glucose disorders in patients with acute coronary syndrome in a cardiac rehabilitation program.*

	2 hours OGTT > 200 mg/dl (DM)	2 hours OGTT < 200 mg/dl	p
Mean age (years)	64,4	59,1	0,001
Fasting glucose levels >100 mg/dl	72,7%	64,2%	0,05
HbA1c > 6%	63,6%	44,3%	0,009
BMI > 30	27,3%	21,4%	0,004
Active smoking habit	72,7%	47%	0,05

hospitalization or in the mean follow up of the CRP. The criteria used to establish the diagnosis of DM included at least two fasting glucose levels > 126 mg/dl and/or HbA1c > 6.5%. 81 patients who met A1C criteria of pre-diabetes (5,7%-6,4%) underwent an oral glucose tolerance test (OGTT), resulting in 13.6% of these patients being diagnosed of new onset DM and 22.2% of abnormal glucose tolerance. Predictors of altered OGTT according to a univariate analysis were age, fasting glucose levels >100 mg/dl, HbA1c >6%, Body mass index (BMI) >30 and active smoking habit.

Conclusions. Cardiac rehabilitation programs play a key role in the identification and control of major cardiovascular risk factors. Glucose disorders in patients with ischemic heart disease as determinants of the prognosis should be promptly diagnosed and treated. HbA1c and fasting glucose levels are useful and reliable tools, and can diagnose most of the cases of new onset DM.

Poster no. 14. — Glycated albumin to haemoglobin A1c ratio: could it be a clinical marker for hepatic function in patients with chronic liver diseases?

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Background. Glucose metabolic abnormalities is a frequent complication in patients with chronic liver diseases (CLD) such as hepatitis and liver cirrhosis .In patients with CLD neither HbA1c nor glycated albumin (GA) reflects glycaemic control

Objectives. We investigate the association of HbA1c, GA and GA/HbA1c ratio with hepatic function tests and the possibility of these glycaemic control indices to be a clinical marker of hepatic function

Methods. This study was conducted on 50 hospitalized patients with CLD and 80 type 2 diabetic patients without CLD as a control group. Fluctuation in plasma glucose levels were examined for all patients and mean plasma glucose was calculated. At the same time liver function tests as: Cholinesterase, serum albumin, total bilirubin, direct bilirubin and platelets count were measured. Glycated Albumin was also measured. Estimated HbA1c values were calculated from the mean plasma glucose. The G/HbA1c ratio was obtained by dividing GA over HbA1c

Results. The statistical comparison between patients and control group shows that the correlation of glycated haemoglobin (HbA1c) levels with glycated albumin (GA) levels was found to be higher in patients with CLD than in type 2 diabetic patients without CLD (y=2.6x + 1-6 *versus* y= 2.7x + 8.7). The multivariate analysis showed a significant association of G/H ratio with cholinesterase and direct bilirubin (P: 0.012 and P: 0.025) respectively. The G/H ratio was not associated with the mean plasma glucose

Conclusions. Our result showed that GA/HbA1c ratio reflects the hepatic function independently of plasma glucose levels, so GA/HbA1c ratio can be used to monitor diabetic patients for the development of CLD.
Poster · Controversies of glucose control on microvascular and macrovascular complications

Poster no. 15. — Elevation of early markers of atherogenesis is more pronounced in impaired glucose tolerance than in impaired fasting glucose

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Background. Abnormal post-challenge plasma glucose characterizes the impaired glucose tolerance (IGT),

TABLE.—*Slide1.*

Mean values (SD) of anthropometric measures and biomarkers levels according to categories of glucose metabolism

	Normal (n=336)	IFG (n=441)	IGT (n=221)	p
BMI (kg/m²)	25.5 (3.9)	26.3 (4.0)	28.1 (4.1)	0.000[a]
Abdominal circumference (cm)	83.0 (10.2)	87.2 (11.2)	92.2 (11.5)	0.000[a]
IL-6 (pg/mL)	19.7 (38.4)	18.3 (33.9)	19.7 (47.9)	0.57[b]
TNF-α (pg/mL)	24.7 (107.0)	24.0 (89.5)	31.7 (168.9)	0.736[b]
Fibrinogen (g/L)	1.62 (0.37)	1.63 (0.37)	1.68 (0.34)	0.192[b]
E-selectin (ng/mL)	80.3 (53.4)	88.2 (57.3)	93.5 (65.9)	0.045[b]

[a] using ANOVA or [b] using Kruskal-Wallis

which is more consistently associated with increased cardiovascular mortality than the category of impaired fasting glucose (IFG). Whether early markers of atherogenesis could distinguish these 2 diagnostic categories is not clear.

Objectives. To examine a profile of non-traditional cardiometabolic risk factors involved in the early atherogenic process of individuals stratified by glucose tolerance status.

Methods. 998 individuals aged 35 to 55 years, without diabetes or cardiovascular disease were classified according to glucose tolerance status (normal, IFG and IGT). Anthropometric parameters, inflammatory markers, fibrinogen and E-selectin levels were compared among groups by ANOVA or Kruskal-Wallis.

Results. 33.7% had normal glucose tolerance, 44.2% had IFG and 22.1% had IGT. Mean values (SD) of anthropometric measures and E-selectin increased significantly across categories of glucose metabolism:

Conclusions. The findings of worse metabolic profile were expected in individuals with disturbed glucose metabolism. In addition to higher adiposity, the IGT was also associated with higher E-selectin concentration, a vascular cell adhesion molecule which might be reflecting the atherogenic process earlier than in IFG category. This finding is in agreement with a deleterious role for postprandial glycemia. Predictive role of circulating E-selectin should be tested in prospective studies.

Poster no. 16. — Effect of pentoxyfylline on the development and progression of diabetic nephropathy in streptozotocin-induced diabetic rat model

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Background. Diabetes is a the primary cause of end-stage renal diseases and approximately 44% of patients entering dialysis are diabetics. Early diagnosis and intervention are critical in preventing progression to renal failure. Few drugs are available to manage diabetic nephropathy (DN) as pathogenesis is complex and multifactorial. Pentoxifylline (POF), a xanthine derivative, has been used for the treatment of diabetes-induced peripheral vascular diseases but its potential effect on DN is unclear.

Objectives. The present study was designed to explore the effect of POF on the occurrence and progression of DN in streptozotocin-induced diabetic rats

Methods. After streptozotocin injection and establishment of diabetes, a group of rats were given pentoxifylline 40mg/kg,IP daily. Biochemical and hemodynamic parameters indicating renal function such as fasting blood glucose (FBG) renal blood flow (RBF), glomerular filtration rate (GFR), 24 hours urinary albumin excretion (UAE), urine flow (UF), Na+&K+ excretion and plasma urea and creatinine were monitored in control (non diabetic), non treated diabetic control and pentoxifiyline-treated diabetic groups before, 4 and 8 weeks after administration of drug.

Results. FBG in control group was 94±6, and was increased in diabetic untreated to 220±16 after 4W and 360±20 after 8 w. There was a significant decrease in FBG in POF treated diabetic group compared to diabetic untreated (186±6 after 4W and 280±22 after 8 w; $p<0.05$). Renal parameters recorded are included in the table below.

Conclusions. In pentoxifylline-treated rats, there was a significant improvement of renal parameters when compared to diabetic untreated group. Thus, pentoxifylline has nephroprotective effect in diabetes and might be used in patients to protect and/or slow progression of DN.

Poster no. 17. — Urinary 8-hydroxydeoxyguanosine as a biomarker of microangiopathic complications in Type 2 diabetic patients

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Background. Reactive oxygen species (ROS) produced either endogenously or exogenously can attack lipid, protein and nucleic acid simultaneously in the living cells. Increased oxidative stress induced by hyperglycemia may contribute to the pathogenesis of diabetic complications. Urinary 8-hydroxydeoxyguanosine (8-OHdG) has been reported to serve as a sensitive biomarker of oxidative DNA damage.

Objectives. To evaluate urinary 8-hydroxydeoxyguanosine (8-OHdG) as a marker for diabetic microangiophatic complications and to correlate its levels with the severity of diabetic nephropathy and retinopathy.

Methods. The study included 50 patients with type 2 diabetes mellitus and 30 non-diabetic age and sex

TABLE.—*Effect of pentoxifylline on diabetic nephropathy.*

	UAE	RBF	GFR	UF	Na^+	K^+	urea	creatnine
Control group	3.6±0.1	11.4±0.9	0.9±0.06	5±0.12	135±9.6	4.1±0.21	23.3±1.2	0.78±0.04
Diabetic control (4W)	8.3±0.2*	===	0.5±0.04*	8±0.36*	146±8.4	4.9±0.22*	80±2.5*	2.1±0.13*
Diabetic control (8W)	14.5±1.1*	5.3±0.2*	0.3±0.02*	9±0.26*	149±11.2	7.2±0.17*	145±4.6*	3.7±0.17*
POF treated (4W)	7.9±0.4*	===	0.59±0.03*	7 ±0.34**	143±7.1	4.5±0.13	78±3.1*	2±0.14*
POF treated (8W)	11.5±1.1*	8.8±0.13**	0.63±0.04**	7.8±0.5**	146±7.6*	6.49±0.1*	90±2.8**	2.5±0.08**

(*significant from control, **significant from control and diabetic control)

matched control subjects. Urinary 8-hydorxydeoxyguanosine (8-OHdG), urine creatinine and urinary albumin excretion (UAE) rate were measured in all patients and control subjects. Both 8-OHdG and UAE rate were assayed by immunoassays. Assessment of glycemic control in patients was achieved by measurement of HbA1c. All of the patients underwent direct opthalmoscopy and photography with pupils dilated.

Results. There was a highly significant difference between different groups of type 2 diabetic patients classified according to retinopathy, and controls as regards 8-OHdG (50.4 ± 12.8 vs 19.2 ± 8.4 respectively, F = 5.6 ($p<0.01$), and albumin/creatinine (alb/creat) ratio (257 ± 29.3 vs 16 ± 6.4 respectively) (F = 5.2) ($p<0.01$). Statistical comparison between groups of patients classified according to alb/creat, ratio using ANOVA test revealed a highly significant difference regarding 8-OHdG, (F = 5.2, $p <0.01$) Also there was a significant difference between patients with microalbuminuria as regard 8-OHdG excretion (71.3 ± 11.8 vs 53.0 ± 18.5 respectively) ($p<0.05$). Similarly a significant difference between patients with microalbuminuria regarding 8-OHdG excretion(71.3 ± 11.8 vs 26.1 ± 8.1 respectively) ($p<0.01$). There was also a significant difference regarding 8-OHdG between patients without retinopathy and those with simple retinopathy (30.6 ± 11.5 vs 56.5 ± 12.8 respectively) ($p<0.05$), and a highly significant difference

Conclusions. Measuring Urinary 8-hydroxydeoxyguanosine (8-OHdG) is a novel convenient method for evaluating oxidative DNA damage. Diabetic patients, especially those with advanced nephropathy and retinopathy had significantly higher that such changes may contribute to the development of microvascular complications of diabetes.

Poster no. 18. — The association between diabetes and urinary incontinence in Jordanian women

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Background. Incontinence is a known complication of diabetes in women. Less information is available about the association between diabetes and incontinence in Jordanian women.

Objectives. This study aims at estimating the prevalence and correlates of urinary incontinence in Jordanian women with diabetes

Methods. we conducted a cross-sectional, comparative study with case-control design to collect data on incontinence. Women attending six healthcare centers were recruited in the study from the area of North Jordan. Subjects were dichotomized into case and control based on the presence of diabetes. Data were collected over 18 months in 2011 and 2012. A standardized incontinence questionnaire was used to assess prevalence and risk factors for incontinence with presence of weekly incontinence as the main outcome.

Results. A total of 1011 women were included in the study: 42% were diabetic and 58% were non-diabetic. The total number of women who reported incontinence was 678 (67%) in which 242 (36%) with weekly episode. Weekly any incontinence was significantly more prevalent in women with diabetes (n = 135, 56%) than in women without diabetes (n = 107, 44%), p = 0.001. Similarly, weekly urge incontinence was significantly more frequently reported by women with diabetes (59, 24.4%) than by those without diabetes (35, 20%), p = 0.001. Less difference was noticed between women with diabetes and those without diabetes in prevalence of stress incontinence; 83 VS 86 respectively, p = 0.006. Results of logistic regression indicated that diabetes was the strongest independent determinant of weekly any (odds ratio [OR] = 1.89; 95% CI: 1.36- 2.63) and urge incontinence (OR = 2.128, 95% CI: 1.306-3.467). For stress incontinence number of normal vaginal deliveries (NVDs) (OR = .859; 95% CI: .778-.948) was the strongest determinant followed by diabetes and then by age.

Conclusions. Women with diabetes are at greater risk for incontinence compared to those without diabetes. Special attention should be given to women who are older and have multiple NVDs upon initial screening for incontinence. Results of the current study should prompt healthcare providers to early screen the incontinence problem in women with diabetes and to integrate health promotion strategies for treatment and management of incontinence before its progression.

Poster no. 19. — Cardiac autonomic neuropathy in type 2 diabetes patients with impaired renal function and albuminuria

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Background. Albuminuria (AU) and reduced estimated GFR (eGRF) predict cardiovascular (CV) events in type 2 diabetes (T2DM). Cardiac autonomic neuropathy (CAN) is considered to be significant risk factor for cardiac mortality including sudden death in T2DM patients (pts). Prevalence of AU and reduced GRF as well as that of CAN increases with the increase in diabetes duration (DD).

Objectives. The aim of the study was to assess CAN data - heart rate variability (HRV), QTc interval dispersion (QTcd), silent myocardial ischemia (SMI) and non-dipper phenomena in T2DM pts with AU and reduced GFR.

Methods. We supervised 2 groups (GR) Gr.1 - T2DM pts (n=38, 21m/17f, mean age - 57±7.3 yrs) with AU >=30 mg/24 h and reduced eGFR<60 ml/min/1.73 m2, and Gr.2 without AU and with normal eGFR (n=35, 19m/16f, mean age - 55.8±8.1 yrs). In all pts 24h ambulatory ECG and BP monitoring were performed. Time domain HRV parameters and SMI episodes were assessed on Holter ECG. QTcd was measured on surface ECG. DD, HbA1c, LDL-C and triglicerides (TG) were also assessed.

Results. All Gr.1 pts were hypertensive and had higher 24-h systolic and diastolic blood pressure compared to those without AU and reduced GFR (142.6±9.3 vs 135.9+8.1 mmHg – SBP, p=0.002), 92.1% of Gr.1 pts and 62.9% of Gr.2 pts received antihypertensive drugs. Non-dippers were more often observed in Gr.1 compared to Gr.2 (47.3% vs 22.9%). SMI episodes were more frequently formed in Gr.1, compared to Gr.2 (52.6% vs 22.9%). There were significantly lower HRV parameters:

TABLE.—*Myocardial fibrosis as chronic complication in an experimental model of type 2 diabetes mellitus.*

EDIPS cases identified by FINDRISC[10] and high risk cut-points for fasting plasma glucose (FPG) and glycated Haemoglobin (HbA1c) as specified by NICE, ADA and WHO with risk statistics for intervention and control groups compared

	FINDRISC score cut-points	
	Moderate or greater risk (≥12)	High or greater risk (≥15)
FINDRISC [a] score only		
EDIPS cases n (%)	*519 (69·3)*	*330 (44·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·42(0·20 to 0·15) P <0·001*	*0·30 (0·20 to 0·51) P<0·001*
FPG (mmoll^{-1})		
NICE high risk range (5·5 to 6·9)		
EDIPS cases n (%)	*354 (49·4)*	*224 (31·2)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·48 (0·28 to 0·83) P = 0·008*	*0·39 (0·20 to 0·78) P = 0·008*
ADA high risk range (5·6 to 6·9)		
EDIPS cases n (%)	*328 (45·7)*	*209 (29·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·51 (0·30 to 0·87) P = 0·014*	*0·41 (0·21 to 0·83) P = 0·007*
WHO high risk range (6·1 to 6·9)		
EDIPS cases n (%)	*198 (27·6)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·37 (0·90 to 0·72) P = 0·003*	*0·31 (0·13 to 0·73) P = 0·007*
HbA1c [b] (%)		
NICE and UK-NSC high risk range (6·0 to 6·4)		
EDIPS cases n (%)	*96 (13·7)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·46 (0·19 to 1·10) P = 0·08*	*0·35 (0·12 to 1·00) P = 0·05*
ADA high risk range		
EDIPS cases n (%)	*227 (32·4)*	*158 (22·6)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·43 (0·24 to 0·76) P = 0·004*	*0·28 (0·13 to 0·59) P = 0·001*

[a] n = 717 [b] n = 732

SDNN (0.079 ±0.017 vs 0.098±0.012, p=0.000) and Triangular index (21.3±6.2 vs 32.6±8.3, p=0.000) in Gr.1 QTcd was longer in Gr.1 compared to Gr.2. HbA1c values did not differ between two groups but values of LDL-C and Triglicerides were higher in Gr.1 compared to Gr.2 (3.43±1.2 vs 2.5+0.0.9 mmol/l, p=0.000 and 2.6±0.8 vs 2.1±0.7 mmol/l, p=0.01). Only 52% of Gr.1 pts and 44.54% of Gr.2 pts received lipid-lowering drugs. DD was significantly longer in Gr.1 compared to Gr.2 (16.3±6.7 vs 7.1±2.1 yrs, p=0.000).

Conclusions. Pts with AU and reduced eGFR showed association between DD, levels of BP, LDL-C , TG and CAN. It suggests that CAN plays important role in hypertension development and absence of nocturnal BP decline, which is responsible for development of more severe damage of renal function. T2DM pts, especially with CAN, need good control and treatment of CV risk factors, to reduce damage of the target organs and improve prognosis.

Poster Session 1.3
CVD-risk

Poster no. 20. — Myocardial fibrosis as chronic complication in an experimental model of type 2 diabetes mellitus

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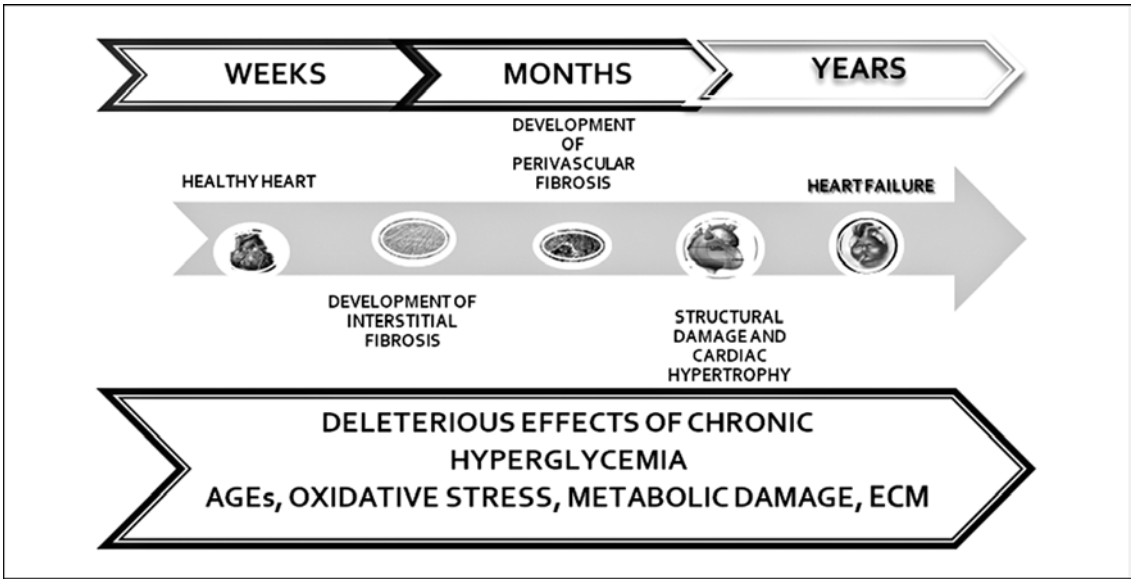

Figure.—Myocardial fibrosis as chronic complication in an experimental model of type 2 diabetes mellitus.

Background. Diabetes Mellitus (DM) induces several cardiovascular complications that represent the principal cause of mortality in diabetic population. Data from experimental, pathological, epidemiological and clinical studies have shown that DM causes structural and functional changes in cardiac tissue. This condition observed in diabetic heart is called diabetic cardiomyopathy and it is described as complex changes in the myocardium characterized by loss of myocytes and myocardial fibrosis in patients with DM, in the absence of hypertension and coronary artery disease. Interstitial fibrosis was key element preceding cardiac fibrosis in diabetic heart contract dysfunction, resulting finally in heart failure. The prevalence of this entity may be greater than 60% in type 2 diabetic patients with good glycemic control. It would be very useful to have an animal model of cardiac fibrosis. However, in spite of the availability of several animal models for type 2 diabetes mellitus including genetic and chemically induced, none of them simulate human type 2 DM and chronic cardiovascular complications.

Objectives. The aim of the study was to assess changes in the myocardium in an animal model of type 2 diabetes mellitus (DM2) in order to resemble cardiac fibrosis useful to describe signaling pathway and pathophysiological mechanisms implicated in diabetic heart fibrosis induction that may be useful for chronic studies.

Methods. Hyperglycemia was induced in male Wistar rats (150-200 g) by 5 daily intraperitoneal injections of low doses of streptozotocin (STZ) (20 mg/kg) in addition to a high fat diet 15 days before STZ and for 25 weeks. Blood glucose measurement and histological studies of pancreatic and cardiac tissues evaluation was done. Animals were sacrificed at different times until 25 week to evaluate the progression of cardiac fibrosis and stable hyperglycemia was maintained. Haematoxylin and eosin staining was used to distinguish functional pancreatic islets. Heart sections were stained for collagen deposition by Masson's trichrome. STATISTICAL ANALYSIS: All data are expressed as mean ± SEM. Stastistical analysis was performed using one-way analysis of variance followed by Dunnett´s t-test. Differences were considered to be statistically significant when $P<0.05$.

Results. Experimental diabetes using low doses of STZ in addition to a high fat diet caused stable hyperglycemia, without gradual recovery of normoglycemia. The use of insulin therapy was not necessary suggesting that doses calculated to cause a partial destruction of β cell mass in addition to a high fat diet was appropriated. Besides, we observed a gradual development of interstitial fibrosis, getting started at week 15 after induction, becoming very obvious at week 25. We found similarities with the human condition in our model, which presented moderate obesity, polydipsia, polyphagia, polyuria, and stable hyperglycemia without a tendency to cause ketosis or deterioration into type 1 diabetes mellitus.

Conclusions. This model was reproducible and could be useful to investigate pathophysiological mechanisms in myocardial fibrosis related to this important chronic macrovascular complication of diabetes and also may pave the way for new therapies in the treatment of DM2.

Poster no. 21. — Environment and family factors in the development of cardiometabolic risk in Mexican schoolchildren

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Background. Childhood obesity is a health problem in Mexico. Prevalence of overweight and obesity (OW/

TABLE.—*Interaction between smoking, diabetes and prediabetes in patients with recent acute coronary syndrome.PNG*

	Smokers	Non-smokers	p
Age	54,2	61,8	<0,0001
Type 2 DM	22,6%	28,9%	NS
HDL mg/dl	35,7	42,7	0,003
HDL<35 mg/dl	55%	43%	0,08
LDL mg/dl	112,1	102,6	0,030
TG>150 mg/dl	40%	28%	0,01
TG/HDL≥3,5	59%	46%	0,03
BMI>30	25%	28%	NS
Mean A1C in DM	7,4%	6,9%	NS
Mean A1C in non-DM	5,6%	5,5%	NS
A1C≥6,5%	14,7% (11% DM new diagnosis)	17,8% (13% DM new diagnosis)	NS
A1C 5,7-6,5%	40,6% (30% with known DM)	32,9% (54% with known DM)	NS

OB) can be as high as 56% in some regions of the country. It is known that children with overweight /obesity present impaired biochemical parameters, which put them at risk for developing cardiometabolic disease at early age. The interactions of home (parenting) and school environmental (for diet and physical activity) variables on cardiometabolic risk factors (CMRF) have not been sufficiently studied.

Objectives. To identify mean differences in CMRF of OW/OB children, and determine the influence of environmental variables on CMRF

Methods. A sample of 228 healthy children, and their mothers consented participate. Body fat percentage (BFP), blood pressure (BP), and acanthosis nigricans (AN) was assessed. The child's capillary blood was used to perform lipids, glucose, C-reactive protein (CRP); also a self-care scale for managing diet and physical activity was answered. Mothers provided information on sociodemographic, family history, parenting style, and home environment. Mothers BFP was assessed.

Results. The average age for children and mothers were 8.5 and 36.8 years. The average schooling of mothers was 12.4 years, with 4.6 members per family. Children had a family history of obesity, high cholesterol, diabetes, and hypertension. More prevalent CMRF in children were OW/OB, coronary heart disease risk, AN, and hyper triglyceride. Mean differences was found in systolic BP, HDL, LDL, triglycerides, glucose, and CRP. Mother schooling correlated with school diet environment (SDE) (p<.005) and school physical activity environment (SPAE) (p<.001). Child´s self care correlate with SDE (p<.005) and SPAE (p<.001). There was an inverse correlation between child´s age and the SPAE (p<.05), and the child´s birth order with SPAE (p<.01). Age and child gender, and mother schooling influenced CMRF [Wilk's Lamda=.65, F=21.71, p<.001].

Conclusions. Mean difference was found for weight status in some CMRF. It was confirmed the influence of environmental variables (school) and family (mothering) in the development of CMRF. The join prevalence of OW/OB was high (70%) when classification was made based on body fat percentage (BFP). BFP was the best predictor of CMRF. It would be convenient assessed when measuring prevalence, but also in the screeninf of CMRF related to environmental variables. .

Poster no. 22. — Interaction between smoking, diabetes and prediabetes in patients with recent acute coronary syndrome

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Background. There is evidence that smoking may increase the incidence of diabetes mellitus (DM), and that diabetic smokers tend to have poorer glycemic control.

Objectives. In order to study the effects of smoking on the carbohydrate metabolism, we compared the metabolic profile of smokers and nonsmokers with recent ACS.

Methods. We analyzed 333 patients (83.7% male) referred to a cardiac rehabilitation program after ACS; 54% were current smokers, 23% former smokers and 23% had never smoked.

Results. Despite a mean age 7-8 years lower in smokers, the prevalence of DM is close to that of nonsmokers. In terms of A1C, prediabetic situations are more frequent in the group of smokers, which generally have a higher prevalence of A1C above the normal range (> 5.7%). Despite the known anorectic effect of smoking, smokers have a similar prevalence of obesity and overweight. The lipid profile of smokers is similar to the profile observed in situations of increased insulin resistance (low HDL, high TG), and the ratio TG / HDL clearly expresses this tendency in smokers.

Conclusions. There is a clear interaction between smoking and abnormal glucose regulation in patients with ischemic heart disease, which results in increased insulin resistance. It is important to consider this interaction in secondary prevention programs, as well as the potential impact of weight gain related to smoking cessation on metabolic profile of these patients.

Poster no. 23. — Metabolic syndrome and cardiovascular risk in the Province of Segovia (Spain)

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Background. There are few population based-studies to report on the prevalence of the Metabolic Syndrome (MS) and its relationship to cardiovascular disease in Spanish population. Various definitions have been proposed by different organizations over the past decade, the most recent by a Joint Interim Statement (JIS).

Objectives. Our aims in this study were to describe the prevalence of MS in a healthy representative population from Segovia Spanish province and to investigate the association of MS with high cardiovascular risk.

Methods. Cross-sectional design. Randomized and representative sample of 818 individuals (46,5 % males) aged 35-74 years. Residents in urban and rural areas of the Province of Segovia (Spain). Period of study from January 2000 to January 2003. Waist circumference, SBP, DBP, fasting glucose, lipid profile of patients were obtained. AHA/NHLBI, IDF and JIS criteria were used to define MS. High cardiovascular risk was estimated as = 20 % with the Framingham function and = 3 % with the SCORE project.

Results. The age/sex standardized prevalence of the MS was: AHA/NHLBI 15.7 % males and 18.1 % females; IDF 24,7 % males and 23,7 % females; JIS 28,4 % males and 26,9 % females. The probability of being classified as a 10-year predicted risk of cardiovascular disease = 20 % by the Framingham risk score was: OR(AHA/NHLBI): 5,7 (2,8-11,6), OR(IDF): 4,1 (2,2-7,8), OR(JIS): 4,5 (2,4-8,5) - stratified by age, sex and BMI -. The probability of being classified as a 10-year predicted risk of cardiovascular mortality = 3 % with the SCORE project was: OR(AHA/NHLBI): 5,1 (2,2-11,9), OR(IDF): 4,4 (2,1-9,6), OR(JIS): 4,7 (2,2-10,1) - stratified by age, sex and BMI -.

Conclusions. Our results show: (1) MS prevalence was lower estimated by AHA/NHLBI criteria compared with IDF and JIS criteria. (2) MS increases the predicted cardiovascular risk and it may be a useful tool for CVD prevention.

Poster no. 24. — Determination of ankle-brachial index in patients with cardio vascular risk factors

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Background. Keywords: ankle-brachial index, chronic obstructive pulmonary disease (COPD), peripheral artery disease, primary care

Objectives. Known prevalence of peripheral arterial disease (PAD) in patients with COPD and its possible relation with the degree of bronchial obstruction.

Methods. 47 patients with COPD spirometric criteria have been classified according to the GOLD classification. Data were collected from CVRF.Se determination made ankle-brachial index (ABI) using portable Doppler probe and sphygmomanometer. Patients were classified into 5 groups: no PAD, PAD mild, moderate, severe and PAD for arterial stiffness.

Results. We divided patients according to Gold level: mild COPD 13 (27.7%), moderate 20 (42.6%), severe 11 (23.4%), very severe 3 (6.4%). Following PAD, had no peripheral arterial disease (PAD) 28 (59.6%), 15 (31.9%) had mild PAD, 1 (2.1%) moderate and 3 (6.4%) severe. PAD as COPD prevalence degree: 30.8% in mild COPD, 40% moderate, 45'45% severe, 66.6% very severe. Cardiovascular risk factors as the degree of COPD in severe or very severe COPD: 34 (72.3%) PAD, 34 (72.3%) overweight, 8 (100%) type 2 DM, 13 (68.4%) hypertension, 11 (84.6%) dyslipidemia, 12 (25.5%) smokers. In mild to moderate COPD: 13 (27.7%) PAD, 13 (27.7%) overweight, 6 (31.6%) and 2 hypertension (15.4%) dyslipidemia. Observed higher prevalence of PAD in type 2 DM, 8 (100%), overweight 18 (51.4%) and severe COPD, 15 (44.1%).

Conclusions. 1-High prevalence and increasing trend of PAD as more the degree of severity of COPD. 2-pad correlated with type 2 diabetes, overweight, obesity and severe COPD. 3-High prevalence of cardiovascular risk factors in severe or very severe COPD, especially type 2 DM.

Poster no. 25. — Lipid profile in patients with diabetes

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Background. Hyperlipidaemias are common in patients with diabetes and further increase the risk of cardiovascular disease. For that reason, detection and control of hyperlipidaemia in this kind of patients can reduce myocardial infarction, coronary deaths and overall mortality

Objectives. The aim of this study is to compare lipid profile in diabetics and non diabetics. In addition, we analyzed the rate of patients with some treatment in relation with hyperlipidaemia and the rate of people who do not know they have no normal lipid values.

Methods. This was an observational and descriptive study of a historical cohort: DRECE-Dieta y Riesgo de Enfermedad Cardiovascular en España (diet and cardiovascular disease in Spain). The DRECE project was designed to identify the prevalence of cardiovascular risk factors in the Spanish population and their relationship

TABLE.—*Lipids.*

	Non diabetics	*Diabetics*	*p-valor*
Total cholesterol (mg/dl)	203,18	222,52	0,000
Triglycerides (mg/dl)	118,33	180,86	0,000
HDL cholesterol (mg/dl)	55,54	50,52	0,000
LDL cholesterol (mg/dl)	125,83	136,94	0,000

with dietetic habits. It included 4,783 subjects who were followed from 1991 to 2011. By that time, the cohort age range was from 5 to 60 years. Vital status and causes of mortality were provided by the Spanish Office for National Statistics through an agreement. In 1991, all subjects comprising the DRECE cohort were subject to a medical examination, a family and personal anamnesis, including a nutritional and physical activity questionnaire, and a laboratory complementary. In order to describe categorical variable, frequency distribution was calculated and in case of lipid profile variables, mean and standard deviation was obtained. For comparison of lipid profile, non parametric Mann Withney test was used. We have analyzed differences in lipid disease meanwhile chi-squared test. All significance tests will be 2-tailed and differences will be considered to be significant at p-value < 0.05 and STATA SE/10 was used for analysis.

Results. The prevalence of diabetes in DRECE was 6.54% (212 individuals). Of them, 53 (25.0 %) did not know their condition of diabetes, although from 159 (75.0 %) individuals with some treatment (diet, insulin or antidiabetic drug), 88 (55.34%) had glucose levels upper to 126 mg/dl. Comparison of lipid profile is analyzed in table 1; Total cholesterol, LDL-cholesterol and triglycerides levels were higher in diabetic individuals, only HDL-cholesterol had lower values in diabetics. All differences were statistically significant. Prevalence of lipid diseases in diabetics was 52.51 % versus 23.49 % in non diabetics, being this difference statistically significant. Moreover, 18.48 % of diabetics with lipid disease were not having treatment.

Conclusions. Lipid diseases are a major complication of diabetes. The increased incidence of cardiovascular disease in diabetics with lipid diseases strongly suggest that preventive lowering of lipid levels, is of great importance. Unfortunately, many questions regarding the management of blood lipid levels in diabetes is still open.

Poster no. 26. — Estimation of IL-2 plasma level in diabetic foot patients with chronic non-healing ulcers at higher risk of coronary artery disease

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Background. Diabetic foot is characterised by a pronounced inflammatory reaction which results in interaction of many pro inflammatory cytokines involving migration of lymphocytes, laying of protein meshwork and endothelial cell proliferation to form the granulation tissue in a fibrin meshwork. Some of these cytokines (IL-2) and acute phase reactants (hsCRP) also activate coronary endothelial cells to predispose for acute coronary event and coronary artery disease.

We have studied some of these variables amongst patients of diabetes having chronic non-healing foot ulcers.

Objectives. To evaluate and study the correlation between the plasma levels of IL-2, hsCRP, and lipid profile in subjects with diabetic foot.

Methods. 90 subjects with type 2 diabetes mellitus and having diabetic foot with non-healing ulcers were recruited for the study.

These were divided into two groups of 45 each, one having hsCRP <3 mg/L (Group B) and other having hsCRP>3 mg/L (Group C). 35 healthy controls (Group A) were also recruited who did not have any clinical or biochemical evidence of diabetes or coronary artery disease.

Plasma glucose, total cholesterol (TC), HDL cholesterol, LDL cholesterol and triglyceride (TG) levels were measured using autoanalyzer (Aeroset System Operations Manual, Abbott Laboratories, Abbott Park, IL).

Concentrations of plasma hsCRP and IL-2 were determined by quantitative sandwich enzyme-linked immune-sorbent assay (ELISA) kit (R&D Systems, USA) as per manufacturer's protocol.

Results. IL-2 concentration was significantly higher in group C as compare to group B and group A ($p<0.001$) whereas HDL value was significantly reduced ($p<0.001$) in the same group. hsCRP, TC, TG and LDL values was also significantly higher in group C as compare to group B & A. There was significant positive correlation was observed in between IL-2, hsCRP and lipid profiles.

Conclusions. Our study demonstrated that diabetic foot patients at higher risk of CAD showed higher IL-2 plasma level and positive correlation with hsCRP and lipid profiles. This observation supports that IL-2 production may potentially enhance the atherogenic process by promoting the recruitment of monocytes and T cells into the arterial intima.

Poster no. 27. — Mortality trends in subjects with and without diabetes during 20 years of follow-up

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Background. Mortality in individuals diagnosed with diabetes normally is due to other reasons related to its own complications (renal diseases, cardiovascular events…). For that reason, it is common to find some limitations when studying mortality in this population. Among the risk factors for mortality in diabetics, it is important to emphasis age at beginning of the diagnoses, gender, smoker use, hypertension, hyperlipidemia or sedentary lifestyle. Diabetes, in Spain, is the third cause of death in women and the seventh in men according to the SESPAS report.

TABLE.—*Mortality.*

Global Mortality	Crude RR	p-value	Adjusted RR	p-value
gender	1.69(0.94;3.02)	0.078	1.70(0.90;3.21)	0.103
hyperlipemia	0.97(0.56;1.69)	0.920	0.86(0.49;1.52)	0.609
hypertension	1.23(0.67;1.94)	0.501	1.31(0.70;2.47)	0.399
Smoke use	1.10(0.63;1.94)	0.730	0.93(0.50;1.74)	0.821

Objectives. THe main objective of this work is to describe mortality and its causes in diabetic population in the DRECE-cohort in a 20 years follow-up

Methods. This was an observational and descriptive study of a historical cohort: DRECE-Dieta y Riesgo de Enfermedad Cardiovascular en España (diet and cardiovascular disease in Spain). The DRECE project was designed to identify the prevalence of cardiovascular risk factors in the Spanish population and their relationship with dietetic habits. It included 4,783 subjects who were followed from 1991 to 2011. By that time, the cohort age range was from 5 to 60 years. Vital status and causes of mortality were provided by the Spanish Office for National Statistics through an agreement. In 1991, all subjects comprising the DRECE cohort were subject to a medical examination, a family and personal anamnesis, including a nutritional and physical activity questionnaire, and a laboratory complementary. To describe dichotomies variables such as mortality, frequency distribution was calculated. Multivariate analysis was performed using binary logistic regression with forward conditional method. Dependent variable was mortality in diabetic population and independent variables were gender, smoker use, hypertension, hyperlipidemia or sedentary lifestyle. Calibration of the model was performed using the Hosmer-Lemeshow statistic. The discriminatory power was assessed using the area under the ROC curve (receiver-operator characteristics) obtained by analyzing the probability of the value predicted by the multivariate model.

Results. The prevalence of diabetes in DRECE was 6.54% (212 individuals), 97 of them (45.75 %) were women and 115 (54.25 %) were men. From 1991 to 2010, there were 42 diabetics who died. Cause of death distribution into diabetic population from DRECE was: 13 due to cancer (6.13 %), 15 due to vascular disease whom 14 were for cardiovascular disease (6.6 %) and finally, 14 (6.6%) were grouped into other causes. Smoking prevalence in diabetic population was 33.5 %. Related to mortality into diabetics for last 20 years, 21.43 % individuals were smoker use versus 19.42 %.

Conclusions. Mortality for cardiovascular disease is the most frequent cause of death in diabetic population in DRECE cohort.

Poster no. 28. — Blood pressure in patients with diabetes

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Background. Increased blood pressure (BP) is a major risk factor for cardiovascular disease particular in diabetic subjects. For that reason, detection and control of hypertension in this kind of patients can reduce myocardial infarction, coronary deaths and overall mortality.

Objectives. The aim of this study is to compare blood pressure in diabetics and non diabetics. In addition, we analyzed the rate of patients with some treatment in relation with hypertension and the rate of people who do not know they have no normal BP values.

Methods. This was an observational and descriptive study of a historical cohort: DRECE-Dieta y Riesgo de Enfermedad Cardiovascular en España (diet and cardiovascular disease in Spain). The DRECE project was designed to identify the prevalence of cardiovascular risk factors in the Spanish population and their relationship with dietetic habits. It included 4,783 subjects who were followed from 1991 to 2011. By that time, the cohort age range was from 5 to 60 years. Vital status and causes of mortality were provided by the Spanish Office for National Statistics through an agreement. In 1991, all subjects comprising the DRECE cohort were subject to a medical examination, a family and personal anamnesis, including a nutritional and physical activity questionnaire, and a laboratory complementary. In order to describe categorical variable, frequency distribution was calculated and in case of systolic and diastolic blood pressure variables, mean and standard deviation was obtained. For comparison of lipid profile, non parametric Mann Withney test was used. We have analyzed differences in hypertension diagnosis meanwhile chi-squared test. All significance tests will be 2-tailed and differences will be considered to be significant at p-value < 0.05 and STATA SE/10 was used for analysis.

TABLE.—*Blood pressure.*

	Non diabetics	Diabetics	p-valor
systolic blood pressure	119,27	133,38	0,000
diastolic blood pressure	75,56	81,91	0,000

Results. The prevalence of diabetes in DRECE was 6.54% (212 individuals), 97 of them (45.75 %) were women and 115 (54.25 %) were men. Comparison of blood pressure and hypertension diagnosis is analyzed in table 1. Both, systolic and diastolic blood pressure values were higher in diabetics group. All differences were statistically significant. Moreover, Prevalence of hypertension in diabetics was 24.53 % versus 8.46 % in non diabetics, being this difference statistically significant (p-value < 0.001). In addition, 47.05 % of diabetics with hypertension were not having any treatment, nevertheless 80.85 % of individuals with treatment have systolic and diastolic blood values upper to 140/90.

Conclusions. Differences in prevalence of hypertension between diabetics and non diabetic subjects are very disturbing and specially the rate of untreated diabetic patients. Therefore, health policies should focus their efforts on controlling blood pressure in diabetics, since otherwise, incidence of cardiovascular disease and similarly associated medical burn is enormous.

Poster no. 29. — Glucose abnormalities predict erectile dysfunction in coronary patients

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Background. Erectile dysfunction shares common risk factors with ischemic heart disease and may become symptomatic years before the cardiac episode.

Objectives. We analyzed the prevalence and predictors of erectile dysfunction in a cohort of males included in a cardiac rehabilitation program after an acute coronary syndrome.

Methods. 140 patients (mean age 54,3 years) with the diagnose of acute coronary syndrome in the previous month (65,7% with S-T segment elevation) were included. The global distribution of the risk factors was: arterial hypertension 42,9%, lipid disorders 59,3%, diabetes mellitus 24,3%, active smoking 68,6%, previous smoking habit 24,3%, sedentary lifestyle 71,4% and obesity 30,7%. In order to evaluate the presence of erectile dysfunction, patients were asked to fulfill the SHIM questionnaire (Sexual Health Inventory for Men). Patients were treated according to the guidelines: 96,8% received beta-blockers, 74,5% ACE-inhibitors or ARA-II, 100% antiplatelet therapy, 17,1% aldosterone antagonists, 8,1% diuretics and 100% statins.

Results. 51,4% had some degree of erectile dysfunction (SHIM <21), from these 26,4% were defined as severe (SHIM<21). 52% of the patients had symptoms of erectile dysfunction previous to the cardiac episode. There was no statistical significance between those with erectile dysfunction and those without it when comparing left ventricular ejection fraction or number of vessels. In a univariate analysis predictors of erectile dysfunction were age, arterial hypertension, sedentary lifestyle, functional capacity and fasting glucose levels. Although smoking was not a predictor of erectile dysfunction, history of smoking habit was longer in patients with erectile dysfunction. In a multivariate analysis just age and fasting glucose levels predicted the development of erectile dysfunction.

Conclusions. Erectile dysfunction is a common disease in patients with ischemic heart disease. Besides of age, there are common modifiable risk factors such as glucose disorders. Diagnosis and treatment of erectile dysfunction should always include secondary prevention programs.

Poster no. 30. — Epicardial fat and metabolic disorders in patients with acute coronary syndrome

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Background. Recent investigations have shown that epicardial fat may play a decisive role at the beginning of the atherogenesis of coronary epicardial vessels.

Objectives. We search the relationship between several metabolic factors and the thickness of this fat in patients who showed acute coronary syndrome (ACS).

Methods. We included in our study 59 consecutive patients accepted in our Coronary Unit due to ACS. An echocardiography was performed blindly, not knowing the result of to the coronary angiography. We measured in millimeters the epicardial fat thickness in parasternal long-axis (epiPL). We analyzed the relationship between anthropometric and biochemical parameters (lipidic profile, insulinemia, C-peptide) and epiPL.

Results. Thirty-two patients had ST-segment elevation ACS and 27 non-ST-segment elevation ACS. Mean age was 60±10 years, 14 were female (25%). Twenty three (39%) patients were diabetics, 25 (42%) smokers, and 33 (56%) had hypertension. Body Mass Index (BMI) was 29.2±4.6 kg/m2. The thickness of epiPL was higher in diabetic patients (p=0.38). We found a significant correlation between epiPL and very-low-density lipoprotein (VLDL) (r=0.41, p<0.01), triglycerides (TG) (r=0.40, p<0.01), high-density lipoprotein (HDL) (r=-0.38, p<0.01), and BMI (r=0.32, p=0.01). No significant correlation was found between epiPL, total cholesterol (r=0.21, p=0.11), low-density lipoprotein (LDL) (r=0.15, p=0.26) and glycosylated haemoglobin A1c (r=0.03, P=0.83). A multivariate linear regression model was made with HDL, VLDL, TG, diabetes, hypertension, C-peptide, and BMI. An important correlation was found between epiPL and HDL (p=0.03, [0.78-0.98]).

Conclusions. The thickness of epicardial fat is higher in diabetic patients and it is significantly related to BMI, TG, VLDL and inversely related to HDL. This fact suggests a link between epicardial fat, metabolic syndrome and coronary artery disease.

Poster Session 1.4
Cost of diabetes prevention. Socieconomic and cultural differences

Poster no. 31. — Dry blood on filter paper in the determination of glucose: a new methodology in population screening studies

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Background. With the increasing prevalence of diabetes, there is an urgent need to develop new methods for identifying populations in risk. The detection of glucose in plasma is a method with practical limitations for population studies. It requires an entire collection equipment, storage and transport of samples and laboratory apparatus and an effective quality control analysis. The filter paper (FP) has been used for analysis of human blood for over 40 years. It is a simple, inexpensive and it requires only a small volume of blood, obtained through a small incision in the skin with a lancet, finger prick, which is less invasive and does not require centrifugation procedures. Population studies require a method of applying simple, cheap and effective. The technology to measure glucose in the FP may facilitate epidemiological studies of screening, detection of individuals susceptible to diabetes and rationalization of financial resources.

Objectives. Comparing the degree of correlation between glucose titration in plasma (Gold Standard) and glucose titration in blood samples collected on FP.

Methods. 315 blood samples were collected for measurement of glucose from patients aged 18-49 years old, who were attended at the Laboratório da Maternidade Escola da Universidade Federal do Rio de Janeiro (ME) from 10th May to 25th August, 2011. After 12 hours of fasting, were collected 3 ml of blood in a Vacutainer tube containing sodium fluoride from each patient, and the content of glucose was measured using the unit A15 (Biosystem) and the enzyme glucose oxidase method. Blood samples were collected simultaneously in FP, which were dried at room temperature and analyzed for glucose levels in the Laboratório Biomarc do Instituto Vital Brasil, Rio de Janeiro. To analyze the concordance, we used complementary strategies to explore different statistical characteristics and report possible equivalence between the two methods. The paired t Student was used to compare the average glucose values obtained by both methods and the method of Bland and Altman to assess graphic concordance.

Results. the average values of glucose were 88.19mg/dL ± 12.05 DP for plasma samples and 89.43 mg /dL ± 11.52 DP for measurements made on filter paper. Paired t-test showed that the average of the two methods did not show a statistically significant difference (p-value = 0.062). The Altman and Bland plot (Figure 1) confirmed the presence of fixed bias, but no evidence of proportional bias. The upper and lower concordance of 95% was estimated at -24.55 y 22.09, respectively.

Conclusions. Both type of sample, plasma an on FP, showed concordance on the parameter in study. Then blood samples collected on FP may be an excellent option for population screening studies in remote or poverty areas, where technological and analytical conditions are not appropriated.

Poster no. 32. — The association between metabolic risk and socio-economic status in Portuguese children

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Background. Increasing incidence of type 2 diabetes and metabolic abnormality is a worldwide public health concern. Socioeconomic status (SES) has been highlighted as important in the development of type 2 diabetes and metabolic syndrome in adults and children. The degree to which SES influences metabolic risk is unclear and data are equivocal with some studies suggesting an inverse relationship between metabolic abnormality and deprivation, other suggesting the opposite and others identifying no association (Shrewsbury and Wardle, 2008). It is likely that any relationship between SES and metabolic risk is dynamic and will vary across countries. Little data are available on this topic from Portugal (Santos *et al*., 2009). As metabolic abnormality begins in childhood there is need to understand how factors such as SES impact on these disease processes so preventive interventions can be targeted.

Objectives. To examine any SES differences in metabolic risk in Portuguese children.

Methods. A cross-sectional school-based study was conducted on 359 Portuguese children (202 girls and 157 boys) aged 10 to 17 years (Mean age ± SD = 13.9 ±1.98years) in 2011. Height and body mass were assessed to determine body mass index (BMI). Socioeconomic status (SES) was determined by proxy using parental education level. Capillary blood sampling was used to determine: Total Cholesterol, Triglycerides, High and Low Density Lipoprotein. These were combined with measures of systolic blood pressure and cardiorespiratory fitness as z-scores. A metabolic risk score (MRS) was constructed by summing the z-scores.

Results. Analysis of covariance, controlling for BMI, indicated that MRS was significantly different across SES groups (P = .01) with MRS score being significantly lower in low (P = .03) and middle (P = .008) SES groups compared to high SES. Moreover, the covariate, BMI was also significant (P = .0001, β = .003) evidencing a significant positive association between BMI and MRS with higher BMI associated with greater metabolic risk.

Conclusions. This is the first study, to date to examine the impact of SES on metabolic risk in Portuguese children. In this study, significantly greater metabolic risk was found for children of high SES after controlling for weight status. Such SES differences are largely attributable to lifestyle factors such as consumption of more energy dense diets, food quantity and higher BMI leading to increased metabolic abnormality in high SES children.

Poster no. 33. — Differences in German and Finnish diabetes prevention and self-care management - Do the incentives steer in the right direction?

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Background. This study was done as part of the international Emotionaal Village project. The partner countries Finland and Germany have different kinds of health care systems. The financing of the health care system in Finland is tax based and in Germany the publicly financed scheme is operated by statutory health insurance funds. Prevention is said to be an important part of public health care in the Finland with its health care centers. In Germany the freedom of choice and the family doctor have been the key points of the system, lately the role of Disease Management Programs has been increasing. Due to these differences, it is reasonable to ask how these differences manifest themselves in practice and what kinds of incentives and power they have.

Objectives. The aim of this study was to expose the differences in cost distribution in German's and Finland's health care systems and its impact on incentives, especially in the prevention and self-care management of type 2 diabetes mellitus (T2DM).

Methods. We used literature, interviews and calculations to explore health care systems and their cost distribution especially in prevention and treatment pathways in T2DM in Finland and in Germany.

Results. In Finland the investments and savings in

health care prevention fall mainly onto same actor, the municipality. According to our calculations, diabetes prevention and intensive support for the self-care management could bring good value for money for municipalities. For example the annual savings for health care in Pieksämäki would be about 450 000 €, if the number of people with diabetes complications were 25 % smaller. The role of public health nurses in the Finnish health care system and diabetes prevention is notable. In Germany the sickness funds try to motivate clients to behave in a healthier way via the Bonus-system. The bonuses may be provided for example in cash (30 €), in reductions of insurance contributions (80-200€) or in kind (cycle helmets) for the members of the program who have earned all 500 points. The Disease Management Programs are more generalized but at the same time the support for the self-care management is decreasing. For example financial support for the self-monitoring of blood glucose has reduced (T2DM without insulin treatment).The justification for this is that there are inconsistencies in studies about benefits of the self-monitoring of blood glucose.

Conclusions. In Finland the municipalities should have a strong incentive to invest in prevention and self-care because the majority of the costs accumulate on the municipalities' own resources. In Germany the sickness funds are the actors who pay the costs and get benefits. The sickness funds have only a few possibilities to motivate family doctors to work in the way they would wish. Their tool to have an impact on the costs is the Bonus-system, where they try to motivate clients via financial incentives. In Finland this part of the system should be easier because most of the health care staff is working for municipalities.

Poster no. 34. — Dry blood on filter paper in the determination of glucose and its utilization in population screening studies

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Background. With the increasing prevalence of diabetes, there is an urgent need to develop new methods for identifying populations in risk. The detection of glucose in plasma is a method with practical limitations for population studies. It requires an entire collection equipment, storage and transport of samples and laboratory apparatus and an effective quality control analysis. The filter paper (FP) has been used for analysis of human blood for over 40 years. It is a simple, inexpensive and it requires only a small volume of blood, obtained through a small incision in the skin with a lancet, finger prick, which is less invasive and does not require centrifugation procedures. Population studies require a method of applying simple, cheap and effective. The technology to measure glucose in the FP may facilitate epidemiological studies of screening, detection of individuals susceptible to diabetes and rationalization of financial resources.

Objectives. The aims of this work was to incorporate of blood samples collection on filter paper to determinate glucose in blood, and allowing, with the advantages of this pre-analytical stage to carry out the population screening and its automation in the analytical stage, making easy the process for population screening for diabetes prevention.

Methods. Sample of blood was collected and preserved in filter paper, and submitted to a process of elution with alcohol-acetone originating an eluate that contains the structure of the glucose. The eluate was added into a micro plate hole (cell culture type) and the present glucose in the sample was determined with an enzymatic reaction, developing a colored final complex that presents its maximum of absorption to 492mm. The values of optical density were reader in an ELISA spectrophotometer and the concentration of glucose was calculated with the cotangent obtained using standards of known concentration. The technological procedure has been validated statistically by means of studies of precision, accuracy, specificity, sensibility, linearity and stability.

Results. The precision study did not show any significant difference for $p<0,001$ between the procedure of repetitively between samples of plasma and filter paper. The rejection of Ho in the study of specificity following the process of Fisher and Student accepts a similar specificity with the classic glucose in plasma technology. The test of recovery did not give values over 105%. The result of sensibility for the detection of glucose showed quality up to 25mg% with CV=3,9%. The result of the study of linearity for four dilutions with the initial value of glucose (150,00mg %) sample showed a recovery percentage minor that 105% and, the correlation between the expected and observed value was $R=0,999$ ($p<0,001$). The stability of the glucose in filter paper came to 56 days at 4-8ºC.

Conclusions. The results presented in this work demonstrate the possibility, with a high reliability of using this technology, of determine glucose levels on dry blood collected in paper of filter, contributing to screening, with this automated procedure, of populations in risk of suffering Diabetes, especially in pediatric age.

Poster no. 35. — Dry blood on filter paper in the determination of glucose, cholesterol and triglycerides and its utilization in population screening studies

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Background. Accordin to WHO, 35 million deaths worldwide are caused by non-communicable diseases. These include heart disease, stroke, diabetes, cancer and chronic respiratory diseases, the majority of which are in low and middle income countries. Of these estimated 35 million deaths, around 40% are premature deaths from preventable heart attacks, strokes, diabetes and asthma. It requires an entire collection equipment, storage and transport of samples and laboratory apparatus and an effective quality control analysis. The filter paper (FP) has been used for analysis of human blood for over 40 years. It is a simple, inexpensive and it requires only a small volume of blood, obtained through a small

incision in the skin with a lancet, finger prick, which is less invasive and does not require centrifugation procedures. Population studies require a method of applying simple, cheap and effective. The technology to measure glucose in the FP may facilitate epidemiological studies of screening, detection of individuals susceptible to diabetes and rationalization of financial resources.

Objectives. The aim of this work was to incorporate of dry blood samples collection on filter paper to determinate several biochemical markers (Glucose, Cholesterol and Triglycerides in supposedly healthy population.

Methods. There were studied 724 samples of adult persons of both sexes during the campaign done in Kidney World Day. All blood samples had been collected via finger prick and placed on filter paper (PF 2992), being dried and stored to 4-12ºC. The technical procedure was based in the capture of the markers (Glucose, Cholesterol and Triglycerides) in the specific eluate and, placed afterwards in the micro plate of 96 holes for its enzymatic determination calculated against the standard value and the calculation of his cotangent with automated support for screening population study.

Results. The tests used for Glucose, Cholesterol and Triglycerides in healthy adult persons of both sexes, with ages between 16-76 years old, showed the following (man / woman): Glucose: 91 ± 10,4mg% / 82 ± 24,2mg%, Cholesterol: 186 ±19,2 mg% / 128 ±17,2 mg%, Triglycerides : 112 ± 19,2 mg% / 112 ± 28,2 mg%. The limit values considered

Conclusions. We found in the female samples cases superior to the limit of glucose, cholesterol and triglycerides in 11 (3%), 17 (4,3%) and 14 (2,8%), respectively and, in the group of men: 14 (7,8%), 12 (6,8%) and 1 (0,56%). Being outlined as conclusion that the value recounted in supposedly healthy persons, we have similar values to the presented for other authors using conventional technologies for Glucose, Cholesterol and Triglycerides, showing, the usefulness and reliability of the filter paper and the proposed technologies, for the studies of screening population.

Poster no. 36. — The relationship of the presence of cardiovascular complications with cost components and work productivity in Turkish type 2 diabetes mellitus patients

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Background. An update of health economics analysis of type 2 diabetes mellitus (T2DM) in the adult population in Turkey was performed.

Objectives. The primary objective of the analysis was to determine the direct cost components caused by T2DM and its complications. The relationship of cardiovascular complications with cost components and work productivity is reported in this presentation.

Methods. Forty centres were selected from the list of centres in which adult T2DM patients were followed on a routine basis. These centres were representative of the country, since they were selected by two-stage cluster sampling. Medical files were reviewed for two to five years prior to the study. Collected data included healthcare utilization items (medical and surgical treatments, laboratory tests, inpatient/outpatient visits, consultations and patient education). Item prices were obtained from Ministry of Health and Social Security Organization of Turkey. Costs are calculated simply as the total of all frequency-price products. Additionally, data on work productivity was collected via "Work Productivity and Activity Impairment Questionnaire: General Health V2.0 (WPAI:GH)" (1€ = 2.3210 Turkish Liras; Feb 2012).

Results. A total of 942 patients' data were included in the analysis. Mean age was 57.7±11.4 years; 57.6% were female, median DM duration was 8 years.

During the previous five years, 11.6% of the patients had at least one visit or hospital stay related to cardiovascular complications. Patients with cardiovascular complications (CVC group) were similar to patients without cardiovascular complications (non-CVC group) with regards to gender (male 49.1% *vs.* 41.6%), but CVC group was older (63.2±9.9 *vs.* 57.0±11.4 years; p<0.001) and had DM for a longer period than the non-CVC group (12.7±8.3 *vs.* 8.8±6.6 years; p<0.001). The proportion of patients who were working currently was lower in CVC group (4.1% *vs.* 15.7%; p=0.002). More patients in CVC group needed assistance by a person (professional or relative) for health problems (27.6% *vs.* 17.0%; p=0.013). Patients in CVC group reported more impairment of daily activities other than work (37.7±32.3 *vs.* 30.2±28.5%; p=0.035). Total annual cost was 726.52 € *vs.* 375.76 €, in CVC and non-CVC groups, respectively. Total cost directly related to DM was 305.44 € *vs.* 224.11 €, and total cost related to diabetic complications was 421.08 € *vs.* 151.65 €, in CVC and non-CVC groups, respectively. When cost components were evaluated as the sources of cost, cost related to treatment was 497.56 € *vs.* 276.69 €, in CVC and non-CVC groups, respectively. Cost related to laboratory tests was 124.13 € *vs.* 61.99 € and cost related to healthcare services was 104.83 € *vs.* 37.08 €, respectively.

Conclusions. All components of cost increased by 80% to 180% with the presence of cardiovascular complications. Furthermore, patients with CVC had more social impairment with regards to having work, need for assistance of another person and impairment in daily activities. These socio-economic consequences of cardiovascular complications should and might be avoided by the prevention of cardiovascular complications with appropriate management of DM patients.

Poster no. 37. — The role of subject's clinical characteristics and family's socio – economic status on glycemic control in children and adolescents with type 1 diabetes

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TABLE..—*The role of subject's clinical characteristics and family's socio economic status on glycemic control in children and adolescents with type 1 diabetes.*

Dependent variable: Glycemic Control (>=7.5 vs <7.5)		95% Confidence Intervals		
model 1	OddsRatio	LL	UL	p
Self administration of Insulin (yes)	0.5	0.32	0.78	0.003
BMI (kg/cm2)	1.06	1.01	1.12	0.029
Daily basal insulin dose (U/kg/day)	5.4	1.61	18.54	0.007
Diabetes duration (years)	1.12	1.06	1.18	<0.001
SES score	0.99	0.97	0.99	0.029
model 2				
Self administration of Insulin (yes)	0.48	0.31	0.76	0.002
BMI (kg/cm2)	1.06	1.01	1.12	0.024
Daily basal insulin dose (U/kg/day)	5.39	1.61	18.45	0.007
Diabetes duration (years)	1.12	1.06	1.19	<0.001
Mothers' school years (years)	0.95	0.91	0.99	0.027

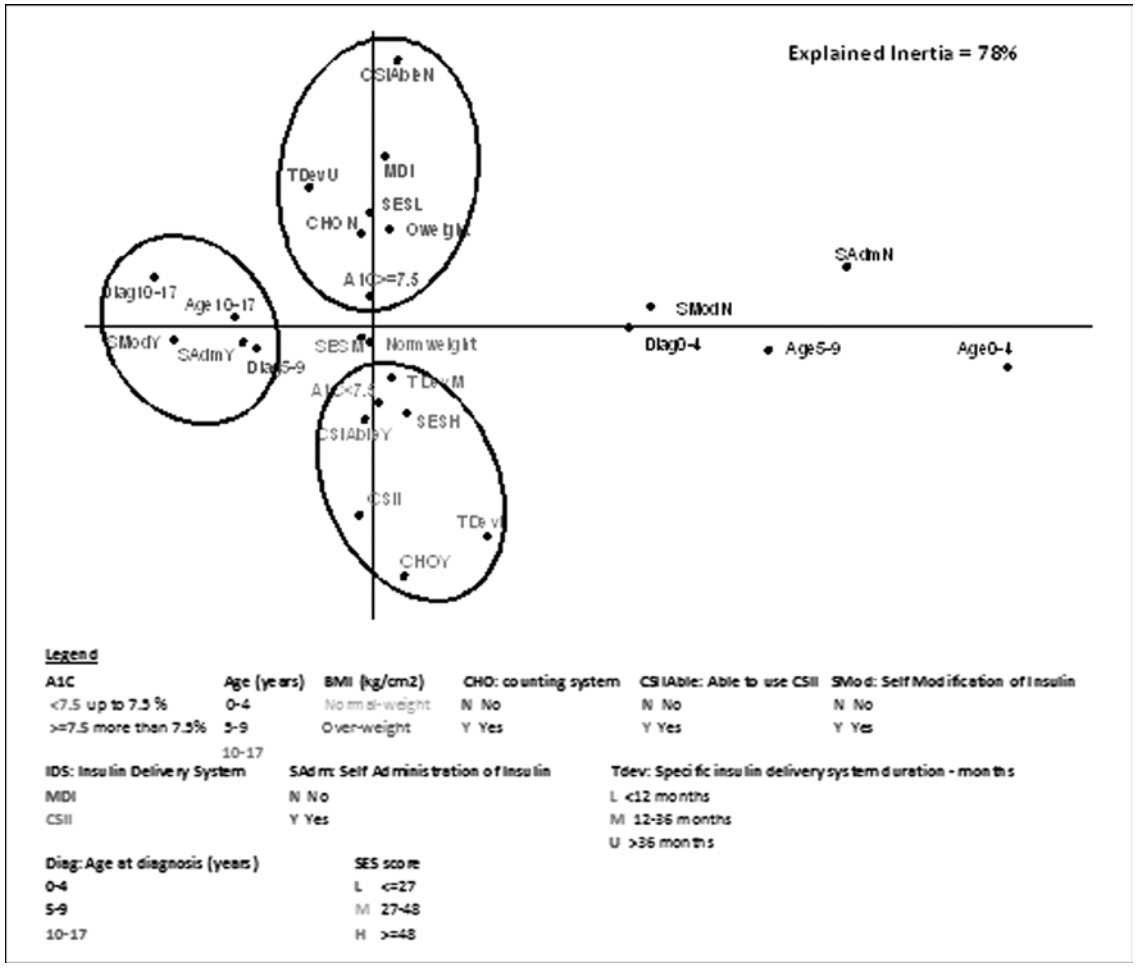

Figure.—The role of subject's clinical characteristics and family's socio economic status on glycemic control in children and adolescents with type 1 diabetes.

Background. A good Glycemic Control (GC) is crucial in the management of type 1 diabetes; however, it is not easy to achieve and maintain optimal levels. Clinical features of the subjects and also socio - economic status of their family may play a role in affecting GC.

Objectives. The aim of the study was to investigate the role of subject's clinical characteristics, family's socio – economic status on GC in children and adolescents with type 1 diabetes mellitus.

Methods. All data were obtained from VIPKIDS (eValuation of Insulin Pump treatment in KIDS), a cross-sectional, multi-center Italian study based on 752 subjects, aimed to evaluate the quality of life in subjects under 18 years of age with type 1 diabetes, treated with MDI (Multiple Daily Injection) or CSII (Continuous subcutaneous Insulin Infusion). Multiple Correspondence Analysis (MCA) was performed to describe the association between variables considered altogether. Family socio – economic status was evaluated in two ways: first, using Hollingshed two-factors index (SES), a synthetic score based on a combination of parents' education and occupation; second, using mothers' and fathers' years of education. Two multiple logistic regression analysis were carried out to evaluate the effect of family characteristics on GC. HbA1c was classified as optimal (for values < 7.5%) and poor (for values >=7.5%) and used as dependent variable. In the first model SES was included as independent variable; in the second model, socio-economic status was expressed by mothers' and fathers' years of education. Clinical features were included in the two models as covariates. The final model included only the significant variables. All estimates were evaluated as 95% confidence intervals.

Results. MCA identified three main clusters of subjects: a) those with poor GC, low level of family's socio - economic status; these subjects didn't use CHO counting system, were over-weight, were using MDI and the current delivery system from a longer period of time and were not able to use CSII; b) subjects with optimal GC, high level of family's socio – economic status, who more frequently used CSII, CHO counting system and were using the current delivery system from a short/medium period; c) elder subjects, characterized by higher level of autonomy in diabetes management, who were able of self-modifying insulin dose and self-administrating insulin (Fig 1). Table 1 shows the results of the two logistic regression analysis; socio-economic status had a significant effect on GC; in particular, mother's years of education played a significant role on GC (model 2).

Conclusions. Assessing subject's socio – economic and clinical features may be crucial in optimizing the GC, and thereby, to a better disease management and to develop more effective treatment strategies, particularly for adolescents. Moreover, this study shows the importance of mother's socioeconomic characteristics on patients' GC. It may be important for members of healthcare team to know the socio-demographic features of patients' family, because these aspects may be useful to develop educational programs.

Poster no. 38. — Secular and socioeconomic trends in the ten-year incidence of type 2 diabetes in Finland

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Background. Type 2 diabetes (T2DM) has increased worldwide during the past decades and at the same time a social gradient in T2DM prevalence and diabetes-related mortality has become an issue of concern in Finland and in other countries. Several factors may explain the rising prevalence of type 2 diabetes including changes to diagnostic criteria over time, greater awareness leading to more testing and detection of existing, undiagnosed cases, increased longevity of people with diabetes, and a true increase in new cases. Whether the rising prevalence is due to an increase in new cases and whether socioeconomic differences exist can be established by examining secular trends in T2DM incidence by SES across decades.

Objectives. The aim of this study was to investigate secular and socioeconomic trends in the incidence of diabetes in Finland.

Methods. Cross-sectional FINRISK surveys have been conducted five-yearly since 1972, using nationally representative independent random samples, stratified by ten-year age bands. In this study, cohorts were grouped according to the decade of FINRISK assessment, such that participants in the 1972 and 1977 surveys were considered collectively, as were those assessed in 1982 and 1987, and 1992 and 1997. Overall, 18 806 men and 19 883 women aged 30-59 who participated in FINRISK surveys between 1972 and 1997, were included to this study population. Incidence of diagnosed, pharmacologically treated diabetes was established by following FINRISK participants in the National Drug Reimbursement Register for ten years from each survey. Socioeconomic status (SES) was defined by education. Incidence rate of diabetes by cohort and within and between educational groups over time was assessed. Also, the impact of T2D risk factors (e.g. obesity, physical inactivity, smoking and dietary fats) to incidence of T2D over time was assessed. The risk factors were defined by self-administered questionnaires and clinical examinations. All statistical analyses were done using STATA 11.

Results. Overall, 339 women and 420 men developed T2DM over the ten-year follow-up periods. Among men, T2DM incidence increased over time. Increase in incidence was partly explained by increasing BMI. After adjustment with BMI the age-adjusted HR between 1990's cohort and 1970's cohort decreased from 2.18 to 1.68. Strong evidence

TABLE.—*Intensive lifestyle intervention for prevention of type 2 diabetes in adults with impaired glucose tolerance the european diabetes prevention study.*

EDIPS cases identified by FINDRISC[10] and high risk cut-points for fasting plasma glucose (FPG) and glycated Haemoglobin (HbA1c) as specified by NICE, ADA and WHO with risk statistics for intervention and control groups compared

	FINDRISC score cut-points	
	Moderate or greater risk (≥12)	High or greater risk (≥15)
FINDRISC [a] score only		
EDIPS cases n (%)	*519 (69·3)*	*330 (44·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·42(0·20 to 0·15) P <0·001*	*0·30 (0·20 to 0·51) P<0·001*
FPG (mmoll^{-1})		
NICE high risk range (5·5 to 6·9)		
EDIPS cases n (%)	*354 (49·4)*	*224 (31·2)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·48 (0·28 to 0·83) P = 0·008*	*0·39 (0·20 to 0·78) P = 0·008*
ADA high risk range (5·6 to 6·9)		
EDIPS cases n (%)	*328 (45·7)*	*209 (29·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·51 (0·30 to 0·87) P = 0·014*	*0·41 (0·21 to 0·83) P = 0·007*
WHO high risk range (6·1 to 6·9)		
EDIPS cases n (%)	*198 (27·6)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·37 (0·90 to 0·72) P = 0·003*	*0·31 (0·13 to 0·73) P = 0·007*
HbA1c [b] (%)		
NICE and UK-NSC high risk range (6·0 to 6·4)		
EDIPS cases n (%)	*96 (13·7)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·46 (0·19 to 1·10) P = 0·08*	*0·35 (0·12 to 1·00) P = 0·05*
ADA high risk range		
EDIPS cases n (%)	*227 (32·4)*	*158 (22·6)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·43 (0·24 to 0·76) P = 0·004*	*0·28 (0·13 to 0·59) P = 0·001*

[a] n = 717 [b] n = 732

of increasing T2DM incidence over time was evident among low and middle educated men but less clear increase among highly educated men. Among women, there was no increase in T2DM incidence over time within any educational group.

Conclusions. The incidence of diagnosed, pharmacologically managed T2DM has increased significantly among men over the past 30 years. The increased incidence has occurred predominantly among low and middle educated men. The increase is strongly, but not fully, explained by BMI. There were no secular changes in T2DM incidence in women, irrespective of educational attainment.

Poster Session 1.5
Health behaviour change

Poster no. 39. — Participant perspectives on a lifestyle intervention for the prevention of type 2 diabetes: a qualitative evaluation within the 'new life, new you' pilot study

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Background. There is good evidence for the efficacy of lifestyle interventions for prevention of type 2 diabetes (T2D), but translation of research evidence to pragmatic service provision remains challenging. The 'New life, New you' (NLNY) intervention aimed to promote increased physical activity (primary outcome), healthy eating, and weight loss. NLNY targeted adults at risk of futureT2D living in socio-economically deprived areas and was delivered in leisure and community settings. Pilot study results at 12 months were encouraging (60% retention and mean (SD) weight loss of 4.2(5.7) Kg in those completing 12 months).

Objectives. We undertook a qualitative study, nested within the NLNY pilot, aiming to elicit participant perspectives of their behaviour change.

Methods. Ethical approval was obtained from Newcastle University Ethics Committee. Participants were purposively sampled with emphasis on success criteria for physical activity increase, and invited to attend individual semi-structured interviews. Participants were encouraged to reflect on their experience in their own words with minimal prompts. We used framework analysis and the Theoretical Domains Framework (TDF) to analyse the transcribed data. The theoretical domains examined were: Intentions and goals, reinforcement, knowledge, social role and identity, social influences, beliefs about capabilities and skills, behavioural regulation, memory, emotion, attention and decision processes, and environmental context and resources.

Results. Fifteen people completed an interview and their characteristics are shown in Table 1. We grouped the themes emerging from the data to reflect different phases of the behaviour change process. Participant perspectives were conceptualised as perceptions that promoted: initiating, enacting, and maintaining behaviour change. We then categorised (sub-set) the data in accordance with the TDF (as defined by the refined framework). Coding allocations were discussed and, where appropriate, domains were amalgamated to resolve conceptual over-lap. Social influences, both outwith and within the programme, reference to social role and identity, and intentions and goals were dominant themes across all phases. Reinforcement, regulation and decision processes were most evident in the maintenance phase. Environmental context and resources (especially monetary cost of participating in the intervention) were important (Figure 1).

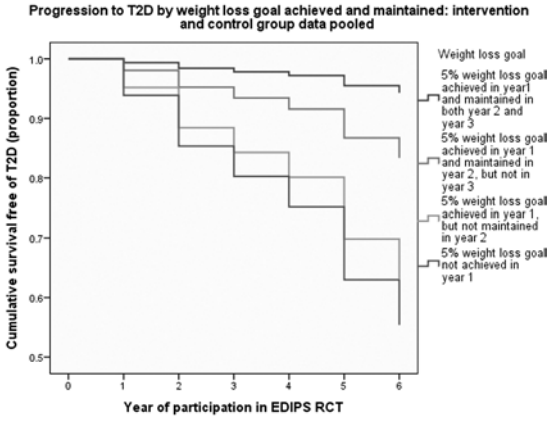

Figure.—Intensive lifestyle intervention for prevention of type 2 diabetes in adults with impaired glucose tolerance the european diabetes prevention study.

Conclusions. Consideration of emergent themes in relation to progressive phases and theoretical domains of behaviour change provided a novel structure that added to the depth and utility of this analysis. Further consideration of this analysis will inform intervention optimisation towards features that promote engagement and progression through the programme, relative to participant perspectives.

Poster no. 40. — Motivational interviewing for the prevention and management of overweight in children

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Background. Prevention of childhood overweight may serve as an early prevention of T2D. Motivational Interviewing (MI) has emerged as a possible approach to modify diet and physical activity behaviour in adults. There is a paucity of studies on the effectiveness of MI for overweight prevention and treatment in children. This study analyses a project implemented in a Danish municipality in which child healthcare nurses on the basis of a three-session MI intervention with children aged 6-15 and their parents encouraged lifestyle changes to reduce relative weight in children.

Objectives. To assess the applicability of MI used to modify diet or physical activity behaviours in Danish school aged children and their families.

Methods. In-depth semi-structured interviews with a convenience sample of nine nurses were conducted. The nurses were encouraged to explain their perceptions, experiences and practices of using MI as part of the intervention. The interviews were based on child cases selected by the nurses. No interviews or observations were conducted directly with the children or the parents.

Results. In general, MI was perceived to be consistent with nurses' values and norms on how child healthcare should work. However, applying MI in a family-addressed intervention posed severe challenges. There was no consensus on at what age the MI could be applied with the child and at what age the parents should be involved as well. Furthermore, the sessions were sometimes complicated by the fact that the child and the parents had different levels of motivation for change. For instance there were cases where the child was motivated, whereas the parents did not recognise the importance of or were ready to promote healthy lifestyle behaviours with their children. Thus, it became complicated for the nurse to diffuse resistance and reduce ambivalence with the family as a whole. Nurses said that they did not have sufficient time to adopt the new skills. Instead, they had to reinvent to fit to the goal of intervention thus removing critical elements from MI. Finally, the analysis identified several structural factors that are associated with overweight but which are outside the scope of the MI.

Conclusions. The use of MI in the childhood overweight intervention faced several challenges: 1) the method has not been shown to be effective among

children before, 2) it proved to be problematic to use MI as a tool in consultations with both children and parents who in some cases were not motivated to the same extent, 3) the rationale of MI is inherently individualistic (i.e. changing lifestyle), and consequently it does not address the various structural factors that according to state of the art health promotion concepts also play an important role in overweight and obesity.

Poster no. 41. — Promotion of healthy food choices for children in first grade

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Background. The increasing prevalence and incidence of overweight and obesity in childhood is a serious public health problem. Thus health nutrition habits and physical activities are fundamental to deal with this trend.

Objectives. Development of a communitarian intervention project in a first-grade school to promote healthy eating habits and physical activity in 1st grade children.

Methods. This project was based in Betty Neuman's Systems Model and in health planning methodology. 46 third-grade-students filled in a nutrition and physical activity questionnaire for the assessment and diagnosis of the situation. The results showed a high consumption of non-healthy food, especially in the snacks and moderate physical activity for most children. Subsequently, semi-structured interviews were made to experts, who validated the results obtained in the questionnaires. The experts considered an intervention on healthy eating, with priority incidence on the snacks. The promotion of physical activity was not considered a priority area for community intervention. Then, we defined priorities, objectives and intervention strategies. The interventions involved teachers, students and parents. We developed activities with interactive group methodologies, using facilitating, empathetic and positive reinforcement attitudes. Considering the relationship between the students and parents/legal guardians, during the implementation of the several interventions, there were proposed some activities to be jointly developed by both.

Results. The intervention results were analyzed according to indicators such as productivity, adherence, quality, direct effect and efficiency. This analysis showed that the initial objectives were achieved. The participation of parents was higher in activities to be undertaken with students at home. After 8 weeks of intervention, the students' nutrition choices during the snacks improved – there was a decrease of sugar intake (48,5% to 16,7%) and an increase of fruit intake (3,2% to 19,1%), cereals and vegetables (21,2% to 28,2%) and milk products (20,4% to 30,2%).

Conclusions. The results are according with the consulted bibliography, underlining the importance of intervention in schools for the promotion of healthy food choices, with the parents involvement, using flexible educational tools enabling the participation in students' homes.

Poster no. 42. — Medication adherence in diabetic patients

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Background. Diabetes mellitus is a disease characterized by high level of blood glucose and highly prevalent, affecting approximately 150 million people worldwide, and this number is expected to rise to 300 million in the year 2025. Central role in diabetes care is patient self-care what implies that the patient actively monitors and responds to changing environmental and biological conditions by making adaptive adjustments in the different aspects of diabetes treatment. Adherence to self-care is an active, responsible and flexible process of self-management, in which the patient strives to achieve good health by working in close collaboration with health care staff, instead of simply following rigidly prescribed rules.

Objectives. The aim of the study was to establish whether patients considered it feasible for them to comply with their physician's instructions and whether they believed their therapy to be beneficial for their health.

Methods. The study was designed as a cross-sectional survey by use of a self-administered questionnaire. The study included 635 individuals collecting or buying drugs for the treatment of chronic diseases, with special reference to subjects taking antidiabetic agents (n=120). The survey was conducted at Zagreb pharmacies and the questionnaire was filled out by study subjects with instructions and help provided by the pharmacist as questionnaire administrator.

Results. One hundred twenty (18.9%) of 635 study subjects were on therapy for some type of diabetes. In the study population (n=635), non-adherent subjects prevailed over adherent subjects (n=370; 58.3% *vs.* n=265; 41.7%). The majority of subjects treated for diabetes reported on forgetfulness as the main reason for medication non-adherence (n=74; 61.7%). The second and third most common reasons were being absent from home and drug shortage (n=55; 45.8%). Analysis of reasons for medication non-adherence according to age groups in the group of subjects treated for diabetes indicated forgetfulness as the leading reason (62.7%) in the oldest and largest age group (66+; n=37) as well as in all other age groups. In the 66+ age group, the second leading reason for medication non-adherence was a drug shortage (42.4%) followed by taking a number of drugs several times a day (40.7%), absence from home (37.3%) and problems with medication timing (33.9%).

Conclusions. There was no difference in medication adherence between general patient population and patients receiving antidiabetic therapy and there was no correlation between medication adherence and age. Common barriers to adherence, such as forgetfulness are under the patient's control, so that attention to them is a necessary and important step in improving adherence. The reason related to the absence from home and the reason of shortage of the drug could also be related to forgetfulness.

Poster no. 43. — Diabetes prevention management training course – a new course

J. Oliveira [1], A.C. Paiva [2], J.F. Raposo [2], J.M. Boavida [1]

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Background. Diabetes Mellitus is one of the most common non communicable diseases in the world and therefore is an important public health problem. Type 2 Diabetes, the most frequent type, is strongly associated with lifestyles, unhealthy nutrition, sedentary habits and obesity. The change into healthy lifestyles can significantly reduce the risk of developing diabetes. Thus an active intervention and health education become fundamental to reduce diabetes incidence and prevalence. A local programme was developed, based on the IMAGE Project, entitled "Type 2 Diabetes Prevention Managers" with the following.

Objectives. To acknowledge evidence for intervention in type 2 diabetes prevention; to plan and develop intervention projects; to acquire basic knowledge in Nutrition and Physical Activity. This project is aimed to all professionals, beyond healthcare professionals, intervening in the community - such as physical activity professors, physiotherapists, sportive animators, local development agents, to name a few – which is an innovation when compared to IMAGE Project. These professionals are closer to the people, which give them a better perspective of the individuals' and their environment reality. For that reason, they are in a privileged position to the implementation of intervention programmes on healthy lifestyles promotion.

Objectives. 1. To evaluate the perceived importance of the Courses (Diabetes Prevention Managers) 2. Evaluate the course structure and the used methodologies, according to participants' needs.

Methods. To a sample of 22 people of multidisciplinary teams who attended the 3-day /18-hours training course "Type 2 Diabetes Prevention Managers" were asked to answer to an evaluation questionnaire in the end of the course. A qualitative and quantitative analysis was conducted of all the collected data.

Results. Regarding the global evaluation 63.6 % of the participants answered as Very Good. The length was evaluated as Good by 54.5% and Very Good by 27.3%. The used audiovisual support was rated as Good (59.1%) and Very Good (27.3%). The participants considered Very Good (77.3%) the trainers' ability to motivate. The overall opinion was that the course was an important moment of experiences' exchange, reflection and discussion. It was also considered as a gain due to its dynamic and active characteristics. The fact that is in their intervention area was valued since it facilitated their travels.

Conclusions. The established partnership between General Health Directorate, APDP – Diabetes Portugal and Ernesto Roma Foundation is very important since it promotes Diabetes prevention promotion and it's aimed not only to health professionals but also to multidisciplinary teams who deal directly with the population. The participants appreciate the fact that trainers go to their sites. They also consider the training course as a good divulgation instrument of intervention strategies in high-risk populations leading to a early diagnosis and Diabetes prevention through the promotion of lifestyles changes.

Poster no. 44. — The Waste the Waist study: Four month outcomes from a pilot trial of a primary care based intervention to support lifestyle change for the reduction of diabetes and cardiovascular risk

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Background. In England, interventions to promote healthy diet and physical activity are needed for hundreds of thousands of people who are being identified as having high cardiovascular (CV) risk and /or pre-diabetes by the national NHS Health Checks programme. There is a lack of good quality evidence to guide commissioners to cost-effective lifestyle interventions. Waste the Waist is an evidence-informed, theory-driven group-based intervention designed to promote a healthy diet and physical activity for people at high risk of diabetes or cardiovascular disease.

Objectives. To conduct a pilot study of the Waste the Waist intervention to a) establish the feasibility of its delivery in UK primary care and b) estimate the likely standard deviations of outcome measures for a future RCT.

Methods. In a single-blind pilot RCT, patients with high CV risk and/or pre-diabetes were identified in six general practices, using searches of computerised practice databases. Data on cholesterol, blood pressure, Body Mass Index (BMI), blood glucose and other clinical data allowed identification of pre-diabetes and the calculation of CV risk scores using the QRISK2 algorithm. Willing participants were stratified by practice and randomised using a hierarchical minimisation algorithm to balance BMI, pre-diabetes status, gender and age. In addition to usual care, the intervention group received nine group-based lifestyle sessions over eight months and controls received a standardised information pack on CV risk and lifestyle. The intervention was developed using Intervention Mapping techniques, with literature reviewing and stakeholder involvement activities to guide the selection of evidence-based intervention components and to ensure suitability for use in UK primary care. The intervention is manualised and follows a clearly defined process model (a modified Health Action Process Approach). Recruitment, intervention attendance and measures-completion rates were recorded at 0, 4 and 12 months. Measures at 4 months included weight (Kg), physical activity (accelerometry) and a series of process measures designed to test the behaviour change model.

Results. 108 participants were recruited (15.4 participants per month) from 6 practices with 3 days per week of researcher time. Of those approached, 22% were randomised and 89% of those recruited

provided data at 4 months. Mean baseline weight was 97Kg (SD: 13.4), mean age was 65 (SD: 7.0) and 70% of participants were male. On average, intervention participants attended 72% of the initial 'core' programme of five sessions (the number expected after 4 months). At 4 months, the mean weight loss in the intervention group was 3.3Kg. The difference between intervention and controls was 3.1Kg (95%CI: 0.8 to 5.4) adjusted for baseline weight. Other data, including physical activity (accelerometer) data and changes in key process variables will be reported at the WCPD meeting.

Conclusions. The findings of this study will help to plan a larger trial of the Waste the Waist intervention. Recruitment, intervention delivery and outcomes measurement are feasible with good levels of retention at 4 months. The weight loss results at 4 months are promising, but the maintenance trajectory between 4 and 12 months (and beyond) will be critical in assessing the potential usefulness of this intervention.

Poster no. 45. — Barriers to and opportunities for lifestyle change to prevent diabetes in us South Asians

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Background. South Asians are a growing immigrant group in the US with an elevated risk of developing diabetes. Diabetes can be prevented or delayed by improving lifestyle behaviors, particularly diet and physical activity; however, little is known about the cultural barriers and motivators for these lifestyle changes among US South Asians. This information is critical for developing culturally appropriate diabetes prevention programs that are acceptable in this high-risk community.

Objectives. This study aims to describe how cultural preferences and social norms affect lifestyle choices around diet and physical activity in the South Asian American community and to make recommendations for tailoring diabetes prevention programs for US South Asians.

Methods. Seventeen focus group discussions, stratified by gender and age (25-39 years or ≥40 years), were conducted with South Asians. Focus group discussions were led by a trained moderator, digitally recorded, and transcribed verbatim. A thematic analysis was conducted to identify core issues around diet and physical activity. Structured comparisons were conducted, and outliers were examined to identify contextual influences on those who reported positive deviance regarding lifestyle choices.

Results. Key influences on the lifestyle behaviors of South Asian Americans included the immigration experience and culturally ascribed gender expectations. Participants reported that their immigration to the US contributed to unhealthy lifestyle choices and weight gain, because the US environment promotes sedentary lifestyles, the change in food and ingredient availability led to consumption of unhealthy diets, and for men, a lack of cooking skills resulted in a reliance on less healthy dietary choices (e.g., prepared foods, restaurant meals). Cultural expectations about gender roles also influence lifestyle choices. Cultural pressures for men to succeed in their education and career and achieve marital and financial success often take priority over health promotion activities. Similarly, expectations on women to provide for all the family and household needs lead to women placing a low priority on attending to their own health needs. Furthermore, social and family expectations on women to serve traditionally cooked foods, particularly those that are high in fat and calories, lead to unhealthy eating. Some participants did report healthy lifestyles and described the importance of family and social support as primary motivators for their healthy behaviors. They cited that following a healthy lifestyle improved their ability to care for their families, and they expressed a desire to learn and pass on health information to family members. Participants reported that the social support of peers and family was critical for maintaining health behaviors.

Conclusions. Focus group discussions with South Asian Americans show that culturally prescribed gender expectations and immigration play an important role in healthy lifestyle behaviors. Lessons from this study can be used to create culturally tailored lifestyle programs for diabetes prevention for South Asian communities.

Poster Session 1.6
National Diabetes Prevention Programs

Poster no. 46. — Implementation Salvage: lessons learnt from the Melbourne diabetes prevention study

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Background. Diabetes prevention programs based on evidence from randomised controlled trials encounter difficulties when being scaled up within health systems. Even under the best of circumstances, implementation is exceedingly difficult. The road is likely to be full of unexpected detours, blind alleys, new opportunities and changing constraints. Implementation Salvage Strategies is a framework used to describe and understand the possible factors that can influence the conduct of a trial within real world circumstances and the possible solutions to such problems.

Objectives. In this paper we will describe the implementation salvage experiences from a randomised

controlled trial, Melbourne Diabetes Prevention Study (MDPS), which is investigating the effectiveness and cost-effectiveness of the state wide Life! Taking Action on Diabetes (Life!) program in Victoria, Australia, compared with usual care. Life! is a group-based lifestyle behaviour change program which is facilitated by a certified health professional. The goals of the program are based on modifications to diet and physical activity. The Life! program is funded by the Victorian Government Department of Health and delivered by Diabetes Australia - Victoria.

Methods. The MDPS sits within an evolving larger scale implementation project, the Life! program. Changes that occurred during the roll-out of that program had a direct impact on the process of conducting this trial. The issues and methods of recovery the study team encountered were conceptualised using an implementation salvage strategies framework. This model highlights specific factors that can impede on different phases of a trial, and is used to analyse, describe and promote strategies to rescue a study.

Results. The specific issues the study team came across included continuity of State funding for the Life! program and structural changes to the Life! program which consisted of adjustments to eligibility criteria, referral processes, structure and content, as well as alternative program delivery for different population groups. Staff turnover, recruitment problems, setting and venue concerns, availability of potential participants and participant characteristics were also identified as evaluation roadblocks. Each issue and corresponding salvage strategy will be presented.

Conclusions. The experiences of conducting such a novel trial as the MDPS have been invaluable. The lessons learnt and knowledge gained will inform the future execution of this trial in the coming years. We anticipate that these results will also be beneficial to other researchers conducting trials in the diabetes prevention field internationally. Understanding how to overcome evaluation and implementation roadblocks during the translation of diabetes prevention programs is essential to their scale up to the state or national level. We recommend that researchers openly share their experiences, barriers and challenges when conducting implementation research in the real world.

Poster no. 47. — The Norfolk Diabetes Prevention Study (NDPS): intervention description and process model

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Background. There are now more than 2 million people in the UK with T2DM and the associated personal and NHS costs are well described. Landmark clinical trials suggest that lifestyle intervention reduces the risk of T2DM in high risk groups. A National Institute for Health Research funded 5 year RCT programme grant (£2.029M) aims to establish if; a novel diet and lifestyle intervention will significantly reduce the risk of developing T2DM compared to standard care in participants with IFG.

Objectives. To select and describe a detailed process model underpinning the intervention; to select behaviour change techniques and strategies to deliver these processes and to develop a rigorous process evaluation to test and refine the theoretical model.

Methods. The intervention and process evaluation plans were developed and included; 1) needs assessment to describe the health problem (IFG /T2DM), behavioural causes and determinants of behaviour. 2) Constructing matrices to 'map' theorised processes against their modifiable determinants (including consideration of cognitive, emotional, financial, interpersonal, environmental, community level, and societal influences). 3) Selection of Intervention Methods and strategies to modify the determinants identified above, drawing on taxonomies of behaviour change techniques and prior experience. 4) Organising the intervention methods and strategies into a coherent programme, including training materials, participant manuals etc. 5) Process Evaluation Design: The detailed specification of intervention mechanisms and content informed the design of process evaluation methods for testing and refining the theoretical model and for checking intervention fidelity.

Results. The intervention mapping process identified a) A theoretical process model (an adapted HAPA model) and b) Intervention techniques and strategies that map directly onto the intended processes. A detailed mixed-methods process evaluation was designed to test and refine the intervention model and allow intervention fidelity assessment. This comprises: 1) A quantitative process evaluation: Multivariate regression and structural equation modelling will be used to test a pre-defined process model using measures specifically selected to map onto hypothesised behaviour change processes. 2) Qualitative process evaluation: A purposive sample will be selected to provide diversity in terms of a) age b) gender and c) the amount of behaviour change and weight loss achieved at 12 months.

Conclusions. Rigorous development work led to the development of a clear theoretical /process model processes for the NDPS intervention. Specifying the model in detail allowed the planning of an in-depth mixed-methods process evaluation to test and refine the model.

Poster no. 48. — Diabetic foot in Germany - A market analysis towards comprehensive integrated care of statutory health fund members of AOK Nordost

Heike Wittmann

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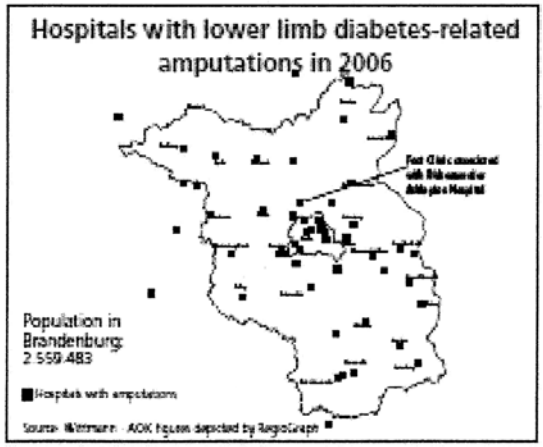
Background. Diabetes foot syndrome (DFS) is one of the most neglected complications associated with diabetes. 1989 the World Health Organization (WHO) has called upon the world community for lowering the rate of lower limb amputations as a consequence of diabetic gangrene by half within 5 years. This aim has not been reached yet. In Germany alone, more than 30.000 dia-

TABLE.—*Frequency Amputations Diabetic Foot in Germany - a market analysis towards comprehensive integrated care of statutory health fund members of AOK Nordost.*

Frequency of amputations related to diabetes in 2006		
Procedures/Codes	Description	Number
5-864	Major amputations of the leg	
5-864.0	Hemipelvektomy	0
5-864.1	Incomplete Hemipelvektomy	1
5-864.2	hip disarticulation	0
5-864.3	Femoral amputation not further specified	22
5-864.4	proximal femoral amputation	27
5-864.5	medial and distal femoral amputation	120
5-864.6	amputation close to the knee	1
5-864.7	knee disarticulation	7
5-864.8	transtibial amputation	12
5-864.9	proximal transtibial amputation	97
5-864.a	transtibial amputation	22
5-864.x	others	4
5-865	Minor amputation of the leg	
5-865.0	below-knee amputation according to Syme	2
5-865.1	foot amputation	7
5-865.2	foot amputation according to Spitzy	1
5-865.3	foot amputation according to Pirogoff	2
5-865.4	fore foot amputation according Chopart	24
5-865.5	midfoot amputation according to Lisfranc	14
5-865.6	proximal transtibial amputation	152
5-865.7	toe amputation	304
5-865.8	foot ray resection	44
5-865.x	others	8
Amount	lower limb amputation	871
	relapses	46
Total		917



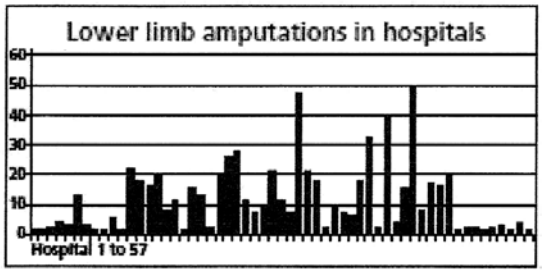


Figure.-—Amputations in Hospitals Podiatri Care Diabetic Foot in Germany - a market analyses towards comprehensive integrated care of statutory health fund members of AOK Nordost.

betics are suffering lower limb amputations each year. In the state of Brandenburg, like in many other German states, the DFS care still shows substantial inadequacies.

Objectives. Applying evidence-based multidisciplinary treatment results in reduction of lower limb amputations. Several studies show that a cross-sectoral and multidisciplinary approach, which includes prevention, patient education and multi-factorial care (out- and in-patient care, podiatrists, orthopedic shoemakers, etc.) in the treatment of the foot ulcers reduce amputations by 45 to 85%.

Methods. Since the introduction of Statutory Health Insurance Modernisation Act, sickness funds in Germany are required to initiate effective programs by so-called integrated health care contracts. In order to offer efficient programs it is necessary to identify diabetics with foot problems by different grades of injury and select adequate providers accordingly. Analyzing the internal claims data enables the sickness funds to monitor the numbers of diabetes-related lower limb amputations, define priorities, deduce correctional measures and develop optimal strategies which could guarantee a qualitatively higher-grade and simultaneously cost-efficient comprehensive DFS health care. The geographic software allows the user to analyze and visualize health care situations by maps and present the collected data.

Results. The anonymous analysis of 569 patients in 2006 showed 650 cases of diagnosed diabetes (ICD-coding E10-E14) concluding with 313 major and 558 minor lower limb amputations as well as 46 recidives. Through an integrated care contract with a specialized diabetic foot care center major lower limb amputations were reduced from 6.8 % in 2006 to 2.9 % in 2010.

Conclusions. Research and planning of efficient health care is heavily dependent on demographic and regional factors as well as the existence of data that can be analysed. A geographical analysis reveals the dis-

tribution of service providers and shows clearly where care is deficient. Our motto for the future must be "Prevention not Amputation". The rise in costs in the short term will be more than compensated for by the long term results.

Poster NO. 49. — "DIABRISK-SL": a study of cardio-metabolic risk in a young urban Sri-Lankans and correction through lifestyle modification

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Background. Urban South-Asian's are predisposed to early onset of type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD). There is an urgent need for country specific primary prevention strategies to address the growing burden of cardio-metabolic disease in this population.

Objectives. The aim of this clinical trial is to evaluate whether intensive (3-monthly; study group) lifestyle modification advice (LSM) is superior to a less-intensive (12-monthly; control group) LSM advice on a primary composite cardio-metabolic end-point in 'at-risk' urban young aged 10-40 years.

Methods. This is an open randomised controlled parallel group clinical trial performed at the National Diabetes Centres in Sri-Lanka. A cluster sampling strategy was used to select a large representative sample of subjects aged between 10-40 years at high risk of T2DM and CVD for the intervention study. We have screened 23,296 healthy subjects for four risk-factors: raised body mass index (BMI), raised waist circumference (WC), family history (FH) of T2DM and physical inactivity, using a questionnaire and anthropometry. Those with two or more risk-factors were evaluated for metabolic syndrome (MS) and recruited for an intervention trial.

Results. 23,296 participants were screened and 22,507 (47% Male) were eligible [8,497 aged 10–14 yrs, 4,763 aged 15–19 yrs and 9,247 aged 20–40 yrs]. 23% (5,163) had ≥2 risk-factors of whom 4,532 were assessed for MS. Raised BMI was noted in 19.7% aged 10–14 yrs, 15.3% between 15–19 yrs, and between 20–40 yrs, 27.4% of males *vs.* 21.8% of females (p-0.001). Prevalence of raised WC was greater in females for each age group: 42.7% *vs.* 32.1%; 28.1% *vs.* 16.1%; 34.5% *vs.* 25.7% (p-0.05 for all) as was physical inactivity: 39.9% *vs.* 14.5%; 51.7% *vs.* 20.0%; 62.7% *vs.* 41.3% which rose in both sexes with age (p-0.05 for all). FH of T2DM was present in 26.2%. In 4532 (50%, <16 yrs) with ≥2 risk-factors, central obesity was detected in 70.6% of subjects and raised BMI in 51.1%. T2DM was newly diagnosed in 2.34% and overall prevalence of pre-diabetes (impaired fasting glycaemia/impaired glucose tolerance) was 16%. MS was more prevalent in males [10–16 yrs (13.0% *vs.* 8.8%), 16–40 yrs (29.5% *vs.* 20.0%) p-0.001 for both]. Early indicators show a significant improvement of risk and final results will be published at the end of our study in 2014.

Conclusions. There is a high prevalence of modifiable cardio-metabolic risk-factors in young urban Sri Lankans with significant gender differences which requires early intervention to prevent or delay disease. A low cost non pharmacological primary prevention intervention trial is ongoing in this cohort.

Poster no. 50. — The life! Taking action on diabetes course: from the perspective of the participant

Jane Shill, Dr Amy Timoshanko, Kate Delley

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Background. The Life! Taking Action on Diabetes program was launched in 2007 and is funded by the Victorian Government in Australia with Diabetes Australia-Victoria as the lead agency and fund holder. The Life! program has seen the statewide implementation of evidence based, lifestyle behaviour change interventions to reduce the risk of progression to type 2 diabetes for people who are at high risk. The main intervention of the Life! program is a six-session community-based lifestyle behavior change program. Sessions one-five are held on a fortnightly basis, with the final session held six months following session five. Centring on health psychology theories which focus on behaviour change, participants are encouraged to work towards adopting a healthy diet and active lifestyle to reduce their risk of developing type 2 diabetes. Individuals at high-risk of type 2 diabetes are identified using the Australian Type 2 Diabetes Risk Assessment tool (AUSDRISK) and either self-refer to the program or are referred by their general practitioner or a health professional.

Objectives. The Life! program is subjected to constant monitoring and evaluation for quality assurance purposes and program development. The aim of this study was to explore Life! participants perspectives of the Life! course in terms of assisting with behaviour change, ease of course enrolment and course content, structure and delivery mode.

Methods. Participants were selected randomly from a list of individuals who had completed the six-session program within the previous six month period. Two focus groups and twenty in-depth semi-structured telephone interviews (n=40, 55% women, participants all aged 50 years and above, representing 32 different Life! groups) were conducted to explore participants perspectives. Data were analysed using content and thematic analyses.

Results. Majority of participants felt the enrolment process was easy and the fortnightly session delivery suited most. In general, participants enjoyed the group format, particularly the social aspect, and felt that the sharing of experiences was beneficial for learning. All participants were satisfied with the course content, particularly the practical exercises such as label reading and completing food diaries. In general, participants reported that the content was sufficient to gain a

better understanding of diabetes, risk factors and prevention. Participants spoke highly of the professionalism and warmth or their facilitators, frequently linking this to the level of enjoyment they experienced. Majority of participants reported that the Life! course had resulted in behaviour change which had contributed to weight loss, reduction in symptoms and risk factors, and an improved feeling of wellbeing. In general, participants could not recommend any improvements however suggested that a refresher/follow-up session post course completion would be helpful for maintaining behaviour change.

Conclusions. Group support and facilitator skill are important influencers on the participant's motivation and involvement in the course. Those we spoke with that did well in the program, engaged more in the practical experiences, received support from their group and seemed to understand that small changes lead to healthier habits and sustained lifestyle change.

Poster no. 51. — The Norfolk Diabetes Prevention Study (Norfolk DPS)

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Background. There are now more than 2 million people in the UK with T2DM and the associated personal and NHS costs are well described. Landmark clinical trials suggest that lifestyle intervention reduces the risk of T2DM in high risk groups. With the increase in the number of diagnosed cases of T2DM and the emerging evidence on expert patient impacts. a logical extension may be to use patient expertise to deliver motivational support to those at risk of the same disease.

Objectives. A National Institute for Health Research funded 5 year RCT programme grant (£2.029M) aims to establish if; a novel diet and lifestyle intervention will significantly reduce the risk of developing T2DM compared to standard care in participants with IFG; and if the use of lay mentors with T2DM has additional benefit in prevention

Methods. Screen 10 000 people from an at risk population to enter 1000 eligible participants into the 3 year lifestyle intervention. This intervention was successfully piloted in a 2 year NIHR funded UEA-IFG Study. Participants will be randomised into 1 of 3 intervention arms with the primary outcome being progression to T2DM. Involvement of people with established T2DM who will act as lifestyle mentors over the telephone is novel, and they will work in parallel with healthcare professionals to deliver the intervention.

Results. Qualitative and quantitative analysis will test the effectiveness of the study on behavioural outcome measures of dietary and physical activity behaviours (measured objectively by accelerometers) and on the primary outcome of T2DM progression in a 'prediabetes' population. Furthermore, a mixed-methods process evaluation has been designed to test the model and allow intervention fidelity assessment.

Conclusions. We aim to establish if the intervention could be delivered cost-effectively in the UK NHS and purchased as an 'off the shelf package'; and if volunteers with the condition can help prevent the same condition.

Poster no. 52. — Cognition in the Finnish diabetes prevention study

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Background. Studies suggest an association between diabetes and risk of dementia or cognitive impairment. The Finnish Diabetes Prevention Study (DPS) showed that type 2 diabetes risk can be decreased by 58% with 4-year lifestyle intervention. Hypothetically, diabetes prevention might also prevent cognitive impairment.

Objectives. Our aim was to compare cognitive performance between the former intervention and control groups of the DPS and also investigate associations between glucose metabolism and cognition.

Methods. The DPS included middle-aged, overweight subjects with impaired glucose tolerance randomized to an intensive lifestyle intervention group or usual care group. An oral glucose tolerance test (OGTT) was performed annually and the diagnosis of diabetes was confirmed by a second test. Intervention duration was on average 4 years with extended annual follow-up visits. The CERAD Neuropsychological Battery was performed to 332 DPS participants (64%; mean age 68 y) 13 years after the baseline and repeated two years later. 284 (54%) participated in both rounds.

Results. The cognitive performance among the DPS participants was good in general in both CERAD rounds. There were no differences between the former intervention and control groups. However, those participants who had been diagnosed with diabetes during the follow-up period (n=246, average follow-up time 13 y, diabetes duration 7 y) had lower Immediate Memory Score (p=0.0179) in the first CERAD round and their MMSE Score and the Verbal Fluency Score declined more between the rounds (p=0.0094 and 0.0202, respectively) compared to non-diabetic participants. Surprisingly, higher baseline fasting glucose was associated with better cognitive performance in MMSE (β=0.58, p<0.001) and Verbal Performance (β=1.28, p=0.010). Average fasting glucose during the first six study years was not associated with the cognition, but 2-hour OGTT glucose level was inversely associated with performance in Total Memory (β=-0.24, p= 0.020), Verbal Fluency (β=-0.41, p= 0.021) and Trail Making Tests (β=1.06, p=0.039, higher score indicating worse performance).

Conclusions. No difference was detected between the groups, possibly because of relatively young age and good cognition of the participants. However, participants with diabetes had lower Immediate Memory scores and greater decline in MMSE and Verbal Performance compared to non-diabetics. Previous blood glucose levels were also associated with some domains of cognitive performance, but the results were somewhat inconsistent. Longer follow-up time may be needed to detect all glucose-related cognitive changes.

Poster Session 1.7
Obesity

Poster no. 53. — Prevalence of Overweight & Obesity in Urban population of Karachi, Pakistan

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Background. South Asian populations are more prone to an epidemic of obesity due to rapid urbanization and adoption of obsogenic life style. Not only is the prevalence of obesity higher but the risk of complications like diabetes and cardiovascular disease is much higher in comparison to Caucasian population. Evidence suggests that association between BMI, percentage body fat and chronic diseases also differ between Asian and Caucasian population. Because of these differences between population, the International Association for study of obesity and International obesity task force have recommended lower BMI cut off values for overweight and obesity for Asian population. In terms of abdominal adiposity, IDF & NCEP ATP III also have recommended lower cutoffs in comparison to Caucasian population. The last prevalence of overweight and obesity was based on cross-sectional data collected during 1990-1994 National health survey of Pakistan.

Objectives. We therefore sought to determine the prevalence of overweight & obesity using Asian specific BMI definition and abdominal adiposity cutoff.

Methods. This is data collected for community based Diabetes prevention study funded by International Diabetes Federation (IDF). The first part of study consists of screening of individuals with the help of risk scoring system. This risk scoring system consists of age, gender, BMI, waist circumference, physical activity, history of B.P, diabetes and smoking. Data analysis was done using SPSS version 19.0. Continuous variables with normal distributions were reported as mean (SD). Frequencies (%) were computed for categorical variables for the characteristics of participating subjects. All p-values were based on two-sided tests and significance was set at a p-value less than 0.05.

Results. The total number of participants screened so far is 3491. The mean age of participants was 41 ± 10. The overall response rate was 71%. The prevalence of overweight & obesity was found to be 13.4% & 62% respectively. The prevalence was found to be more in females and in age group between 36-45 years of age (p=<0.001). Likewise, the prevalence of abdominal adiposity was found to be 80% using South Asian population cutoff, more common in females and in age group between 36-45 years of age (p=<0.001). To see the impact of city plan, we further analyzed the data and found that the areas with ample parks had high prevalence of obesity in comparison to areas with no parks (p=<0.001). 35.4% of male and 65% of the females were found to be physically inactive.

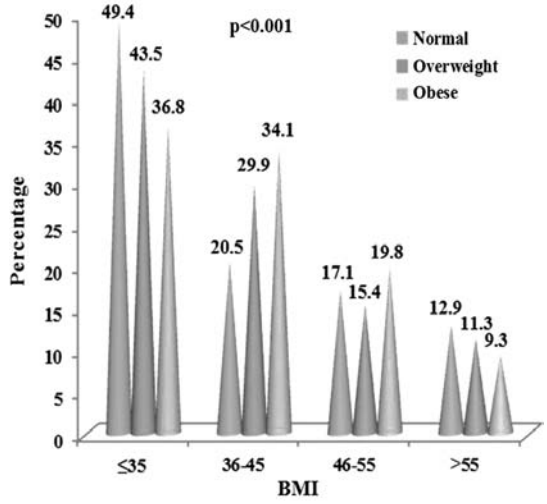

Figure.—Pravalence of overweight & Obesity.

Conclusions. More than half of the population is classified as obese with the use of Indio-Asian specific BMI cut offs. Moreover, 80% of the population have waist circumference in the range of abdominal adiposity. The high prevalence of obesity in younger age group is troublesome since it is usually the most productive years of one's life. The higher prevalence of obesity and decreased physical activity in female population could be due to perceived unsuitability of women's participation in physical activity in their spare time due to cultural restrictions.

Poster no. 54. — Profound weight loss and beneficial effects on the metabolic syndrome as a result of testosterone treatment for up to 15 years with testosterone undecanoate injections in 334 hypogonadal men

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Background. Hypogonadism is associated with metabolic syndrome and all its individual components in men. Testosterone (T) treatment in men diagnosed with hypogonadism has been shown to improve meta-

bolic syndrome and thus reduce risk factors of type 2 diabetes and cardiovascular disease. In men with hypogonadism, T replacement therapy is considered standard treatment, particularly in younger men with congenital forms of hypogonadism. Intramuscular injection of the long-acting ester testosterone undecanoate (TU) at 3-month intervals after an initial 6-week interval have proven to be an effective method of testosterone substitution.

Objectives. Testosterone replacement studies in the literature have a maximal duration of 3 years. In the Centre of Reproductive Medicine and Andrology, we study long-term effects of testosterone treatment in hypogonadal men.

Methods. Open-label, single-center, cumulative, prospective registry study of 334 patients (147 with primary, 100 with secondary and 87 with late-onset hypogonadism) aged 15 to 72 years (mean 42±15 years) receiving intramuscular injections of 1000 mg of TU during a maximal treatment time of 15 years, corresponding to 6,596 injections and 1403 treatment years. Hypogonadism was defined as total testosterone below 12 nmol/L and occurrence of symptoms.

Results. Serum T concentrations rose from 5.8 to 16.1 nmol/L within the first year of treatment and remained stable thereafter. Body weight decreased from 103.0 ± 16.3 kg at baseline to 79.1 ± 12.6 kg at the end of the observation period. Body mass index declined from 31.8 ± 5.2 to 24.4 ± 3.2 kg/m2. Waist circumference declined from 114.0 ± 10.5 to 94.1 ± 8.7 cm. Systolic blood pressure decreased from 148.0 ± 13.8 to 128.0 ± 10.6 mmHg, diastolic blood pressure from 98.0 ± 10.9 to 81.0 ± 10.2 mmHg. Pulse rate decreased from 89.0 ± 9.4 to 75.0 ± 8.3 bpm. Triglycerides decreased from 198.0 ± 32.8 to 145.0 ± 21.2 mg/dL and HDL increased from 38.4 ± 9.7 to 53.6 ± 11.7 mg/dL. Fasting plasma glucose (FPG) decreased from 108.1 ± 29.7 to 91.2 ± 15.2 mg/dL. Prostate volume increased from 16.1 ± 5.2 to 19.7 ± 5.4 ml. Prostate specific antigen (PSA) remained stable. No case of prostate cancer was diagnosed. Haemoglobin increased from 14.5 ± 1.2 to 16.3 ± 1.5 g/dL, haematocrit from 40.9 ± 2.1 to 46.2 ± 2.5%.

Conclusions. Intramuscular injections of testosterone undecanoate lead to improvements in body composition and other features of the metabolic syndrome. These changes are maintained over a long-term follow-up period. Testosterone treatment with long-acting TU in hypogonadal men is safe and well tolerated.

Poster no. 55. — Evaluation of the group lifestyle balance program ™ for weight management in a large multidisciplinary healthcare system

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Background. The Diabetes Prevention Program (DPP) demonstrated that individuals with pre-diabetes reduced their risk for type 2 diabetes by 58% through an intensive 16 week lifestyle modification program. The Group Lifestyle Balance (GLB) program™ is a 12 week modified DPP program with monthly follow-up sessions developed by the University of Pittsburgh, Diabetes Prevention and Support Center (DPSC). The translation of this program into a primary care setting resulted in a mean 3.5% weight loss with 24% of participants achieving the goal of 7% weight loss and 52% of the participants meeting the 5% weight loss goal (Kramer, 2009). Implementing DPP guidelines into standard weight management programs for all individuals could provide increased access to this intervention in the primary care setting.

Objectives. The purpose of this study is to evaluate the effectiveness of the GLB™ program as a weight management program, delivered at multiple Sutter Medical Foundation (SMF) care centers in the Sacramento Sierra Region under the name Sutter Options for Success (SOS).

Methods. Patients in the SOS program were at least 18 years of age with a BMI ≥25. Efficacy was assessed by pre- and post-intervention measures of weight, minutes of physical activity and attainment of 5% to 7% weight loss at the end of 12 weeks. Secondary outcomes include change in waist circumference, blood pressure and WHO 5 well-being scores. Pre and post changes in weight and exercise were analyzed using repeated measures t-tests. Differences between patients with diabetes, pre-diabetes, and no diabetes were measured using analysis of variance and post-hoc tests (Tukey).

Pre-post and between groups differences on achievement of exercise and weight loss goals were assessed using the χ^2 Test of Independence and the McNemar Test.

Results. Subjects (N=104) completed the program from April 2010 through December 2011 (22 diabetes, 23 pre-diabetes, and 59 no-diabetes). Mean percent weight loss was 5.5% ($t103 = 14.35$, $P < 0.05$). Between groups, diabetes lost 4.0%, pre-diabetes lost 4.3%, and no-diabetes lost 6.4% ($F2,101 = 5.03$, $P < 0.023$) with statistically significant differences between the diabetes and no-diabetes groups. Twenty-eight percent of subjects demonstrated a 7% weight loss. Of those, 15% had diabetes 13% had prediabetes and 72% had neither). A total of 56% of subjects lost 5% of their weight. Sixty-nine percent of no-diabetes subjects met this goal, significantly higher than patients with diabetes (16%) and pre-diabetes (16%) (X2 2= 8.01, P = .018).

The number of subjects that exercised 150 minutes per week improved from 28% to 41% (X2,P = .002). Mean waist circumference decreased from 114.7cm to 109.9cm ($t75 = 8.81$, $P < 0.05$). Mean WHO well-being scores improved from 14.9 to 17.8 ($t90 = -6.99$, $P < 0.05$). Mean systolic blood pressure decreased from 129 to 125 $t81 = 2.69$, $P = .009$). There were no significant differences between groups on changes to minutes exercise, waist circumference, mean total WHO score, and blood pressure.

Conclusions. The SOS program is effective as a weight loss program delivered in a large multidisciplinary healthcare system.

Poster no. 56. — Decreased insulin sensitivity and antioxidant status and increased thrombotic and inflammatory factors in obese children, adolescents and youth

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Background. In obesity and metabolic syndrome (MS) abdominal obesity is accompanied with hyperinsulinism and insulin resistance (IR). As IR is increasing, insulin sensitivity (IS) is decreasing and we used Matsuda index of whole-body insulin sensitivity derived from the oral glucose tolerance test (OGTT), which represents a composite of both hepatic and peripheral tissue sensitivity to insulin. Abdominal obesity also correlates with increased thrombotic and inflammatory factors supporting the progression of atherosclerotic complications.

Objectives. This study analyzes IR and IS, thrombotic and inflammatory factors, and antioxidant status in obese children, adolescents and youth.

Methods. The study included 205 obese individuals (age 7-30) classified according to age: I- children (7-15), II- adolescents (16-20) and III-youth (20-30). Three of the following five criteria were used for MS diagnosis: waist circumference (WC)>90 Pct.; triglycerides (TG)>1.7mmol/L; high density lipoprotein cholesterol (HDL-C) <1.0mmol/L; hypertension> 90 Pct.; glycemia>6.0mmol/L. IR was determined by homeostatic model assessment (HOMA IR). IS was determined by Matsuda index of whole-body insulin sensitivity (10 000/square root of (fasting glucose x fasting insulin) x(mean glucose x mean insulin during OGTT). Serum CRP was measured by immunometric assay. Plasminogen activator inhibitor (PAI-1) was determined by plasminogen substrate essay. Microalbuminuria was determined immuno-nephelometrically. Activities of markers of antioxidant defense, superoxide dismutase (SOD) and glutation peroxidase (GPX) were determined in erythrocytes with Randox Lab (UK) commercial kit.

Results. MS increases considerably with age, was found in 33.3% children, 46.2% adolescents and 50.5% youth. Patients had increased WC: (I-90.3±10.9, II-104.2±15.4, III-105.2±20.2 cm), blood pressure (I-113.0±13.2 /75±9.4, II-121.9±12.4/81.9±9.93,III-126±19.0/82.7±10.7mmHg), HOMA IR (I-5.6±2.8, II-7.5±12.9, 9.2±13.5), triglycerides (I-1.4±0.6, II- 1.5±0.7, III-1.9±1.8mmol/l), CRP (I-2.8±6.2, II- 6.5±8.2, III-7.4±4.4mg/l), PAI-1 (I-5.7±2.2 II- 6.3±1.2,III- 6.4±1.1 U/ml) and microalbuminuria (I-29.4±20.3, II- 43.3±31.1,III-40±30.1mg/24h), and decreased HDL (I-1.17±0.2, II-1.15±0.2, III- 1.14±0.4mmol/l), SOD (I-1057.5±147.2, II-1125.3±215.5,III- 1115.5±178.9 U/gHb), GPX (I-29.6±3.2, II- 19.7±15.4, III- 33.2±11.1U/gHb), and decreased Matsuda index (I-4.7±3.2, II 5.6±4.6, III- 5.4±4.5). Correlations: HOMA IR with BMI, WC, blood pressure, triglycerides, basal, 30 min, 120 min and mean insulinemia, basal glycemia ($p<0.01$), PAI-1 ($p<0.05$), CRP ($p<0.01$) and negatively with HDL ($p<0.01$). Patients with MS had increased IR (HOMA IR 12.1±16.6) and decreased IS (Matsuda index 3.7±3.2) in regard to patients without MS.

Conclusions. In obese patients, abdominal obesity is accompanied with hyperinsulinism, increased IR, decreased IS and antioxidant status. Correlations of HOMA IR with WC, PAI-1 and CRP explain connection between insulin resistence and abdominal obesity, increased levels of thrombotic and inflammatory factors and early risks of atherosclerosis.

Poster no. 57. — Predictive factors of type 2 diabetes mellitus in obese children

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Background. Prevention of childhood obesity and of its complications is an important public health priority. During 2009-2012 pediatric endocrinologist and geneticist created working group, in order to evaluate the health status of obese children.

Objectives. The study purpose was to assess the evidence of type 2 diabetes mellitus (T2DM) risk factors (insulin resistance features and frequencies of Insulin gene (INSG) polymorphisms rates) depending on gender and pubertal stages in lean (control (C)) and obese (O) children.

Methods. 578 O and 204 C children were investigated and were divided into groups: prepubertal O (1st-o) male/female n=178/117 and C (1st-c) n=51/46, early pubertal (2nd-o) n=67/41 and (2nd-c) n=16/17, late pubertal (3rd-o) n=88/87 and (3rd-c) n=14/60). 129 O girls

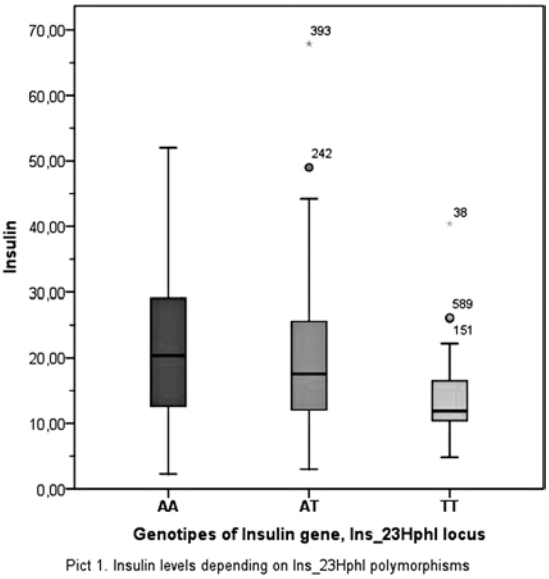

Figure.—Predictive factors of type 2 diabetes mellitus in obese children.

and 144 O boys and 104 lean girls and 55 lean boys were genotyped in INSG (A-23HphIT polymorphism). In order to assess insulin resistance features, serum insulin, capillary glucose (mmol/l) and HbA1c (%) levels were detected and HOMA-ir index was calculated. Statistical analysis was performed using SPSS 16.0 (p=0.05).

Results. Insulin and HOMA-ir ranges were significantly higher in O children than in C regardless of pubertal stage and sex: p=0.0001 and p=0.0001 between the 1st–o and 1st-c, p=0.001 and p=0.001 in the 2nd groups, p=0.0001 and p=0.001 in the 3rd groups respectively. Correlations between insulinemia, glucose level, HbA1c, HOMA-ir and BMI (r=0.4; r=0.3; r=0.3, p=0.0001; and r=0.2, p=0.02 respectively) were revealed. There were gender differences (hi-square 6,56; p<0,05) between genotypes rates occurrence in O children: 51,9% girls and 61,8% boys had AA-genotype, 13,2% girls and 4,9% boys – TT, versus to C children: AA-genotype was found in 61,5% girls and 56,4% boys, TT-genotype - in 3,8% girls and 5,5% boys (p>0,05). Insulin level (pict 1.) and HOMA-ir index were higher in O children with AA homozygote genotype in compared with TT-genotype (p=0.004 and p=0.007 respectively). There were no changes of same parameters in control group irrespective of the gene polymorphisms. Glucose and HbA1c levels were the similar in both groups as regards A-23HphIT INS genotypes.

Conclusions. A-23HphIT INS genotypes in girls with adiposity were significant differ from normal children irrespective of gender. Insulin level in obese children depends on A-23HphIT INS polymorphisms. AA-homozygous INS genotype, increased insulinemia and HOMA-ir index should be considered as T2DM predictive factors.

Poster no. 58. — Obesity, diabetes and mortality (DRECE)

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Background. Diabetes and obesity are the biggest public health challenge of the 21st century. Nowadays, of the people diagnosed with type II diabetes, about 80 to 90 percent are also diagnosed as obese. Although both diabetes and obesity risk factors are often associated with race, age, and family history, the conveniences of modern life also contribute to the development of both diseases and it is well-known that both are important risk factor for other prevalent disease such as cardiovascular disease or cancer. For that reason obesity is the second evitable cause of premature mortality, after smoke use.

Objectives. To describe the relation between obesity, diabetes and mortality.

Methods. This was an observational and descriptive study of a historical cohort: DRECE-Dieta y Riesgo de Enfermedad Cardiovascular en España (diet and cardiovascular disease in Spain). The DRECE project was designed to identify the prevalence of cardiovascular risk factors in the Spanish population and their relationship with dietetic habits. It included 4,783 subjects who were followed from 1991 to 2011. By that time, the cohort age range was from 5 to 60 years. Vital status and causes of mortality were provided by the Spanish Office for

TABLE.—*Obesity.*

EDIPS cases identified by FINDRISC[10] and high risk cut-points for fasting plasma glucose (FPG) and glycated Haemoglobin (HbA1c) as specified by NICE, ADA and WHO with risk statistics for intervention and control groups compared

	FINDRISC score cut-points	
	Moderate or greater risk (≥12)	High or greater risk (≥15)
FINDRISC [a] score only		
EDIPS cases n (%)	*519 (69·3)*	*330 (44·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·42(0·20 to 0·15) P <0·001*	*0·30 (0·20 to 0·51) P<0·001*
FPG (mmoll^{-1})		
NICE high risk range (5·5 to 6·9)		
EDIPS cases n (%)	*354 (49·4)*	*224 (31·2)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·48 (0·28 to 0·83) P = 0·008*	*0·39 (0·20 to 0·78) P = 0·008*
ADA high risk range (5·6 to 6·9)		
EDIPS cases n (%)	*328 (45·7)*	*209 (29·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·51 (0·30 to 0·87) P = 0·014*	*0·41 (0·21 to 0·83) P = 0·007*
WHO high risk range (6·1 to 6·9)		
EDIPS cases n (%)	*198 (27·6)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·37 (0·90 to 0·72) P = 0·003*	*0·31 (0·13 to 0·73) P = 0·007*
HbA1c [b] (%)		
NICE and UK-NSC high risk range (6·0 to 6·4)		
EDIPS cases n (%)	*96 (13·7)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·46 (0·19 to 1·10) P = 0·08*	*0·35 (0·12 to 1·00) P = 0·05*
ADA high risk range		
EDIPS cases n (%)	*227 (32·4)*	*158 (22·6)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·43 (0·24 to 0·76) P = 0·004*	*0·28 (0·13 to 0·59) P = 0·001*

[a] n = 717 [b] n = 732

National Statistics through an agreement. In 1991, all subjects comprising the DRECE cohort were subject to a medical examination, a family and personal anamnesis, including a nutritional and physical activity questionnaire, and a laboratory complementary.

Results. The prevalence of diabetes and obesity in DRECE was 6.54% and 17 %, respectively. Body mass index (BMI) distribution in diabetic individuals (a total of 212) was following: obesity, 45.67 %; overweight, 34.13 % and normoweight 20.19 %. From diabetic subjects, 97 of them (45.75 %) were women and 115 (54.25 %) were men. On the other hand, overweight rate in men was higher than in women (63.38 % versus 36.62 %). However, women had the highest obesity rate (55.79 % versus 44.21 %), being gender differences statistically significant (p-value =0.037). Table 1 shows total mortality and mortality for different causes and we observe that mortality rate was higher in diabetics. Moreover, non diabetic individuals had the highest mortality cause in cancer, however, diabetic subject died for cardiovascular disease. By BMI categories we observe similar rates in cardiovascular mortality when diabetics but in case of non diabetics overweight or obesity had almost double cardiovascular mortality rate

Conclusions. Specialists demand a more active policy of both, prevention and treatment in against obesity. Diabetes is very close to obesity and both are the leading cause of cardiovascular death, mainly on young people.

Poster no. 59. — Comparison of different methods to diagnose diabetes and prediabetes in a large population-based survey

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Background. There is a concern of emerging diabetes (DM) epidemic in Turkey. We conducted the second Turkish Diabetes Epidemiology Survey (TURDEP-II) to determine the prevalence of DM and preDM, and their risk factors in adult population in 2010.

Objectives. The purpose of this paper is to compare diagnostic accuracy of different sets of methods to identify DM and preDM, and to evaluate the most vulnerable group of preDM people whom might benefit from prevention programs.

Methods. A population-based random sample of 26,499 adults (≥20 yrs, women 63%, response rate 87%) participated in this cross-sectional survey. After an overnight fast, FPG, and A1C other biochemical tests were measured in all participants, then eligible peoples had an OGTT to identify undiagnosed DM and preDM (IFG, IGT, and high risk A1C; 'HRisk') in non-diabetic participants.

Results. If FPG considered gold-standard test, OGTT could identify 80.6% of normal, 32.7% of preDM, and 29.8% of DM cases. Whereas when A1C considered gold-standard test, FPG could recognize 70.4% of normal, 52.8% of preDM, and 82.8% of DM cases. Finally, if OGTT considered gold-standard test, A1C could agree with 78.1% of normal, 40.4% of preDM, and 10.4% of DM cases. Comparison of one test to the other resulted in a specificity between 70.4% to 80.6%, a sensitivity 32.7% to 52.8%, a positive predictive value between 33.7% to 50.5%, and a negative predictive value between 71.1% to 80.9%. Overall accuracy was approximately in two-thirds in every occasion. Both IGT and HRisk categories were more prevalent among women. Peoples with IFG were significantly younger, less obese, and less hypertensive; also had lower waist, 1hPG, 2hPG, folate, and nonHDL-chol but higher FPG, IGF1, and eGFR than people with IGT or HRisk. In contrast, HRisk peoples were significantly older; less educated; more sedentary, smoker, obese, hypertensive, and dyslipidemic; also had higher waist, insulin, HOMA-IR, triglycerides, nonHDL-chol, hsCRP, cystatin-C, anti-TPO, and PTH but lower HDL-chol, eGFR, FT4, IGF1, and IGFBP3 than people with IFG or IGT.

Conclusions. Diagnostic methods identify different groups of people in terms of lifestyle, and co-morbidities. People with HRisk A1C are the most vulnerable than people with IFG and IGT, therefore they should be taken as a priority group to implement diabetes prevention programs.

Poster no. 60. — Female gender, waist circumference, BMI and basal metabolic rate associate with body fat percentage in young urban subjects at-risk of type 2 diabetes mellitus

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Background. Increased body fat can be associated with raised risk of Type 2 Diabetes Mellitus (T2DM) and cardiovascular disease (CVD). Urban South Asian subjects are at enhanced risk of T2DM and CVD. South Asians have increased body fat compared to age and BMI matched subjects as elegantly described by Yajnik and Yudkin as the Y-Y paradox. The relationship between body fat and cardio-metabolic markers has not been studied in young urban at-risk Sri Lankan subjects.

Objectives. To identify the clinical and biochemical markers of cardio-metabolic risk associated with body fat in young urban Sri Lankans at risk of cardio-metabolic disease.

Methods. We investigated the associations between clinical and biochemical markers of T2DM and CVD risk and body fat percentage (by bio-impedance analyser, BODYSTAT 1500) in 159 healthy subjects aged 10-40yrs with ≥2 risk factors (of raised body mass index (BMI),

raised waist circumference (WC), physical inactivity and family history of T2DM) participating in an randomised controlled trial (DIABRISK-SL). All subjects had fasting biochemical (including 2hr OGTT), bioimpedance and clinical measures prior to randomisation. Basal metabolic rate (BMR) was calculated by the BIA system by an equation based upon the Harris Benedict formula. Univariate and multivariate linear regression analyses to identify variables independently associated with body fat were performed.

Results. Of the 159 subjects (48% males) studied, 48 (30%) were ≤18years. Mean (SD) body fat was 30.2(9.8)%. In univariate analyses the following variables were significantly associated with body fat percentage: correlation coefficients are shown: positively correlated : age 0.26, female gender 0.70, BMI 0.40, post OGTT glucose (mg/dL) 0.11, C-reactive protein(mg/dL) 0.245, WC (cm) 0.213 and negatively correlated with fasting plasma glucose (mg/dL) -0.16, estimated GFR (ml/min) -0.30, BMR (cal/day) -0.48 and triglycerides (mg/dL) -0.21 ($p<0.05$ for all). A multivariate regression analysis model with the above variables included explained 90% of the variance of body fat. In multivariate regression analysis the following variables were independently associated with fat percentage; B coefficient shown; positively associated: female gender 4.89, BMI 1.41, WC 0.19 and negatively BMR -0.03 ($p<0.005$ for all).

Conclusions. In at-risk healthy South Asian young urban subjects; female gender, WC, BMI are independently and positively associated with body fat percentage. There is a modest negative association between BMR and body fat. The effect of an individualised lifestyle intervention programme on body fat composition and overt cardio-metabolic disease in this cohort is under investigation.

Poster no. 61. — Clinical and laboratory characteristics in children with obesity

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Background. In the last decade there is a significant increase of obesity in children , which is a great risk factor of futher development of diabetes mellitus type 2 (DM2).

Objectives. To evaluate the prevalence of metabolic changes as metabolic syndrome´s components in children with alimentary obesity (O) depending on gender.

Methods. We examined 120 children with O in the endocrinological department of University hospital (Minsk) over 2011 year. The number of boys 66 (55%) (mean ± SD age 12 ± 3 yrs), girls 54 (45%) (13,6 ± 2,5 yrs) (p = 0,1). Ultrasound (u/s) of the abdominal cavity; insulin (Ins); biochemical markers (total cholesterol (TC); triglycerides (TG); high-density (HDLc), low-density (LDLc), very low-density (VLDLc) lipoprotein cholesterol; atherogenic coefficient (AC); standard oral glucose tolerance test (OGTT) with the calculation of HOMA-IR and CARO indexes; the levels of blood pressure (BP) and body mass index (BMI) were held and measured to all patients. The results were processed using the Statistica 6.1.

Results. BMI boys 29,4 ± 5,7 kg/m², girls 33 ± 5,9 kg/m² (ð = 0,7). BP more than 95th percentile was in 27 (40,9%) boys and 22 (40,7%) girls (p = 0,03). The signs of steatohepatosis and hepatomegaly were determined in 25 (37,8%) boys, 19 (35,2%) girls (p = 0,1). The average levels of TC boys were 4,66 ± 1 mmol/L (norm 3,08 – 5,2), girls - 4,54 ± 1 mmol/L (p = 0,9); TG - 1,4 ± 0,8 mmol/L (norm 0,45 – 1,7) and 1,5 ± 0,7 mmol/L (p = 0,3). The concentration of HDLc boys - 1,3 ± 0,36 mmol/L (norm 0,91 – 1,91), girls - 1,26 ± 0,33 mmol/L (p = 0,3); VLDLc - 0,63 ± 0,37 mmol/L (norm 0,3 – 0,45) and 0,66 ± 0,33 mmol/L (p = 0,2). LDLc boys – 2,92 ± 0,9 mmol/L (norm < 3,3), girls – 2,86 ± 1 mmol/L (p = 0,9). AC boys 2,8 ± 1 (norm 2-3), girls – 2,9 ± 1,2 (p = 0,7). Basal and postprandial plasma glucose levels didn't exceed normal limits regardless of gender (ð = 0,08). Ins boys 28,1 ± 3,5 mU/ml (2,1 – 22), girls 25,1 ± 4,5 mU/ml (ð = 0,5). HOMA-IR boys 6,7 ± 0,8 (< 2,77), girls 5,5 ± 1 (ð = 0,5). CARO boys 0,3 ± 0,12 (> 0,33), girls 0,2 ± 0,02 (p = 0,6).

Conclusions. The development of arterial hypertension (boys - 40,9%, girls - 40,7%) and steatohepatosis (boys - 37,8%, girls - 35,2%) were observed in children with obesity. Insulin resistance with maintaining the basal and postrandial normoglycemia was noted by conducting OGTT in all patients regardless of gender. It can say about great probability of futher development of DM2 in children with obesity.

Poster no. 62. — Decrease of insulin sensitivity, from obesity through pre - diabetes - importance of Matsuda index

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Background. Increased insulin resistance (IR) and decreased insulin sensitivity (IS) characterize obesity and early glycoregulation disorders: impaired fasting glucose (IFG) and impaired glucose tolerance (IGT). Incidence of metabolic syndrome (MS) is increasing with glycoregulation disturbances increasing the risks for atherosclerotic complications. In this study we used Matsuda index of whole-body insulin sensitivity derived from the oral glucose tolerance test (OGTT), which represents a composite of both hepatic and peripheral tissue sensitivity to insulin.

Objectives. To examine IS and IR in obese and prediabetic patients, and analyze thrombotic, inflammatory factors, microalbuminuria and HbA1C as the risk factors for developing atherosclerotic complications.

Methods. The study included 434 obese individuals (age over 45, body mass index (BMI) >25 kg/m2) classified into four groups: I-obese (245); II-IFG (103); III- IGT (86). OGTT was used to evaluate the extent of disorder. IDF classification was applied for diagnosing MS, IR was determined by homeostatic model assessment (HOMA IR). IS was determined by Matsuda index of whole-body insulin sensitivity (10 000/square root of (fasting glucose x fasting insulin) x (mean glucose x mean insulin during OGTT). Serum CRP was measured by immunometric assay. Plasminogen activator inhibitor (PAI-1) was deter-

mined by plasminogen substrate essay. Microalbuminuria was determined immuno-nephelometrically.

Results. Blood pressure, HbA1C and HOMA IR values followed the progression of disorders. Matsuda index represents decreasing of insulin sensitivity in advanced stages of the disorders. WC: (I-103.9±15.5, II-105.7±17.9, III-100.5±16.4 cm), HbA1C (I-5.6±0.8, II-5.7±0.5, III 5.8±0.5), CRP (I-6.2±6.0, II- 5.9±6.0, III-8.1±11.6mg/l), PAI-1(I-5.3±.2.3, II- 4.5±3.4, III- 4.6±2.0U/ml) and microalbuminuria(I-49.7±72.5, II- 61.9±68.0, III-41.0±39.6mg/24h). Correlations: Statistical significance has been proved between groups: HOMA IR (p<0.0l), Matsuda index (p<0.0l), HbA1C (p<0.0l), microalbuminuria (p<0.105). MS was found (I-61%, II- 84.4%, III- 80.5%). In advanced stage of the disease patients with MS had increased IR and decreased IS: HOMA IR (I-6.0±5.3, II-6.1±3.7, III 8.8±9.5), Matsuda index (I-5.1±3.5, II 4.6±2.7, III- 2.6±1.7).

Conclusions. Decreased insulin sensitivity presented as decreased Matsuda index, exists in obesity and decreases more in pre-diabetes. Correlations of insulinemia with WC and HOMA IR confirm the importance of abdominal obesity in disorder etiopathogenesis. Highly important correlation of 0, 30 and 120 min glycemia with HbA1C, HOMA IR confirms the connection of increased IR and decreased IS with the progression of glycoregulation disorder. Our early results indicate beneficial effects of mediterranean diet (rich in integral carbohydrates, dietary fibers and monounsaturated fatty acids) on obesity, insulin sensitivity, glycoregulation, lipid status, blood pressure and antioxidant protection in primary prevention of diabetes mellitus type 2 and atherosclerosis.

Poster no. 63. — Evaluation of a novel multimedia approach to delivery of lifestyle intervention for diabetes prevention and cardiovascular risk reduction

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Background. The Group Lifestyle Balance (GLB) Program is a comprehensive lifestyle behavior change program adapted directly from the successful lifestyle intervention used in the Diabetes Prevention Program (DPP), which demonstrated a 58% reduction in risk for diabetes. Members of the original DPP lifestyle core, who guided the development and administration of the lifestyle intervention for all sites, collaborated to adapt and update the individual intervention to the GLB program, with a recommended delivery schedule of 12 core, 4 core transition, and 6 monthly support sessions during the course of a 1-year period of time. The GLB program has been shown to be effective in reducing risk factors for diabetes and cardiovascular disease (CVD) in several settings. A DVD of the 12 GLB core sessions was created in collaboration with the US Air Force to provide an alternate program delivery mode. Options for translation of lifestyle intervention to community settings are currently being investigated as it is likely that the "best" mode of delivery will vary by setting and individual.

Objectives. The purpose of this presentation is to describe the evaluation of the GLB program delivered via DVD with remote telephonic coach support.

Methods. As in the DPP, the goals of the GLB program include a weight loss of 7% and achievement and maintenance of at least 150 minutes/week of moderate intense physical activity. The GLB-DVD was evaluated along with traditional group GLB delivery in both a primary care practice (PCP) and a worksite setting (WS). Individuals with pre-diabetes and/or the metabolic syndrome were enrolled in both settings. Upon enrollment, participants in both settings chose either GLB-DVD or GLB-Group delivery. Participants who selected GLB-DVD delivery viewed one DVD session each week and a trained prevention professional contacted each participant weekly via telephone to provide support. WS participants were also invited to attend monthly group meetings. Participants in GLB-Group met face to face with a prevention professional weekly, transitioning to bi-weekly and then monthly sessions or contacts. Participants completed baseline, post-intervention, and 12MO assessments.

Results. A total of 48 (26 female, 14 male) and 60 (34 female, 26 male) participants completed the GLB program via GLB-DVD or GLB-Group at PCP and WS respectively. At post-intervention, mean weight loss for GLB-DVD and GLB-Group following intention to treat analysis was -11.8 lbs (5.6%) and -13.9 lbs (6.6%) in PCP, and -11.5 lbs (5.5%) and -7.9 lbs (4%) in WS. Significant decreases in HbA1c, waist circumference and BMI were noted for GLB-DVD in both settings, with significant decreases in total cholesterol, systolic and diastolic BP noted for GLB-DVD in PCP. A similar trend was noted for total cholesterol for GLB-DVD (0.07) in WS). Significant decreases in weight and other risk factors for diabetes continued to be noted for GLB-DVD at 12MO in both settings.

Conclusions. These results suggest that the GLB-DVD with remote telephone support appears to be effective and similar to traditional group delivery mode in reducing risk factors for diabetes and CVD. The GLB-DVD may provide an effective option for individuals at risk who choose not or are unable to participate in face to face group meetings.

Poster Session 1.8
Risk scores/prediction/screening

Poster no. 64. — Predictive value of risk factors for the progression from prediabetes to type 2 diabetes

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Background. Diabetes and prediabetes have become major public health problems in recent decades, and are increasing in prevalence around the world.

Objectives. The aim of the present study was to evaluate the predictive value of different risk factors and their changes with time on the progression from prediabetes to type 2 diabetes.

Methods. A total of 383 subjects (213 females and 170 males), at mean age 51.93±13.47 years and mean BMI 29.11±5.3 кг/м2, divided in three groups according to glucose tolerance - 147 with normal glucose tolerance, 122 with impaired fasting glucose (IFG) and 114 with impaired glucose tolerance (IGT), were included in the study and were followed-up about a year (13.4±2.2 months) later. OGTT was performed in all participants and the categories of glucose tolerance were defined according to 2006 WHO criteria. We have assessed anthropometric, laboratory parameters (fasting and 2-hour plasma glucose, HbA1c, lipids, hsCRP, insulin, proinsulin), arterial blood pressure, body fat mass.

Results. Progression rates from IFG and IGT to diabetes over 1 year were 12.08 and 19.91 per 100 person-years, respectively. Baseline determinants of progression from IFG to diabetes were found to be age, systolic blood pressure, insulin resistance (HOMA-IR), lack of daily fruit and vegetable intake, hsCRP; and from IGT to diabetes – overweight and obesity (BMI), waist circumference, insulin resistance (HOMA-IR), basal insulin secretion (HOMA-%B), lack of daily fruit and vegetable intake. Baseline proinsulin level and proinsulin:insulin ratio appeared to be independent predictors for progression to diabetes in both IFG and IGT. The most significant predictors for the progression from IFG to diabetes were found to be the increase in HbA1c, BMI, waist circumference, systolic blood pressure, total cholesterol and triglycerides for one year, and for progression from IGT to diabetes – the changes in HbA1c, BMI, body fat mass, systolic and diastolic blood pressure.

Conclusions. Individuals with IFG or IGT identified through high-risk strategies in a Bulgarian population, have a rather high risk of developing diabetes within one year. The changes in glucose measures, body weight, waist circumference, body fat mass, total cholesterol and triglycerides, systolic and diastolic blood pressure are significant determinants of progression to diabetes, which implies for adequate measures for their control aiming at prevention of the disease.

Poster no. 65. — Quality and inequality of clinical pathways in diabetes management AEQUITAS study project

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Background. The appropriateness of care process in diabetes treatment represents one of the main goals of healthcare services. Independently of the income level of a country, subject's socio-economic status is associated with diabetes incidence; social inequalities are also associated with metabolic control and use of healthcare services for patients with diabetes.

Objectives. AEQUITAS is a study aimed to evaluate social and geographic differences in the appropriateness of diabetes management, in Marche Region, Italy; to estimate the prevalence of diabetes; to evaluate the diabetes clinical pathways; to assess the quality of data obtained linking different administrative databases and registries. In this abstract the project protocol and some preliminary results are presented.

Methods. AEQUITAS is an observational, multicenter study based on subjects with diabetes in care with 91 General Practitioners (GP) working in Marche Region and participating to the regional network of GPs. Data are obtained from electronic GPs' databases, regional hospital discharge database, databases of laboratory analyses in the diagnosis and management of diseases, databases for free of charge complete medical care and drug therapy, database of 13 diabetic centers in Marche Region and national administrative registry of the Treasury department. The rate of avoidable admissions and metabolic control measures are used as indicators of appropriateness in diabetes management. Socio-economic deprivation index, median income for census districts and years of education are used as inequality indicators. The treatment appropriateness variability is evaluated analyzing the association between appropriateness indicators and social, geographic, economic and anamnestic characteristics of subjects. The period prevalence is calculated for years 2003-2005, 2006-2008 and 2009-2010.

Results. AEQUITAS is in progress. To date we have collected data from 52 GPs and from 2 databases of Regional Health agency, which allow a preliminary estimation of the prevalence. We detected 3 946 (51.5% M) patients with diabetes in 2003-05, 4 996 (53.0% M) in 2006-08, 5 354 (52.7% M) in 2009-2010. The raw

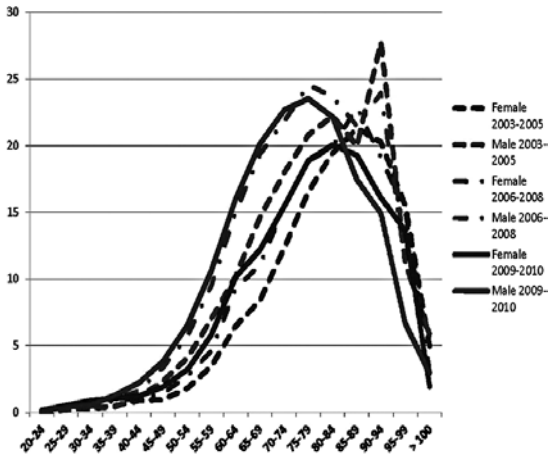

Figure 1.—Quality and inequality of clinical pathways in diabetes management aequitas study project.

prevalence results of 6.74% (CI95% 6.54%-6.95%) in 2003-2005, 7.30% (CI95% 7.00%-7.61%) in males and 6.23% (CI95% 5.96%-6.51%) in females, and 8.16% (CI95% 7.95%-8.37%) in 2009-2010, 9.08% (CI95% 8.76%-9.40%) in males and 7.33% (CI95% 7.06%-7.61%) in females. The figure below shows the period prevalence of diabetes according to age and gender distribution.

Conclusions. Using GPs' medical record databases as primary data source, AEQUITAS project allows carrying out reliable analysis. The reason is that a general practitioner for free as part of the National Health System (NHS) cares for all the residents, irrespective of social class and institutionalization. In Italy, primary care for persons with diabetes is mainly provided by specialized diabetes clinics. Nevertheless, patients need their GP prescriptions to obtain drugs and other. Hence the GPs detect every case of diabetes among their patients, regardless of severity.

Poster no. 66. — Occupational health care prevents risk factors for type 2 diabetes and cardiovascular disease

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Background. Occupational health care (OHC) is an important part of Finnish health care system covering 80% of the working population. OHC has an excellent opportunity to influence employees' health by offering preventive actions. A new role of OHC in promoting health is arising in conjunction with the aim of preventing work-related illnesses.

Objectives. The aim of the study was to test if a lifestyle intervention given by OHC is efficient to decrease risk factors for type 2 diabetes (T2D) and cardiovascular disease among employees of an airline company.

Methods. The renewed health check-up of OHC consisted of physical examination, blood tests, and questionnaires. T2D risk test FINDRISC score ≥10 and/or elevated, but non-diabetic blood glucose were used to identify employees with an increased risk of T2D. All employees participating in the study received health counselling by a physician or a nurse. Those with elevated T2D risk were offered lifestyle intervention sessions by a dietician and/or a diabetes nurse. During these meetings the participants' dietary, physical activity and other lifestyle habits were evaluated and individual lifestyle change plan was agreed upon. Two and half years later (min 1.3, max 4.0 years) participants were invited to a follow-up study encompassing the same measurements, questionnaires, and blood tests as at baseline.

Results. At baseline (n=2239) FINDRISC score points, body mass index, and all traditional risk factors for cardiovascular disease were higher in men than women. 31% of all participants (35% of men, 26% of women) had increased T2D risk and 53 % of them agreed to participate in lifestyle intervention (52% of men, 53% of women). 1485 persons (66 % of the baseline participants) took part in the follow-up study, men more often than women (69% and 64%, respectively). The attendees of the follow-up were three years older and the male attendees were more often married (82% and 76%) and non-smokers (79% and 71%) compared to the non-attendees. Day workers participated in the follow-up more frequently than shift workers (men 72% and 67%, women 72% and 60%, respectively). Otherwise the groups did not differ significantly. In the low diabetes risk group men gained weight 0.8 kg and women 1.4 kg during the follow-up. Their waist circumference increased 0.3 and 1.2 cm, total cholesterol 0.21 and 0.20 mmol/l, LDL cholesterol 0.20 and 0.32 mmol/l, and fasting plasma glucose 0.32 and 0.26 mmol/l, in men and women, respectively. However, the men with an elevated risk of T2D lost weight 0.3 kg, their total and low density cholesterol decreased 0,06 mmol/l and fasting plasma glucose increased less (0.19 mmol/l) compared to the low risk men. Weight loss of 5% was achieved by 16% of the elevated T2D risk men (19% of those who took part in sessions with the dietician or the diabetes nurse) compared with 7.4% of the men with low risk.

Conclusions. The health check-up of OHC effectively identified employees with an increased risk of T2D. The men with elevated T2D risk benefitted from the renewed health check-up.

Poster no. 67. — Genome-wide association study for glucose intolerance in Xavante population

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Background. In the last years, Brazilian Xavante Indians have experienced a marked transformation in nutrition and lifestyle. These changes resulted in a significant increase in prevalence of obesity and type 2 diabetes. In the last decade, a great improvement in the knowledge about the genetic component of diabetes have been made. Genome wide studies have dramatically increased the number of known type 2 diabetes susceptibility loci and isolated population can offer advantages for genome-wide mapping studies of inherited disorders.

Objectives. We performed a GWAS for glucose intolerance in Xavante population to identify novel susceptibility alleles.

Methods. DNA from 150 cases (glucose intolerance) subjects and 150 control subjects with normal

glucose tolerance were genotyped on Human Omni Express Bead Chip plataform (Illumina, San Diego, CA, USA). A total of 731,442 SNPs were tested for association with glucose intolerance. Genome-wide association tests were performed using the statistical analysis FASTA software.

Results. Despite no SNP reached a genome-wide significance level, the top SNPs associated with glucose intolerance in Xavante population were identified. The strongest association mapped to variants in MTHFD1L (rs9322301, rs6923669 , rs3849793, rs9397032), variants in an intergenic region of chromosome 5 (rs712624, rs712623) and chromosome 7 (rs13311400, rs2428427) and variants in DNAH17 (rs11654661, rs894976).

Conclusions. A initial examination of a GWAS for glucose intolerance in Xavante Indians identified SNPs in regions which have not been previously reported in others populations. Further replication of these SNPs in a largest group of this population is necessary to confirm these associations.

Poster no. 68. — Prediabetes screening in South Asians using the Canadian Diabetes Risk Assessment (CANRISK) tool

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Background. According to Statistics Canada (2006) census, South Asians are the largest visible minority group in Canada. South Asians are at 3 to 5 times increased risk of developing diabetes than the general population. South Asians also develop diabetes at a relatively younger age and there is a rapid progression of prediabetes to diabetes in South Asians as compared to other populations. Primary prevention is important to reduce burden of diabetes in South Asians.

Objectives. The objective of the study was to use Canadian Diabetes Risk Assessment (CANRISK) tool developed by the Public Health Agency of Canada to screen for prediabetes in South Asians.

Methods. 280 South Asians (29% males and 71% females) from Greater Vancouver, British Columbia between the ages of 30-74 completed the CANRISK questionnaire developed in both English and Punjabi. Subjects did both the fasting blood glucose (FBG) and two hour glucose tolerance test.

Results. Mean age of the subjects were 52.6 years and 41% subjects had normal BMI (<25). 44% males had normal waist circumference (<94 cm) and 10% females had normal waist circumference (<80 cm). 66% subjects did daily brisk physical activity and 88% had daily consumption of fruits and vegetables. Overall we identified 14.6% subjects with impaired glucose tolerance (IGT), 6.8% subjects in the diabetes range, 2.5% with impaired fasting glucose (IFG), and 2.1% with both IFG and IGT. Life style interventions on healthy eating and physical activity were provided to all the participants.

Conclusions. Our study indicated high prevalence of IGT in South Asians which would not have been detected using FBG alone. It appears that CANRISK tool can be used to stratify South Asians with prediabetes and glucose tolerance test appeared to be a better screening test for South Asians. Life style interventions program can be implemented to prevent the progression of prediabetes to diabetes.

Poster no. 69. — Diabetes and dental interface:a measuring and management tool for primary care dental practitioners and their teams

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Background. There has been an established link between diabetes and oral health for a number of years. More recent evidence supports a reciprocal link, we have developed a measuring and management tool aimed at primary care dental practitioners. This tool will enable dental teams to identify areas in a patient's mouth that may be impacting on their glycaemic control, and allows monitoring over time to help measure improvement. It also allows the impact of these changes on glycaemic control to be correlated. In creating the tool consideration was given to the factors of time and investment as primary care practitioners will need to consider these when offering additional services to patients. As most diabetic patients who see the dentist are likely to be seen in the primary care setting it is clear that the tool needs to be fulfil these requirements.

Objectives. To create a tool that can be used by primary care dental practitioners and their teams to identify oral inflammation that may be having an impact on glycaemic control, and use it to prescribe appropriate management.

Methods. The patients were assessed using the diabetes/dental matrix as a baseline. A treatment plan was formulated based on the results. The aim of the treatment plan was to eradicate inflammation or factors that may be leading to inflammation. They were reassessed at 3 months and 6 months.

Results. The measurements will be continued over a longer period of time, however as the results showed positive outcome after 6 months we have presented these preliminary findings. In all cases the dental component of the scoring system improved (as one would expect). In all but 1 case the HBA1c improved. That patient was very well controlled at the outset. In 3 patients there was an improvement in blood pressure.

Conclusions. We believe this matrix is a useful tool that can be utilised by general practitioners/dental providers in primary care to help them identify areas in a patient's mouth that could be impacting on their glycaemic control. Most practices would be able to use the system with very little additional investment, and once it has been used a few times it only takes 20-30 minutes of clinical time much of which can be as part of a normal examination, and most, if not all, can be carried out by hygienist and therapists. Some aspects can be carried out by an appropriately trained nurse.

Poster no. 70. — The development and validation of the Portuguese risk score for detecting type 2 diabetes and impaired fasting glucose

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Background. A population based screening study showed a prevalence of undiagnosed diabetes of 5.1% in a Portuguese population, with 23.2% in the high risk category of impaired glucose regulation. Studies have suggested that early detection of abnormal glucose tolerance and appropriate intervention can reduce progression to T2DM and potentially mortality from cardiovascular disease.

Objectives. The aim of this study was to develop and validate a simple score which can be completed by a lay person for detecting impaired fasting glucose (IFG) and type 2 diabetes (T2DM) for use in a Portuguese population.

Methods. We used data from 3,374 individuals aged 18-94 years from a cross-sectional study carried out across Portugal. We developed a logistic regression model for predicting IFG and T2DM (both diagnosed using fasting glucose) using data from anthropometric measurements and self-reported questionnaires. Using the best fitting model we developed the Portugal Risk Score. We externally validated the score using data from two cohorts of the EPI-Porto study, baseline cross-sectional data (n=2,131) and also data from the 5 year follow up of the study (n=1,304).

Results. The final model included age, sex, BMI and hypertension with an area under the ROC curve of 70.1 (95% CI 68.4, 71.7) and acceptable agreement between the observed and predicted estimates (Hosmer–Lemeshow χ^2=13.0, p=0.11). Using a cut point which classifies 50% of the EPI-Porto baseline data as high risk gave sensitivity of 73.2% (95% Confidence Interval (CI) 77.9%, 85.8%), specificity 47.8% (95% CI 55.5%, 57.8%), positive predictive value 27.0% (95% CI 24.3%, 29.8%) and a negative predictive value 90.2% (95% CI 88.3%, 92.0%) for IFG/T2DM. Using the same cut point on the prospective data 53% would be classified as high risk with sensitivity of 77.8% (95% CI 72.5%, 82.4%), specificity 55.7% (95% CI 52.3%, 59.0%), positive predictive value 36.4% (95% CI 32.6%, 40.4%) and a negative predictive value 88.5% (95% CI 85.5%, 91.0%).

Conclusions. The Portuguese Risk Score can be used to identify those at high risk of both prevalent and incident IFG and T2DM. The score is very simple (4 questions – age, sex, BMI, and hypertension) and does not require input from a health care professional or invasive tests.

Poster no. 71. — Diagnostic inertia for diabetes in a mediterranean region: a whole population study. The ESCARVAL study

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Background. In 2001, Philips defined the concept of clinical inertia. A few years later, Andrade defines therapeutic inertia. After analyzing all electronic medical re-

TABLE I.—*Diagnostic inertia for diabetes in a mediterranean region a whole population study.The escarval study.*

	Total N=870405	Inertia Yes N=21208 (2.4%)	Inertia No N=849197 (97.6%)	Adjusted OR
Has The Physician Done The Course?:				
Yes	138204 (15.9)	2677 (1.9)	135527 (98.1)	0.753
No	732201 (84.1)	18531 (2.5)	713670 (97.5)	
Gender:				
Male	359059 (41.3)	11445 (3.2)	347614 (96.8)	1.742
Female	511346 (58.7)	9763 (1.9)	501583 (98.1)	
Atrial Fibrillation:				
Yes	28330 (3.3)	1053 (3.7)	27277 (96.3)	0.981
No	842075 (96.7)	20155 (2.4)	821920 (97.6)	
Hypertension:				
Yes	440701 (50.6)	12756 (2.9)	427945 (97.1)	1.119
No	429704 (49.4)	8452 (2.0)	421252 (98.0)	
Dyslipidemia:				
Yes	446503 (51.3)	9453 (2.1)	437050 (97.9)	0.744
No	429902 (48.7)	11755 (2.8)	412147 (97.2)	
Cardiovascular Event:				
Yes	74086 (8.5)	2542 (3.4)	71544 (96.6)	0.940
No	796319 (91.5)	18666 (2.3)	777653 (97.7)	
Number Of Visits	1.5 (1.9)	1.6 (2.1)	1.5 (1.9)	0.982
Age (Years)	63.7 (12.6)	69.8 (12.9)	63.6 (12.5)	1.038

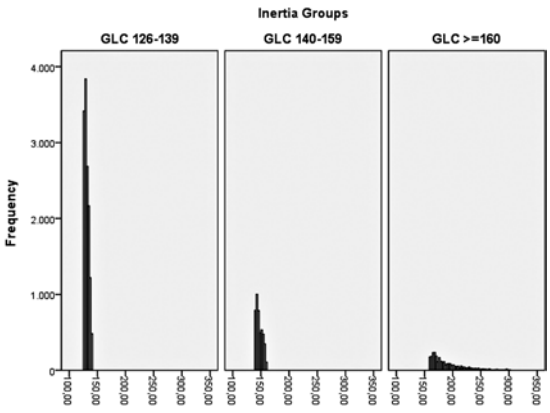

Figure 1.—Diagnostic inertia for diabetes in a mediterranean region a whole population study. The escarval study.

cords of individuals aged 45 years or more with glucose screening of Valencia within the ESCARVAL Project (ESTudio CARdiometabolico VALenciano), we identified in non-diabetic population 2.4% of individuals with blood glucose values altered (GLC> = 126 mg / dl) and are not diagnosed with diabetes. This study shows that a number of factors that are associated with this problem and solved that ostensibly improve the level of knowledge of diabetes in the population.

Objectives. To analyze the magnitude of inertia diagnostic in a broad non-diabetic population in a Mediterranean European region. To identify associated factors. To analyze the influence of a one year online course about cardiovascular and diabetes prevention.

Methods. Electronic health records from all population in Valencian Region (5.120.343) were analyzed selecting people without a previous diagnostic of diabetes, over 45 years old and Diabetes Screening (870405). Associated factors influencing diagnostic inertia were analyzed including if the online course was made or not by the PCP. The definition of inertia diagnosed by clinical history (GLC> = 126 mg / dl and no indication of impaired clinical status) is based on Philips as indicated by failure in the initiation of treatment when indicated. Consequently, the diagnostic inertia would not indicate it, the diagnosis of diabetes if screening is altered (inertia of screening), or does not indicate whether the diagnosis of diabetes, the diagnosis is impaired (inertia confirmed). We define three types of inertia: limit (GLC 126-139), slightly altered (GLC 140-159) and altered (GLC> = 160).A logistic regression was applied.

Results. 2.4% of population over 45 years with Diabetes screening has been inertia (n=21208). The associated factors were: Has the Physician Done the Course? (OR 0.753); Male (OR 1.742), Age (1.038), Atrial Fibrillation (OR 0.981), Hypertension (1.119), Dyslipidemia (0.744), Cardiovascular Event (0.940), and Number Of Visits (0.982). See table 1. 65.1% de population with inertia has inertia limit, 21.4% slightly altered and 13.5% altered. The distribution of the GLC in these three groups is shown in Figure 1.

Conclusions. Will recognize a new problem that can be easily solved by recording the computer system through alarm systems. An estimated its magnitude and factors to overcome the inertia associated diagnosis.

Poster no. 72. — The prevalence of abnormal glucose tolerance and its risk factors in the adult population of Latvia, the cross-sectional study

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Background. The prevalence of abnormal glucose tolerance (AGT), including type 2 diabetes and its risk factors is increasing around the world. There has not been done any prevalence study in Latvia to estimate the burden of AGT nor studies on the screening methods to detect people with the high risk for AGT.

Objectives. To assess the current prevalence of abnormal glucose tolerance (AGT), its risk factors and to suggest the possible screening tools to detect people with the high risk for AGT.

Methods. A cross-sectional survey among the

TABLE I.—Risk factors agt.

	Total number (%)	Men (%)	Women (%)
BMI			
<25 kg/m²	32,2%	29,8%	33,6%
25-29.9 kg/m²	37,7%	44,6%	33,7%
≥ 30 kg/m²	30,1%	25,6%	32.6%
Smokers	19,2%	30,5%	11,4%
Arterial hypertension	45,4%	53,0%	40,0%
Hypercholesterolemia	75,2%	72,0%	78,0%
Hypertrigliceridemia	27,0%	33,9%	24,1%

25-74-years old population randomly selected from the Latvian population register was carried out in 2009. The total number of population in Latvia was 2,26 million people. The study sample was 6000 adults stratified by gender and 10-year age-group. The survey consisted of the questionnaire, objective measurements such as height, weight, waist circumference, blood pressure as well as blood samples of oral glucose tolerance test, total cholesterol and its fractions.

Results. The final study sample consisted of 4080 people, corresponding to the response rate of 68%. Already diagnosed cases of type 2 diabetes were excluded from analysis. The mean fasting glucose level reached 5,47 mmol/l (SD±1,28) The prevalence of newly diagnosed type 2 diabetes was 5,3% (95%CI = 3.5-7.1), impaired fasting glucose (IFG) was 15,8% (95%CI = 12,9–18,7) and impaired glucose tolerance (IGT) was 11,8% (95%CI = 9,5-14,1). The prevalence of AGT increased significantly with age ($p<0.001$) and was higher in men than in women ($p<0.001$). Body mass index (BMI) ≥ 25kg/m2 amongst men and women reached 70,2% and 66,3% accordingly. The prevalence of smoking for at least for one year was 56,3% of men and 20,5% of women. The prevalence of arterial hypertension was 45,4% of total population.

Conclusions. This study was the first cross national study revealing the prevalence of the AGT in the representative sample of adult Latvian population. It showed high prevalence of AGT and its risk factors in the local population with an average AGT prevalence of 17,5% . As in other countries gender and age differences were found. If only fasting glucose measurements are used to screen for AGT, 11,8% of people with AGT remain undetected.

17.30 - 19.00 Oral Communications

Track 3: Session 1.3.3
National Diabetes Prevention Programs. Asia/ Pacific Region

From small implementation trial to large scale population program in diabetes prevention: what gets lost in translation? Participant experiences from Australia

[1]Andrea Hernan,
[2]Christine Walker, 1. James Dunbar on behalf of the Melbourne Diabetes Prevention Study research group

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Background. The Greater Green Triangle Diabetes Prevention Project (GGT DPP) was a lifestyle intervention program implemented in a primary health care setting during 2004-2006 in South East Australia. Adults at moderate to high risk of type 2 diabetes (n=311) participated in a series of structured group-counselling sessions facilitated by trained health professionals. The group sessions aimed to motivate and support participants to adopt lifestyle changes through modifying diet and physical activity levels. This successful small efficacy trial, as part of the experience in Victoria, was scaled up to a population program to the Life! Taking Action on Diabetes (Life!) program, which is available to Victorians 50 years of age and over at high risk of developing diabetes. The Melbourne Diabetes Prevention Study (MDPS) is a scientific study to evaluate the Life! program.

Objectives. Understanding how to implement interventions on a large-scale is the next step in the process of translating diabetes prevention into multiple and multi-level population strategies that span the state or national stage. Participant experiences from both the GGT DPP and MDPS provided an opportunity to identify what was lost and gained, and recommendations for improvements during translation from small scale to state-wide implementation of a diabetes prevention program.

Methods. Focus groups were conducted with participants who had completed the GGT DPP and MDPS. Discussions focused on recruitment, awareness of risk factors, experience of the group, personal achievements and outcomes, program presentation, content and structure, sustaining behaviour changes and suggested program improvements. Thematic analysis was undertaken to categorise dominant topics into overarching themes, to compare results between both groups and explore impacts on participants.

Results. A total of 29 participants from the GGT DPP, and subsequently nine participants from the MDPS took part in the focus groups. Overall most participants were engaged by the programs and sustained lifestyle changes over varying periods of time, in the case of the GGT participants up to three to five years. When comparing the themes that emerged from both groups; MDPS participants identified some differences to the GGT DPP participants. It was observed that MDPS participants were not as aware of their risk factors for diabetes, showed little concern for their cardiovascular risk factors, experienced inconsistencies with program presentation, and considered some facilitators to be more motivating than others. Recommendations for program improvement included personalised attention and feedback, increased group interaction and peer led discussions through advanced facilitator training.

Conclusions. The findings suggest that some effective aspects of the GGT DPP could be lost during translation from a small trial to the population wide roll out of the Life!. Recommendations provided by focus group participants will contribute to continued quality improvement practices over the course of the implementation of the Life!, particularly regarding delivery, content and structure. The findings have also strengthened recognition of participants as important sources of information about programs effectiveness, their acceptability, uptake, reach, and appropriateness. Evaluations of this nature can determine program fidelity and sustainability, which is particularly important for future type 2 diabetes prevention research and practice.

Preventing diabetes in pregnancy from progressing to type 2 diabetes: macrolevel system change in south Australia and Victoria: the MAGDA program

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Background. Gestational diabetes mellitus (GDM) is the strongest single population predictor of type 2 diabetes. At least 50% of women who have GDM will go on to develop diabetes. Few interventions have been designed specifically for this group. The MAGDA program will implement a system change to reduce the risk of progression to diabetes. Partners include the Department of Health Victoria and South Australia Health, Diabetes Australia Victoria, researchers, clinicians and consumers.

Objectives. To evaluate the effectiveness of a policy based on system change in South Australia and Victoria to prevent the progression to type 2 diabetes post GDM.

Methods. Project 1: Screening, GDM register and recall The Australian National Gestational Diabetes Register (NGDR) for all women who have GDM has been established. Annual reminders to attend their family doctor for checkup have been sent out since 1 July 2012. A clinical guideline for GPs following up these women has been produced. An evaluation of the effectiveness of the NGDR is obtained from registration completeness (compared with state perinatal records), effects on OGTT/FBG testing rates in laboratories as a surrogate measure of the effectiveness of patient recall, and follow-up using unique privacy-protecting record linkage to link previously inaccessible administrative and clinical datasets. Project 2: Randomised controlled trial of Diabetes Prevention Program post-GDM (GDM-DPP) A lifestyle modification program adapted for post-GDM women is being tested in 600 postpartum women from three hospitals randomized to intervention vs usual care. Changes from baseline in anthropometric measures, fasting and 2hour OGTT glucose and cardiovascular risk factors will allow comparison of the reduction in diabetes and cardiovascular risk between the two arms. A feasibility study completed in November 2011 with 9 post-GDM women tested the materials and intervention. Recruitment commenced after the feasibility study at three sites to evaluate the effectiveness of the intervention. MAGDA consists of 1 face-to-face, 5 group and 2 telephone sessions. Based on the HAPA model, it includes providing individuals with specific estimates of their risk of developing diabetes and potential risk reduction, and interactive learning activities to improve dietary decision making, activating and coping. Project 3: Economic assessment The economic assessment will cover the screening, recall and GDM-DPP components, both as changes in their own right and as an integrated system change. It will include a Cost-Utility Analysis (CUA) with economic modeling of longer-term impacts; as well as a Cost-Effectiveness Analysis (CEA) combining resource usage data and recruitment/participation and clinical/behavioural outcomes based on trial results. Project 4: Moving from research and policy to operational health services The Government Liaison Group has been established to operationalise the results of projects 1-3. It comprises the two state Chief Medical Officers, the two most senior researchers and relevant staff. At the end of the project the system will be in place across both states for screening, the National GDM register and recall, the GDM diabetes prevention program offered six months postnatally, and indefinite follow-up by family doctors.

Results. See Above.

Conclusions. See Above.

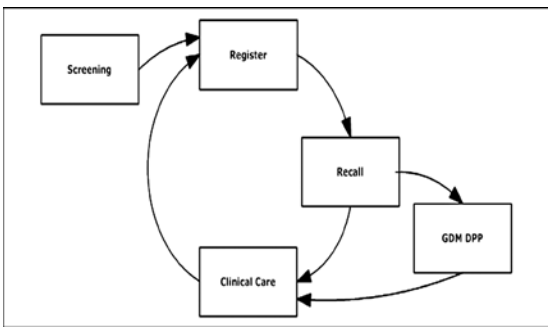

Figure 1.—Macrolevel system change for management_preventing diabetes in pregnancy from progressing to type 2 diabetes.

Diabetes self-risk assessment questionnaire coupled with a multimedia health promotion campaign are cheap and effective tools to increase public awareness of diabetes in a large chinese population

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Background. The prevalence of type 2 diabetes is increasing rapidly in mainland China. Education and lifestyle intervention has been considered to be the most cost-effective way to fight the epidemic of type 2 diabetes and obesity.

Objectives. To evaluate costs and effectiveness of implementing a diabetes self-risk assessment (DRS) questionnaire coupled with a multimedia health promotion campaign (MHPC) on changes in diabetes awareness in a large diabetes prevention program.

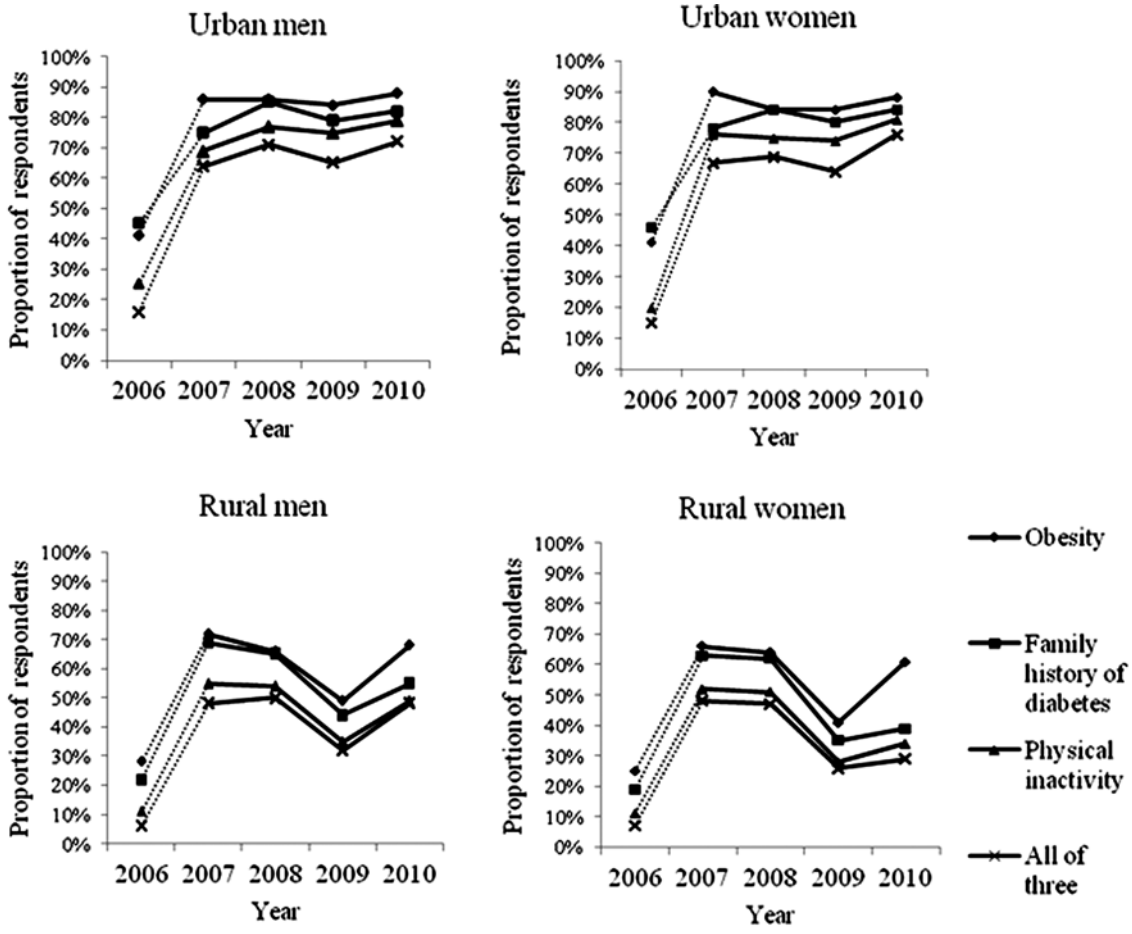

Figure 1.—Diagram diabetes risk assessment and awareness.

TABLE I.—*Diabetes risk assessment and awareness.*

Educational means	Unit cost (€*)	No. of delivery	Total costs	Coverage‡ (%)	Estimated No. of individual exposure	Expenditure (€) per 1000 individuals
Diabetes risk score	3/1000 sheets	1,260,000	3,780	56	705,600	5.4
Booklet	78/per 1000 booklets	724,130	56,482	83	1,803,084†	31.3
Newspaper	150/per article	34	5,100	34	659,600	7.7
Radio	200/time	120	24,000	33	640,200	37.5

*1Euro (€)≈ 10 RMB (¥)

†Estimated that one booklet can covered ~3 family members which is the average family size in Qingdao based on the Sixth National Census in 2010

‡ Assumed as the mean value for the whole areas

Methods. Between 2007 and 2010 a MHPC was conducted targeting the 1.94 million population of Qingdao China, using newspapers, radio programs, distribution of free booklets and DRS flyers. Diabetes awareness questionnaires filled out by people first interviewed in 2006 (survey A) before the initiation of the campaign were compared to those first interviewed between 2007 and 2010 during the campaign period (survey B). The rates of diabetes awareness in both surveys were studied amongst adults aged 35-74 years without a prior history of diabetes but with a DRS of ≥14.

Results. In the survey B, 85%, 82% and 76% of the urban participants correctly recognized obesity, family history of diabetes and physical inactivity as

important risk factors for diabetes; while the awareness rates were 43%, 46%, and 25%, respectively in the survey A (P < 0.001). The corresponding figures among rural participants were 65%, 63% and 53% in the survey B and 29%, 22% and 11% in the survey A (P < 0.001). To cover 1000 individuals the program spent €5.4 on the use of DRS, €31.3 on the education booklet, €7.7 on newspaper campaign, and €37.5 on radio programs.

Conclusions. The combination of a DRS questionnaire with a MHPC is a cheap and effective health promotion tool to raise public awareness of diabetes.

Preliminary results from the long-term follow up of participants in the Sydney Diabetes Prevention Program: Is weight loss maintained one and two years after program completion?

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Background. The Sydney Diabetes Prevention Program (the 'Program') was a translation study, delivered in a community setting through primary health care. The Program tested a modified type 2 diabetes prevention intervention in order to improve nutrition, increase physical activity and reduce weight. Using the Australian Diabetes Risk Assessment tool, doctors screened and referred eligible at-risk patients aged 50-65 years into a 12-month lifestyle modification program (n=1238 began the Program). The intervention consisted of an initial individual session and three group sessions, followed by 3-monthly health coaching contacts and a final review after 12 months. The mean weight loss of those who completed the program (n=850) was 2kgs.

Objectives. To assess if participants who completed a 12-month lifestyle modification diabetes prevention program, reduce, increase or maintain weight one and two years after the program is completed.

Methods. Participants who had consented to be followed up and begun the Program at least three years ago were contacted by computer assisted telephone interview to self-report their health status, diet, physical activity and weight one and two years after they had completed the program.

Results. Of the 232 participants (mean age 59.4, 68% female) able to be contacted the mean weight at program completion was 86.9kgs. At one year and two year follow-up the response rates 88% and 89%, respectively. The mean weight at one year follow-up 83.1kgs (n=183) and at two year follow up 85.1kgs (n=199). There was no significant differences in weight between the three time points. Participants reported they were eating less fat and more fibre, however physical activity had not increased at the one year follow-up.

Conclusions. This moderately intensive diabetes prevention program resulted in modest weight loss after 12 months and participants did not regain the weight after two years. More intensive interventions may be required to reduce or prevent weight gain in the longer term in this population to prevent or delay type 2 diabetes.

Track 4: Session 1.4.3
Physical activity and obesity

Relations between baseline physical activity by pedometer counts and the development of diabetes mellitus in the NAVIGATOR study

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Background. Few clinical pharmacologic trials of diabetes (DM) or cardiovascular disease (CVD) have investigated the effects of lifestyle (physical activity and nutrition) on these pre-defined trial clinical outcomes. In the NAVIGATOR study, 9306 participants with impaired glucose tolerance (IGT) and either CVD or CVD risk factors, were assigned, in a double-blind, randomized fashion to receive nateglinide, valsartan, both or placebo, in a 2-by-2 factorial design, with all participants being provided a lifestyle modification program.

Objectives. To determine the effect of baseline daily physical activity on the development of DM in people with IGT.

Methods. The level of physical activity was measured by 7-d pedometer [Accusplit] records at baseline. Participants were followed for a median of five years for incident DM. In this secondary analysis of the NAVIGATOR trial, we examined the associations between average daily ambulatory activity and development of DM, irrespective of study arm assignment.

Results. Mean daily steps (SD) by quartiles were: 1831, 4652, 7096, and 11240. By five years, 3254/9306 (35.1%) of participants had developed DM. For every 2,000 average daily steps up to an average of 10,000 daily steps, the progression to DM was associated with a reduction of 6% over five years (HR 0.94; 95% CI 0.92-0.96) in an unadjusted analysis, 7% (HR 0.93; 0.91-0.95) when adjusted for age, gender and geographic region, and 5% (HR 0.95; 0.93-0.98) when adjusted for all baseline parameters. The Kaplan-Meier curves for the DM outcome from the lowest to the highest quartile of pedometer step counts by 6-monthly visits (unadjusted analysis) are shown in the Figure. The difference in incidence between the four groups gradually increased over time.

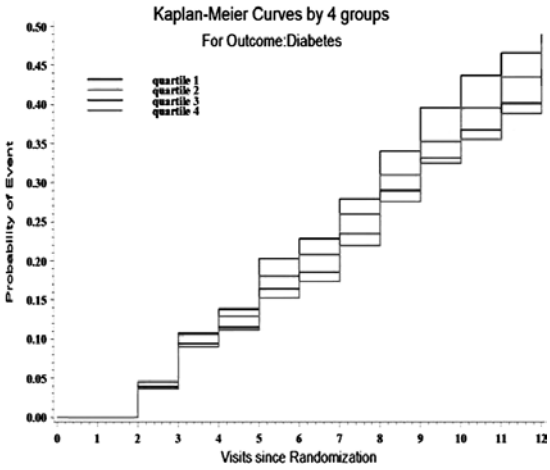

Figure.—Relations between baseline physical activity by pedometer counts.

Conclusions. Increased pedometer step counts at baseline were related to a reduced risk of DM in individuals with IGT and cardiometabolic risk of 24% over 5 years when comparing the highest quartile of the level of physical activity (>10,000 steps/d) to the lowest (<2,000 steps/d). The effect was largely independent of other factors.

Association of Individual Characteristics with Type I or Type II Diabetes

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Background. Metabolic disorders, particularly Type I or Type II diabetes, are among the common clinical disorders occurring in most communities. The main aim of this study was to determine the associated causes of Type I or Type II Diabetis occurrence in patients in IRAN.

Objectives. Determine the associated causes of TypeI- or TypeII Diabetis occurrence in patients in IRAN physical factors psychological factors.

Methods. This study was a cross sectional retrospective study, which was conducted to investigate Type I or Type II diabetes patients and contributing causes of Type I or Type II diabetes occurrence in IRAN. Data were analyzed using t and Chi-square tests

Results. The results show that of 412 patients whom we studied, 28.6% were Type I and and 53.6% were Type II Diabetes. The distribution of ABO blood group phenotype in Type I or Type II diabetes patients was comparable to its normal distribution in the area. The frequency of diabetes was higher in female than male (P<0.005). History of familial marriage was observed in 25% of parents of Type I and in 25.6% of parents of Type II diabetes patients. History of stress was common in 59.7% of Type I and in 64.7 % of Type II patients and a history of negative life events was observed in26.7 % of Type I and in 27.3 % of Type II patients.

Conclusions. Occurrence of Type I or Type II diabetes was more common in females than males. Genetic background, familial history, psychological problems were among the important causes associated with . Type I or Type II diabetes occurrence in patients in IRAN.

Best practice recommendations for school-based primary prevention/ health promotion interventions for NCDs in developing countries - a review of projects supported by WDF

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Background. The onset of diabetes in developing countries now occurs at an increasingly younger age imposing huge economic and capacity constraint on these countries. Healthy lifestyle interventions to address modifiable risk factors in people at high risk have been shown to prevent or delay the onset of type 2 diabetes in different racial, ethnic and socioeconomic settings. As habits and lifestyle are established in childhood and adolescence, targeting children before they develop unhealthy habits offers a big window of opportunity to halt and reverse the current diabetes epidemic.

Objectives. Identify best practice recommendations for school-based primary prevention/ health promotion interventions based on a review of 17 primary prevention and health promotion projects funded by the World Diabetes Foundation in the developing world.

Methods. Data was collected from program implementers using a web-based questionnaire exploring local structural macro-environment, stakeholders and their roles, information regarding chosen interventions, successes, barriers faced and lessons learnt in the course of implementing school based health interventions. Additionally, in-depth interviews were conducted with nine projects further investigating perceptions and experiences. Focus group interviews with project beneficiaries and stakeholders from three programs during a field trip to India provided further in depth understanding of the issues.

Results. Key findings were • A broad public health approach to health promotion and primary prevention in schools is advisable rather than focusing on specific NCDs such as obesity, diabetes or cardiovascular diseases. A broad approach allows for targeting common risk factors increasing the relevance and applicability of the project. • A two-pronged strategy - health-promoting activities implemented to change individual behaviour along with interventions targeting the surrounding school environment are recommended. By applying this approach several dimensions are targeted simultaneously and structural changes are put in place to support individual change. By including parents, school

management, canteens and vendors around the schools, and the community at large a supporting environment encourages sustained changes at the individual level. • To increase understanding and internalisation of the project activities by the students a participatory approach is recommended, as it increases chances of individual behaviour change. Learning practical skills motivate and increase sustainability of the acquired lifestyle. Project activities must be acceptable and applicable to the specific context and target group. • Special attention should be paid to advocacy and publicity to build awareness about the project as it provides opportunity to bring multiple stakeholders, particularly policymakers on-board and positively impact sustainability of project activities. Few projects had planned for follow-up activities, and this is an area that needs special attention.

Conclusions. Structured approach and multidisciplinary activities targeting multiple stakeholders is important for successful implementation of school based health promotion and primary prevention interventions. When done well the activities have ripple effect beyond on the primary targets of the interventions.

Predictors of change in objectively measured and self-reported health behaviours among people with recently diagnosed type 2 diabetes: results from the ADDITION-PLUS trial cohort

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Background. Despite the established importance of a healthy lifestyle for the clinical management of type 2 diabetes, many people with diabetes find it difficult to achieve and maintain health behaviour change after their diagnosis. Little is known about the factors which influence health behaviour change among these individuals. Health behaviours may be influenced by sociodemographic factors, clinical measures, quality of life, beliefs about behaviour change, illness perceptions and knowledge. If it were possible to identify patients who were able to change health-related behaviours following diagnosis of diabetes, future interventions may be better targeted.

Objectives. To (i) assess change in objectively measured and self-reported health behaviours over one year and (ii) examine associations between socio-demographic, clinical and psychological variables, and change in health behaviours among patients with recently (≤3 years) diagnosed diabetes.

Methods. The ADDITION-Plus trial evaluated a behaviour change intervention among 478 patients (mean age 60 years) under intensive UK general practice care. Physical activity was measured objectively at one year (physical activity energy expenditure (PAEE) by combined heart rate and accelerometry monitoring) and by self-report at baseline and one year. Dietary intake was measured objectively (fruit and vegetable intake by plasma vitamin C) and by self-report at baseline and one year. We used multivariable linear regression to quantify associations between baseline socio-demographic, clinical and psychological variables, and health behaviours over one year.

Results. Only women reported increased physical activity levels (mean change ±SD): 0.85±4.86 MET hrs/day. Both men and women showed an increase in plasma vitamin C levels (men: 2.78±21.06, women: 3.91±22.09 µmol/l) and self-reported fruit intake (men: 39.26±218.45, women: 40.03±215.35 g/week) and a decrease in self-reported energy (men: -213.63±552.09, women: -94.88±542.6 kcal/day) and fat intake (men: -10.04±25.64, women: -4.82±25.26 g/day). Men reported increased vegetable intake (19.41±116.25 g/week). Older age (unstandardised β-coefficient [95%CI]: -0.67 [-0.98 to -0.36]), female sex (β 10.9 [7.85 to 13.89]), a larger baseline waist circumference (β-0.35 [-0.49 to -0.22]) and a higher baseline systolic blood pressure (β-0.18 [-0.31 to -0.05]) were associated with lower PAEE levels at one year. Higher plasma vitamin C levels were observed in women compared with men, at one year (β-5.03 [-9.37 to 0.69]). Higher baseline total cholesterol predicted lower fruit intake (β-24.66 [-39.19 to -10.13]) at one year. Beliefs about behaviour change and diabetes did not predict behaviour change.

Conclusions. People with recently diagnosed diabetes who receive intensive treatment in primary care improved their dietary intake, measured objectively and by self-report. Only women reported increases in physical activity. Higher total cholesterol values predicted lower fruit intake and female sex predicted higher plasma vitamin C levels. Older patients, females, those with central adiposity and higher systolic blood pressure at baseline showed lower levels of physical activity at one year. These patients may need more intensive behaviour change support. The current findings add to a limited body of literature and suggest that certain sociodemographic and health factors should be taken into account when targeting health-related behaviour change in a diabetic population.

Implementation of the translated slim diabetes prevention intervention in a Dutch real-life setting: the SLIMMER pilot study

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[2]GGD Gelre-IJssel (Community Health Service); Academic Collaborative Centre AGORA, Apeldoorn, the Netherlands
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Background. Worldwide, several studies in experimental settings have shown that type 2 diabetes can be prevented by a healthy diet and increased physical activity. One of these studies is the Dutch SLIM study. However, such studies are not easily applicable in public health practice. If interventions are to be

translated to practice, adaptations are needed to make the fit with the professional functioning and working standards, the network of local organisations, and the broader societal and health care structure of that setting. The Dutch SLIM intervention has been adapted into the SLIMMER intervention which is applicable in a Dutch real-life setting.

Objectives. The aim of this study is to pilot test the implementation of the adapted SLIM diabetes prevention intervention in a Dutch real-life setting.

Methods. Implementation of the adapted lifestyle intervention SLIMMER was tested in a one-year pilot study, guided by process evaluation. The process indicators (reach, acceptability, implementation integrity, applicability, and key factors for success and failure) were assessed by programme records, observations, interviews and focus groups. Effect measures were taken into account to test the procedure for the elaborated effect evaluation, starting in January 2012. The pilot study was performed by three GPs, three practice nurses, three dieticians and four physiotherapists. In total, 31 subjects participated.

Results. Programme reach was high with an initial response rate of 60% and a drop-out rate of only 6%. Participants were enthusiastic about the programme and satisfied with the deliverance by professionals. Primary health care professionals appreciated the interdisciplinary collaboration. Overall, the intervention was implemented as planned. The SLIMMER intervention was applicable in the Dutch real-life setting; several key factors for success and failure have been identified. Some minor adaptations have been made in order to optimise fit between the intervention and real-life setting.

Conclusions. Based on the SLIMMER pilot, it can be concluded that translation of an experimental trial into Dutch primary health care is feasible. Minor adaptations have been made to the intervention programme. In the next and last phase, we will investigate the (cost-) effectiveness of the SLIMMER intervention in Dutch primary health care.

SECOND DAY - NOVEMBER 13, 2012

09.30 - 11.00 Oral Communications

Track 1: Session 2.1.1
Early detection and prevention
of diabetic retinopathy

Heart rate variability in non-proliferative diabetic retinopathy

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Background. Diabetes Mellitus (DM) is a serious medical and social problem. Elevated blood glucose levels cause pathologic changes in all organs and systems of the human body. DM is a common cause of autonomic neuropathy. Cardiac autonomic neuropathy (CAN) is asymptomatic in one fifth of patients and can be revealed while heart rate variability is assessed.

Objectives. The aim of our work was to study heart rate variability (HRV) and fluctuation of blood pressure in patients with diabetic retinopathy (DR).

Methods. In total, 250 patients with DM were enrolled in the study. Based on clinical data they were allocated to following groups (Gr.): Gr. 1 (controls) – 115 patients with type 1 and type 2 DM, mean arterial blood pressure (ABP) – ≤130/85mmHg, fundus photography grading 10/10; and Gr. 2 (study) where 135 patients were subdivided into Gr. 2a, n=43 type 1 patients with mean ABP ≤130/85 mmHg and fundus photography grading from ≥20/10 to ≤47/47; and Gr. 2b, n=92, type 2 patients with mean ABP ≤160/90 mmHg and fundus photography grading from ≥20/10 to ≤47/47. Diabetes duration in the groups was 7±1,6, 6,6±1,9 и 8,3±2,4 yrs, respectively. According to fundus examination: Gr. 1 – no diabetic retinopathy (DR) was registered; Gr. 2a – mild DR – 28 patients, moderate DR – 15 patients; Gr. 2b – mild DR – 61 patients, moderate DR- 22 patients, severe DR – 9 patients. Heart rate variability (HRV) was assessed based on following parameters: SDNN, PNN50 (%).

Results. In hypertensive patients (Gr. 2b), comparing with normotensive ones (Gr. 1 and 2a) decrease in 24h HRV indices was observed. Besides, hypertension associated with disorders in normal circadian dynamics. While assessing mean 24h circadian HRV data, QT-interval and QT-corrected by Holter monitoring it became obvious that in hypertensive patients, compared to normotensives, QT interval prolongation in daytime was observed.

Conclusions. Thus, elevated ABP in patients with DM is associated with a number of negative electrophysiological shifts in left ventricle myocardium that result in its hypertrophy and dysfunction of the vegetative nervous system. Risk of CAN development depends on the diabetes duration and glycemia control and increases together with development and progression of other complications, such as retinopathy and nephropathy.

Track 2: Session 2.2.1
Primary care and Prevention of Diabetes

Effect of health education in people with early detected dysglycemia: 3 year follow-up (the ADDITION-DK)

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Background. Much research has been devoted to explore the effects of health education and self-management programmes in diabetes prevention as part of an effective intervention strategy. Rather less attention has been paid to the long-term sustainability, and, indeed, if health education can target newly diagnosed groups with prediabetes and diabetes at the same time.

Objectives. We aim to investigate the three-year effects of the

Methods. 509 adults with dysglycaemia were recruited from the primary care type 2 diabetes screening pro-

gramme (the ADDITION- study, Denmark). As a supplement to intensive treatment by the GP the participants were randomised to the "Ready to Act" programme (I: 322; C: 187) focusing on four core components; motivation, action experience, informed decision-making and social involvement. The programme was conducted in two one-to-one sessions and eight group-meetings in a 12-week period (18 hours). In total 436 (86%) were eligible for three-year follow-up analysis. The primary outcome was cardiovascular risk score measured by SCORE. Further haemoglobin A1c levels, blood pressure, BMI, blood lipid levels, smoking status, physical activity (IPAQ), quality of life (EQ5-D), patient activation (PAM) and patient assessment of chronic illness care (PACIC) were measured. Analyses were performed by intention-to-treat supplemented with pre-defined stratified analyses.

Results. A tendency of effect on the cardiovascular risk was shown measured by difference in SCORE: -0.08 (95% CI: -0.18; 0.03). Statistically significant differences were seen for total cholesterol, in favour of the intervention group -0.23 (95% CI: -0.44; -0.03). The stratified analysis revealed the shown effects to attribute those to with prediabetes compared with T2D. No other measures were statistically significant different between the groups.

Conclusions. Three year after the educational programme "Ready to Act" offered to people with screen-detected dysglycaemia a small effect was seen on cardiovascular risk due to cholesterol-levels. The findings are in line with shown effects on 1-year psychosocial outcomes (motivation and perceived competence) and the shown 3-year effect on dietary habits. The effect was particularly advantageous to those with prediabetes compared with T2D, and implies a systematic approach to early detection and intervention of prediabetes.

Three years experience with european DE-PLAN for the prevention of diabetes mellitus type 2 (DM 2) at the national level of Serbia

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Background. Results of Diabetes Prevention Study (DPS) showed that none of those who achieved 5 or 4 targets developed DM2 during follow-up period of 3 years. We showed previously (Belgrade II team, Serbia) that after one year of intervention 6.1% developed DM2 , however the majority who reached 4 targets goals and after 2 years of intervention none of those who achieved 3,4 and 5 targets goals developed DM2.

Objectives. In this study we examined the influence of achieving the targets goals on the probability of developing DM2 after 3 years of intervention.

Methods. 109 participants as a part of European DE-PLAN project in Serbia were subjected to dietary modification and physical activity .The targets goals were the same as those in our previous study including target 3: saturated fat < 10% as the instructions for intensive and continuous intervention. The connection between targets and glycoregulation status after 3 years of intervention was statistically examined using X2 and Kruscal-Wallis tests.

Results. 1.target BMI , 25 kg/m2 or reduction of weight for at least 5% from baseline achieved: 5l.4% participants, 2. target reduction of total fat intake < 30E% 76.9%, 3.target reduction of saturated fat , 30E% 76.9%, 4. target fibre intake > 15 gr/1000 kcal 100%, 5. target physical activity more than four hours/week 61.1%,The statistically significant increase of percentage of reached goals was found for all targets compared with those after 1 and 2 year of intervention. Number of targets reached: 1. 12.8%, 2. 8.3%, 3. 15,6%, 4. 28.4% and 5. 34.9%. Also, the statistically significant increase of percentage of these reached goals was found for all targets .Regarding glycoregulation status: normal 62.4%, IFG 26.6%, IGT 6.,4% and DM2 4.6%. From those achieved 5 and 4 targets normal glycoregulation was 65.8% and 61.3% respectively, IFG 28.9% and 29%, IGT 2.6% and 6.5% and DM2 2.6 and 3.2%.There was not statistical significant difference ($p > 0.05$). .After 3 years of intervention glucose tolerance was improved in 23.6%and did not change in 56.4%, all together in 80% of participants prevention of DM2 was achieved.

Conclusions. The results of this study showed further improvement in comparison with those achieved after 1 and 2 years of intervention. After 3 years of intervention glucose tolerance was not aggravated in majority of risk participants (IGT) and there was only a small percentage of those who reached 5 and 4 targets and developed DM2. These results sustained through 3 years of intervention, indicate that successful primary prevention of DM2 according to diabetes prevention initiative in Europe (DE-PLAN) is feasible.

ALAS program: detection of people at high risk of type 2 diabetes mellitus followed by lifestyle interventions in Madrid, Spain

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Background. The risk of developing type 2 diabetes (T2D) and vascular disease is increased in people with impaired fasting glucose (IFG), impaired glucose tolerance (IGT) or both conditions. A healthy diet, increases in physical activity and weight loss have shown to decrease the likelihood of developing T2D. The City Council of Madrid has implemented in its 18 Health Promotion Centres the "ALAS program" consisting of detection people at high risk of T2D and lifestyle interventions targeting nutritional and physical activity changes in those identified to be at risk.

Objectives. To evaluate the lifestyle habits and risk factor profile of people at high risk of T2D in the Health Pro-

TABLE.—*ALAS program detection of people at high risk of type2 diabtes mellitus followed by lifestyle interventions in Madrid Spain.*

Risk factors	Women (%)	Men (%)
Hipertensión: SBP≥140 mmHg, DBP≥90 mmHg	34	50
Total cholesterol >240 mg/dl	64	40
LDLcholesterol >130 mg/dl	50	32
HDLcholesterol, men: <40 mg/dl, women: <50 mg/dl	5	10
Triglycerides >200 mg/dl	19	19
Abdominal obesity, men: 102 cm; women 88 cm	89	66
Obesity, BMI >30 kg/m^2	58	47
IFG (>100mg/dl)	8	4
IGT (?140mg/dl)	26	17
IFG and IGT	14	23
MDA score ? 9	56	47
IPAQ (<600 MET-minutes/week)	28	14

motion Centres of Madrid and to assess the changes in lifestyle habits and risk factors of T2D in people at high risk.

Methods. Patients older than 35 years-of-age were asked to fill in the Finnish Diabetes Risk Score (FinDRISC) in 2011. If the FinDRISC was ≥15 they were invited to an oral glucose tolerance test (OGTT). People with IFG and/or IGT were invited to participate in a intensive lifestyle intervention (10 group sessions of 2 hours for 6 months) led by a multidisciplinary team and included cognitive and behavioural change strategies as well as group discussions and problem solving strategies techniques. The three personal targets of the lifestyle interventions were: 5-10% weight reduction; acquirement of Mediterranean Diet and 30 minutes of moderate intensity physical activity daily. Before the seminar and at 6, 12 and 18 months intervention participants were measured blood pressure, weight, body mass index (BMI), waist circumference, OGTT, HbA1c and a complete lipid profile. Furthermore, the participants filled in the Mediterranean Diet Adherence (MDA) and the International Physical Activity questionnaires (I-PAQ).

Results. Altogether, 36% (n=1252) of the 3477 people who filled in the FinDRISC scored ≥15 (91% women). An OGTT was performed in 58% (n=726) of them. Newly screen-detected diabetes was 18% (n=132) and 48% (n=352) had both IFG and/or IGT. The prevalence of the risk factors in participants with a FinDRISC <15 points are presented in Table I. The lifestyle intervention seminars reached 41% (n=144) of the people with IFG and/or IGT. The preliminary results of the changes in lifestyle habits and risk factors of the participants who have finished the 6-month intervention (n=33) showed mean reductions of systolic blood pressure (-8,7 mmHg), diastolic blood pressure (-3,5 mmHg), weight reduction (-3,7 kg), BMI (-1,8 kg/m2), waist circumference (-2,2 cm). The prevalence of people with IFG and/or IGT decrease by 55%.

Conclusions. The FinDRISC combined with an OGTT is a suitable tool to identify people at high risk of T2D. Very preliminary results of the lifestyle interventions showed beneficiary changes in the main risk factors of T2D and cardiovascular disease and a decreased of people with IFG and/or IGT. Thus, the strategies to use multidisciplinary teams to address changes in lifestyle habits seem to be effective in primary health-care en Madrid.

Type 2 diabetes screening and prevention program in Serbia: relationships between high diabetes risk and cardiovascular risk factors

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Background. It has been postulated that the risk for Type 2 diabetes (T2D) and cardiovascular disease (CVD) risk factors are closely interrelated, but this relationships has not studied in details. Therefore, in the course of implementation of the National Program for Early Detection and Background and objectives. Prevention of Type 2 Diabetes in Serbia, in 3712 individuals tested for the T2D diabetes risk by using the FINDRISC questionnaire, this study was aimed to analyze first (a) the prevalence of increased risk score allocating the subjects into two groups: (1) high T2D risk score (≥ 15) (group A) and (2) moderate and low T2D risk score (<15) (group B) and then (b) in each of the groups we evaluated the following CVD risk factors: (i) prevalence of hypertension; (ii) the lipid subfraction (cholesterol and triglyceride) levels; (iii) blood glucose levels; (iiii) body mass index (BMI) and waist circumference value (WC) and (iiiii) cigarette smoking expressed as number of cigarettes/day.

Objectives. Included in background.

Methods. The FINDRISC questionnaire was used in the authorized Serbian version. Hypertension was defined as blood pressure ≥140/90mmHg (average of 3 measurements) or the use of antihypertensive medication. From the fasting blood samples taken simultaneously with other testing, lipid subfraction levels were determined by enzymatic method and blood glucose levels by glucose oxidase method. Cigarette smoking was evaluated by a special questionnaire.

Results. We found that 442 (11.9%) of the subjects were allocated to group A while 3270 (88.1%) were recruited to group B. When the CVD risk factors were analysed, we found that the prevalence of hypertension was remarkably higher in group A vs B (68.2 vs 17.5%, p<0.001), together with increased blood glucose levels (5.7+/-0.3 vs 5.2+/-0.1 mmo/l, p<0.05), and increases in BMI (29.97+/-0.8 vs 25.2+/-0.3 kg/m2, p<0.05) and WC (93.8+/-1.6 vs 86.1+/-0.9 cm, p<0.05). In contrast, we could not detect changes in lipid subfraction levels nor in cigarette smoking between the groups.

Conclusions. Our results signify that high risk for T2D is associated selectively with some but not all of the established CVD risk, the association being strong with hypertension, total and abdominal obesity but not with lipid changes and cigarette smoking. The results imply that the monitoring of blood pressure, BMI and WC, together with blood glucose might be of a high relevance in monitoring the effects of preventive interventions.

Implementation of a multicentre program of screening and first-year primary prevention of T2D with lifestyle modifications: DE-PLAN study

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Objectives. 1-To detect individuals with high risk of type-2 diabetes (T2D) in primary care setting in Spain.

2-To identify a lifestyle modification program

3-To prevent T2D in high risk individuals.

Methods. 1-Screening program in individuals 45-74 years old using the FINDRISC score.

2-Assessment of glucose metabolism status by OGTT in those with high risk (FINDRISC >14).

3-Lifestyle intervention (diet and physical activity): 3-month intensive program plus continuous programme).

Setting. Primary care centers of Madrid, Castilla la Mancha (Talavera and Cuenca) and Castilla y Leon (Segovia and Avila)

Year evaluations: OGTT, lifestyle and cardiovascular risk changes.

Results. In the total study population, screening with the FINDRISC was completed in 3891 individuals and 1105 (28.40%) of them were classified as high risk (FINDRISC >14) for developing T2D. The mean age (SD) of the study population was 55.4 (+ 7.3) years; (55.9% women); 89.4% were overweight (45%) or obese (34.4%); 28.2% used antihypertensives; 42% had a family history of diabetes; 82% self-reported fruit or vegetables everyday intake, and only 57% practiced 30 minutes or more of daily physical activity. Among the high–risk people, screened-detected T2D (SD-T2D) was observed in 134 individuals (18.87%). The prevalence of any dysglycaemic condition (IFBG or IGT) in the population was estimated around 39%. The 63%(n= 365) of those classified as high risk (SD-T2D excluded) were enrolled in the intervention program the firth years follow up is completed (n=248. 81%).

Conclusions. Prevalence of both high risk for T2D, screening-detected T2D and dysglycamic status are quite high in the Spanish population.

-The FINDRISC questionnaire is an useful screening tool to detect these people. After two follow-up years the intervention program is still ongoing.

-The Primary Prevention of T2D is feasible to implement at Primary Care level in Spain.

Track 3: Session 2.3.1
EInsulin resistance, β-cell function, and prevention of T2D

Blood glucose is neurally regulated

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Background. The physiological systems are involved in the regulation of all aspects of the body's function including the coordinated function of visceral organs. That blood glucose is a neurally regulated physiological system is hugely significant for the diagnosis and treatment of diabetes. The following article explores the etiology of diabetes, in particular the influence of acidity upon diabetes etiology, and explores whether this leads to a better understanding of what has come to be known as insulin resistance. The article illustrates that blood glucose is a neurally regulated physiological system and discusses the complications arising thereof. In particular that the influence of other physiological systems will materially influence diagnostic outcomes, that current techniques have difficulty distinguishing the early emergence of the diabetic condition, and the influence of acidity. The article concludes that type 2 diabetes, in particular what we know as 'insulin resistance', is fundamentally a problem of acid/base regulation.

Objectives. 1. Introduction. In systems biology a number of different approaches are considered. These are the bottom-up approach so favoured by medical research i.e. the reductionist approach; and also the middle-out and top-down approaches. This short paper focuses upon a top-down or cognitive approach. The bottom-up approach has become the dominant way of assessing changes to the body's function. Nevertheless there are significant limitations with this approach e.g. (i) the multi-systemic nature of the body's function 1 (ii) both genotype and phenotype must be considered 1. (iii) there are difficulties distinguishing the onset of the condition from its presymptomatic origins 1. (iv) it ignores the influence of sensory input which influences the stability of the autonomic nervous system. The prevailing genetic paradigm fails to consider the influence of environmental factors. Genetic changes can be the cause, but can also be the consequence, of the medical condition. The causes of genetic change can be due to viral infections, vaccines, genetically modified foods, etc. Moreover the

process can often be reversible e.g. a virus can be responsible for the onset of type 1 diabetes but also that viruses may be used to treat type 1 diabetes 2. In addition some medical conditions can be stimulated by solely environmental factors e.g. stress. This relationship between genotype and phenotype remains largely undefined. There is not yet an understanding of the relationship between sensory input and cellular and molecular biology 3 yet it is recognised that various types of stress can influence the body's function in different ways e.g. create autonomic dysfunction, alter the nature of cell morphologies, initiate pathological processes, and lead to organ dysfunction 4.

Methods. The existence of Virtual Scanning is proof of concept. Results from the use of this technology have been reported widely in peer-reviewed articles.

Results. Physiological Systems. The existence of Physiological Systems is widely recognised however their significance has been almost completely ignored by the prevailing biomedical paradigm. Nevertheless that such systems exist – the coordinated function of networks of organs – indicates that no single system can function independently of other systems. This is recognised in medical research where for example a blood pressure medication is often given in combination with a diuretic. The Russian researcher I.G.Grakov has developed a cognitive technique which has the capability to determine the light which is absorbed and emitted by proteins and which may be a measure of both genotype and phenotype 5. This technique, Virtual Scanning, incorporates a mathematical model of the physiological systems incorporating a revised understanding of the neurally regulated physiological systems: comprising breathing, digestion, elimination, sleeping, blood glucose, blood pressure, blood cell content, blood volume, sexual function, pH, temperature, osmotic pressure and musculoskeletal structure. Such understanding, in essence an understanding of the mechanisms which the brain uses to regulate the body's function, is hugely significant for the future of medical research. Such systems (e.g. blood glucose, blood pressure, sleep and pH) illustrate the characteristics of neurally regulated systems 6-8. Moreover they suggest 6,7 that type 2 diabetes is primarily a problem of acid/base regulation i.e. that increased acidity alters the redox state and levels of minerals and ultimately the nature and balance between the prevailing physiological and pathological processes. Every biochemical process is a balance between the genetic expression of proteins, reaction conditions, and protein conformation and reactivity. This influence of phenotype alters the prevailing reaction conditions, and consequently protein reactivity and morphology. A technique based upon such principle deals with the level of expressed protein, typically of insulin, and the rate at which such proteins react. It is independent of the genetic variations which are due to racial sub-types. It is also largely independent of the complex range of factors which can influence the accuracy of biomarker type tests. For example increased genetic predisposition to type 2 diabetes is manifest as lowered levels of insulin and/or of the ability of insulin to perform its biochemical function i.e. insulin resists its normal biochemical function. The prevailing reaction conditions do not support its function. A number of general scenarios should be considered (Tables I and II).

TABLE I.—*The relationship between insulin and blood glucose.*

1. normal level of insulin and low levels of blood glucose
2. normal level of insulin and normal level of blood glucose
3. normal level of insulin and high level of blood glucose prediabetes
4. reduced level of insulin and low levels of blood glucose
5. reduced level of insulin and normal levels of blood glucose
6. reduced level of insulin and high levels of blood glucose type 2 diabetes
7. low level of insulin and low levels of blood glucose type 1/type 2 diabetes
8. low level of insulin and normal levels of blood glucose prediabetes
9. low level of insulin and high levels of blood glucose type 1/type 2 diabetes.

TABLE II.—*The relationship between insulin and protein reactivity.*

1. normal level of insulin and low levels of reactivity prediabetes
2. normal level of insulin and normal levels of reactivity
3. normal level of insulin and high levels of reactivity
4. reduced level of insulin and low levels of reactivity insulin resistance
5. reduced level of insulin and normal levels of reactivity
6. reduced level of insulin and high levels of reactivity
7. low level of insulin and low levels of reactivity type1/insulin resistance
8. low level of insulin and normal level of reactivity type1/type 2 diabetes
9. low level of insulin and high level of reactivity type1/ type 2 diabetes n.b. the above tables 1 and 2 are intended to illustrate a trend which will be obvious to most diabetes researchers i.e. that the lower level of insulin the lower will be the ability to metabolise blood glucose; in the cases 7-9 (in both tables) the condition may be a combination of type 1 and/or type 2 diabetes; such conclusions would be influenced by age, gender, racial subtypes, levels of fitness, etc.

Levels of insulin must be high enough to metabolise the prevailing levels of blood glucose. This is particularly significant in the elderly where the prevailing levels of insulin are no longer sufficient or able to metabolise blood glucose. Under normal circumstances the levels of insulin are supported by an environment which maintains protein conformation and reactivity. Increased acidity influences the prevailing redox state and levels of minerals which are essential for the metabolism of blood glucose. It lowers the levels of Zinc, Magnesium, Chromium and perhaps also Selenium; whilst the levels of Iron and heavy metals (Cadmium, Lead and Mercury) increase. A Zinc deficit in particular influences the ability of insulin to form the zinc hexamer and influences the neurally regulated release of insulin i.e. insulin is perpetually available in an unregulated manner to react with any available blood glucose. This leads to the conclusion that type

TABLE.—*Diagnosis of new onset diabetes in patients with acute coronary syndrome.*

	New onset diabetes (n=39)	Non-diabetic (n=381)	p
Age (years)	59,8+/- 8,7	56,4+/- 10,6	0,16
Arterial hypertension	61,5%	47,2%	0,08
Smoking habit	71,8%	59,3%	0,13
Sedentary lifestyle	76,9%	59,1%	0,03
HbA1c (%)	7,01+/- 1,7	5,59+/- 0,8	<0,01
Body Mass Index	35,6+/- 3,5	27,7+/- 14,6	<0,01
HDLc (mg/dl)	33,8+/- 5,3	37,5+/- 8,5	<0,01
FEVI (%)	54,2+/- 12,2	53,1+/- 4,6	0,88
Number of vessels	1,9+/- 0,8	1,7+/- 0,9	0,48
Functional class (METS)	7,3+/- 2,2	7,9+/- 2,5	0,17

2 Diabetes is a problem of acidity - induced by the cumulative effect of alcoholic beverages, acidified soft-drinks, protein-based foods, lack of exercise and stress. Current methods of diagnosing disease either scan a tissue for irregularities or look for biomarkers which can be used as indicators of disease however such is the nature of disease that a wide range of values is often noted. The assessment of such data typically considers whether the results are within or are outwith a normal distribution curve e.g. in the case of diabetes being typically between 4-8mmol per litre blood glucose. This leads to problems of interpretation. Results can vary over a period of time making it difficult to discern whether a patient does or does not have diabetes i.e. it is difficult to establish the onset of the disease. This is particularly important. The earlier that the onset of diabetes can be diagnosed, the earlier that preventative measures or drug therapies can be introduced, thereby slowing the rate of onset of the condition and reducing the cost of treating the disease and its many and various complications. If diabetes is to be measured, (i) the nature of the condition must first be fully understood, and (ii) diagnostic techniques which assess the genetic AND phenotypic factors which are involved in diabetes etiology, should be developed and/or introduced. Of the available and currently used techniques the diagnosis of diabetes using the marker HbA1c (glycated haemoglobin) is the most relevant i.e. it uses haemoglobin as a protein marker and the level of glycation as a measure of excess glucose over a long period. It is considered that once a hemoglobin molecule is glycated, it remains glycated but this cannot be so otherwise the level of HbA1c would continue to increase. HbA1c is an indirect marker. Haemoglobin is not involved in the diabetic process. Furthermore the accuracy of the test is influenced by a range of factors e.g. the assumptions upon which the test is based, change of diet, disease profile of the patient, the degree of progression of the disease, etc. Fasting Glucose and Oral Glucose Tolerance Tests measure Glucose metabolism. It does not isolate the fundamental cause i.e. is it to do with the availability of insulin, the reaction conditions which influence the ability of insulin to react (insulin resistance), or other factors? Moreover such tests can be influenced by their autonomic nervous system e.g. the level of patient activity prior to the test, whether the patient has consumed caffeine or alcohol prior to the test, whether they are taking medications, etc. Point of Care enzyme-based tests have a 20% deviation limit and are calibrated around perceived normal levels of haematocrit. Known interferences include varying levels of haematocrit, oxygen, levels of non-glucose sugars (as in soft drinks), photometric interferences, etc. Such tests do not identify the influence of genotype. A test based upon measuring the light which is absorbed and emitted by proteins, in particular the altered colour spectrum and intensity of a glycated protein, would (at least in principle) appear to have the characteristics of an ideal test: 1. measuring genotype and phenotype in the diabetic process 2. able to determine the onset of the diabetic process at a very early stage 3. able to distinguish between different levels of the disease 4. free from the interferences which affect biomarker type tests. Nevertheless such tests no test can ever be free of interferences. It would be influenced by biochemical factors such as drugs which could influence the rate of reaction. Accordingly patients are required to desist from taking alcohol, caffeine and drugs in the preceeding 24 hours.

Conclusions. There are a number of observations arising from these articles i.e. tests which look solely at genotype will not be an accurate measure of the disease process. It will only indicate genetic predisposition. Phenotype i.e. the influence of non-genetic or environmental factors; is also a very significant element of the pathogenic process. Blood glucose cannot be accurately measured by any single biomarker technique because blood glucose is a complex neurally regulated system involving complex biochemistries. Moreover, as the brain continually regulates the body's function throughout the daily cycle this inevitably means that levels of blood glucose must vary throughout the day. The influence of different physiological systems e.g. sleep, pH, elimination, digestion, blood glucose, etc; can materially influence diagnostic outcomes. A test which measures the light absorbed and

emitted by proteins as they react offers the prospect of being an effective and accurate measure of the rate at which diabetes is manifest. The problem of diabetes is that of acid/base regulation i.e. the role of pH in diabetes etiology has been overlooked.

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11.30 - 13.00 Oral Communications

Track 1: Session 2.1.2
CVD-risk in diabetes

Diagnosis of new onset diabetes in patients with acute coronary syndrome

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Background. Increased prevalence of diabetes mellitus (DM) in patients with acute coronary syndrome (ACS) raise concern as it is a well-established prognostic factor. Almost 10 to 24% of the patients are diagnosed during the acute episode.

Objectives. To determine the prevalence of new onset DM in patients with recent diagnosis of ACS, as well as the clinical and demographic characteristics of this population.

Methods. 538 patients (mean age 57 years, 85% males) enrolled in a cardiac rehabilitation program (CRP) due to ACS between January 2008 and April 2012 were analyzed. American Association Diabetes criteria were used to establish the diagnosis of DM.

Results. 7% (39 patients) were diagnosed of new onset diabetes, while 71% (381 patients) were non-diabetic and 22% (118 patients) had been previously diagnosed of diabetes. New onset diabetes population had higher comorbidity which included previous history of ischemic heart disease (11%), hypertension (61,5%), smoking habit (71,8%) and sedentary lifestyle (76,9%). Compared to non-diabetic patients, the new onset diabetes group had a higher body mass index (mean 35,6+/- 3,5 vs 27,7+/- 14,6, p<0,01) and lower HDLc levels (33,8 +/- 5,3 mg/dl vs 37,4+/-8,5 mg/dl, p<0,01). There were no significant differences in the prognostic variables analyzed which included left ventricular ejection fraction, number of vessels and functional capacity (METS). The most frequent diagnostic test was HbA1c (51%), followed by oral glucose tolerance test (35%) and altered fasting glucose levels (10%). The cardiac rehabilitation unit established the diagnosis in 64% of the cases.

Conclusions. The prevalence of new onset diagnose of DM was lower than expected. In this group of patients obesity, sedentary lifestyle and low HDLc levels were differential characteristics. HbA1c was useful in the diagnostic process. Cardiac rehabilitation units play a major role in establishing the diagnosis and treating associated comorbidities.

"DIABRISC-SL": a study of cardiometabolic risk in a young urban Srilankans and connection through lifestyle modification

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Background. Urban South Asians have a higher risk of and earlier onset of cardiovascular disease (CVD) and type 2 diabetes (T2DM). Low birth weight may be associated with this higher risk. The influence of birth weight (BW) on cardio-metabolic parameters in young urban Sri Lankans remains to be elucidated.

Objectives. To study the effect of BW on cardio-metabolic parameters in healthy young urban Sri Lankans 'at-risk' of cardio-metabolic disease.

Methods. We studied the relationship between BW and a panel of cardio-metabolic markers in 2002 healthy subjects aged between 10-40yrs who are participants of an ongoing randomised controlled trial (DIABRISK-SL). Subjects were selected on the basis of the presence of 2 or more risk factors of raised BMI, raised waist circumference (WC), physical inactivity and family history of T2DM. All subjects attended for measurements in the fasting state prior to randomisation and had a standard 2-hour OGTT (75g glucose for adults or 1.75g/kg body weight, <16years) as per WHO guidelines. BW was obtained from a childhood health book given to all children in Sri Lanka. Univariate and multivariate analyses were performed to iden-

tify variables associated with BW. Pearson's Chi-Square was performed to calculate the Odds ratio (OR) with 95% confidence interval (CI) which explains the influence of BW and subsequent raised BMI on developing Metabolic Syndrome (MS).

Results. Of the 2002 subjects (41% males), 1622 were <20yrs. Low BW (<2.5kg) was present in 10.7% and high BW (>3.5kg) was present in 19.0% of subjects. In univariate analyses the following were significantly associated with BW: positively correlated; C-reactive protein (CRP), raised WC, height, weight, male gender, BMI and negatively correlated 2-hr OGTT plasma glucose (p <0.05 for all). Insulin resistance as measured by Homeostasis model assessment (HOMA-S) was not significantly associated with BW. In multivariate analyses 2-hr post OGTT plasma glucose value (mg/dl (negatively) [unstandardized B coefficient; -1.762 p=0.002] and male gender (positively) [unstandardized B coefficient 90.9 p=0.005] were significantly and independently associated with BW. The results of the model suggest that 10g fall in BW would increase 2-hr post OGTT plasma glucose by 17mg/dl. In relative risk estimation overweight was significantly associated with different BW categories on developing MS; low BW (OR:8.104;CI:3.053-21.509), normal BW (OR:5.290;CI:3.542-7.898) and high BW (OR:3.942;CI:1.729-8.990) (p<0.05 for all).

Conclusions. In young urban Sri Lankan healthy subjects with risk factors for cardio-metabolic disease, low BW is negatively associated with 2hr post OGTT plasma glucose levels. In each BW categories, if subjects subsequently become overweight in later life, low BW is associated with increased risk of developing MS. Our data suggest that early life programming and subsequent weight gain is associated with MS in 'at-risk' young urban subjects.

Glycaemic status, diabetes, and cardiovascular risk. A new risk score for the aged Southern European population

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Background. The impact of diabetes mellitus (DM) on cardiovascular disease (CVD) risk is an important aspect to be considered in risk assessment. The European HEARTSCORE did not consider the impact of glycaemic status, anti-diabetic treatment and the age groups older than 70 years on the total CVD risk.

Objectives. To develop a new CVD risk prediction tool, including information on glycaemic status, treatment of diabetes, to accurately estimate the individual cardiovascular risk in Southern Europe, where elderly people account for more than 25% of the total population, and have higher prevalence of DM than middle aged groups.

Methods. The project assembled a pool of 7 Spanish cohort studies including middle-aged (30-70 years) and elderly individuals (>70 years). There were 11,800 persons free of CVD at baseline (5,413 men and 6,387 women) representing 108,569 person years of follow-up. DM was defined as FPG > 7.0 mmol/L, random capillary FG > 11.1 mmol/L or treatment with any anti-diabetic drug at baseline Cox regression analyses were conducted to examine the contributions of the different variables to CVD forming the potential basis for the development of the CVD risk-score (ERICE-score).

Results. Overall prevalence of DM at baseline was 8.6% (8.8.in males. and 8.4% in females). A total of 1,214 cardiovascular events were identified, of which 633 were fatal. Age was the strongest risk factor for CVD. With regard to modifiable risk factors, in men, high SBP was the strongest predictive factor of CVD followed by DM and smoking with similar impact. In women, DM plays a crucial role followed by smoking and high SBP. Multivariate adjusted hazard ratios for CVD in people with treated DM, compared to non-diabetics, were 1.37 (95%CI: 1.22-1.46) in men and 1.59 (1.30-1.69) in women,. The contribution of high total-cholesterol levels to the CVD risk was only significant, both in men and women, in younger than 70 years.

Conclusions. Separate risk chart are given for treated diabetics, non-treated diabetics and non-diabetics, both for males and females, because the absolute risk increased with its combination, with the highest risk in men treated-diabetics. The individual contribution of DM to the global CVD risk was also higher than total-cholesterol in this aged Southern European population.

Track 2: Session 2.2.2
Implementing a National Diabetes Prevention Program for High Risk Adults: what does in take?

Preventing the progression to type 2 diabetes in adults at high risk: the production of nice public health guidance

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Background. 1 in 7 adults (around 15%) has impaired glucose regulation (IGR), of whom an estimated 5-12% develop type 2 diabetes each year. People with IGR are 5-15 times more likely to develop type 2 diabetes than people with normal glucose values. Successful prevention needs to be based on population-based action for the whole community together with interventions targeted at those who are at greatest risk.

Objectives. We describe and discuss the production of NICE guidance to reduce the progression to type 2 diabetes in high risk individuals.

Methods. The guidance development process: The guidance topic was referred to NICE by the UK government. The topic was tightly defined in a 'scoping' exercise involving consultation with stakeholders. NICE commissioned an academic centre to undertake 4 systematic reviews: effectiveness and cost-effectiveness evidence on risk assessment and prevention initiatives; associated barriers and facilitators; and economic mod-

TABLE.—*Beverages and diabetes E3N.*

Type of sweetened beverage, (mL/week)	Overall population				BMI<30 kg/m²		BMI≥30 kg/m²	
	Cases	Age-adjusted model	Multivariate Model †	Multivariate Model + BMI Ψ	Cases	Multivariate Model †	Cases	Multivariate Model †
Sugar sweetened								
Non consumer	1046	1 (reference)	1 (reference)	1 (reference)	799	1 (reference)	247	1 (reference)
<86	125	1.54 (1.28-1.86)	**1.32 (1.09-1.59)**	1.28 (1.06-1.55)	92	**1.32 (1.06-1.64)**	33	1.15 (0.79-1.67)
86 - 164	61	1.21 (0.94-1.57)	1.16 (0.90-1.51)	1.12 (0.86-1.45)	41	1.06 (0.77-1.45)	20	1.30 (0.82-2.07)
165 - 359	64	**1.31 (1.02-1.68)**	1.24 (0.96-1.60)	1.22 (0.94-1.57)	45	1.17 (0.87-1.59)	19	1.35 (0.84-2.18)
>359	73	**1.49 (1.18-1.89)**	**1.34 (1.05-1.71)**	**1.30 (1.02-1.66)**	56	**1.43 (1.08-1.88)**	17	0.94 (0.56-1.57)
p trend		**0.0002**	**0.0088**	**0.0206**		**0.0113**		0.9073
Artificially sweetened								
Non consumer	1046	1 (reference)	1 (reference)	1 (reference)	799	1 (reference)	247	1 (reference)
<99	252	**1.27 (1.10-1.45)**	1.21 (1.05-1.39)	1.19 (1.03-1.37)	186	**1.20 (1.02-1.42)**	66	1.14 (0.86-1.52)
99 - 221	17	**1.67 (1.03-2.70)**	1.17 (0.72-1.90)	1.25 (0.77-2.01)	12	1.10 (0.62-1.96)	5	1.66 (0.68-4.05)
222 - 603	20	**1.95 (1.25-3.03)**	1.37 (0.88-2.14)	1.27 (0.81-1.98)	12	1.10 (0.62-1.96)	8	1.50 (0.74-3.08)
> 603	34	**3.50 (2.49-4.93)**	**2.21 (1.56-3.14)**	**1.68 (1.19-2.39)**	24	**2.45 (1.61-3.71)**	10	1.00 (0.52-1.92)
p trend		**<0.0001**	**<0.0001**	**0.0057**		**<.0001**		0.8658

Models †: Adjusted for years of education, smoking status, physical activity (Met-h/week), hypertension, hypercholesterolemia, use of hormonal replacement therapy, family history of diabetes, use of antidiabetic drugs, alcohol intake (g/day), omega 3 fatty acids intake, carbohydrate intake (g/day), total energy intake (excluding alcohol and carbohydrate, kcal/day), coffee (mL/day), fruits and vegetables and processed meat consumption (g/day) and dietary patterns (Western/Mediterranean).
Models Ψ: Models † + BMI (<20/20-25/25-30/≥30 kg/m²)

elling. A report of practice in risk assessment and management involving vulnerable groups was also commissioned. Expert testimony was received from leading researchers from Finland, Germany, UK and USA and from the NHS Health Check programme. An independent advisory committee of 16 members from a range of backgrounds, including academics, clinicians, dieticians, general practitioners, health economist, nurses, pharmacist and community members, considered the evidence and developed the guidance. The draft guidance was circulated to registered stakeholder organisations for consultation. Fieldwork (focus groups and interviews with practitioners) was undertaken as part of the consultation process. The PDG revised the guidance in response to consultation and fieldwork. Finally, implementation support and costing tools were developed.

Results. Issues in guidance development: Our presentation will expand on the following aspects relating to the science of guidance development. What distinguishes NICE guidance in terms of processes and methods? o Open and transparent practices o Evidence based o Cost effectiveness explicit o Consultation processes o Detailed timeline for each stage of guidance development Using deliberative processes in the independent advisory committee: o How does a committee interpret evidence to develop guidance? o How the composition of a committee contributes to this process o Achieving consensus o Testing feasibility in the real world. How do we take resource constraints into account when developing guidance? What did the committee do when it had very little, or no, evidence? How NICE positioned the guidance alongside other guidance from other expert groups.

Conclusions. Rigorous processes are essential when developing robust guidance.

Track 3: Session 2.3.2

Overconsumption of sugar sweetener beverages as a marker of nutritional quality predicting CMR

Both artificially sweetened and sugar sweetened beverages are associated with a risk of type 2 diabetes in the E3N cohort

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Background. It has been extensively shown, mainly in US populations, that sugar sweetened beverages are associated with an increased risk for type 2 diabetes (T2D), but little is known on the effects of artificially sweetened beverages.

Objectives. To evaluate the associations between sugar sweetened and artificially sweetened beverage consumption and the risk of T2D over 14 years of follow-up.

Methods. Among 66 118 women from the French E3N cohort, age-adjusted and multivariate Cox regression models were used to estimate hazard ratios (HR) and 95% confidence intervals (95%CI) for T2D risk, according to quartiles of beverage consumption, adjusted for total energy intake by the residuals method. Sugar sweetened beverages were soft-drinks or sodas, and artificially sweetened beverages were diet soft-drinks or sodas. Multivariate models were adjusted for most of

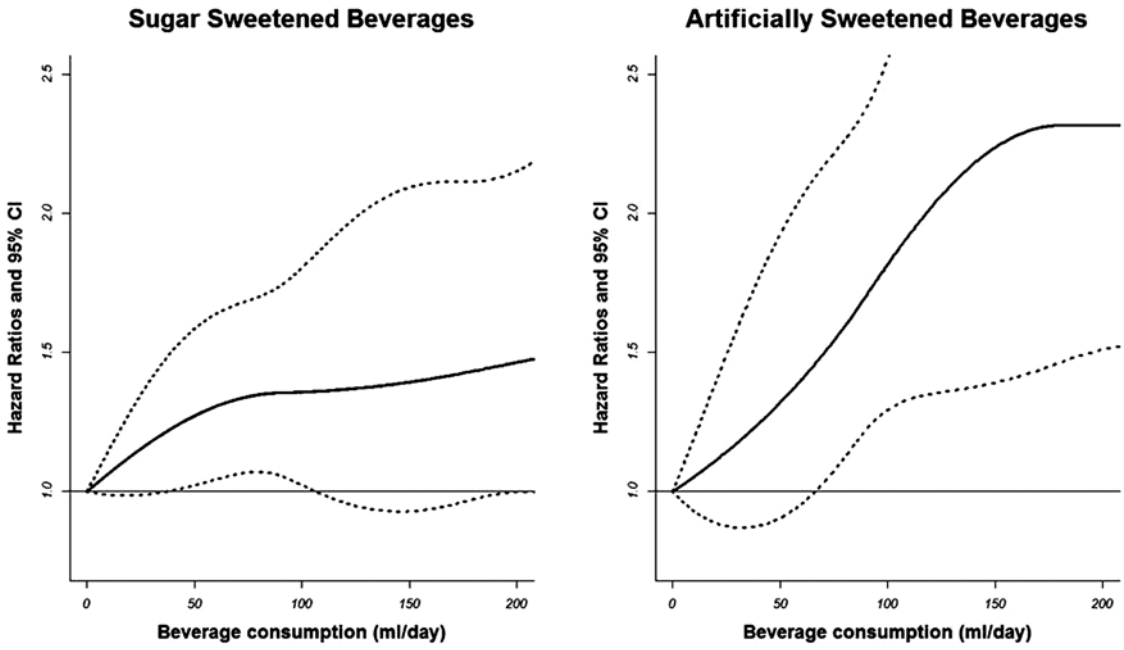

Figure.—Beverages and diabetes E3N.

the established T2D risk factors (see Table 1 legend). As adiposity has been hypothesized to be an intermediate factor in the relationship between sugar sweetened beverages and T2D, a sensitivity analysis adjusted additionally for BMI; analyses were also stratified according to obesity. To test a reverse causation bias, HRs were estimated excluding the diabetes cases diagnosed in the 5 first years of follow-up.

Results. Between 1993 and 2007, 1 369 T2D incident cases of diabetes were diagnosed. The average consumption of sweetened beverages, among consumers only, was 328 and 568 mL/week respectively for sugar and artificially sweetened beverages. Women in the top quartile of sugar sweetened beverage consumption (>359mL/week) were at increased risk of T2D (HR=1.34[1.05-1.71]) compared to no consumption. For artificially sweetened beverages, women in the top quartile of consumption (>603mL/week) had a significant increased T2D risk (HR=2.21[1.56-3.14]), compared to no consumption. Strong positive trends in T2D risks were also observed across consumption categories for both types of beverage consumption (P=0.0088 and P<0.0001). Additional adjustment for BMI systematically attenuated the magnitude of the preceding associations, but all remained significant (HR=1.30 [1.02-1.66] and HR=1.61[1.14-2.27] for the highest categories respectively, of sugar and artificially sweetened beverages, when compared to no consumption. Analyses stratified according to obesity showed that the risks associated with sugar and artificially sweetened beverages were driven by women with BMI<30kg/m² (see Table 1). When diabetes cases in the first five years of follow-up were excluded, similar associations were observed (HR=1.38[1.05-1.83] and HR=2.26[1.49-3.42] for sugar and artificially sweetened beverages respectively (not tabulated).

Conclusions. We are the first to show that artificially sweetened beverage consumption was associated with an increased T2D risk in a French population. These risks were only observed among non-obese women. The associations seamed to be partly mediated by BMI, but there was still a strong significant effect, independent of BMI, between consumption of these beverages and T2D risk. From a public health perspective, if these results are confirmed by other studies, artificially sweetened beverages should not be recommended as a healthy alternative to sugar sweetened beverages.

Higher soda consumption is associated with an increased risk of diabetes incidence among Mexico city´s adult cohort

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Background. Over the past 10 years observational studies have found positive associations between soda intake and long-term weight gain and development of type 2 diabetes (T2D) and related

TABLE.—*Higher soda consumption is associated with an increased risk of diabetes incidence among mexico citys adult cohort.*

	Soda consumption categories			
	< 1 per week n (%)	1 per week to < 1 per day n (%)	1 per day* n (%)	> 1 per day n (%)
	290 (20.08) n (%)	568 (39.33) n (%)	318 (22.00) n (%)	261 (18.07) n (%)
Incident Cases of T2D	19 (6.5)	54 (9.5)	31 (9.7)	38 (14.5)
Person Time	1723.90	3387.26	1896.79	1516.65
Incidence Ratio	0.011	0.015	0.016	0.025
HR unadjusted	1	1.45 (0.86 - 2.47)	1.42 (0.80 - 2.54)	2.25 (1.28 - 3.92)†
HR adjusted[1]	1	1.46 (0.85 - 2.49)	1.43 (0.79 - 2.60)	2.32 (1.26 - 4.28)†
HR adjusted[2]	1	1.49 (0.87 - 2.55)	1.46 (0.80 - 2.66)	2.39 (1.29 - 4.43)†
HR adjusted[3]	1	1.48 (0.87 - 2.54)	1.44 (0.79 - 2.63)	2.11 (1.14 - 3.92)†

T2D: Type 2 Diabetes.
*One portion per day.
[1]Adjusted for age, sex, total calories
[2]Adjusted for age, sex, education level (none, incomplete primary school, complete primary school and more than primary school), total calories, smoking (if ever smoked during the 9 years of follow-up) and physical activity (total METS).
[3]Adjusted for age, sex, education level, total calories, smoking, physical activity and body mass Index.
† $p < 0.05$
Reference category: soft beverage consumption <1 per week.

metabolic conditions. Experimental studies provided potential explanations of the biological mechanisms. Data showed that intake of soda increases risk of T2D and cardiovascular risk factors through weight gain; another mechanism has been postulated for the increased risk of T2D by the glycemic effects of consuming large amounts of rapidly absorbable sugars and their metabolic effects. Soda consumption plays an important role in the epidemic of hypertension, obesity and the metabolic syndrome, diabetes, kidney disease, and cardiovascular disease.

Objectives. To determine if there was an association between soda consumption and an increased risk of type 2 diabetes incidence in a prospective adult cohort.

Methods. The Mexico City Diabetes Study was a population-based that included 3 follow-up visits within a cohort (1990 - 1999) of 2,282 men and women. The aim of this study was to provide information about the prevalence of diabetes, CVD, and CVD risk factors among low-income residents of Mexico City Northern region. A validated semi-quantitative food frequency questionnaire was administered through an interviewer to all study subjects. This instrument contained information by food group, including all type of beverages. Diabetes was diagnosed as fasting glucose ≥126 mg/dl, 2-hour glucose ≥200 mg/dl or self-report of physician's diagnosis with hypoglycemic medication. Diabetes diagnosis was done by ADA and WHO standards combined. We discarded the already diagnosed diabetic patients at baseline. Kaplan-Meier survival models were adjusted to determine if there was an increased risk between soda consumption frequency and diabetes type 2 incidence rate, among cohort subjects between baseline measurements and the following appointments. All subjects provided informed consent.

Results. The longitudinal analysis showed an increased risk of twice the hazard ratio of diabetes type 2 incidence among the group that consumed more than 1 soda per day, compared with the group that consumed less than 1 soda per week (see table 1). At base-line the non-diabetic subjects analysis showed an association between soda consumption frequency and metabolic biomarkers such as triglycerides, high density lipoprotein, fasting plasma glucose, 2 hour glucose post-load, specific insulin, pro-insulin , very low density lipoprotein and HOMA. In general, when included in the analysis, BMI diminished importantly the strength of the association.

Conclusions. Drinking more than one soda per day can increase the probability (HR= 2.39, 95%CI 1.29-4.43) of becoming a diabetic patient in exposed subjects within this cohort of Mexican adults after 9 years. This is an important finding which could be the base of a Public Health Policy for Mexican adults, amongst our obesity epidemic. According to our findings women should be an important target population, because they consumed almost twice the amount than men. Efforts should be made to reduce the burden of T2D in Mexico (14.4% prevalence). Addressing soda consumption might be a feasible way to T2D prevention.

13.00 - 14.30 Posters

Poster Session 2.1
General

Poster no. 73. — Skeletal muscle participates in amelioration of insulin resistance by CB1 receptor antagonism in obese mice

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Background. Evidences have suggested that the endocannabinoid system is overactive in obesity, resulting in enhanced endocannabinoid levels in both circulation and visceral adipose tissue. The cannabinoid CB1 receptor is expressed in skeletal muscle and adipose tissue besides the brain. Furthermore, some studies have demonstrated beneficial effects of the pharmacological treatment of obesity with CB1 antagonists on some components of metabolic syndrome. However, the mechanisms of such effect remain unknown.

Objectives. The objective of the present study was to investigate the CB1 receptor modulation on the glucose transporter GLUT4 expression and the related mechanisms in obese mice treated with AM251, a high-selective CB1 receptor antagonist.

Methods. Insulin sensitivity *in vivo* (by insulin tolerance test), GLUT4 mRNA (Real Time PCR) and protein (Western blotting) were assessed in 23-week old monosodium glutamate–induced obese mice untreated or treated with low doses of AM251 (0.01 mg/kg body weight) for 10 days.

Results. As expected, obese mice showed insulin resistance and reduced content of GLUT4 mRNA and protein in both skeletal muscle and adipose tissue. Interesting, AM251 treated-obese mice recovered insulin sensitivity *in vivo* and GLUT4 mRNA and protein content in skeletal muscle. However, treatment with CB1 antagonist did not affect GLUT4 mRNA and protein content in adipose tissue.

Conclusions. In conclusion, the present data suggests that the skeletal muscle participates in the amelioration of insulin resistance by CB1 receptor blockade.

Poster no. 74. — Lessons learnt in the implementation of a type 2 diabetes high-risk prevention program in the aboriginal population in Victoria, Australia

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Background. The Life! Taking Action on Diabetes program was launched in 2007 and is funded by the Victorian Government in Australia, with Diabetes Australia - Victoria as the lead agency and fund holder. The program aims to reduce the growth in type 2 diabetes and to contribute towards the earlier diagnosis of the condition in those with undiagnosed diabetes. A core program element is a strategy for engaging with and delivering a prevention program in the Victorian Aboriginal community. This strategy targets individuals at high-risk, organisations who deliver the program, and to a lesser extent, communities. The Road to Good Health (RTGH) course is a six-session community-based lifestyle modification program targeting Aboriginal men and women at high-risk of developing type 2 diabetes.

Objectives. To identify barriers and enablers to program implementation to help inform further delivery and statewide implementation of a diabetes prevention program to the Victorian Aboriginal population.

Methods. Seven community health organisations participated in the pilot study; these organisations were selected on the basis of having existing infrastructure to deliver a lifestyle modification program. Up to four staff from each organisation were trained to facilitate the RTGH course within their local community. An evaluation of the feasibility, acceptability and effectiveness of the RTGH was conducted; this paper focuses on the outcomes of the process evaluation. Interviews were conducted with course facilitators, seeking information on the implementation of RTGH course activities, and any supporting activities or strategies instigated by the course facilitator or individual organisation.

Results. The most common barriers to delivering the RTGH course fell into two categories: challenges associated with delivering a course and staff capacity to deliver a course. A lack of time (competing pressures in staff workloads), a high staff turnover, and a lack of effective program advertising/publicity were identified as main barriers. Other barriers included: inadequate training to confidently deliver a course, difficulties with recruiting, high drop-out rates, and difficulties with adapting to the local needs of the community. The most common enablers were: having community participation and good planning. Managerial support and having sufficient and experienced (confident) staff to deliver to course were also cited as enablers.

Conclusions. The RTGH program has experienced several implementation challenges. The limited capacity of many health services highlights the importance of providing ongoing support to organisations delivering the program, as well as the importance of allowing flexibility in the delivery of the course to ensure local needs are met. Developing a more sustainable workforce is vital. Involving service providers and participants in program design, working groups and evaluations, and also finding strategies which effectively target the wider community, organisations, social groups and families (not just the individual) are also important considerations in the Aboriginal population.

Poster no. 75. — The analysis of diabetic rats femur with using SEM (scanning electron microscopy) and FTIR (furier transform infrared) spectrometer

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Background. Diabetes mellitus is a systemic disease which causes many complications such as nephropathy, neuropathy, retinopathy and osteopenia. Diabetic osteopenia is manifested by increase in bone fracture and a delay in healing of fractures and thus affects the quality of life. Although many human and experimental studies on the complications of diabetes mellitus have demonstrated extensive alterations in bone and mineral metabolism, the mechanisms responsible for diabetic osteopenia have not been clearly identified.

Objectives. To investigate the diabetes on histological and structural diferences in rats femur.

Methods. In this study, thirteen female Wistar rats were used. Fifteen of these animals were used diabet group (D) and were injected STZ (50 mg/kg) by a single intraperitoneal injection. Fifteen of these animals were used control group (K). Only rats with blood glucose levels > 300 mg/dl were enrolled in the study. All animals were sacrificed at the end of 12. weeks. Totally thirty femurs were used for analysis of SEM and FTIR. All femurs were seperated into two parts. The microscopic images were analyzed to determine total trabecular area, and alveolar structures as square millimeter by defining region of interests (ROIs) in the image analysis software. Obtained data were given as percentages of alveolar structure in trabecular bone. Bones were homogenized with nitrogen for FTIR analysis.

Results. SEM analysis revealed that in the diabetic rats, the percentage of the alveolar structures was significantly increased compared to that of femurs in control rats because of the diabetic deformation, In FTIR analysis, diabetic rats bone mineral structures were impaired according to diabetic deformatin.

Conclusions. Diabetes causes many complications such as nephropaty,neuropaty and retinopaty. Osteopenia is also a complication of diabetes. Our results revealed that diabetic osteopenia impairs trabeculer structure in bone and causes an increase in bone fracture.
Keywords: diabetes, trabeculer bone, SEM, FTIR

Poster no. 76. — The predictors of correct foot self care behaviour in diabetic high risk group patients

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Background. The diabetic foot syndrome results from complex interaction of intrinsic (diabetic peripheral neuropathy (DPN), foot deformities etc.) and extrinsic factors (trauma, inappropriate shoes etc.) While the intrinsic intervention is too difficult, the extrinsic influence is fully preventable. That is why the importance of foot care education is so high – in fact, it is a key point of ulcer and amputation preventive programmes. However it happens quite often that patients fail to follow foot care recommendations. Patient Interpretation of Neuropathy (PIN) questionnaire was developed and validated to investigate this phenomena. Using PIN the data have been obtained that the possible reasons are patients' misperceptions about DPN and incorrect actions due to it. Particularly one of the predictors of poorer foot care behavior (FCB) was beliefs that impaired circulation is the main cause of foot problems, better FCB was associated with fear of amputation. The aim of this study was to investigate the psychological factors associated with adherence to foot care in Moscow diabetic foot and high risk group patients.

Objectives. 357 diabetic patients with moderate to severe neuropathy (VPT- 35.5 ±14.7 V; NDS- 11.6 ± 5.5 scores), mean age 60.3 ±10.5 years old and diabetes duration 13.3 ± 9.1 years took part in this study. All of them had no signs of peripheral vascular disease (palpable foot pulse of both legs, ankle-brachial index =0.9-1.15). 45% of patients had current or previous ulceration.

Methods. Upon explanation of the goal of the study and physical examination all patients filled in FCB and PIN questionnaires. Ten FCB items assessed preventive foot self- care, nine analyzed foot-damaging one. To investigate psychological models of DPN interpretation the same patients completed the PIN questionnaire. PIN consists of 38 items with cognitive and emotional domains. SPSS (version 15.0; Chicago, IL) was used for statistical analyze. Psychometric assessment of PIN was made using principal component factor analyze with varimax rotation. In order to identify the predictors of FCB the multiply lineal regression analyze was performed.

Results. The factor analysis produced 9 factors: 2 emotional and 7 cognitive. Emotional pattern "Worry about consequences" had the highest factor scores and explained 14% of total variance The regression analysis revealed that only active controllability was significant predictor of preventive FCB. Understanding of physical cause of foot ulcers was significant predictor for potentially dangerous FCB.

Conclusions. 1. Worry about consequences and fear of amputation does not mean that patients follow the recommendations. 2. Patients' misperception about illness identity was not associated with incorrect FCB. 3. Underestimation of physical cause of foot ulcers was significant predictor for potentially dangerous FCB. 4. Clear understanding that efficacy of foot self-care should prevent ulcer and amputation- that is what influence preventive FCB.

Poster no. 77. — Prevalence of type 2 diabetes mellitus in Xavante Brazilian indians from Mato Grosso, Brazil

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Background. The Brazilian Xavante Indians living in Mato Grosso, Brazil, are changing habits of tradicional hunter-gatheres to a more sedentary life, to have important changes in their diet, incorporating foods as rice, pasta, sugar, cockies, salt, soft drinks and alcohol, influenced by the contact with civilization. This process of permanent contact with the Brazilian society started after 1950 and became more intense after projects of experimental cultivation of rice in the 1980s. These changes resulted in modifications in their nutricional status and the prevalence of weight excess an diabetes became an important health problem among Xavante Indians.

Objectives. To evaluate the prevalence of type 2 diabetes mellitus among Xavante Indians of Mato Grosso, Brazil.

Methods. A cross-sectional study was conducted among 948 adults Xavante Indians aged 20 years or more (463 men and 485 women) living in two reservations (Sangradouro and São Marcos), Mato Grosso, Brazil. After the agreement of Xavante leaders and signing an informed consent form, all individuals undergone clinical and antropometrical examinations and submitted to a 75g oral glucose tolerance test. Fasting and two hour capillary glycemias were measured by HemoCue Glucose 201 and classified according to WHO criteria. Height were measure by a portable stadiometer and weigh was measured by bean balance Plenna, and waist, hip and right thigh were measured by inelastic tape-measure. Body composition was assessed by bioelectric impedance Biodynamics 450.

Results. The crude and age standardized prevalence of type 2 diabetes in adults was 25.9% (95% CI: 23.2-28.9) and 28.2% (95% CI: 25.3-31.1) respectively. In men was 16.6% (95% CI: 13.3-20.3) and 18.4% (95% CI: 14.9-22.2); in women was 34.8% (95% CI: 30.6-39.3) and 40.6% (95% CI:36.2-45.1) (p=0.0000). The rate of impaired glucose tolerance (IGT) observed was 33.4% (95% CI:30.4-36.5) and 32.3% (95% CI: 20.5-44.1), respectively crude and age standardized. In men the age standardized prevalence of IGT was 29.7% (95% CI:25.4-33.9) and women 34.4% (95% CI: 30.2-38.8). The prevalence of arterial hipertension was 17.4% (95% CI: 13.9-21.0) in men and 17.3% (95% CI: 14.0-20.9) in women. In men 48.8% of adults had Body Mass Index (BMI) higher than 30kg/m², and in women 52.8%. BMI > 30kh/m² is associated with diabetes (p=0.0008) in men, but not in women (p>0.05). The thigh circunference observed in men and women was lower in diabetics (p<0.05); the waist/thigh ratio was higher in diabetics (p=0.0000) in men and women; the waist/hip ratio was higher in diabetics (p<0.05) in men and women.

Conclusions. The prevalence of type 2 diabetes was higher in Xavante Indians than in the the Brazilian general population and diabetes is a major health problem among Xavante Indians, specialy in women. In a probably genetic predisposal population, the change of habits, assuming a more sedentary life and changes in diet are the most important risk factor related to observed type 2 diabetes prevalence. A education program and health assistance is necessary to manage this public health problem.

Poster no. 78. — Studies of toxic effect of 4,8-Dihydroxyquinolin-2-carboxylic acid on pancreatic b-cells of human's embryons

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Background. 4,8-Dihydroxyquinolin-2-carboxylic acid [4,8DOX], a diabetogenic derivative of 8-oxyquinoline [80X], is formed in animals and human as result of disturbances of tryptophan metabolism caused by chronic deficiency of vit.B6 accompanied by fat abundance. It is known that diabetogenic activity of 8OX determined by forming in B-cells of complexes with a large amount of Zn+2-ions contained in B-cells.

Objectives. To study direct effect of 4,8DOX on histostructure and insulin content in pancreatic B-cells of Human's embryons in compared with B-cells of Rats.

Methods. Isolated by Collagenase pancreatic islets (IPI) of Lewis rats 4 days old and pieces of Human's embryons pancreas contained groups of B-cells or islets [PI] of 14-16 weeks old embryon's pancreas taken as abortive material. Precultivation of islets 30 min in nutria media 199, pH 7.32-7.39 contained 4,8DOX 50 mcg/ml or 100 mcg/ml and followed cultivation 48h in fresh portion of 199+5.5 mM/l of glucose. Fixation in Bouin. Paraffin and frozen sections of islets were used. Staining technologies: aldehyde-fucshin [AF], immunohistoche- mical method staining of insulin[IG], fluorescent staining of Zn+2-ions by high specific fluorescent reagent, a 8-para(toluenesulphonylamino)-quinoline [8PTSQ] with measuring density of staining and intensity of fluorescence. Groups of islets: 1.Rat's IPI+4,8DOX, 50.9 mcg/ml for 30 min; 2.Rat's IPI+4,8DOX, 102.7 mcg/ml for 30 min; 3.Human PI+4,8DOX, 51.8 mcg/ml for 30 min; 4.Human PI+4,8DOX, 102.3 mcg/ml for 30 min; 5. Human PI+4,8DOX+100.8 mcg/ml without cultivation 48h.

Results. Group 1. Insulin content in B-cells: IG-1.51±0.04, intact islets-1.92±0.07; Zn+2-ions content in B-cells: 8PTSQ-1.60±0.04, intact islets-2.02±0.08; partial necrobiosis of B-cells [AF]. Group 2. Insulin content in B-cells: IG-1.12±0.03, intacts -1.97±0.07; Zn+2-ions content in B-cells: 8PTSQ-1.06±0.02, intacts -2.04 ± 0.08; destruction and hydropic degeneration of B-cells. Group 3. IC in

B-cells: IG-1.27 ±0.03, intact B-cells-1.68±0.04; Zn+2-ions content in B-cells: 8PTSQ-1.26±0.04, intacts-1.72±0.05; Group 4. Insulin content in B-cells: IG-1.03±0.02, intact-1.70±0.07; Zn+2-ions content in B-cells: 8PTSQ-1.05±0.04, intact B-cells-1.71±0.06; histostructure [AF]: necrosis and destruction of 70-75% number of PI. Group 5. Zn+2-ions content in B-cells in fresh frozen sections [FS] of Human PI and in FS of rats IPI: 8PTSQ-1.02±0.04, intact B-cells-1.66±0.05; rats: 1.16±0.05, intacts-1.89±0.08.

Conclusions. 1) Human embryon's pancreatic B-cells are more sensitive for alterative action of 4,8DOX; 2) Direct action of 4,8DOX on B-cells result marked decreasing of insulin and of Zn+2-ions content in Human's B-cells as for 15-20% less in compared with B-cells of rat's pancreas; 3) Negative reaction of revealing of Zn+2-ions in B-cells (Group 5) on frozen sections of fresh islets and on Human pancreas tissue immediately past action of 4,8DOX determined by binding of Zn+2-ions by 4,8DOX with forming of complex Zn+2- 4,8DOX not as result of destruction of cells.

Poster no. 79. — Leicester practice risk score can be used to detect type 2 diabetes and impaired glucose regulation in a young South Asian UK population

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Background. The Leicester Practice Risk Score is an automated tool for detecting those at high risk of Type 2 Diabetes (T2DM) and Impaired Glucose Regulation (IGR – defined as IFG and/or IGT) in primary care. The score includes age, ethnicity, sex, family history of diabetes, antihypertensive therapy and body mass index. It has been shown to have high sensitivity for detecting those with undiagnosed IGR/T2DM in a multi-ethnic UK population. The tool was developed and validated in those aged between 40-75 years. This is one of the tools that have been recommended by NICE in the UK for use in stepwise screening programmes. NICE suggest that screening those less than 40 years old from a South Asian background using a two-step approach is likely to be cost saving. To date no risk scores for prevalent disease have been validated in a young South Asian population.

Objectives. To validate the Leicester Practice Risk Score in a young (25-40 years) South Asian population.

Methods. We used data on 353 South Asians aged 25-40 years from the population based ADDITION-Leicester screening study. The Leicester Practice Risk Score was calculated and compared to the diagnosis of IGR/T2DM using either 2-h glucose ≥7.8 mmol/l, fasting glucose ≥5.5 mmol/l or HbA1c ≥6.0% and T2DM alone using either 2-h glucose ≥11.1 mmol/l, fasting glucose ≥7.0 mmol/l or HbA1c ≥6.5%. Sensitivity, specificity, and positive and negative predictive values were calculated for a cut point based on the median score (i.e. 50% at greatest risk invited for diagnostic testing).

Results. Using a median cut off, 177 participants were defined as high risk, of these 68 had IGR or T2DM. This gives a sensitivity of 67.3% (95% CI 57.2% to 76.1%), specificity 56.7% (95% CI 50.3% to 62.9%), positive predictive value 38.4% (95% CI 31.3% to 46.0%), negative predictive value 81.3% (95% CI 74.5% to 86.5%). 17 out of the 21 participants with T2DM were defined as high risk. This gives a sensitivity of 81.0% (95% CI 58.1% to 94.6%), specificity 51.8% (95% CI 46.3% to 57.3%), positive predictive value 9.6% (95% CI 5.7% to 14.9%), negative predictive value 97.7% (95% CI 94.3% to 99.4%).

Conclusions. This score can be used with reasonable reliability to identify those with undiagnosed IGR and/or T2DM in a young UK South Asian population. This is the first score developed for prevalent disease taking into account HbA1c in the diagnosis of T2DM and to be validated in this age group.

Poster no. 80. — Home use OGTT device and test kit

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Background. SmartSensor telemed has developed a home-use test kit for performing an OGTT (oral glucose tolerance test) at home without any training or equipment. The kit uses a novel electronic test device which guides the user through the OGTT procedure, performs glucose measurements before and after the consumption of a glucose drink and records the test data for subsequent analysis. The device does not present test results to the user; a data record is detached from the device after use and sent for processing. When received, the data record is scanned wirelessly and the data processed in an IT system which stores results in an electronic record for viewing by a healthcare professional. The kit is intended to be provided by a healthcare professional along with a suitable glucose drink. The objective of the system is to allow OGTTs to be performed conveniently at home, with test results sent directly to the healthcare professional for interpretation. The test kit is intended to cost substantially lower than the cost of providing OGTTs in a clinical setting.

Objectives. The OGTT kit was evaluated in user studies and laboratory studies to assess whether it could provide an effective alternative to performing OGTTs in a clinical setting. For the evaluation, 100 single-use prototypes of the electronic OGTT device were produced along with a reusable version which allowed the glucose sensors to be replaced to facilitate precision studies without having to produce a larger quantity of devices.

Methods. A prototype test kit was subjected to user testing with 60 subjects recruited to represent the target user population. 40% were aged 60 to 75 years. No training or assistance was provided, however the users were provided with a copy of the instructions for use before commencing the user testing sessions. The electronic OGTT test device was tested in a laboratory to assess precision, linearity and accuracy.

Results. 5 out of 60 subjects were withdrawn from

testing due to factors which prevented them from using the OGTT device, including deafness. Of the 55 subjects who continued, greater than 95% completed the key steps in the OGTT procedure correctly. 96% of subjects stated that they found the test easy or very to perform. In the laboratory evaluations of the prototypes, precision was acceptable (CVs were 3.1% to 4.3%) and linearity was acceptable (R2 = 0.99). There was a positive bias compared to the YSI glucose method, however the sample size was too low to properly assess accuracy and the test system is still undergoing optimisation.

Conclusions. The evaluation was conducted using the first small batch of analytically capable OGTT prototypes. The key objective was to assess usability of the device and the OGTT procedure. Usability and performance were found to be acceptable and the study showed that OGTTs can be performed by untrained patients at home. Since the study was conducted, the OGTT device and test kit has undergone further optimisation and development to prepare for full manufacture.

Poster no. 81. — Collaboration in the detection of possible diabetics not diagnosed in a communitarian pharmacy

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Background. Type 2 diabetes is one of the most prevalent and serious diseases. It is therefore very important to make an early diagnosis for health, social and economic reasons. Community pharmacies can help not only because of its proximity to the population but also to primary care physicians.

Objectives. To collaborate with the primary care physicians in the precocious detection of possible diabetics. To evaluate the utility of the implantation of this program within the Pharmaceutical Care of the work center.

Methods. It called for over 18 years, of both sexes, users of the Communitarian Pharmacy, undiagnosed diabetes, or pregnant. Determination of glucemia basal in capillary blood and answer to a questionnaire with 28 variables, including age, weight, carves, perimeter of waist and the calculation of FINDRISC test; made in May, 2009.

Results. Of the 53 people who participated in the program, 36 (68%) had baseline glycemia according to ADA criteria 2003 (<100mg/dl), 13 (25%) blood glucose levels (100 to 125 mg / dl) and 4 (8%) high (> = 126 mg / dl). Applying the FINDRISC Test, 19 patients (36%) had a low risk of diabetes (score less than 7 points), other 19 (36%) achieved a medium risk (score between 7 and 14 points) and 15 (28%) high or very high risk (score 14 points). The people who got high blood glucose and / or high or very high in the FINDRISC test were 17. All the people received a report to deliver to their primary care physicians for reevaluation. Three of these people have been diagnosed with diabetes type 2 and have begun with pharmacological treatment with oral agents. For the rest, the doctor did not consider to make any additional intervention.

Conclusions. Sending to the patient to the doctor, one has been able to put on the alert to people who are unaware of their risk and some have been diagnosed by their doctor of diabetics. It has been stated that risk factors such as age, waist circumference and weight among others, lead to high occurrence in generating altered or high blood glucose. For those with altered blood glucose it could be useful to repeat testing a few weeks after implementing the recommended dietary and physical activity. It would be desirable to implement new analysis of baseline glucose with more people and more restrictive inclusion criteria, such as people with IMC> 30 or with the FINDRISC test in high or very high levels. It has been used successfully the Communitarian Pharmacy as a health establishment close to the patient, in connection with the primary care physicians for early detection of diabetes.

Poster no. 82. — Educative programme for people with diabetes mellitus type 2 (DM2): consensus in Costa del Sol district

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Background. Type 2 diabetes is a frequent and expensive chronic disease associated with premature mortality and significant morbidity. There cannot be the slightest doubt that the education is essential in the therapeutic fight of the patient suffering from diabetes. Obtaining lasting changes in the patients' daily lifestyle is the most important challenge in the education about chronic diseases as diabetes. The fundamental aims are favouring an attitude change, getting into the habit of a lifestyle for the patient adapted to the personal disease so that they can achieve the self-management and a more considerable participation in their health. However, there are no organized educational intervention programs which could facilitate and reduce the professional variability in that activity.

Objectives. Agreement on the criteria of intervention and reduction of the variability of attention to these Type 2 diabetics who are treated in the primary care unit of the fourteen clinical management units (UGC, Unidad de Gestión Clínica) of the Costa del Sol District. Facilitation of making decisions adapted to the welfare reality. Constitution of a general base for the protocols development and updating applied in each UGC and for those professionals who deal with these patients. Favour the monitoring and the evaluation of the educational intervention contributing to evidence with our actions.

Methods. Key words: educational intervention, primary care, diabetes, education. Systematic research on the last evidences about therapeutic diabetes education in primary and secondary data basses and in the clinical practical guidelines. Working party and consensus of professionals, models of diabetes education in the Costa del Sol District. The participating professionals know from their expert competence the necessities of coordination and they provide with the last scientific tests or evidences as for therapeutic education. Incorporation of the educative tool Conversation Map and the methodology of the School of Patients based on the figure of the formative patient influence of the Andalusian School of Public Health (EASP, Escuela Andaluza de Salud Pública). The program includes tests of knowledge (ECODI, knowledge of diabetes scale), test of the treatment adhesion (Morisky-Green y Batalla), quality of life in diabetes test (EsdDQOL, Diabetics Quality of Life measurement scale), commitment of attendance to the program and satisfaction test. All of them are determined to evaluate the effectiveness and the impact on the health of Type 2 diabetics.

Results. Editing an educational program for people with type 2 diabetes in the district Costa del Sol.

Conclusions. Devising a program of therapeutic education for Type 2 diabetics, in which an individual therapeutic education program, a basic education program in groups and an advanced education program in groups must be included. In short: creating a useful tool in order to reducing the variability of attention to these Type 2 diabetics with the aim of educating active patients who assume and develop self-control of their disease at the same time that they improve their metabolic control and their quality of life.

Poster no. 83. — Association of ACE gene polymorphism and diabetes in Sudanese patients

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Background. The role of genetic factors in diabetes among Sudanese is untouched area. Our study to investigate the relationship between diabetes and an insertion/deletion polymorphism in the angiotensin-converting enzyme (ACE) gene in Sudanese patients.

Objective. To study the association of ACE gene polymorphism and diabetes in Sudanese diabetic patients.

Methods. Genomic DNA was isolated from the peripheral blood leukocytes. To determine the ACE genotype, genomic DNA was amplified by PCR. 150 subjects (aged 18-62 years) were divided to two groups diabetics and healthy with full-informed consent. Glucose and lipid profile were investigated. ACE I/D polymorphism were determined by PCR (Nikzamir. et al 2008). Using a sense primer: 5-CTGGAGAGCCACTCCCATCCTTTCT-3 and anti-sense primer: 5-GGGACGTGGCCATCACAT TCGTCAG-3. To avoid ID/DD mistyping, all DD genotype samples were confirmed using primer: forward: 5-TGGGACCACAGCGCCCGCCACTAC-3 and reverse: 5-TCGCCAGCCCTCCCATGCCCATAA-3

Results. I am working on that research, didn't get the final results yet.

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Poster no. 84. — 25(OH)vitamin D levels in premenopausal patients with polycystic ovary syndrome and/or obesity

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Background. Current evidence suggests that vitamin D (VitD) deficiency may contribute to the disturbance in insulin metabolism and the development of type 2 diabetes. Insulin resistance, hyperinsulinemia and obesity play an important role in development of polycystic ovary syndrome (PCOS). PCOS patients have higher risk for type 2 diabetes.

Objectives. The aim of this study was to investigate VitD levels, measured as 25(OH)D, in Bulgarian women with PCOS and/or obesity.

Methods. The study included 103 patients, divided into three groups - group 1 Obese (n=33); group 2 Lean PCOS (n=50) and group 3 Obese PCOS (n=20). 25(OH) D levels were measured by electrochemiluminescence immunoassay.

Results. Almost 2/3 of the patients with PCOS and/or obesity appeared to be VitD deficient. Patients with obesity, especially visceral (with or without PCOS) had significantly lower levels of 25(OH)D compared to lean PCOS subjects. Patients with and without metabolic syndrome however did not differ significantly in 25(OH) D levels. Patients with normal BMI had higher 25(OH) D levels compared to overweight and obese (p=0.028). There was no correlation between 25(OH)D levels and indices of glucose metabolism – fasting blood glucose and IRI and after OGTT and HOMA index.

Conclusions. There is a very high prevalence of vitamin D deficiency in Bulgarian patients with PCOS and/or obesity. 25(OH)D levels are much more dependent on patients' weight than on PCOS-status or insulin resistance.

Poster no. 85. — MPO levels in patients with PCOS and/or obesity before and after metformin treatment

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Background. Polycystic ovarian syndrome (PCOS) is often linked to adverse cardiometabolic profile and type 2 diabetes risk. Myeloperoxidase is (MPO) a leukocyte-derived enzyme, generating reactive oxidant species, that is thought to be linked to increased cardiovascular risk. Diabetes mellitus type 2 was found to

be associated with increased levels of myeloperoxidase, independent of other clinical variables. This association may contribute to the accelerated progression of atherosclerosis in diabetics. Metformin is used both for type 2 diabetes and PCOS treatment. The effect of metformin on myeloperoxidase levels in PCOS patients is not thoroughly studied.

Objectives. The aim of the present study is to investigate MPO levels in premenopausal women with PCOS and/or obesity and to compare them to other classical cardiovascular risk factors before and after metformin treatment.

Methods. In the study were included 75 patients – 27 Obese, 31 Lean PCOS and 17 Obese PCOS women. Anthropometric measurements and biochemical study, including MPO measurement, were performed in the beginning of the study. For patients that were diagnosed with insulin resistance, started metformin treatment (1500-3000 mg/day) and were reevaluated all the laboratory test and anthropometric measurements were repeated after 6 months.

Results. MPO levels did not differ between patients with obesity with and without PCOS, nor between patients with PCOS with and without obesity. There were no differences in MPO levels between patients with different PCOS phenotype, with and without visceral obesity or insulin resistance based on variety of criteria, with and without arterial hypertension, dyslipidemia, menstrual disturbances and obstructive sleep apnea. There was no significant change in MPO levels after several months of metformin treatment despite the beneficial changes in insulin concentrations and erythrocyte sedimentation rate.

Conclusions. MPO levels did not depend on the PCOS status of the patients. MPO levels did not change significantly after metformin treatment.

Poster Session 2.2
Diabetes and brain

Poster no. 86. — Associations between psychological flexibility and eating behavior among working women

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Background. For some, eating is a passive way of coping with stress and difficult feelings. Psychological inflexibility means that fears, memories, thoughts and feelings prevent living the life that person wants to live. Instead, psychological flexibility means ability to fully contact the present moment, being aware of and accepting the thoughts and feelings at the present moment, and acting, at the same time, based on one's own values and goals. Thus, one might expect that those who are psychologically inflexible have more unhealthy eating behaviors. Abnormal eating behavior, namely high levels of emotional eating (EE) and uncontrolled eating (UE), associates with obesity. Among patients with type 2, diabetes high EE associated with higher energy intake, whilst high cognitive restraint (CR) associated with lower energy intake. Furthermore, decreased levels of EE and UE, and increased level of CR are associated with better results in weight loss programs. Thus, normalized eating behavior is one key element in the prevention and treatment of type 2 diabetes.

Objectives. This study investigated differences in EE, UE and CR between those with different levels of psychological flexibility.

Methods. Study subjects were working women (n=263) who participated in randomized controlled Nuadu health intervention trial with 12-month follow-up. Eating behavior was measured using Three Factor Eating Behavior Questionnaire -18 (TFEQ-18) which evaluates EE, UE and CR. Psychological flexibility was studied using Acceptance and Action Questionnaire-II (AAQ-II). Both questionnaires were answered using Likert-type response scale. TFEQ-scores were summed and altered to percents (0 to 100), and AAQ-II scores were summed summed (10 to 70) and divided in to quartiles (1) inflexible ≤ 48.4, 2) average I 48.5 to 55.6, 3) average II 55.7 to 60.2, and 4) flexible ≥60.3).

Results. Study revealed that EE ($p<0.001$) of inflexible [EE mean (95% confidence interval) 56.2 (48.9; 63.5)] was higher than those of average II [EE 40.9 (34.1; 47.6)] and flexible [EE 35.5 (27.9; 32.7)], and that the UE ($p<0.001$) of inflexible [UE 45.0 (40.0; 50.0)] was higher than those of average I [UE 36.2 (31.7; 40.6)], average II and [UE 30.1 (25.6; 34.6)] and flexible [UE 27.9 (22.9; 32.7)].

Conclusions. Levels of EE and UE are higher among those women with psychologically inflexible compared to those of psychologically more flexible. Thus, increasing psychological flexibility might help in normalizing eating behaviour, weight loss and weight maintenance, and further in the prevention of diabetes. In future studies these associations should be studied further to ascertain whether increasing psychological flexibility would help decreasing EE and UE of those psychologically inflexible and with high levels of EE and UE.

Poster no. 87. — Associations between stress and depression scores and cardio-metabolic risk markers in young urban subjects at risk of type 2 diabetes

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Background. There is increasing evidence that stress at different stages in the life cycle starting from intrauterine period may be associated with onset of Type 2 diabetes (T2DM). Stress may manifest clinically as behavioural problems with or without symptoms of depression. Stress and depression may be

associated with increased risk of cardio-metabolic disease. The relationship between measures of stress and depression and cardio-metabolic risk markers have not been studied in detailed in South Asian population.

Objectives. To study the associations between psychological parameters (stress and depression scores) and cardio-metabolic risk markers in young healthy urban Sri Lankans 'at risk' of cardio-metabolic disease.

Methods. We investigated in a cross sectional study the baseline associations cardio-metabolic markers and depression [Patient Health Questionnaire (PHQ-9) score] and Perceived Stress Scale (PSS) scores in subjects aged 10-40yrs currently participating in DIABRISK-SL trial. 4487 (45%Males) subjects with ≥ 2 risk factors of raised Body Mass Index (BMI), raised waist circumference (WC), physical inactivity and family history of T2DM attended for measurements in the fasting state and PHQ-9 and PSS questionnaires were completed. Univariate and multivariate regression analyses were performed to identify variables associated with PHQ-9 and PSS scores. PSS score was evaluated as a continuous variable (linear regression) and as high (≥median) and low (5 abnormal).

Results. Median (inter-quartile range) PSS score was 11(0-16);76.4% had normal PHQ-9 and 23.6% abnormal; 2207 subjects had high and 2280 low PSS score. Prevalence of moderate/moderately severe depression was 4.8% and 0.3% had severe depression. In a linear regression multivariate analyses the following variables were independently associated with PSS, unstandardized B coefficient; positively; PHQ-9 1.034, alcohol use 0.531, height (cm) 0.149, BMI (kg/m2) 0.466, age 0.106 (yrs), negatively; WC (cm) -0.046 and DBP (mmHg) -0.043 ($p<0.05$ for all). In logistic regression the following were independently associated with high PSS (Odds ratio and 95% CI shown); height 1.06 (1.02-1.11), BMI 1.24 (1.09-1.41), PHQ-9 1.4 (1.36-1.43), age 1.03 (1.02-1.04), WC 0.98 (0.97-0.99), weight 0.932 (0.87-0.98), DBP 0.98 (0.97-0.99) ($p<0.05$ for all). For abnormal PHQ-9 only age 1.04 (1.03-1.05) was significantly associated.

Conclusions. In subjects at risk of T2DM and CVD there are modest associations between clinical and biochemical measures of cardio-metabolic risk and stress and depression scores. The low prevalence of stress and depression in this healthy young cohort is a limiting factor. Prospective studies are needed to prove if there is causality between PHQ-9 and PSS scores and the development of T2DM and CVD.

Poster no. 88. — Working memory effiency in older adults with type 2 diabetes

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Background. Delaying the onset and controlling the progression of type 2 diabetes mellitus (T2DM) is an important public health priority. T2DM is associated with aging with approximately 1 in 5 older adults diagnosed.

Aging and T2DM are related with specific executive function impairments. Blood glucose control has been clearly associated with cognitive performance and there is some evidence that impaired glucose tolerance may be correlated with executive function deficits. Executive functioning encompasses such tasks as planning, scheduling, decision making, error correction, task-switching, inhibiting irrelevant stimuli, and navigating unfamiliar situations. Impairments in certain executive functioning processes may affect individual ability to perform activities of daily living and lead to compromised quality of life.

Objectives. The purpose of this study was to examine inter-individual differences in executive function, specifically working memory performance, between older adults with and without T2DM.

Methods. Generally healthy older adults (n = 30, Mage = 61 ± 7.9) with (n = 29) and without (n = 31) T2DM were screened for dementia or Alzheimer's disease and then completed a battery of executive function tests. Working memory capacity was measured using the spatial working memory task where participants were required to remember the spatial placement of one (easiest), two, or three (hardest) dots. Inverse efficiency, a composite ratio of accuracy and response time, was calculated to examine overall task performance. Analyses included initial independent t-tests for difference of means, calculations for Cohen's d effect size, and a multivariate analysis of variance.

Results. Inverse efficiency was lower, indicating better efficiency, in the individuals without diabetes in the one- ($p = .04$, $d = .55$) and two-dot ($p = .02$, $d = .68$) conditions. The three-dot condition showed a marginally significant difference ($p = .07$, $d = .48$) by T2DM status. A multivariate analysis of variance revealed a significant effect of T2DM on the combined dependent variable of one- and two-dot spatial working memory performance [$F(2,56) = 2.986$, $p = .059$, $\eta 2 = .096$]. Analysis of each of the conditions separately indicated contribution of T2DM to both the one-dot condition [$F(1,59) = 4.309$, $p = .042$, $\eta 2 = .070$, $d = .53$] and the two-dot [$F(1,59) = 6.051$, $p = .017$, $\eta 2 = .096$, $d = .61$] working memory performance.

Conclusions. Our data indicate that individuals with T2DM were slower and less accurate in the one- and two-dot conditions of the spatial working memory task, suggesting that the cognitive impairment associated with T2DM occurs at more basic levels of working memory. Basic memory skills, which are necessary for successful daily functioning, appear to be slightly impaired in T2DM. As cognitive health contributes to quality of life in older adults, those with T2DM are at increased risk for experiencing difficulties with activities of daily living and compromised quality of life. Our data underscore the importance of certain health behaviors, such physical activity, which may not only prevent T2DM but is also implicated in enhanced cognitive function.

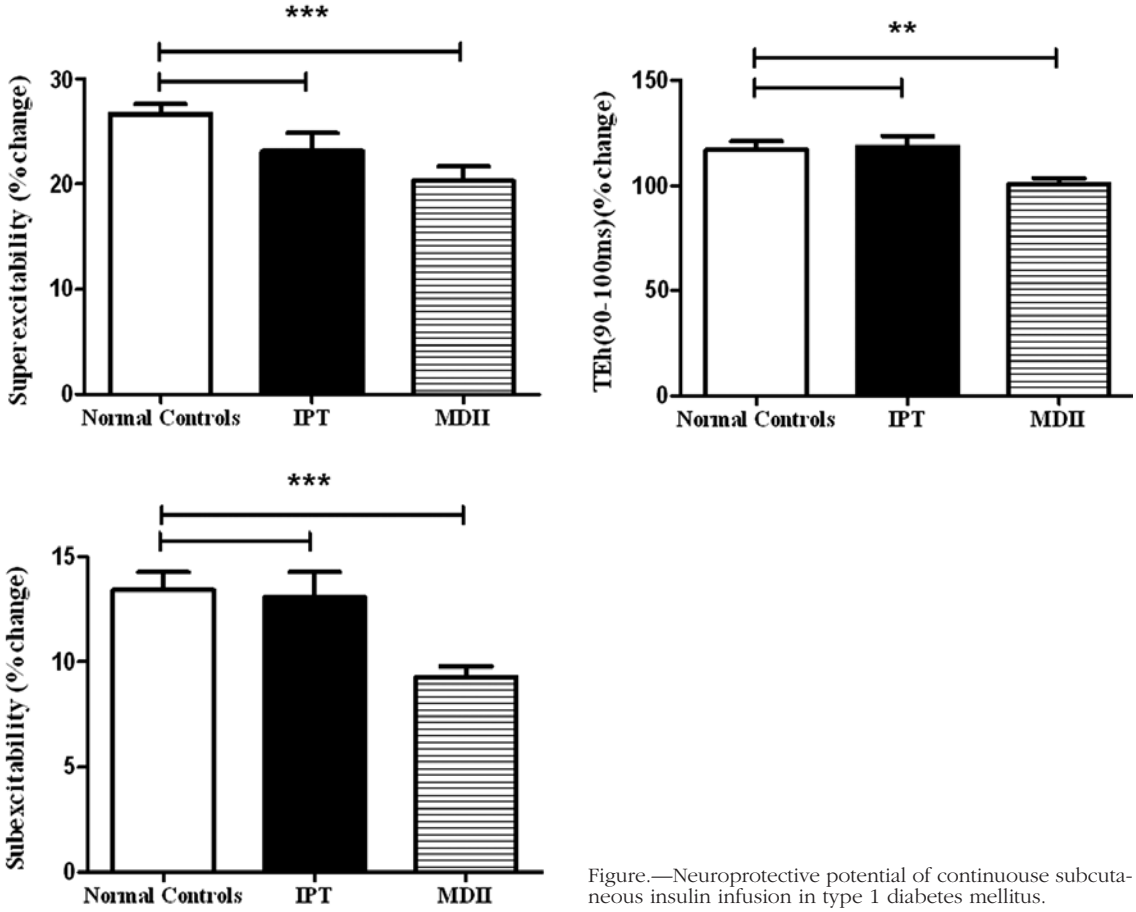

Figure.—Neuroprotective potential of continuouse subcutaneous insulin infusion in type 1 diabetes mellitus.

Poster no. 89. — Neuroprotective potential of continuous subcutaneous insulin infusion (CSII) in type 1 diabetes mellitus

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Background. Diabetic peripheral neuropathy is a common and debilitating complication of diabetes mellitus (DM). While strict glycaemic control through multiple daily insulin injections (MDII) or continuous subcutaneous insulin infusion (CSII) may reduce the risk of DPN development, there have been no studies comparing the neuroprotective potential of MDII and CSII. Nerve excitability techniques are a novel method that provides sensitive information on nerve function, particularly relating to changes in nerve ion channel function and membrane potential. Previous studies utilizing nerve excitability techniques have demonstrated prominent abnormalities indicative of ion channel dysfunction in type 1 diabetes (T1DM) patients which may occur prior to onset of diabetic peripheral neuropathy.

Objectives. To establish if there are differences in nerve excitability parameters between T1DM patients treated with MDII and CSII in the absence of clinical signs of diabetic peripheral neuropathy.

Methods. 36 T1DM patients underwent comprehensive neurological screening, including clinical neurological assessment and nerve conduction studies to identify the presence of neuropathy. Twenty non-neuropathic T1DM patients were subsequently recruited and grouped according to insulin delivery method: MDII (n=11, 9M:2F, age 27.3 + 5.8 yrs) or CSII (n=9, 7M: 2F, age 28.7 + 13.6yrs). Nerve excitability measurements were obtained from the median nerve in all patients. Groups were matched for age, glycosylated haemoglobin (HbA1c%), body mass index (BMI) and disease duration. Excitability testing was also performed on 20 age-matched normal controls for comparison using independent t-tests.

Results. As a group, T1DM patients demonstrated pronounced alteration in numerous excitability parameters reflecting ion channel dysfunction. Greater ab-

normalities were noted in the MDII group compared to the CSII group and normal controls (Figure 1). Specifically, excitability parameters reflecting alteration in nerve membrane potential were abnormal in the MDII group, including superexcitability (a: MDII -20.33%, NC -26.67%, p<0.001), subexcitability (b: MDII 9.287 %, NC 13.42%, p < 0.001) and hyperpolarizing threshold electrotonus at 90-100 ms (c: MDII -104.1%, NC -124.7%, p < 0.005). In contrast to the prominent changes noted in MDII patients, there were no significant differences noted between CSII patients and normal controls.

Conclusions. T1DM patients on multiple daily insulin injections (MDII) exhibit greater alteration in nerve function, when compared to patients treated with continuous subcutaneous insulin infusion (CSII). These abnormalities are subclinical and reflect changes in ion channel function. Critically, these changes predate onset of clinical diabetic neuropathy and suggest a neuroprotective potential for CSII in T1DM patients.

Poster no. 90. — Assessment of sympathetic and parasympathetic nervous system activity in patients with prediabetes and newly-diagnosed type 2 diabetes

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Background. There is increasing evidence that complications characterizing diabetic hyperglycaemia, including peripheral and autonomic nervous system damage, are present at earlier stages of glucose intolerance.

Objectives. The aim of the present study was to assess sympathetic (SNS) and parasympathetic nervous system (PSNS) activity in patients at different stages of altered glucose metabolism - prediabetes - impaired fasting glucose (IFG) and impaired glucose tolerance (IGT), and newly-diagnosed type 2 diabetes (NDD).

Methods. A total of 83 subjects, of mean age 48.25x16.0 years and mean BMI 31.2±6.2 kg/m2 were involved in a cross-sectional study. The patients were divided in 3 groups according to their glucose tolerance - 38 with normal glucose tolerance (NGT), 31 with prediabetes (IFG and IGT), and 14 with NDD. Glucose tolerance was studied during OGTT, applying 2006 WHO criteria. SNS and PSNS activity was assessed by autonomic nervous system (ANS) monitoring technology ANSAR ANX 3.0 based on spectral analysis of heart-rate variability (HRV) with concurrent spectral analysis of respiratory activity at resting as the independent means of identifying PSNS (vagal) activity in the HRV spectrum - Respiratory Frequency area (RFa) and using the remaining portion of the low frequency region for evaluating SNS activity - Low Frequency area (LFa), and measuring the balance between both ANS branches using the following clinical tests: 1) deep breathing (E/I ratio), 2) Valsalva and 3) standing from a seated position (30:15 ratio) tests.

Results. The two groups with glucose intolerance – prediabetes and NDD, presented a significant decline in both SNS (p=0.02 and p=0.01, respectively) and PSNS (p=0.004 and p=0.01, respectively) activity as compared to the group with NGT. Despite the trend toward lower LFa and RFa values with the progression from prediabetes to NDD, the difference was not statistically significant. The groups with impaired glucose tolerance showed a significant deterioration in the clinical tests. Abnormal E/I ratio was found in 29.03% of subjects with prediabetes, 35.71% of those with NDD and 5.26% of NGT group. Valsalva test was impaired in 45.16% of prediabetes, 28.57% of NDD and 44.73% of NGT group. Abnormal 30:15 ratio was observed in 19.35% of prediabetes group, 42.85% of NDD and 13.15% of NGT group. One abnormal test was demonstrated in 31.57% of NGT group, in 29.03% of prediabetes group, and in 14.28% of NDD group. Alteration in two tests was found in 10.52% of NGT group, in 22.58% of prediabetes group, and in 14.28% of NDD group. Abnormalities in all three tests were established in 6.45% of prediabetes group, in 21.42% of NDD group in comparison to 2.63% in the group with NGT.

Conclusions. Our results demonstrate that both SNS and PSNS activities are diminished even at the early stages of altered glucose homeostasis - prediabetes and NDD, and the ANS imbalance accelerates with the worsening of glucose tolerance.

Poster no. 91. — Testosterone treatment in older diabetic foot men

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Background. Replacing low testosterone levels in older, overweight or obese diabetic men to normal levels is appeared to result in dramatic weight loss and other health benefits, such as better blood pressure and blood glucose control.

Objectives. We hypothesized that testosterone treatment in older diabetic men with low testosterone levels (hypogonadal) would prevent of metabolic disorders and progression of diabetic complications.

Methods. We examined 49 diabetic foot men which had required surgery operations and foot amputations in history of the disease. The men's baseline testosterone levels ranged from between 1.3 to 12 nmol/L with the cut-off point for testosterone treatment ≤ 12 nmol/L, a standard cut-off point for testosterone levels to be considered as 'low'. Anthropometric measurements, biochemical param-

eters, clinical neurological examination with evaluation according to the Neuropathic Disability Score (NDS, range 0 – 28) were performed. All patients underwent cardiovascular autonomic function tests, and arterial baroreflex sensitivity (ABS) was determined. All participants were divided on two groups: first group (25 patients) had received testosterone (250 mg/week i/m during 6 months), other one (24 patients) had received placebo.

Results. The patients of both groups had same age (57.2±1.99 and 55.5±1.07 years respectively; p=0.57), duration of diabetes (8.6±1.74 and 9.9±1.34 years respectively, p=0,57) and anthropometric parameters (BMI 28.7±0.84 and 29.3±0.79; p=0.24). The mean HbA1c level was 7.6±0.25% and 8.3±0.22% respectively (p=0.93). We found moderate or severe sensor-motor neuropathy in all patients. Moreover sever CAN was observed quiet often (9/25 and 6/24 respectively; χ^2=0.57; p=0.24). Only patients in the treatment group turned out to experience the decrease of clinical symptoms of low testosterone levels and improvement of quality of life. After 6 months of treatment we didn't find any significant change of BMI, waist/hip ratio, metabolic indicators as well as NDS results in comparing with baseline. However testosterone treatment resulted in improvement of peripheral vasomotor constriction on cold stimulus (22.9±3.11 and 28.5±2.39% at baseline and after treatment respectively; p=0.029), increase of blood pressure during handgrip test (9.1±1.12 and 10.4±1.48 mmHg at baseline and after treatment respectively; p=0.04). As result only participants in group of treatment showed restoration of normal blood pressure reaction on orthostatic test.

Conclusions. Raising serum testosterone to normal during short period improved quality of life but didn't influence significantly on metabolic profiles. However the testosterone treatment was followed by restoration of normal blood pressure orthostatic reaction and as a result no cases of severe CAN were observed. This preventive effect of testosterone should be profoundly investigated.

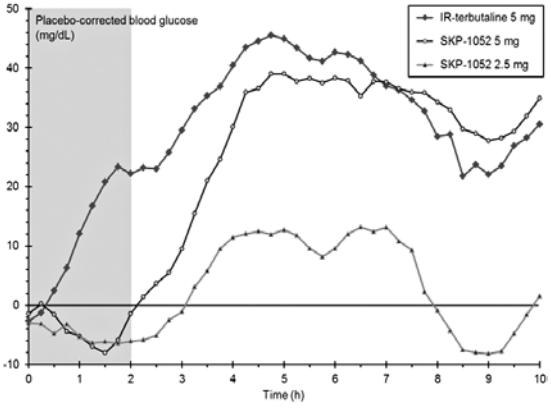

Figure.—Optimal timing of terbutaline release has the potential to prevent insulin-induced nocturnal hypoglycaemia.

Poster no. 92. — Optimal timing of terbutaline release has the potential to prevent insulin-induced nocturnal hypoglycaemia

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Background. Terbutaline has been shown to protect against nocturnal hypoglycaemia, however, at the

TABLE.—*Optimal timing of terbutaline release has the potential to prevent insulin-induced nocturnal hypoglycaemia.*

Parameter	Placebo	SKP-1052 2.5 mg	SKP-1052 5 mg	IR-terbutaline 5 mg
Mean BG (0-10h post-dosing) [mg/dL]	97 (40)	96 (38)	113 (44)*	120 (49)*
Hypoglycaemic events (11 pm – 7 am)	27	16	9*	10*
Reduction vs placebo [%]		41	67	63
Hypoglycaemic events (1-5 am, 3-8 h post-dosing)	13	5	3	4
Fasting BG (7 am) [mg/dL]	101 (57)	99 (56)	126 (73)*	126 (70)*

expense of morning hyperglycaemia. SKP-1052 is a formulation using the Geoclock technology releasing terbutaline about 2 hours post-dosing which might lead to a better match between terbutaline and blood glucose concentrations.

Objectives. To assess the effect of 5 mg immediate release terbutaline (IR) and placebo (PLA) in comparison to 2.5 mg and 5 mg of SKP-1052 (SKP) on overnight blood glucose (BG) concentrations and the incidence of nocturnal hypoglycaemia.

Methods. A randomised, single-blind cross-over trial in 30 subjects with type 1 diabetes. On each treatment day, BG was lowered to 90 mg/dL before injection of insulin glargine at 6:30 pm. IR, SKP or PLA were given at 9 pm, BG and pharmacokinetics (PK) were followed until 7:00 am the next day. Carbohydrates (10 g) were given if hypoglycaemia (BG < 50 mg/dL) occurred.

Results. Maximum PK levels were reached 2-2.5h later with SKP than with IR confirming the delayed release with the Geoclock technology, whereas dose normalised PK showed equivalence between SKP and IR. IR and both SKP doses showed a (non-significant) 41-67% reduction in hypoglycaemic events (table 1). Whereas IR and 5 mg SKP showed significantly higher nocturnal and fasting BG than placebo, 2.5 mg SKP only exhibited a modest and transient (non-significant) increase in BG 3-8 hours post-dose (figure 1). All terbutaline formulations were well tolerated without relevant increase in adverse events or changes in electrolytes or ECGs.

Conclusions. This study confirmed the potential of hypoglycaemia prevention with terbutaline. With an optimized dose of SKP and the related delayed increase of nocturnal BG it might be feasible to prevent nocturnal hypoglycaemia with less morning hyperglycaemia as compared with conventional IR-terbutaline formulations.

Poster Session 2.3
Nutrition

Poster no. 93. — Fruit and vegetable intake and its association with metabolic syndrome in women participants of the Mexican Teachers' Cohort Study (ESMaestras)

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Background. Mexico as many other developing countries is suffering of an increasing epidemic of diabetes and metabolic syndrome (MS). Traditionally, fruit and vegetables (F&V) consumption has been recommended as a healthy life style for many diseases including those associated with cardiovascular risk. However, studies on the association between F&V intake and metabolic syndrome and diabetes have yielded inconsistent results.

Objectives. To evaluate the cross-sectional association of F&V consumption with MS and its components in women participants of the Mexican Teachers' Cohort study (ESMaestras)

Methods. We analyzed data from 875 female teachers from 2 states of Mexico (Veracruz and Jalisco) who participated in the baseline evaluation of ESMaestras and were part of the sub-sample with clinical evaluation. Teachers with previous diagnosis of diabetes, hypertension or hyperlipidemia were excluded. Information about socio-demographic characteristics, nutrition, physical activity, health and chronic diseases was obtained by a self-reported questionnaire. Information about F&V consumption during the previous year was assessed by a Food Frequency Questionnaire, previously validated in Mexican population. Portions of F&V per day were categorized in quintiles. Fasting blood glucose, serum levels of HDL-c and triglycerides, blood pressure, weight, height and waist circumference were measured using standard techniques and personnel. Presence of MS and its components was established using the Adult Treatment Panel III (ATP- III) definition. Logistic regression models, adjusted by possible confounders were used to estimate ORs of the association between F&V and MS, using the lowest quintile consumption category as reference.

Results. The median intake of F&V was 3.9 and 2.6 portions per day, respectively, and mean (±SD) age was 45(±6). MS prevalence was 41.1%, and the most frequent component was low HDL-c (60.0%) followed by abdominal obesity (54.3%). After a multiple analysis adjusting by age, total energy intake, state of residence, menopausal status, SES, smoking, alcohol consumption and physical activity, vegetables consumption was negatively associated with MS, with an OR (95%CI) comparing the quintile with the highest intake (Q5) *vs.* the quintile with the lowest intake (Q1) of 0.53 (0.32 – 0.87). Fruit consumption was inversely but not significantly associated with MS. The OR comparing the extreme quintiles of fruit intake (Q5 vs Q1) was 0.72 (95% CI=0.4 – 1.20). Individual components of MS that were associated with vegetables consumption were low HDL-c and abdominal obesity. Additional adjustment by fiber and macronutrient intake and BMI did not modify the conclusions.

Conclusions. Vegetables consumption was significantly associated with decreasing risk of MS. The association between fruit intake and MS was inverse but not statistically significant. These differences might suggest the need of differential recommendations on F&V consumption to decrease the risk of MS and related conditions, and need to be evaluated prospectively.

Poster no. 94. — Validation of 16-item food intake questionnaire to estimate diet quality

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Background. Dietary patterns play a major role in the development and prevention of many non-communicable diseases. Especially quality of fats and carbohydrates in diet is known to affect the risk for type 2 dia-

betes. Comprehensive dietary assessment methods used by nutritionists are not appropriate for routine clinical use. Reliable and fast diet quality questionnaires are therefore valuable tools for physicians, nurses, and other health-care personnel to assess clients dietary quality. So far, validated short diet quality questionnaires which estimate the intake of fat and carbohydrates, have not been published.

Objectives. The aim of the study was to validate a 16-item food frequency questionnaire (16-FFQ) and to test the ability of the questionnaire to estimate the quality of carbohydrate and fat intake.

Methods. 77 participants (52 men and 25 women) completed the 16-FFQ and a 7-day food diary. Spearman correlation coefficients were used to compare food intake between 7-day food diaries (amount in grams) and corresponding 16-FFQ answers as well as nutrient intakes between the16-FFQ and food diaries. Nutrient intakes were also divided into tertiles and exact and opposite agreement between the methods were calculated. In addition, to be able to estimate intake of fat, saturated fat, sucrose and fibre from the 16-FFQ, simple linear regression models were created.

Results. The Spearman correlation coefficients for food groups between the 16-FFQ and food diary ranged from 0.08 for poultry dishes to 0.74 for wine. Good correlations were found for milk products (0.68), fruits and berries (0.65), porridge (0.65), cereals (0.63), beer (0.61), rye bread (0.59), fish dishes (0.57) and desserts and pastries (0.57). Statistically significant correlations were not found for sausage and poultry dishes and fast foods. The Spearman correlation coefficients for fat, saturated fat, sucrose and fibre intakes calculated from food diaries and the 16-FFQ were 0.36, 0.47, 0.60 and 0.53, respectively. At least 44% of the participants were correctly classified into the same third of intake for fat, saturated fat, fibre and sucrose by 16-FFQ and food diary. Less than 10% of the participants were misclassified into the opposite third of intake for saturated fat, fibre and sucrose and for total fat 13%.

Conclusions. The 16-FFQ performed reasonably well for the assessment of the intake of milk products, fruits and berries, porridge, breakfast cereals, beer, rye bread, fish dishes, desserts and pastries. It also managed to rank individuals according to their intake of saturated fat, fibre and sucrose intake. The questionnaire could be used as a tool for assessing quality of fat and carbohydrates in diet and to support dietary counselling.

Poster no. 95. — Dietary intake and degree of adherence to nutritional recommendations in adults of DRECE-COHORT with diabetes and related degree of metabolic control

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Background. A dietary pattern that includes carbohydrate from fruits, vegetables, whole grains, legumes and low fat milk is encouraged for good health. Food frecuency analysis would be useful for managing type 2 diabetes and let to identified, if subjects with lowest dietary adherence had the poorest metabolic control

Objectives. The aim of the study is determinate the adherence to nutritional recommendations of American Diabetes Association by diabetes population of DRECE Cohort and related with metabolic control.

TABLE.

Clinical , dietary intake, metabolic goals met by adherence category for (insulin) with type 2 diabetes , consuming >1000 Kcal/d
DRECE COHORT

Metabolic control	Global (n=203)	Very Low (n=34) 1 item	Low (n=96) 2 tems	Intermediate (n=56) 3 items	High (n=17) 4 items	p-value
TAS (mmHg)	132,7±20	131,3±15,8	134,1±22	132,6±17,5	127±21	0,664
TAD (mmHg)	81,7±12,5	81,2±12,6	82,1±9,6	80±12,1	81,4±11,7	0,920
Cholesterol(mg/dl)	222,31±43	227±35	227,7±45	212,46±46	214,5±26,7	0,146
Trigliceride (mg/dl)	179±131	218,2±172	175,6±106	150,1±86	212,7±234	0,075
HDL- Col	50,5±14,7	52,5±14,7	50,6±15,4	49,2±13	50,3±17,4	0,799
LDL-Col	137,1±38,5	130,8±33,4	142,5±40,9	133,5±39,2	129,9±27,8	0,280
IMC	29,4±5,2	29,7±6,1	29,5±5,4	29,1±4,43	29,2±4	0,94
Creatinina	0,95±0,18	0,94±0,18	0,96±0,21	0,92±0,15	1±0,12	0,503

Methods. This was an observational and descriptive study of a historical cohort: DRECE-Dieta y Riesgo de Enfermedad Cardiovascular en España (diet and cardiovascular disease in Spain). The DRECE project was designed to identify the prevalence of cardiovascular risk factors in the Spanish population and their relationship with dietetic habits. It included 4,783 subjects who were followed from 1991 to 2011. By that time, the cohort age range was from 5 to 60 years. The participants completed a food frecuency questionnaire were used to estimate daily energy intake and determinate each subject´s adherence to nutritional recommendations of ADA by Clinical Practice. Recommendation related with carbohydrates, fats, proteins, SFA, cholesterol and fiber intake. We determined the proportion of subjects wih low carbohydrates diet [restricting total carbohydrates to >130 g/d] and patients with high proteins diet (>20% proteins energy intake). Subject were divided into groups based on the proportion of ADA dietary goals met, of 5 items evaluated.

Results. The total of subject included in the study was 212 participants. We excluded 9 subjects reporting daily energy intake <1000 kcal because these results were considerable unreliable. Subjects were then categorized into three groups depending on their adherence rates to nutritional recommendations of ADA standards, previously described. 39,4% of subjects met the standard for carbohydrates intake , 3% met the standard for saturated fatty acids, all subjects met the standard for cholesterol , and the consumption of fiber was raised by 16,7% of subjects. 64% of subjects achieved optimal adherence to dietary standards, get less than 50% of the objectives. 16,7% of patients only have correct adherence to 1 items of recommendations, 47,3% compliance two items of them, 27,9% (compliance of three nutritional recommendations), and and only 8,45% (four recommendations) have 4 items of their dietary habits intake. The degree of adherence to nutritional recommendations are not significantly different between obese diabetics and those who are not obese. We didn´t found differences between groups by degree of compliance to nutritional recommendations. No differences were found between for clinical for blood pressure, serum cholesterol level, serum triglyceride level, IMC. In this study, the least adherence subjects to nutritional recommendations, don´t have worst metabolic control, described in table

Conclusions. The degree of nutritional recommendations in diabetes subject is not optimal. Nutritional interventions to improve the adherence, as tool to prevent the presence of complications and control of evolution of disease. In this study, the least adherence subjects to nutritional recommendations, don´t have worst metabolic control.

Poster no. 96. — Anti-diabetic, anti-hyperlipidemic & hepatoprotective effect of a polyherbal medicinal unani formulation "qurs tabasheer" in STZ-diabetic wistar rats

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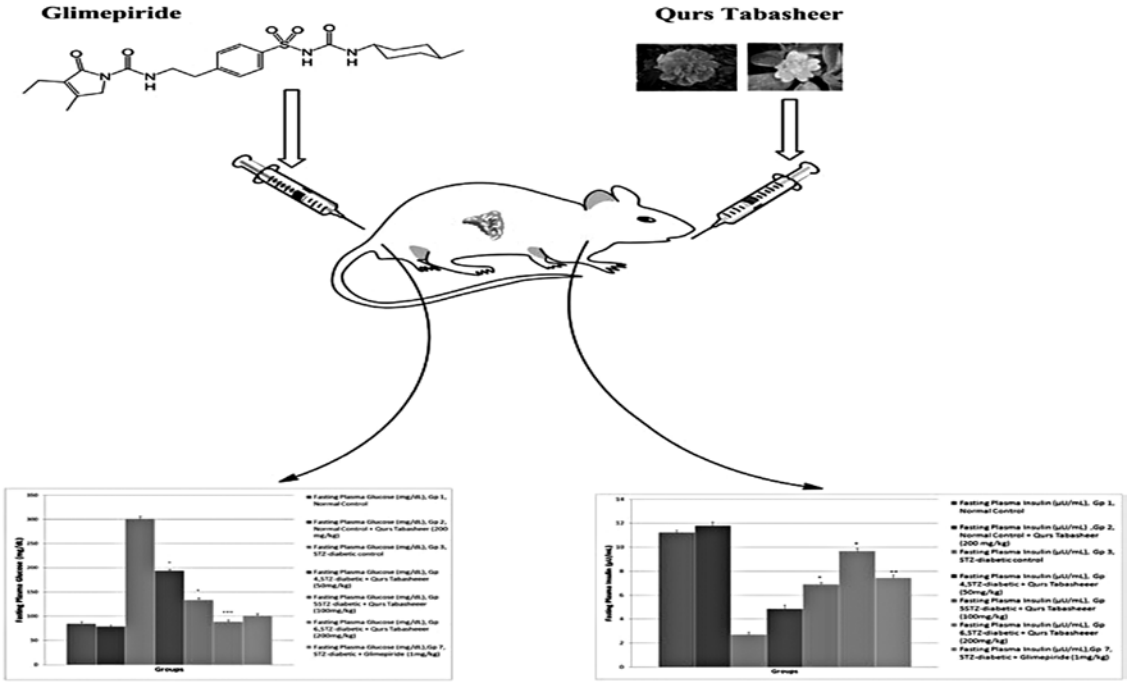

Figure.—Anti-diabetic, anti-hyperlipidemic & hepatoprotective effect of a polyherbal medicinal unani formulation "qurs tabasheer" in stz-diabetic wistar rats.

Background. Alternative and traditional medicines have scores of advantages over the conventional medicines. Despite many conventional therapies are present in the market to curtail the diabetes and its complications, traditional medicines such as Unani formulations has unambiguous advantage of being almost free from adverse effects. Diversity, flexibility, easy accessibility, broad continuing acceptance in developing countries and increasing popularity in developed countries, relative low cost, low levels of technological input, relative low side effects and growing economic importance are some of the positive features of traditional medicine. Polyherbal formulation more willingly than monotherapeutic herbal formulation are frequently used because of the synergistic effect. Many polyherbal formulation such as Okudiabet Diashis , Diasulin etc. have revealed their efficacy and potency against diabetes

Objectives. The present study was undertaken to evaluate the antihyperglycemic ,antihyperlipidemic and hepatoprotective effect of a traditional unani formulation "Qurs Tabasheer" in streptozotocin (STZ) induced diabetic wistar rats

Methods. Effect of Qurs Tabasheer was assessed in STZ (60 mg/kg, i.p single shot) induced diabetic wistar rats. STZ produced a marked increase in the serum glucose, Total Cholesterol, LDL cholesterol, VLDL Cholesterol, Triglycerides and trim down the HDL level. We have weighed up the effect of Qurs Tabasheer on hepatic activity through estimating levels of various liver enzymes viz. Hexokinase, Glucose-6-Phosphatase and Fructose-1-6-biphosphatase in STZ diabetic wistar rats.

Results. In STZ-induced diabetic wistar rats level of Hexokinase, and Glucose-6-Phosphatase was decreased to a significant level while the level of fructose-1-6-biphophatase was augmented. Therapy with Qurs Tabasheer for 30 days to STZ-induced diabetic rats significantly reduces the level of serum glucose, total cholesterol, triglycerides, glucose-6-phosphatase and fructose-1-6-biphosphatase, while magnitude of HDL cholesterol and hexokinase was amplified.

Conclusions. Antihyperglycemic, antihyperlipidemic activity of Qurs Tabasheer suspension in STZ- induced wistar rats was found to be more effective than oral hypoglycemic drug Glimepiride.

Poster no. 97. — Food intake of individual with and without diabetes in the DRECE cohort and adherence to nutritional recomendations

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Background. Healthy nutritional habits are a core element of diabetes self management. However, in diabetes patients receive regular health care and are more likely to have participated in nutritional counseling, which determined that subjects with diabetes would be more likely to follow dietary recommendations for healthy eating than those without diabetes.

Objectives. the aim of the study is determine the degree of adherence to nutritional recommendations, in patient with diabetes and compare with healthy subject in cohort DRECE.

Methods. This was an observational and descriptive study of a historical cohort: DRECE-Dieta y Riesgo de Enfermedad Cardiovascular en España (diet and cardiovascular disease in Spain). The DRECE project was designed to identify the prevalence of cardiovascular risk factors in the Spanish population and their relationship with dietetic habits. It included 4,783 subjects who were

TABLE.—*Adherencia.*

	DIABETES (n=212)	No diabetes (n=3032)	p-value
g_D1dieta	1.841,1±780	1.978,8±767	p=0,001
g_D1dieta_con	1.866,9 ± 785	2.006,42±773	p=0,001
Energy (kcal per day)	2.515,9	2.934	p=0,000
Carbohydrates (g)	262,2	309,9	p=0,000
Fat (g) energy)	100,4	117,7	p=0,000
Fat (% energy)			
Saturated fat (g) energy	34,8	42,9	p=0,000
Monounsaturated fat (g)	49,8	57,7	p=0,000
Polyunsaturated fat (g) energy	19,19	22,68	p=0,000
Protein (g) Energy	105,7	118	p=0,000
Dietary fiber mg/dl	23,23	25,65	p=0,001
Colesterol (mmol/L)	17,2	20,5	p=0,000

followed from 1991 to 2011. By that time, the cohort age range was from 5 to 60 years. Self-reported case type 2 diabetes were confirmed when at least one of the symptoms, positive diagnostic glucose test, and medication use were reported on a supplementary questionnaire. Glucose criteria were from the ADA (American Diabetes Association). Participants completed food-frecuency questionnaires (FFQs). We evaluated the following nutrient recommendations: • Carbohydrate (40-50% total energy intake) • Proteins (15% to 20% of energy) o Fat and Cholesterol): Limit saturated fat to <7% of total energy and lower dietary cholesterol to <200mg/dl Nutritional recommendations in non diabetic people were: Carbohydrate (45-65%, 20% to 35% from fat, and 10% to 35% from protein. The recommendations about limit saturated fat to <10%, for polyunsaturated fat between to 6%-10% and monounsaturated fat intake >10%. Lower dietary cholesterol to <300mg. Statistical analysis. Mean intakes (95% confidence intervals) of foods groups and nutrients were calculated and compared between diabetics and non-diabetics subjects. Compared median with T student and the proportions with chi-square test. Determine degree adherence nutritional recommendations.

Results. Higher content of energy intake (kcal) and the all of macronutrients are significantly higher in the non-diabetic. (p<0,05), are described in table 1 In non-diabetic group the percentage of proteins intake were lower than diabetic group. (17% vs 17,9) ; p=0,000. We observed for saturated fat higher intake in diabetics group (13,7% vs 13,2); p=0,000 Observed significantly higher consumption significantly in diabetic food group: low-fat dairy (116.49 *vs.* 85.8;p= 0.001), Fruits (302.05 *vs.* 251.69;p=0.000) and beer consumption (179.35 *vs.* 186.3;p= 0.038). There are important differences across the groups for adherence to nutritional recommendations, with better compliance in the protein intake in diabetics and better compliance in patients without diabetes associated with saturated fat intake.

Conclusions. The energy consumption is significantly higher in non-diabetics with respect to diabetes. Consuming food groups or dietary patterns differ between groups (low meat consumption in diabetics, increased consumption of fruit and vegetable and legume intake. Degree of compliance with the recommendations differs in intake of proteins and saturated fat.

Poster no. 98. — EGG consumption and risk of incident type 2 diabetes among French women.

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Background. Experimental studies in animals suggest that egg yolk diets may increase plasma glucose and that diets rich in fat may induce hyperinsulinemia. Results from three US prospective studies that recently investigated the relation between egg consumption and diabetes risk are inconsistent.

Objectives. To evaluate the relation of usual egg consumption with incident diabetes risk.

Methods. We evaluated this relation in the E3N prospective cohort, the French component of the EPIC cohort. The 66,043 study participants were free of diabetes or cardiovascular disease at baseline in 1993, when diet was assessed by a validated diet history questionnaire. Total egg consumption was based on the number and frequency of consumption of hardboiled eggs and eggs consumed in an omelet or mixed dish and was categorized (0, <1, 1-1.9, 2-4.9 and ≥5 eggs/week). Diabetes cases were identified through self-reports of either diabetes, use of diabetic medications or a hospitalization for diabetes in at least one of the 8 follow-up questionnaires and validated either using a drug reimbursement dataset or a supplementary questionnaire specifically designed for diabetes validation. Multivariate analyses were adjusted for age, smoking and secondhand smoke, educational level, BMI, physical activity, parental history of diabetes, treated hypercholesterolemia, treated hypertension, menopausal status, hormone use, and intake of calories, fruit and vegetable, processed red meat, coffee and alcohol. Effect measure modification by BMI was explored.

Results. Between 1993 and 2007, 1,358 cases of incident diabetes occurred. In multivariate models we did not observe an association between total egg consumption and diabetes risk. However, when hardboiled egg consumption was evaluated separately there was a suggestion of a direct relation between egg consumption and diabetes risk. Comparing women who did not consume hardbolied eggs to women who consumed ≥5 eggs/week, the HR was 1.26 (95%CI 0.94-1.68), p-trend =0.08. When analyses were stratified by the median BMI (<22.3, ≥22.3) a significant association was observed among women with a higher BMI HR for extreme categories of total egg consumption was 1.31 (95%CI 0.96-1.79), p-trend =0.003.

Conclusions. In this large prospective cohort of French women, there was no association between egg consumption and type 2 diabetes. There is an indication that the relation may differ by BMI level.

Poster no. 99. — Sweet connections: a tale of two countries to build capacity in diabetes prevention

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Background. The 2011 UN General Assembly High Level Meeting on prevention and control of Non-communicable Diseases challenged its member states to address the global crisis of Diabetes by strengthening international co-operation, forging partnerships, using a multi-sectoral approach, and working collaboratively with innovative, cost-effective health literacy and promotion and training health workers with a focus on prevention as the cornerstone of the global response (UN Resolution 66: Agenda Item 117)

Objectives. To train, equip and empower health workers in a rural community in India, with the knowledge and skills to improve the health of people who are at risk of or living with type 2 diabetes, by using a Diabetes Education Kit (DEK) training package designed in

the local language for effective health management and promotion, for ongoing local use.

Methods. The project was conducted in collaboration with Equal Health, Australia (an Aus-Aid approved, non-profit volunteer organisation) and SEVAI - Society for Education Village Action and Improvement, India (a voluntary service organisation). The project aimed to empower and equip local health workers with the DEK training by developing a training package that could continue to be implemented by local educators. The DEK training package was designed and developed by Equal Health volunteer dietitians. It included sections on Overview of Diabetes, education on diet, exercise, foot check, glucose monitoring and waist measurement. It was then translated into Tamil for ongoing use by local educators. The training package was trialled at SEVAI India, over two weeks in 2011 when it was also evaluated and further refined. The final product was delivered in at SEVAI India in February 2012. A multidisciplinary approach was used to provide the training and the educators included a dietitian, nurses and a physiotherapist. At the end of the training all participants completed competency based assessments, that included observation assessments and a written paper based test - requiring a minimum 50% pass . The DEK kit included the training manual, blood glucose monitors with consumables and instructions on how to use the monitors and interpret the results, a laminated sheet showing appropriate exercises for diabetes and how to do them, monofilaments and instructions on how to use them and interpret findings, measurement tapes for waist measurement, Australian Guide to Healthy Eating posters. Forty DEK kits were provided for 40 health centres in the rural Trichirapalli district of Tamil Nadu, India. Funding for this project was secured through a successful application from the Direct Aid Program, Australia.

Results. In February 2012, Equal Health volunteers provided training to 203 health workers from SEVAI using the DEK training package for effective use in the community. All these health workers passed the competency based assessments which had observation assessments and written paper based tests and 100% of trainees scored over 50%. Forty health centres were equipped with the DEK kit

Conclusions. This innovative, cost effective and sustainable project built local capacity, by empowering health workers with knowledge and skills to reduce T2DM risk and promote the health of people managing their T2DM. The collaborative partnership between Australia and India has been possible due a strong working relationship and addresses the UN's challenge in Resolution 66 to focus on primary prevention approaches by training and equipping health workers in developing countries.

Poster no. 100. — Vitamin D deficiency in type 2 diabetes alone, and in combination with hypertension and/or obesity - A population-based survey

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Background. Researchers suggest that Vit. D deficiency may be involved in the pathogenesis of diabetes mellitus (DM). However, study results are controversial.

Objectives. We aimed to examine the relationship between Vit. D and DM alone, and accompanied with obesity (OB) and/or hypertension (HT).

Methods. We examined 9,560 participants (60% female, aged ≥20 yrs) in the second Turkish Diabetes, Hypertension, Obesity and Endocrine Disease Survey (TURDEP-II). The population was categorized into metabolically normal (52.3%), preDM (30.9%) and DM (16.8% [further divided into DM only, DM+OB, DM+HT, and DM+OB+HT)] groups (Table). Serum Vit. D levels were categorized into 4 groups (<5.0, 5-9.9, 10-19.9, ≥20.0 ng/mL). The survey was cross-sectional and conducted between 15 Jan and 11 June 2010 in 540 random centers representing urban/rural populations in Turkey.

TABLE.—*Vitamin D deficiency in type 2 diabetes alone and in combination with hypertension and or obesity a population based survey.*

	Normal	DM only	DM+HT	DM+OB	DM+OB+HT
n (Women%)	4,339 (59.6)	226 (56.5)	151 (56.9)	416 (72.6)	703 (74.9)
Age (yr)[a]	37.9 (0.1); 37.7-38.1	49.8 (0.6); 48.6-51.0	60.6 (0.7); 59.3-61.9	51.2 (0.4); 50.5-51.9	59.3 (0.3); 58.8-59.8
Vit. D (ng/mL)[a,b]	10.2 (0.1); 10.0-10.5	10.4 (0.5); 9.5-11.3	10.1 (0.6); 9.0-11.3	9.3 (0.3); 8.6-10.0	9.5 (0.3); 8.9-10.0

[a]'Mean (SEM); 95% CI'; [b]adjusted for age, sex, region, urban/rural, season, smoking, alcohol, dairy consumption, physical activity and medications.

Results. Approximately 60% of the population had severe/moderate Vit. D deficiency. Among female, mean Vit. D was lower than male (8.9±6.8 vs 12.1±7.7 ng/mL, p<0.001). In the highest Vit. D group, DM and OB were significantly less common (15.6% *vs.* 17.8%, p=0.041; and 26.7% *vs.* 38.2%, p<0.001, respectively), but HT was more common (34.3% *vs.* 33.4%, p=0.015) than the lowest Vit. D group. In correlation analysis controlled for age, gender, dairy consumption, physical activity, smoking, alcohol intake, medications, BMI, waist, BP, season and region; serum Vit. D were positively correlated with creatinine (r= 0.046, p=0.012), HDL chol (r= 0.062, p=0.001), LDL chol (r=0.038, r=0.042), TPOAbs (r=0.036, p=0.039), Vit. B12 (r= 0.065, p<0.001), folate (r= 0.105, p<0.001), IGF1 (r=0.044, r=0.050) and IGFBP3 (r=0.044, p=0.018); whereas negatively correlated with PTH (r= -0.129, p<0.001) and eGFR-CKD-EPI (r= -0.058, p=0.002). Mean Vit. D levels (adjusted for sex) in normal and preDM groups were not statistically different (10.3±7.3 and 9.9±8.1 ng/mL), and both higher than the whole DM group (9.5±6.5 ng/mL, p=0.050). Vit. D in DM only and DM+HT groups was not different from normals. However, when OB exists, Vit.D levels was lower than the normal group (DM+OB; p=0.012, and DM+OB+HT; p=0.017).

Conclusions. The prevalence of Vit. D deficiency was significantly common in the Turkish adult population, particularly among female. Diabetes in particular when accompanied with obesity was associated with even lower Vit. D levels. Thus replacement of Vit.D deficiency may help to prevent obesity and diabetes.

Poster no. 101. — Vitamin D deficiency and type 1 diabetes mellitus

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Background. Some authors claim that vitamin D supplementation could act as a protective factor against type 1 diabetes mellitus (T1DM) development. It has been stated that vitamin D deficiency might decrease insulin secretion and enhance insulin resistance and risk for other autoimmune diseases.

Objectives. Our aim was to evaluate the prevalence of vitamin D deficiency in a T1DM cohort, as well as correlate it with insulin secretion, daily insulin requirements, glycated hemoglobin (A1C) and autoimmune markers.

Methods. Seventy seven patients with T1DM were included. We excluded patients who presented hepatic failure, chronic kidney disease, nephrotic syndrome, malabsorption syndromes, hypo or hyperparathyroidism, granulomatous disorders, oncological diseases or who were taking medication that could affect vitamin-D levels or insulin resistance. We characterised the referred population on what concerns to sex, age, disease duration, body mass index classification (BMI) and daily insulin requirements adjusted to body weight. The following parameters were also analysed: A1C, vitamin D, C-peptide levels and autoimmune markers for T1DM, thyroiditis (and its correlation with thyroid dysfunction), gastritis, celiac and Addison disease.

Results. Cohort with 53.2% males. The mean age was 11.7±4.1 years; disease duration 4.9±3.7 years. Patients presented a mean daily insulin requirement of 0.9±0.3 Units/Kg and an A1C of 8.2±1.7%. Regarding to BMI, 5.2% were underweight, 16.9% overweight, 1.3% obese and the majority (76.7%) had a healthy weight. Mean 25-hydroxyvitamin D levels: 19.2±6.4 ng/mL; patients mainly settled on a deficient (58.4%) and insufficient (37.7%) state. TSH 1.8±0.8 mUI/L and FT4 1.1±0.1 ng/dL. Glutamic acid decarboxylase antibody (GADA) titers were positive in 45.7% and islet cell antibody (ICA) in 35.1%. At least one thyroid autoantibody was present in 11.7% of the patients (hypothyroidism in 22.2% of this subgroup). Autoimmune gastritis markers (AGM) were detected in 3.9%, adrenal cortex autoantibodies in 2.8 % and tissue transglutaminase antibodies in 2.7% of the cohort. A statistically significant inverse correlation was found between 25-hydroxyvitamin D levels and A1C (p-0.017) and TSH (p-0.031). No correlation was found between 25-hydroxyvitamin D and autoimmune markers. Disease duration correlated directly with positive AGM (p-0.006) and inversely with ICA (p-0.032), GADA (p-0.016) and C-peptide levels (p<0.001). TSH displayed an inverse correlation with age (p<0.001) and disease's duration (p-0.03). A direct correlation between daily insulin requirements and A1C was verified (p-0.006). Both parameters correlated directly with age (p-0.011; p<0.001), disease duration (p<0.001) and inversely with C-peptide levels (p-0.001; p-0.019).

Conclusions. T1DM was associated with a high prevalence of vitamin D deficiency (96.1%) in this cohort. Vitamin D deficiency was correlated with worse glycaemic control, but the underlying causal mechanism is not fully understood. As only a minority had regular 25-hydroxyvitamin D levels and/or presented other autoimmune diseases (justifiable given the youth of the studied population), that could restrict the attained correlations. Further studies are required.

Poster no. 102. — Attitudes towards aerobic and resistance exercise amongst individuals recruited from a weight management clinic

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Background. Most people do not undertake the amount of physical activity recommended for health, and this is particularly the case for individuals who are overweight or obese. Moreover, it is now clear that longer durations of physical activity are required for effective weight management in people seeking to lose weight. Immense effort has been placed in developing public health initiatives aimed at guiding overweight and obese individuals in increasing their physical activity. However, little is known about how the needs and

attitudes towards physical activity of this group differ from their normal weight counterparts. In particular, resistance exercise may offer unique benefits to people seeking to lose weight, yet no study to date has examined views of resistance exercise amongst the overweight and obese.

Objectives. The objective of this study was to gain insight into the attitudes and beliefs of overweight and obese individuals towards both aerobic and resistance exercise.

Methods. 25 overweight and obese females and 5 males, with a mean age of 40.7 years (SD = 15.2) and mean BMI of 33.8 kg/m2 (SD = 7.9) were recruited from a dietetic clinic to take part in initial focus groups and interviews to assess their views on physical activity. After selecting and participating in a 12 week aerobic- or resistance-exercise program, the participants took part in follow-up interviews. Thematic analysis was then performed on the transcribed focus group and interview data.

Results. Weight loss was the primary motivation for physical activity participation for the overweight and obese women in this study. Accordingly, a failure to lose weight was perceived by these women as strongly affecting their motivation to continue or re-engage in physical activity. Only 3 participants selected the resistance exercise option, which reflected the relative lack of interest in resistance exercise compared to aerobic exercise amongst the participants in this study. The view of resistance exercise as a masculine activity was a dominant theme amongst all participants. The lack of interest could be partly explained by an existing lack of knowledge and awareness surrounding resistance exercise.

Conclusions. Weight loss was seen as the primary motivation for physical activity participation amongst the females in this study. This view must be reconciled with the existing knowledge base of physical activity requirements for successful weight loss and maintenance. Participants in this study had little awareness or experience of resistance exercise, and many were fearful of the potential risks.

Poster Session 2.4
Pharmacologic strategies

Poster no. 103. — Lack of interaction between the sodium glucose cotransporter-2 inhibitor empagliflozin and hydrochlorothiazide or torasemide in patients with T2DM

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Background. Empagliflozin (EMPA) is a potent, selective sodium glucose cotransporter-2 inhibitor in development for treatment of T2DM.

Objectives. This open-label crossover study investigated interactions between EMPA and diuretic agents hydrochlorothiazide (HCT) or torasemide (TOR).

TABLE.—*Lack of interaction between empagliflozin and hydrochlorothiazide or torasemide.*

	Geometric mean ratio % (90% CI) of combination vs monotherapy			
Analyte	EMPA		HCT	TOR
Parameter	EMPA + HCT / EMPA	EMPA + TOR / EMPA	HCT + EMPA / HCT	TOR + EMPA / TOR
$AUC_{\tau,ss}$	107.08 (97.11, 118.07)	107.83 (100.14, 116.11)	96.27 (89.08, 104.05)	101.44 (99.06, 103.88)
$C_{max,ss}$	102.78 (88.55, 119.29)	107.50 (97.90, 118.04)	101.77 (88.63, 116.85)	104.43 (93.81, 116.25)

Methods. Patients with T2DM (n=22 treated, mean [range] age 54 [40–65]) were randomized to receive EMPA 25 mg qd for 5 days (Treatment A) and one of the following treatments: Treatment B, HCT 25 mg qd for 4 days followed by HCT 25 mg qd with EMPA 25 mg qd for 5 days; or Treatment C, TOR 5 mg qd for 4 days followed by TOR 5 mg qd with EMPA 25 mg qd for 5 days. Subjects received either dosing schedule AB, BA, AC or CA, with a washout period of ≥7 days between A and B or C.

Results. Based on standard criteria, co-administration of EMPA with HCT or TOR had no effect on exposure ($AUC_{\tau,ss}$ or $C_{max,ss}$) of EMPA, HCT or TOR (Table). There were no major changes in the EMPA terminal elimination half-life (15.3 h with EMPA alone, 14.8 h with HCT, and 16.1 h with TOR co-administration) or renal clearance (36.7 ml/min with EMPA alone, 30.2 ml/min with HCT, and 32.5 ml/min with TOR co-administration) when co-administered with HCT or TOR. Similar findings were observed for HCT and TOR. EMPA was well tolerated; no serious adverse events were reported.

Conclusions. No drug–drug interaction was observed between EMPA and HCT or TOR. Pharmacokinetic assessments indicate that no dose adjustments of EMPA, HCT or TOR are necessary for co-administration of EMPA with HCT or TOR. These data were accepted for publication at ADA 2012. Funded by Boehringer Ingelheim.

Poster no. 104. — High dose statin therapy and development of glucose disorders in non-diabetic patients with acute coronary syndrome

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Background. High dose statin therapy has proven to reduce mortality in patients with acute coronary syndrome (ACS). Recent studies have associated high dose statin therapy with an elevated risk (6 to 8%) of development of glucose disorders, although the mechanism is still unknown.

Objectives. To determine the relation between high-

TABLE.—*high dose statin therapy and development of glucose disorders in non-diabetic patients with acute coronary syndrome.*

	Increased HbA1c levels (n=66)	Stable HbA1c levels (n=64)	p
Male sex	87,7%	80,6%	0,27
Smoking habit	62,1%	54,8%	0,4
Obesity	33,8%	23,8%	0,2
Sedentary lifestyle	66,7%	50,8%	0,06
Dyslipidemia	54,5%	70,3%	0,06

dose statin therapy an new onset of glucose disorders in patients with ACS.

Methods. Between January 2008 and April 2012, 130 non-diabetic patients included in a cardiac rehabilitation program after an ACS were analyzed. We compared starting HbA1c levels with those taken after completion of the CRP (6 to 8 weeks after the acute event).

Results. 94% of the patients received 80mg of atorvastatin while the other 6% received rosuvastatin 20 mg a day. 84% of the patients were males with a mean age of 56.3+/- 10.3 years. Associated comorbidity included: arterial hypertension 49%, dyslipidemia 62%, smoking habit 58%, previous ischemic heart disease 13%, obesity 29% and sedentary lifestyle 59%. Although patients received counseling about lifestyle modification almost 50.8% had a raise in the HbA1c levels 0.29+/- 0.34. Those patients had lower basal glucose and HbA1c levels (97.6, $p<0.01$ and 5.4, $p<0.01$ respectively). Also they were predominantly male sex, obese, with a sedentary lifestyle and active smokers at the onset of the ACS although no significant statistical values were found.

Conclusions. In our study high dose statin therapy was not associated with a significant raise in HbA1c levels. Those who indeed experienced an increase in HbA1c levels had differences in lipid levels as well as in basal glucose and HbA1c levels. The final benefit in mortality and development of new coronary events of high-dose statin therapy overweight the risk of new onset glucose disorders in patients with ACS.

Poster no. 105. — Sodium tungstate alleviates biomechanical properties of diabetic rat femur via modulation of oxidative stress

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Background. Diabetes mellitus is a systemic disease which causes many complications such as nephropathy, neuropathy, retinopathy and osteopenia. Diabetic osteopenia is manifested by increase in bone fracture and a delay in healing of fractures and thus affects the quality of life. Although many human and experimental studies on the complications of diabetes mellitus have demonstrated extensive alterations in bone and mineral metabolism, the mechanisms responsible for diabetic osteopenia have not been clearly identified.

Objectives. In recent years, several inorganic elements have been described that mimic the effects of insulin or increase insulin action. Of these elements, sodium tungstate (Na2WO4) was shown to have antidiabetic activity in experimental studies based on its suggested insulinomimetic or antioxidant activity. Oral administration of sodium tungstate has been reported to normalize glycemia in many animal models of diabetes. Sodium tungstate is an inorganic compound which exerts anti-diabetic activity in experimental studies based on its insulin-mimetic or antioxidant activity. Therefore this study was designed to investigate the potential beneficial effect of tungstate administration on reduced bone quality in diabetic rat femurs.

Methods. Eighty male rats were used in this study. These animals were separated into four groups. Control group (C), treated control group (C-TUNG), diabetes group (D) and treated diabetic group (D-TUNG). Diabetes group (D) and D-TUNG group were injected STZ (50 mg/kg) by a single intraperitoneal injection. Only rats with blood glucose levels > 300 mg/dl were enrolled in the study. The treated rats received daily oral administration of sodium tungstate (150 mg/kg/day) for 12 weeks. All animals were sacrificed by overdose of urethane anesthesia at the end of 12th week. Femurs were collected for biomechanical test (tensile test), biochemical evaluations (TBARS - Thiobarbituric acid reactive substances, GPx - Glutathione Peroxidase Activity), GSH, CAT - Catalase Activity, SOD - Superoxide Dismutase Activity) and bone mineral density (BMD) measurements.

Results. Sodium tungstate showed a little effect on blood glucose levels, while it didn't change the reduced body weights of diabetic rats. In addition, impaired bone mechanical quality was reversed, despite the unchanged mineral density. Sodium tungstate administration significantly lowered the TBARS values and restored the activity of tissue antioxidant enzymes such as GPx, GSH, CAT and SOD in diabetic rats. These findings indicate that tungstate can improve the reduced mechanical quality diabetic rat femurs due to reduction of ROS and modulation of antioxidant enzymes.

Conclusions. In conclusion, tungstate exerts beneficial effect in diabetic osteopenia owing to its antioxidant capacity more than restoration of blood glucose levels.

Poster no. 106. — Neutral effects of pitavastatin and pravastatin on fasting plasma glucose over 12 weeks in elderly patients with primary hyperlipidemia or mixed dyslipidemia

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Background. Limited information is available on the glycemic effect of a recently approved statin, pitavastatin. Prespecified safety analysis in PREVAIL US (Pitavastatin compaREd with praVAstatin In Lowering LDL-C in the United States), a 12-week, randomized, double-blind Phase 4 trial comparing pitavastatin 4 mg with pravastatin 40 mg in a general population with primary hyperlipidemia or mixed dyslipidemia, showed no increases in fasting plasma glucose (FPG) levels on either statin, while pitavastatin 4 mg was superior to pravastatin 40 mg in LDL-C reduction, the primary endpoint. In a Phase 3 study (NK-104-306), pitavastatin 1 mg, 2 mg, and 4 mg demonstrated significantly greater LDL-C reductions compared with pravastatin 10 mg, 20 mg, and 40 mg across the three pair-wise dose comparisons in elderly patients with primary hyperlipidemia or mixed dyslipidemia.

Objectives. The objective of this retrospective analysis is to assess the effects of pitavastatin and pravastatin across the three pair-wise dose comparisons from the Phase 3 trial on changes in FPG over a 12-week period in elderly patients with primary hyperlipidemia or mixed dyslipidemia.

Methods. FPG data were prospectively collected as part of a 12-week, randomized, double-blind, multinational Phase 3 study comparing pitavastatin 1 mg, 2 mg, and 4 mg (n=626) with pravastatin 10 mg, 20 mg, and 40 mg (n=295) in elderly patients (≥65 years) with primary hyperlipidemia or mixed dyslipidemia (NK-104-306). Mean changes in FPG levels from baseline to end of the 12-week trial were assessed for each treatment using t-tests and between treatments using a general linear model, adjusting for country, baseline FPG level, age, gender, body mass index, and use of ACE inhibitor, diuretic, or ß-blocker at randomization.

Results. No significant changes in FPG were observed at 12 weeks when compared with baseline for pitavastatin 1 mg (1.6 mg/dL, n=203, p=0.105), pravastatin 10 mg (1.0 mg/dL, n=101, p=0.249), pitavastatin 2 mg (-0.5 mg/dL, n=218, p=0.622), pravastatin 20 mg (1.3 mg/dL, n=94, p=0.263), pitavastatin 4 mg (-0.2 mg/dL, n=205, p=0.760) or pravastatin 40 mg (0.9 mg/dL, n=100, p=0.300). No statistically significant FPG changes were shown across the three pair-wise dose comparisons for pitavastatin1 mg vs pravastatin10 mg (p=0.623), pitavastatin 2 mg vs pravastatin 20 mg (p=0.388), or pitavastatin 4 mg vs pravastatin 40 mg (p=0.334). Sensitivity analysis after excluding patients with type 2 diabetes mellitus confirmed the findings.

Conclusions. Pitavastatin (1 mg, 2 mg, and 4 mg) and pravastatin (10 mg, 20 mg, and 40 mg) had similarly neutral effects on FPG after 12 weeks of therapy across the 3 pair-wise dose comparisons in elderly patients with primary hyperlipidemia or mixed dyslipidemia. Further studies are needed to elucidate the relevance of these findings to clinical outcomes.

Poster no. 107. — Tumor suppressor p53 may have a role in the treatment of diabetes

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Background. "Metabolism" is the conversion of nonliving material into cellular components (anabolism) and the decomposition of organic matter (catabolism) to produce energy. The term of "proliferation" implies the production of new cells in the process of growth. Cell proliferation and energy metabolism are two major aspects of living cells.

Objectives. Over the past decades, accumulating evidence shows that cell proliferation and metabolism are tightly linked cellular processes. The tumor suppressor p53 has been described as genomic guardian because of its response to various cellular stresses by regulating of target genes. There are large number of new evidence revealed that p53 has an important role in metabolic pathways as parallel with regulation of cell cycle or apoptosis. There is some evidence also show that p53 accumulates in adipocytes of obese models. These data also suggests that p53 has regulatory roles in obesity-induced insulin resistance as a main component of metabolic syndrome.

Methods. Diet induced obese rats were subjected to pifithrin as a selective inhibitor of p53 activation prior to blood and tissues sampling. The blood samples were analyzed for insulin, glucose, TGs and total cholesterol. The tissues were subjected for western blot analysis for p53, phospho-Ikappa B and Mdm2. The results were compared with lean rats.

Results. Our results showed that selective antagonization of p53 in tissues improve insulin sensitivity. Surprisingly our results also showed that p53 accumulation in adipose tissue is more than of other tissues even in lean subjects.

Conclusions. Collectively, these results showed that p53 has major roles in obesity and related disorders such as insulin resistance. We suggest p53 potentially can be a new target for treatment of metabolic disease in future studies.

Poster no. 108. — Do statins interfere with lifestyle intervention in the prevention of diabetes? One-year follow-up of the FIN-D2D project

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Background. Statin therapy has been suggested to slightly increase the risk of type 2 diabetes (T2D). It is not known whether this increased risk could be counteracted by lifestyle intervention.

Objectives. The aim of the study was to examine whether statin treatment modified the effects of 1-year lifestyle intervention on the potential T2D risk and glucose metabolism in individuals at high risk for T2D.

Methods. We screened altogether 10,149 individuals at increased risk for T2D; of these, 2,798 non-diabetic individuals verified by a 2-h glucose tolerance test participated in the 1-year lifestyle intervention in primary care settings. The use of statins was checked at the health check-up at the baseline. We applied analysis of covariance and logistic regression analyses in interpretation of the results.

Results. A total of 484 individuals (17.3%) used statins at the baseline. Of them, 31 (7.5%) developed T2D during the follow-up, compared to 126 (6.5%) of statin non-users (Odds ratio 1.17, 95% CI 0.78 – 1.76, p=0.442). Weight loss reduced the risk of T2D in non-users only. Interestingly, fasting glucose increased by 0.08 mmol/L in statin users, but remained unchanged in non-users, the difference being 0.074 mmol/L (95% Cl 0.014-0.134), and remained significant even after adjustment for sex, age, baseline fasting glucose, the presence of cardiovascular disease, use of antihypertensive and/or coronary artery disease medication, weight and 1-year weight change (adjusted p=0.042).

Conclusions. The incidence of T2D did not differ between the statin users and non-users. The finding that fasting glucose slightly increased in statin users in spite of lifestyle interventions suggests that the use of statins might have unfavourable effects on glucose metabolism and that statins might hamper beneficial effects of lifestyle intervention in people at high risk of T2D.

Poster no. 109. — Pitavastatin is without effect on glycaemic parameters in metabolic syndrome

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Background. It has recently been recognised that several statins are associated with increases in plasma glucose, and in patients at high risk may precipitate incident diabetes. Risk factors include elevated fasting glucose, raised BMI, increased triglycerides, and history of hypertension. Whether this is a class effect remains controversial.

Objectives. In a hypothesis-generating study (CAPITAIN Study) to define the effects of pitavastatin on mechanisms of atherosclerosis in patients at high risk, a cohort of 14 patients with tightly defined metabolic syndrome were treated with pitavastatin 4 mg daily for 6 months. Multiple parameters relevant to atherosclerotic risk were assessed both acutely and over 6 months.

Methods. Patients were carefully screened to ensure a homogeneous phenotype. Otherwise healthy, non-smoking males aged 30-65 years were recruited according to International Diabetes Federation criteria (central obesity with girth >94 cm and 2 of 4 other factors: TG >1.7 mmol/L, HDL-C <1.0 mmol/L, controlled hypertension, FPG >5.6 mmol/L). In this study patients with marked hypertriglyceridaemia (>4.5 mmol/L), diabetes (FPG >7.0 mmol/L) or requiring anti-hypertensive therapy with drugs other than

TABLE.—*Pitavastatin is without effect on glycaemic parameters in metabolic syndrome.*

Patient	Fasting Plasma Glucose (mmol/L)		Insulin (mU/L)		HOMA-IR		Insulin/ Glucose		HbA1c (%)	
	Day 1	End	Day 1	Day 180	Day 1	Day 180	Day 1	Day 180	Scr	End
1	5.0	5.7	47.7	27.8	10.6	7.0	9.5	4.9	5.7	5.5
2	6.4	9.1	7.8	11.6	2.2	4.7	1.2	1.3	7	7.8
3	4.9	4.8	11.8	20.9	2.6	4.5	2.4	4.3	5.4	5.3
4	5.9	5.7	15.6	13.6	4.1	3.4	2.6	2.4	5.5	5.1
5	5.0	4.8	17.9	18.2	4.0	3.9	3.6	3.8	5.5	4.6
6	4.7	5.6	12.2	12.7	2.6	3.1	2.6	2.3	5.3	4.8
7	4.8	4.8	11.8	4.5	2.5	1.0	2.5	0.9	5.1	4.3
8	5.9	5.7	16.4	17.6	4.3	4.4	2.8	3.1	5.8	5.5
9	5.1	4.4	24.2	11.1	5.5	2.2	4.7	2.5	5.8	6.3
10	5.6	5.3	14.5	26.6	3.6	6.2	2.6	5.0	5.5	5.5
11	5.8	5.6	16.9	18.2	4.3	4.5	2.9	3.3	4.5	5.3
13	4.6	5.1	16.4	11.1	3.4	2.5	3.6	2.2	5.4	5.8
14	4.7	5.6	5.2	5.1	1.1	1.3	1.1	0.9	5.5	6.2
Mean	**5.3**	**5.5**	**16.8**	**15.3**	**3.9**	**3.7**	**3.2**	**2.8**	**5.5**	**5.5**
SD	**0.6**	**1.2**	**10.4**	**7.2**	**2.3**	**1.8**	**2.1**	**1.4**	**0.6**	**0.9**

a calcium channel blocker were excluded. Patients could not have received lipid-lowering therapy in the preceding year or consume more than 10g alcohol/day.

Results. At study start patients had mean age 52 yrs with central obesity (mean BMI 31.7 [SD 1.5] Kg/m2, girth 110.2 [SD 8.8] cm). Mean glucose parameters were in the normal range (mean FPG 5.3 [SD 0.6] mmol/L, HbA1c 5.5 [SD 0.6]%) but mean insulin concentrations, insulin/glucose ratio and HOMA-IR were elevated (see Table). Over the course of 180 days of therapy with pitavastatin 4 mg daily, there was no significant change in mean parameters relating to glucose or insulin, and in general values were improved and variability was reduced. One individual, who did not have diabetes according to WHO diabetes criteria in place at the start of the study (FPG 6.4 mmol/L), had an HbA1c value of 7% at study entry and would have been classified as having diabetes by WHO criteria introduced in 2011. Pitavastatin 4 mg daily was well tolerated over 6 months with only reports of GI (flatulence and loose stools) and muscle (cramp, stiffness) adverse events being suspected as related to treatment.

Conclusions. The glycaemic profile of these patients is typical of that previously reported in metabolic syndrome (Hansel et al, 2004). These patients have among the highest risk of developing diabetes and would be the most vulnerable to the effects of an agent which might decompensate glycaemic control. That pitavastatin, at its highest approved dose, was well tolerated in this population and without effect on parameters of glycaemic control over a period of 6 months is reassuring. In the absence of a mechanism by which other statins increase plasma glucose concentrations, it is difficult to conclude that this is a class effect.

Poster no. 110. — The effect of hepatic impairment on the pharmacokinetics, safety and tolerability of empagliflozin, a potent sodium glucose cotransporter-2 inhibitor

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Background. Empagliflozin is a potent and selective sodium glucose cotransporter-2 inhibitor in development for the treatment of type 2 diabetes mellitus.

Objectives. This open-label, parallel-group study investigated the effect of various degrees of hepatic impairment on the pharmacokinetics, safety, and tolerability of empagliflozin.

Methods. Thirty-six subjects (8 each with mild, moderate or severe hepatic impairment according to Child-Pugh classification, and 12 matched controls with normal hepatic function) received a single 50 mg dose of empagliflozin.

Results. Mean (range) age was 53.9 (33–71) years and 17 subjects were male. Empagliflozin was rapidly absorbed and, after reaching peak levels, plasma drug concentrations declined in a biphasic fashion. Compared with subjects with normal hepatic function, geometric mean ratios (90% CI) of AUC0–∞ and Cmax were 123.15% (98.89–153.36) and 103.81% (82.29–130.95), respectively, in patients with mild hepatic impairment, 146.97% (118.02–183.02) and 123.31% (97.74–155.55), respectively, in patients with moderate hepatic impairment, and 174.70% (140.29–217.55) and 148.41% (117.65–187.23), respectively, in patients with severe hepatic impairment. Adverse events (AEs) were reported in 0, 3 and 2 subjects with mild, moderate and severe hepatic impairment, respectively, and 6 subjects with normal hepatic function. All AEs were mild or moderate in intensity.

Conclusions. Empagliflozin was well tolerated in subjects with hepatic impairment. The increase in empagliflozin exposure was less than 2-fold in patients with impaired liver function, therefore no dose adjustment of empagliflozin is required in these patients. These data have been presented at ADA 2012. Funded by Boehringer Ingelheim.

Poster no. 111. — The sodium glucose cotransporter-2 (SGLT-2) inhibitor empagliflozin lowers blood pressure independent of weight or HbA1c changes

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Background. Empagliflozin (EMPA) is a potent, selective sodium glucose cotransporter-2 inhibitor in development for treatment of type 2 diabetes mellitus (T2DM).

Objectives. Given evidence of effects of EMPA on glucose, weight and BP in Phase II trials, we analysed pooled patient data to evaluate the effects of EMPA on BP and the correlations between changes in weight or HbA1c and changes in BP.

Methods. Two randomised, double-blind, parallel group, placebo (PBO)-controlled, dose-finding Phase 2b trials examined the safety and efficacy of EMPA as monotherapy (N=408) and as add-on to metformin (N=495) in patients with T2DM. Identical endpoints, study duration (12 weeks), and the sample size justified using the pooled dataset of the two EMPA doses tested in Phase 3 trials: EMPA 10 mg (N=152) and EMPA 25 mg (N=152) versus PBO (N=153). Changes from baseline in BP at 12 weeks were assessed and Pearson correlation coefficients were calculated. The frequency of any adverse events (AE) was calculated. Patients with a systolic BP (SBP) > 140 mmHg at baseline were analysed as a subgroup.

Results. Baseline mean (±SD) age, HbA1c and BMI of all patients in the Phase 2b trials were 57.9±9.3 years, 7.9±0.8% and 30.3±4.7 kg/m2, respectively. Patients were predominantly white (83%), with an equal gender distribution and the majority (67%) were on antihypertensive medication at baseline. Baseline BP and changes from baseline in BP in patients on EMPA 10 mg, EMPA 25 mg and PBO are reported (Table). SBP de-

TABLE.—*Empagliflozin lowers blood pressure independent of weight or hba1c changes.*

Mean BP [mmHg]	Full Analysis Set			Patients with SBP > 140 mmHg		
	PBO (n=153)	EMPA 10 mg (n=152)	EMPA 25 mg (n=152)	PBO (n=33)	EMPA 10 mg (n=27)	EMPA 25 mg (n=38)
Baseline SBP ±SD	134.3 ± 15.9	131.3 ± 13.8	132.5 ± 14.6	157.2 ± 13.6	152.8 ± 8.9	151.1 ± 8.7
Change from baseline* in SBP ±SE	-1.2 ± 1.0	-3.8** ± 1.0	-4.5** ± 1.0	-10.4 ± 2.4	-17.0 ± 2.6	-13.4 ± 2.3
Baseline DBP ±SD	80.8 ± 8.4	79.1 ± 9.1	80.9 ± 9.2	86.2 ± 9.7	89.1 ± 9.6	88.4 ± 8.7
Change from baseline* in DBP ±SE	-1.8 ± 0.6	-2.3 ± 0.6	-2.7 ± 0.6	-6.1 ± 1.4	-8.1 ± 1.6	-7.6 ± 1.3
*ANCOVA for LOCF with baseline BP, study and country **p<0.05 vs. PBO						

creased by 4-5 mmHg with EMPA; for each dose group, the change was significant versus placebo. The changes appeared to be larger in patients with SBP > 140 mmHg at baseline. DBP changes were more pronounced with EMPA, but did not reach statistical significance versus PBO. Changes in blood pressure did not correlate with changes in pulse rate. The Pearson correlation coefficients between change in weight and change in SBP were 0.10 (EMPA 10 mg), 0.04 (EMPA 25 mg) and 0.12 (PBO), and between change in HbA1c and change in SBP were -0.09 (EMPA 10 mg), -0.02 (EMPA 25 mg) and 0.11 (PBO). None of these correlations reached statistical significance (p > 0.14, for each). Including the number of antihypertensive medications at baseline in the ANCOVA model did not alter the PBO-adjusted effects on BP. The number of patients with AEs was comparable among treatment groups (34.2% in EMPA 10 mg, 31.6% in EMPA 25 mg, and 34.6% in PBO groups).

Conclusions. Treatment with EMPA was well tolerated and provided statistically significant and clinically meaningful reductions in SBP of 4-5 mmHg. Lowering of SBP with EMPA seemed more pronounced in patients with SBP > 140 mg Hg at baseline. BP changes were not correlated with changes in weight or HbA1c, suggesting that EMPA has effects on BP related to its mode of action that are beyond its effects on weight and HbA1c. These data were presented at EASD 2012. Funded by Boehringer Ingelheim.

Poster no. 112. — Assessment of the utilization patterns and factors affecting response to insulin therapy among diabetes mellitus patients in Jimma university specialized hospital, Southwest Ethiopia

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Background. Intensive glycemic control reduces the risk of diabetic complications. Despites this, achieving this goal glycaemic control remains a challenge in diabetes mellitus patients. There are various factors, which could contribute for failure to achieve optimal glycemic control, such as socio-demographic characteristics of the patient, patients' knowledge and skills deficits on insulin use, dietary and life style management combined with partnership between the patient and primary health care provider.

Objectives. to assess the utilization patterns and factors affecting response to insulin therapy among diabetes mellitus patients in jimma university specialized hospital, southwest ethiopia.

Methods. Cross sectional study designs on diabetic mellitus patients who had been on insulin with a regular follow up were used. Data were collected by interviewing the patient using structured questionnaire, observing insulin injection sites by using checklist and abstracting a patient follow up records. Glycemic control was assessed based on average fasting blood sugar levels. Statistical analysis was carried out using SPSS, version 16.0. Data were described using mean (±S.D.) for continuous variables and proportions for categorical variables. Chi-square test was used to assess statistical significance of the difference in the percentages of achieving and not achieving glycemic level according to independent categorical variables. Binary logistic regression was conducted to determine factors that were associated with glycemic control. A p-value 0.05 was considered statistically significant. Patient's written informed consent to participate in the study was obtained after explaining about the purpose and procedures of the study.

Results. Out of 284 participants (166 males and 118 females) with a mean age of 41.37 (SD= 15.08) years, only 18.3% achieved target glycemic level while 81.7% did not achieve. Majority of the participants had been using NPH insulin (89.4%), were using one syringe repeatedly (94.7%), had one or more complication (83.1%), correctly rotating injection sites (47.9%), developed lipohyperthrophy at injection sites (44%) and had been injecting at lipohyperthrophied area (15.8%). In the multivariate logistic analysis, body weight of >70 kg(OR=0.21;95%CI,0.10-0.45;p=0.000),total daily dose of insulin of ≤35IU/day (OR=0.26;95%CI, 0.13-0.54;p=0.000),total daily dose variation without checking glycemic level (OR=3.39; 95%CI,1.21-9.50;p=0.020), non-knowledgeable about signs and symptoms of hyperglycaemia (OR=3.60;95%CI,1.51-8.55;p=0.004), non-adherence to diabetic meal plan of more vegetables and fruits in daily meal (OR=0.35;95%CI,0.17-0.73; p=0.005) were sig-

nificantly associated with increased odds of being poorly controlled glycemic level.

Conclusions. Majority of the participants taking insulin did not achieve optimum glycemic level control, which resulted in development of one or more complications. Independent predictors of the glycemic level in patients taking insulin were body weight, amount of total daily dose, total daily dose variation, knowledge deficit about hyperglycaemia signs and symptoms, and poor adherence to diabetic meal plan. Hence, glycemic control to optimum level is vital to prevent the development of serious micro and macrovascular complications, which impair quality of life and impose a heavy burden on health care system.

Poster no. 113. — Enteropeptidase: a gene associated with a starvation human phenotype as a novel target for the treatment obesity and type II diabetes

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Background. Many obesity related genes have been proposed as targets for the treatment of obesity. However, these obesity genes do not provide efficient drug therapy for obesity treatment. It is therefore a challenge to identify crucial gene(s) targets involved in energy metabolism associated with "lean phenotype". In order to identify these genes we have asked the following questions: - - Is there any genetic disease associated with "lean phenotype"? - Is the phenotype associated with one gene (monogenic)? - Is the gene target tissue specific? - Is there any redundancy of the gene target? Congenital Enteropeptidase deficiency is an extremely rare pathology which answers to all these criteria.

Objectives. Find a new effective target to treat obesity and type II Diabetes.

Methods. BL6 mice were used to generate KO mice for enteropeptidase, *In vivo* experiments were done on Swiss mice fed with Diet Induced Obesity, and treated with two doses of OBE lead compound in comparison with control group.

Results. the KO transgenic mice for enteropeptidase show the same phenotype like in human. The long term treatment (9 weeks) on DIO Swiss mice demonstrates efficacy of OBE lead compound at 10 and 25mg/kg/day with a decrease of around 10% on gain weight. Moreover, in presence of OBE lead compound, triglycerides and proteins absorptions were clearly diminished.

Conclusions. The proof of concept of enteropeptidase as target for treatment of obesity and type II diabetes was validated with KO mice and OBE lead compound at dose of 10 and 25mg/kg/day in mice.

Poster no. 114. — Glycemic level control and its determinants among insulin treated diabetes mellitus patients in Southwest Ethiopia

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Background. Intensive glycemic control reduces the risk of diabetic complications. Despite this, achieving optimal glycemic control remains a challenge in diabetes mellitus patients. There are various factors, which could contribute for failure to achieve optimal glycemic control, such as socio-demographic characteristics of the patients, patients' knowledge and skill deficit on medication use, dietary and life style management combined with partnership between the patient and health care providers.

Objectives. To assess the insulin use patterns, glycemic level control and factors affecting glycemic control among insulin treated diabetes mellitus patients at Jimma University Specialized Hospital.

Methods. Cross sectional study designs on diabetic mellitus patients who have been on insulin with a regular follow up since September 2010 were used. Data were collected by interviewing the patient using structured questionnaire, observing insulin injection sites by using checklist and abstracting a patient chart. Glycemic control was assessed based on average fasting blood sugar level. Statistical analysis was carried out using SPSS, version 16.0. Data were described using mean (±S.D.) for continuous variables and proportions for categorical variables. Chi-square test was used to assess statistical significance of the difference in the percentages of achieving and not achieving glycemic level according to independent categorical variables. Binary logistic regression analysis was conducted to determine factors that were associated with glycemic control and its independent predictors. P-value 0.05 was considered statistically significant. Patient's written informed consent to participate in the study was obtained after explaining about the purpose and procedure of the study.

Results. Out of 284 participants (166 males and 118 females) with a mean age of 41.37 (± 15.08) years, only 18.3% achieved optimum glycemic level. Majority (89.4%) of the participants had been using Normal Protamine Hagedorn (NPH) insulin. Ninety five percent of participants reported using one needle repeatedly, while 47.9% reported correctly rotated injection sites. Study participants also had one or more complications (83.1%), developed lipohyperthrophy at injection sites (44%) and had been injecting at lipohyperthrophied area (15.8%). On multivariate logistic regression analyses, body weight of >70 kg (AOR=0.21; 95% CI, 0.10-0.45; P=0.000), total daily dose of insulin of ≤35 IU/day (AOR=0.26; 95%CI, 0.13-0.54; P=0.000), total daily dose variation without checking glycemic level (AOR=3.39; 95% CI,1.21-9.50; P=0.020), knowledge deficit about signs and symptoms of hyperglycaemia (AOR=3.60; 95% CI, 1.51-8.55;P=0.004), non-adherence to dietary management (AOR=0.35; 95% CI,0.17-0.73; P=0.005) were independent predictors of poorly controlled glycemic level.

Conclusions. Majority of the participants taking insulin did not achieve optimum glycemic level and this failure resulted in the development of one or more complications regardless of duration on insulin treatment. Independent predictors of the glycemic level in patients taking insulin were body weight, amount of total daily dose, total daily dose variation, knowledge deficit about hyperglycemia signs and symptoms, and poor adherence to diabetic meal plan. Hence, glycemic control to optimum level is vital to prevent the development of serious micro and macrovascular complications, which impair quality of life and impose a heavy burden on health care systems.

Poster Session 2.5
Physical activity and Obesity

Poster no. 115. — The effect of high intensity interval training on fatmax and maximal rates of fat oxidation in pre-pubertal children

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Background. It is well known that obesity and type 2 diabetes are associated with features such as insulin resistance and an impaired ability to oxidise lipids. Prior research has also identified that an optimal intensity for fat oxidation (FATmax) exists in adults. Adult studies have identified positive changes in FATmax and maximal fat oxidation (MFO) following exercise training and studies suggest that exercise interventions may be effective in improving fat oxidation and insulin sensitivity. Research has yet to examine whether this is the case in pediatric populations. More recently, data have suggested that low volume, high intensity interval training (HIIT), lasting between 2-4weeks, positively influences fat oxidation and oxidative capacity in adults. This had led to suggestions that HIIT may be effective in enhancing health parameters in children. Research has yet to establish whether this is the case.

Objectives. To examine the effect of HIIT training on FATmax and maximal fat oxidation (MFO) in pre-pubertal children.

Methods. A randomised controlled trial design was employed with cross-sectional school-based study was conducted on 28, pre-pubertal children, (16 boys and 12 girls, mean age ± S.D. was 10.1 ± 1 year) who were allocated to HIIT or control groups in a randomly allocated fashion (by baseline Fatmax and gender). The HIIT group undertook, twice weekly cycling sessions comprising of 5 series of 60 sec sprinting bouts ("all out") at 60% workload max (Wmax) with 60 sec of recovery at a constant cadence of 60rpm at 30W. The control group undertook no additional exercise during the 4 week period. Pre and post the intervention, children undertook an incremental, cycle-based, exercise protocol until volitional exhaustion to determine VO2 peak and FATmax assessed by breath-by-breath gas analysis (Cortex MetaMax 3B®, Leipzig, Germany) and two days following cycled for 5 minutes at a steady sate at the calculated Fatmax (W) to determine MFO. Protocols were adapted from those described previously (Zakrzewski and Tolfrey, 2011) and all testing was carried out after an overnight fast.

Results. A series of 2 (HIIT vs control) X 2 (gender) X 2 (pre to post) ways analysis of covariance, controlling for Body Mass Index, indicated no significant main effects of interactions for FATmax or VO2 peak (Both P>0.05). However, there was a significant pre to post X group interaction for MFO (P = .03). Post-hoc analysis identified a significant increase in MFO in the HIIT group from pre to post compared to the control group. There was also a significant main effect for gender showing significantly higher MFO in boys compared to girls (P = .001) irrespective of time period of group.

Conclusions. This is the first study, to date to examine the impact of HIIT on fat metabolism in children. This study suggests, contrary to adult studies, that HIIT is not effective in enhancing FATmax in children but does positively enhance MFO at FATmax In pediatric samples. Further research is however needed to support these assertions and examine the impact of HIIT on other relevant factors such as insulin sensitivity.

Poster no. 116. — Implementing a community based diabetes prevention programme in a small rural community in Ireland

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Background. Bio: Clair Haseldine BSc(Physio) Community Physiotherapist Qualified from Trinity College Dublin in 1991 Worked as community physiotherapist and in rehabilitation in Florida and the Florida keys 1991 -1996 Worked in private practice in Cork city 1996- 1998 Worked in private practice in New Hampshire before returning to Ireland in 2001. Has worked as community physiotherapist in West Cork since then. Co- presents the 'Walk away from diabetes' course in West Cork Ireland. Bio: Bernadette O'Riordan RN BSc(Hons) Nursing with Educ, MPhil Bernadette qualified in 1983 and worked as a staff nurse in Intensive Care Nursing in the UK and Saudia Arabia, returning to the UK to take up a post as sister in charge within Intensive Care, after that she worked in Canterbury Christchurch University as lecturer/practioner in critical care and then as programme director for the Acute Care Degree, She was the chair to the Royal College of Nursing Critical Care forum from 2001-2003. She was also seconded from the University to the Department of Health working within the critical care modernization agency. She returned to Ireland in 2003 and has been working with the community setting, latterly setting up the Diabetes Prevention Clinic in the West Cork area. Her areas of interest and research have been in clinical supervision, assessing clinical practice and practice development.

Objectives. 1. To enable the meembers of the primary care team to identify clients at risk of diabetes 2. Offer the 'walking away from diabetes' programme for those at moderate to high risk 3. Provide one to one support for those clients who have impaired glucose tolerance and/or impaired fasting glucose. 4. Evaluate the outcomes of both programmes in terms of the roles within the primary care team and outcomes for clients 5. Raise awaraness of the multidisciplinary team of thier role in diabetes prevention

Methods. Clients are risk scored and referred from any member of the primary care team. The clients are then recruited to the 'walk away from diabetes programme' . The walk away programme is a 3 hour programme developed by the desmond diabetes education collaborative which focuses on physical activity and healthy eating. If the patients have igt/ifg they are give additional support to make lifestyle changes. Outcomes were measured for the walk away programme and the one to one support. The difficulties of measuring out-

comes/ audit will be discussed as well as the role of the primary care team in the light of such a programme .

Results. 1) The roles within the team were explored and will be discussed in relation to primary care teams 2) qualitative and quantitiave data were collected - this showed statistacal signficiance in weight loss, gluscose levels, abdominal circumference and cholesterol.

Conclusions. A small community based programme can make changes in client outcomes whilst also raising the profile of diabetes prevention with other proffesionals in the primary care team.

Poster no. 117. — DEXLIFE: mechanisms of prevention of type 2 diabetes by lifestyle intervention in subjects with pre-diabetes – an eu FP7 project

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Background. Despite scientific advances in the understanding of the pathophysiology of type 2 diabetes, it remains a challenge to effectively identify and manage individuals in the general population who are at high risk of developing diabetes or those who already have undiagnosed diabetes.

Objectives. Therefore, there is a need to identify novel early markers of glucose intolerance that reflect the underlying biology and the overall physiological, metabolic and clinical characteristics of progression towards diabetes. This will facilitate a completely new approach to disease prevention, based on accurate prognostic phenotyping of high-risk subjects and accurate selection of these individuals for the appropriately matched interventions.

Methods. In this study, several unique and specially selected clinical cohorts provide the basis for a series of clinical, physiological and mechanistic investigations in combination with a range of the new –omic technologies to construct a detailed profile of the spectrum of progressors/non-progressors across multiple cohorts. In addition, an exercise and dietary intervention study is conducted in two specific cohorts, enabling us to assess the impact of such interventions on both plasma biomarkers and specific functional tissue-based markers

Results. The DEXLIFE project will run over the next 3 years and will identify novel diagnostic and predictive biomarkers which can more effectively detect the progression toward diabetes in high risk individuals. Moreover, these biomarkers will also predict on the responsiveness to lifestyle interventions known to be effective in the prevention of diabetes.

Conclusions. At the end of the study, a handbook to enable the translation of the project results to the clinical environment will be published.

Poster no. 118. — Assessment of sudomotor function as a tool to estimate cardiorespiratory fitness level as compared to VO_2max

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Background. Physical inactivity is one of the main modifiable risk factors for cardiovascular (CV) and metabolic disorders. VO2max is the best method to assess cardio-respiratory fitness level but it is poorly accepted by the patient. Sudomotor dysfunction may develop early in cardiometabolic diseases. EZSCAN® is a quick and non invasive method developed to assess sudomotor function.

Objectives. The aim of the study was to compare the usual health analysis tests for CV risk evaluation to EZSCAN results.

Methods. Cardio-respiratory fitness level was assessed in Finish workers through a questionnaire, physical examination (BMI, blood pressure, waist, body composition) and VO2max using a maximal test on bicycle ergometer (T0). Based on local measurements of sudomotor function on hands and feet, expressed as electrochemical sweat conductances (ESC, microSiemens, µS) a cardiometabolic risk score was calculated. Sudomotor function was assessed before and after the exercise test to assess reproducibility of the method. In the subgroup of women with poor fitness level a training program was proposed. Cardio fitness level and sudomotor function were assessed after a 12 month follow-up (T12) and analysed according to mean weekly activity measured by a podometer. Results are expressed as mean ± sd. Correlation between V02max and EZSCAN® cardiometabolic risk score was performed using Spearman's rank correlation test.

Results. 537 women (age: 50±8 years, BMI: 26±5 kg/m2; VO2max: 9.1±1.8 METs) and 113 men (age: 51±8 years, BMI: 26±4 kg/m2; VO2max: 12.2±2.5 METs) were involved in the study. A difference in BMI, waist and body fat was present in men and women according to EZSCAN® risk score classification (no risk, moderate risk or high risk). For women and men the correlation between sudomotor function score and V02max was r=-0.57, p<0.0001 and 0.48 p<0.0001 respectively. Based on Bland-Altman plots for reproducibility between a first measurement performed before the bicycle exercise used to evaluate VO2 max and the second performed just after the exercise the mean difference was 0.8 [-5.7 ; 7.3] for foot ESC, 10.9 [-8.5 ; 30.3] for hands ESC and 0.4 [-6.30 ; 7.0] for EZSCAN risk score (n=108). The mean percent difference for foot ESC, hand ESC and risk score were 3, 16 and 3 % respectively. A significant increase in hand and foot ESC was observed after lifestyle intervention and was more important in subjects with the highest weekly activity (more than 150 min of moderate physical activity or more than 75 min of intensive physical activity per week, n=20) when compared to women with lower weekly physical activity (less than 150 min of moderate level and less than 75 min of high level activity per week while no significant difference was observed for VO2 max (1.1±1.2 vs 0.8±0.9 METs, NS for VO2 max, 8.4±12.3 vs 3.0±9.4 µS, p=0.043 for the hands ESC and 10.8±12.8 vs 4.9±8.9 µS, p=0.024 for the feet ESC and -8.5±6.8 vs -4.7±6.4 %, p=0.027 for the EZSCAN risk score.

Conclusions. Sudomotor dysfunction as assessed by EZSCAN® is correlated to cardio-respiratory fitness levels and suggests that is can be used to assess CV or metabolic disease risk and to follow individual preventive interventions.

Poster no. 119. — Behavioral patterns of physical activity and leisure-time among the students of the 7th, 8th and 9th grades in the State of Lara, Venezuela

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Background. Some countries are currently experience an epidemic of obesity among the youth, fact that has set off alarms over a potentially devastated future epidemic of diabetes among young adults. Physical activity reduces obesity and consequently the risk of diabetes; therefore it needs to be under public health surveillance. In this study, we present patterns of leisure time physical activity among students at grades 7th to 9th in the State of Lara, Venezuela.

Objectives. To describe the prevalence of physical activity risk factors for obesity on an school based sample.

Methods. Data was collected using the Global School Student Health Survey (GSHS) on a representative, cross-sectional sample, participation was 2070 students (85.5% of the sample).

Results. (a). Active students, at least by 60 minutes, on five days during the past week": In males of the 7th grade (9.7%), 8th grade (20.4%) and 9th grade (25.7%) and in females, 10% or less of each school grade; (b) "walked or used a bicycle for transportation (to school) in three or more days during the past week:" Males (21.4%) and females (16.8%); and (c) "watch TV or use the computer for more than three hours in a normal school day," this accounts for 28% of the total male and female population.

Conclusions. These results point to a lack of adequate physical activity and abundance of sedentary activities, and should prompt public health actions, individual and community, to revert the situation.

Poster no. 120. — Prevention for type 2 diabetes with Mediterranean diet and exercise. Study Egabro-Pizarra

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Background. The probability of having diabetes is very high in obese people or not obese people with/without impaired fasting glucose (IFG) and impaired glucose tolerance (IGT). The only alternative to stop the increasing incidence of diabetes is prevention. Studies have shown that it is possible to reduce the incidence of type 2 diabetes with drugs or changes in lifestyle as much as 50%.

Objectives. To evaluate the effects of lifestyles changes (according to a Mediterranean dietary pattern) and to detect the factors which influence the success of this intervention.

Methods. Design: A population-based cohort study. Subjects: 335 people (40-65 years old) selected for having discovered in the course of a population sampling, some disorder of carbohydrate metabolism: IFG, IGT or undiagnosed diabetes (OGTT, ADA criteria). Intervention cohort were composed by 180 people subject to an intensive educational program using Mediterranean dietary pattern to achieve goals for healthier dietary habits and increased physical exercise. Control cohort were composed by 155 people that were referred to their usual physicians with standard recommendations on lifestyle changes. We present results about the first year of follow up.

Results. 14.6% of patients with prediabetes were diagnosed with type 2 DM after the first year of follow-up in the control group compared to 6.3% patients in the intervention group. The absolute risk reduction was 0.097 (CI95%=0.016-0.17), the relative risk reduction was 41% (CI95%=6-63%), odd ratio=0.52 (CI95%=0.29-0.91) and the number of subject needed to treat for reduce an event was 10 (CI95%=6-61). The intervention has strong effects on serum glucose and anthropometry: those who improved their serum glucose had lost more than 4% of their baseline weight in the intensive intervention cohort ($P < 0.05$) while weight did not change significantly in those not intervened nor that do not improve blood glucose during the program. No anthropometric variable baseline predicted treatment effect or the evolution of the subject within the year. Assistance to health services was not associated with the response. Improving blood glucose is associated with the magnitude of weight loss at follow-up and with the use of antihypertensives.

Conclusions. After a year of intervention, we demonstrated that hyperglycemia can be normalized without medication, only with changes in lifestyle similar to the Mediterranean diet that lead to modest weight reductions.

Poster no. 121. — Insulin resistance in secondary prevention of coronary disease: impact of a cardiac rehabilitation program

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Background. High ratio of Triglyceride/HDL cholesterol (TG/HDL) has been associated with insulin resistance, metabolic syndrome, progression of athero-

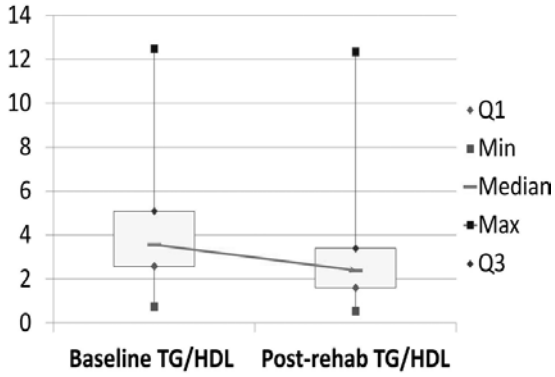

Figure.—Insulin resistance in secondary prevention of coronary disease impact of a cardiac rehabilitation program.

sclerotic plaque and also with the occurrence of cardiovascular events in high-risk patients.

Objectives. To evaluate the average levels of this ratio in ischaemic patients referred to a cardiac rehabilitation program and its relationship with classical risk factors, extent of cardiovascular disease and the changes of this ratio after the program.

Methods. We included 388 consecutive patients submitted to cardiac rehabilitation after an acute coronary syndrome. Demographic data, cardiovascular risk factors and laboratory data were collected at admission to the rehabilitation program. Fasting lipid profile was determined 2-3 days after hospital admission for acute coronary syndrome and at the end of the program.

Results. The subjects consisted of 331(85%) males and 57(15%) females, age 57 SD 10 years. Mean TG / HDL ratio in the study group was 4.2 SD 2.7. 209 patients (54%) had a TG/HDL ratio ≥3.5, which is the accepted threshold for insulin resistance. Males showed a trend toward a higher ratio in the limit of significance. It was significantly higher in patients who had one of the classical cardiovascular risk factors: hypertension, sedentary lifestyle ($p < 0.05$), diabetes, dyslipidemia and active smoking ($p < 0.001$). There was no association between a history of cardiovascular disease (ischemic heart disease, peripheral vascular disease and cerebrovascular disease) and the TG/HDL ratio, possibly because patients were previously treated with hypolipemiant drugs, mostly statins. We found a significant correlation ($p<0.01$) between TG/HDL ratio and LDL levels, glycated hemoglobin, and body mass index (BMI), but not with the number of diseased vessels. 375 (98%) Patients completed a cardiac rehabilitation program that consisted of exercise training, lifestyle education and pharmacological treatment, for an average of 63 days (SD 31). After this period, the TG / HDL ratio decreased significantly (4.2 DS 2.7 at baseline, *vs.* 2.8 DS 1.7, $p < 0.01$), and there was less patients with insulin resistance (TG/HDL ≥ 3.5:54% at baseline *vs.* 35%, $p<0.01$).

Conclusions. TG / HDL ratio, a marker of insulin resistance, is frequently altered in patients referred to cardiac rehabilitation after an acute coronary syndrome, with higher levels in patients with cardiovascular risk factors. A cardiac rehabilitation program improves the burden of insulin resistance in this group of patients.

Poster no. 122. — Effects of lifestyle intervenction in persons at risk for type 2 diabetes mellitus results from a randomised, controlled trial

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Background. Lifestyle change is probably the most important single action to prevent type 2 diabetes mellitus. Reduced health related quality of life (HRQOL) is acknowledged both for subjects with type 2 diabetes and obesity. Less is known about HRQOL in subjects at risk for type 2 diabetes.

Objectives. The purpose of this study was to assess the effects on lifestyle change and HRQOL of a low-intensity individual lifestyle intervention by a physician and compare this to the same physician intervention combined with an interdisciplinary, group-based approach in a real-life setting.

Methods. The "Finnish Diabetes Risk score" (FINDRISC) was used by GPs to identify individuals at risk for type 2 diabetes. With an 18 month follow-up and a randomised, controlled design the effects of individual lifestyle counselling by a physician (individual physician group, (IG)) every six months was compared with the same individual lifestyle counselling combined with a group-based interdisciplinary program (individual and interdisciplinary group, (IIG)) provided over 16 weeks. Primary outcomes were changes in lifestyle indicated by weight reduction ≥5%, improvement in exercise capacity as assessed by VO2 max, diet improvements according to the Smart Diet Score (SDS) and clinically significant changes in HRQOL assessed with the SF-36 questionnaire and to find predictors for improved HRQOL.

Results. 213 participants (104 in the IG and 109 in the IIG group, 50% women), mean age 46 years and mean body mass index 37, were included. 182 returned at follow-up of whom 152 (84%) completed the quality of life questionnaire. There were no significant differences in changes in lifestyle behaviours or HRQOL between the two intervention groups, thus effects are summarised. At least 5% weight loss was achieved by 32% and 34% improved their aerobic capacity at least one metabolic equivalent. Unhealthy diets according to SDS were common at baseline(60%), but uncommon at follow-up(13%). Compared with normative data, the subjects at risk for type 2 diabetes reported clinically significant lower HRQOL (mean difference 13,1) for all eight dimensions of SF-36 at baseline. The drop-outs had even worse HRQOL (mean difference 27,3). Mean changes in HRQOL from baseline to follow-up were small, i.e. a mean improvement of 2,8 for the eight dimensions. The best predictor of improved HRQOL was a clinical significant lifestyle change (both a weight reduction of 5% and improvement in exercise capacity of at least 10%) being associated with improvement of seven out of eight domains of SF-36 with a mean improvement of 12,5 in SF-36 scores).

Conclusions. It is possible to achieve important lifestyle changes in persons at risk for type 2 diabetes with modest clinical efforts.Small lifestyle changes are associated with a moderate improvement in HRQOL. No additional effects were achieved by group intervention. The design of the study, with high inclusion and low dropout rates, should make the results applicable to ordinary clinical settings.

Poster no. 123. — Risk perception and readiness for lifestyle change following completion of a risk questionnaire for developing type 2 diabetes

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Background. The increasing prevalence of type 2 diabetes is a challenging public health problem.

Objectives. This study aimed to assess whether a risk questionnaire could be a motivational tool in the context of lifestyle change for diabetes prevention.

Methods. A German version of the FINDRISC-questionnaire was used to assess diabetes risk. The questionnaire is composed of two parts: 1. Screening (front side): 8 questions (e.g. age, physical activity, nutrition, medication, BMI) to assess personal risk for developing type 2 diabetes within the next ten years. 2. Recommendations (reverse): Level of risk (1%, 4%, 17%, 33%, or 50% resp.) and corresponding health advice. A second questionnaire was applied to assess the correlation between the risk score results and a) individual risk perception & b) readiness for lifestyle change. In addition the understanding of personal level of risk and the recommendations section was analysed. The questionnaires were applied in two different settings: patients from two doctors´ practices and teachers from three schools. Inclusion criteria: age ≥45 years, no diagnosed diabetes.

Results. A total of 137 people completed both questionnaires. For selected results of the diabetes risk questionnaire see table 1. Evaluation questionnaire: In the patient group a moderate correlation between diabetes risk and risk perception was found (Spearman-ρ=0.48). The prevalence of people with low diabetes risk and moderate to high risk perception (45%) is notable. There was a moderate-to-strong correlation between diabetes risk and readiness for lifestyle change (Spearman-ρ=0.54). Whether this result reflects real readiness or an intention for lifestyle change is uncertain. In the teacher´s group there was a moderate-to-strong correlation between diabetes risk and risk perception (Spearman-ρ=0.57). A moderate correlation was found between diabetes risk and readiness for lifestyle change (Spearman-ρ=0.42). In both groups there were moderate-to-strong correlations between risk perception and readiness for lifestyle change (Spearman-ρ=0.60 (patients); Spearman-ρ=0.55 (teachers)) as well as between BMI and readiness for weight reduction (Spearman-ρ=0.50 (patients); Spearman-ρ=0.64 (teachers)). Noticeably, in both groups a substantial proportion of people with normal weight (BMI category <25) expressed readiness for weight reduction (patients 41%, teachers 45%). Perception of risk-related advice: 57% of the patient´s group and 35% of the teacher´s group could not name correctly the respective health recommendation given on the reverse of the risk questionnaire.

Conclusions. People with higher risk were more likely to perceive increased risk an increased readiness to lifestyle change (R≈0.5, p<0.01). However, recollection of actual risk levels and the risk-related recommendations were inaccurate in a substantial number of cases, suggesting that there is room for improvement in the way the information is presented. Further studies are needed to assess whether people who expressed readiness for lifestyle change really implemented their intentions in practice.

TABLE.—*Risk perception readiness lifestyle change.*

	Categories	Patients	Teachers
Number of subjects		77	60
Mean age (approx. from age categories)		62	56
Male/female split		47/53%	36/64%
Diabetes risk (to develop type 2 diabetes within the next 10 years)	1% 4% 17% 33% 50%	12% 52% 17% 16% 4%	37% 42% 17% 5% 0%
Current or former anti-hypertensive medication	Yes	64%	22%
BMI	< 25 25 – 30 >30	30% 56% 14%	55% 43% 2%

Poster no. 124. — Moderate physical activity and metabolic control in Type 1 Diabetes Mellitus

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Background. Exercise is generally recommended for subjects with type 1 diabetes mellitus but the effect of moderate physical activity on metabolic control is discussed. The participation in exercise can also increase the risk of experiencing severe hypoglycaemia both during training and for up to many hours after training.

Objectives. The aim of this study was to evaluate the response of hemoglobin A1c (HbA1c), cardiorespiratory performance, muscular strength and joint mobility to moderate aerobic physical activity in sedentary subjects with type 1 diabetes.

Methods. In a group of 14 sedentary healthy subjects with type 1 diabetes only 8 (5/3 M/F), mean age 36,5 ± 10,6 years, years of diabetes 17,4 ± 8,6, body mass index 22,85 ± 4,0 Kg/m2, mean HbA1c 8,0 ± 1,6% arrived at the end of the training period and were evaluated before and after 4 months of moderate physical activity. It was evaluated the HbA1c, legs muscular strength by dynamometer and the joint mobility of ankle by inclinometer. The cardiorespiratory exercise stress test (CPET) was performed with cycloergometer with a ramp protocol adapted to each patient to reach the end of exercise between 8 - 12 minutes. A Cosmed K4b2 device was used for breath by breath determination of gas exchanges and ventilation. All subjects included in the study followed a physical activity training protocol four times a week for 16 weeks. Two hours before, at the beginning, after 30 minutes of training and at the end of physical activity the blood glucose level was checked. The training program

consisted in walking for 50 minutes: 10 minutes of organic activation, 30 minutes of moderate physical activity at to 45–65% of VO2 peak, near to lactate thereshold and 10 minutes of postural exercise and stretching. At the beginning of study all subjects were given information about the prevention and management of hypoglycaemia by adjusting the dosage of self-administered exogenous insulin and nutritional intake.

Results. After 4 months of training the value of HbA1c was improved (-0.87%; s1=1.58, s2 = 0.65, p< 0,05). The patients showed after training a significantly increase of peak VO2/Kg from 31,4 to 34,5 mL/kg/min (3.1 mL/kg/min; s1=6.61 , s2 = 6.10, p< 0,01) and of peak muscle power output from 174 to 194 watt (20.16 watt; s1=37.10, s2 = 38.49, p< 0,01). After training, at the anaerobic threshold, the patients showed a significantly major capacity of VO2/Kg from 17.3 to 19.9 mL/kg/min (2.6 mL/kg/min; s1=3.40 , s2 = 5.29, p< 0,01) and peak aerobic power output from 82.5 to 97.5 watt (15,0 watt; s1=19.82, s2 = 27.38, p< 0,01). Regarding muscular strength and joint mobility tests there has been no significant changes.

Conclusions. The sedentary subjects with type 1 diabetes are able to perform moderate physical activity near to lactate thereshold and improve since the early months their cardiorespiratory condition and metabolic control. The prevention of the hypoglycaemic condition is linked to a timely information for patients and to the frequent control of glycemias with corresponding corrections.

Poster Session 2.6
Pregnancy

Poster no. 125. — Effect of long-chain omega-3 fatty acid supplementation on foetal body fat distribution in type 2 and gestational diabetic pregnancy

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Background. Exposure to diabetes in utero is associated with increased body fat and macrosomia in offspring which are strong contributor to the development of type 2 diabetes later in life. Animal studies suggest that increased consumption of long-chain omega-3 fatty acids reduces adipogenesis. Evidence in human is scarce. However, our pilot study on type 2 diabetic patients demonstrated that supplementation of 10g of fish oil daily for 2 months shifted the fat and muscle mass without affecting body weight. Moreover, a recent investigation in infants reported a lower skinfold ratio (triceps/subscapular) after fish oil supplementation. Foetus and neonates predominantly rely on maternal supply of long-chain omega-3 fatty acids.

Objectives. The aim of the study is to test if long-chain omega-3 fatty acids supplementation during pregnancy affects the body fat distribution of the foetus.

Methods. Pregnant women with type 2 diabetes were recruited during the 1st trimester and gestational diabetes once they were diagnosed. Upon recruitment, women were randomly assigned to receive either omega-3 supplement which provides 600 mg of docosahexaenoic acid (DHA) or placebo containing high oleic acid based oil until delivery. Both supplements contain 2.8 mg of vitamin E per gram of polyunsaturated fatty acids to prevent oxidation. The ultrasound scan was performed between 32 – 34 weeks of gestation and the following parameters were measured; (1) head-, abdominal-, and mid thigh-circumferences; (2) femur- and humeruslengths; (3) biparietal- and occipitofrontal-diameteres; (4) mid-arm and mid-thigh lean mass; (5) mid-arm and mid-thigh fat mass; (6) abdominal fat mass.

Results. The recruitment of women is now completed (50 type 2 and 95 gestational diabetes). In total, 137 women completed the scan and we expect the remaining scan to be completed in June if the pregnancy goes to the full term.

Conclusions. The final results will be presented at the conference.

Poster no. 126. — Effect of omega-3 docosahexaenoic acid supplementation on red cells, platelets and mononuclear cells fatty acid composition in pregnant women with type 2 diabetes

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Background. Type 2 diabetes is associated with impaired delta-6 and delta-5 desaturase activities, enzymes responsible for de novo synthesis of docosahexaenoic acid (DHA). DHA is a vital nutrient for foetal brain development and its requirement is the highest during latter part of pregnancy. Previously, we have observed a reduction in red cell membrane DHA level in pregnant women with type 2 diabetes during third trimester. It is not known whether the depletion of membrane DHA in diabetic mothers is due to their diabetes or physiological response for increased foetal requirement.

Objectives. The aim of the study is to test if dietary DHA supplementation from early pregnancy halts the reduction of DHA in maternal blood cell phospholipids during third trimester.

Methods. Pregnant women with type 2 diabetes and without (control) were recruited during the first trimester (<13 gestation weeks) and received either omega-3 supplement which provides 600 mg of DHA or placebo containing high oleic acid based oil. Both supplements contain 2.8 mg of vitamin E per gram of polyunsaturated fatty acids to prevent oxidation. Random blood sample was obtained at recruitment (<13 gestation weeks) and during third trimester (28-32 weeks). Fatty acids composition was assessed for red cells, platelets and mononuclear cells.

Results. The recruitment of women is now completed (type 2 diabetes, n=89; control, n=92) and the follow-up of the women will be completed in June 2012. The rate of drop-out and miscarriage before third trimester is 29% in type 2 diabetic and 35% controls women.

Conclusions. The final results will be presented at the conference.

Poster no. 127. — Effect of timely initiated strict metabolic and blood pressure control on pregnancy outcomes in type 1 diabetic women with microalbuminuria

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Background. Type 1 diabetic women with microalbuminuria or diabetic nephropathy are at particular risk of poor pregnancy outcome. Diabetic nephropathy is associated with a high risk of gestational hypertension, Preeclampsia,

Objectives. The aim: to evaluate the effect of strict metabolic and blood pressure control before conception on pregnancy outcomes in type 1 diabetic (T1DM) women with microlbuminuria.

Methods. Materials: In total, 189 pregnant women with T1DM were enrolled in the study. The women were categorized according to their level of urinary albumin excretion (UAE). Normalbuminuria defined as UAE < 30 mg/24h, microalbuminuria - UAE - 30-300 mg/24h. Target BP levels < 135/85mmHg. Women with diabetic nephropathy before pregnancy were excluded . We divided participants into 3 groups:Gr.1 – 18 microalbuminuric women with intensive metabolic and antihypertensive control before pregnancy; Gr.2 – 19 microalbuminuric women with intensive metabolic and antihypertensive control from the 2nd trimester (tr.) of the pregnancy; Gr. 3 – 148 normoalbuminuric pregnant women

Results. Results. At entry HbA1c(%) levels for Gr.1, 2, 3 were: 6.4 (1.04), 7.8 (1.7), 6.54 (1.6), respectively; by the end of the pregnancies they statistically decreased in all the groups (P=0.024, P=0.000, P=0.000, respectively). From the 2nd tr. of pregnancy antihypertensive therapy (mainly methyldopa) was initiated in 16.6% of Gr.1, 47.3% - Gr.2, and 4.05% - Gr.3, patients. In five Gr.2 patients two antihypertensive agents were used in the 3rd tr. The frequency of preeclampsia and preterm delivery in Gr1 was 11.1% and 11.1% respectively, both significantly lower than in Gr.2 (63.1% and 68.4%, respectively, P= 0.000), and in Gr.3 preeclampsia and preterm delivery (3.3% and 6.7%, respectively) were significantly lower than in Gr.1 and 2. Perinatal mortality in Gr.1 (5.5%) was significantly lower than in Gr.2(26.3%, P=0.000).

Conclusions. Conclusion. Strict metabolic control and antihypertensive treatment started in microalbuminuric women initiated before pregnancy prevent development of preeclampsia and preterm delivery and reduce perinatal mortality risk.

Poster no. 128. — The risk of future glucose intolerance among women with history of gestational diabetes

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Background. In gestational diabetes mellitus (GDM) abnormal glucose metabolism normalizes soon after delivery. However, the history of GDM predisposes to carbohydrate intolerance in the future.

TABLE I.

	Group 1 (NGT)	Group 2 (IGT+DM)	t[a], z[b], χ^{2c}	p	OR (B; 95% CI)
n (%)	88 (65)	47 (34)			
Age (yrs)	34.7	33.8	0.992[a]	0.323	
BMI (kg/m^2)	29.4	30.1	0.949[a]	0.349	
Weight gain (kg)	9.9	10.1	0.185[a]	0.853	
Family history of DM n (yes/no)	65/23	33/14	1.097[b]	0.273	
Poor obstetric history n (yes/no)	55/33	36/11	0.659	0.095	
A1C (%) Z scor (0.1%)[d]	5.4±0.3	5.8±0.5	2.961[a]	**0.004**	15.47 (2.74; 2.06-114.23)
Insulin requirement n (yes/no)	7/81	12/35	7.82[c]	**0.005**	11.78 (2.47; 2.61-53.29)

[a]Students *t*, [b]Mann-Whitney U, and [c]Pearson χ^2-tests, [d]Multiple logistic regression model.

Objectives. The aim of this study was to evaluate risk factors predicting to future development of diabetes mellitus (DM) in women with history of GDM.

Methods. 135 women with GDM (mean age 34.4±5.2 yrs; body mass index (BMI) 29.8±4.2 kg/m2) were enrolled into the study. A 75 g OGTT was performed to all of them between 3 and 6 months following delivery. Based on ADA criteria participants were classified into two groups as normal glucose tolerance (NGT = Group 1) and glucose intolerance (IGT+DM = Group 2). We evaluated the relationship between status of carbohydrate metabolism after delivery and possible risk factors such as; age, BMI, family history of DM, poor obstetric history, A1C at diagnosis of GDM, and weight gain and insulin requirement during index pregnancy.

Results. As shown in the table below, 34% of participants had any degree of glucose intolerance after delivery. No predictive factor was found except A1C level at the diagnosis of GDM and insulin requirement during pregnancy. According to the regression model in our study, any 0.1% increase in the mean A1C at onset of GDM, and insulin requirement during index pregnancy were associated with 2.7 and 11.7 fold increase in future glucose intolerance, respectively.

Conclusions. A1C level at the diagnosis of GDM and insulin requirement during GDM are crucial predictors of development of diabetes or glucose intolerance in the future. These women need to be followed carefully after delivery.

Poster no. 129. — The birth of MAGDA: development of a lifestyle modification diabetes prevention intervention specifically for post-gestational diabetes women

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Background. Up to 50% of women who develop gestational diabetes (GD) will develop Type 2 Diabetes (T2D) within five years of delivery, making it the strongest predictor of diabetes amongst women. Lifestyle modification through behaviour change is the most effective population strategy for reducing risk of developing T2D. However, post-GD women are a difficult group to access due to the challenges that early parenthood presents. At present in Australia, prevention programs such as the Life! Program are available for adults at high risk of developing T2D but there is no program to meet the specific needs of post-GD women.

Objectives. To develop a lifestyle modification diabetes prevention program focused around the needs of post-GD women for the MAGDA (Mothers After Gestational Diabetes in Australia) study and assess the feasibility of the program through a pilot rollout.

Methods. A working group was formed consisting of relevant allied health professionals and researchers. The brief of the working group was to develop the prevention program around the established lifestyle modification goals (5% weight reduction, < 30% total dietary fat intake, <10% saturated fat intake, >15g dietary fibre/1000kcal, >30min moderate physical activity daily) that incorporated the needs of a mother with a young family. The MAGDA program was piloted for feasibility and acceptability with a group of 9 post-GD women.

Results. The MAGDA program was developed and the structure is comprised of an individual session followed by 5 group education sessions and 2 follow-up telephone conversations. The content covered during the program has a "whole of family" focus for achieving goals and tackling common barriers to success. The sessions cover risk identification, diabetes knowledge, personalized goal setting, improving physical activity, good mental health and dietary modification to lower energy, total and saturated fat intakes and increase fibre. The pilot rollout had a high level of attendance (70-90% for group sessions). However, only 20% participants attended all sessions with illness and travel commitments causing non-attendance. Childcare arrangements were investigated but all participants elected to have their children present during the program. Participants reported the program to be acceptable and suited to their needs.

Conclusions. The MAGDA study will use an innovative lifestyle modification program designed to meet the needs of post-GD women and have a whole-of-family focus. The pilot determined that the program was feasible and met the needs of the target population. 525 post-GD women from 3 hospital sites will be recruited for the control and intervention arms during 2012-13 for the MAGDA study.

Poster no. 130. — Postpartum weight loss is associated with improved glucose and insulin homeostasis in women with history of gestational diabetes (GDM)

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Background. Women with history of GDM are at high risk of developing type 2 diabetes. They represent at high risk young population that might benefit from early intervention for weight reduction to prevent diabetes. However, there is a lack of data on postpartum weight loss and glucose and insulin homeostasis.

Objectives. We examined whether weight loss between 6 weeks and 12 months postpartum was associated with improved changes in glucose and insulin measured fasting and 2 hours after a standard 75-gr OGTT.

Methods. A subset of 72 women from the Diet, Exercise and Breastfeeding Intervention study, a randomized controlled trial of diabetes prevention in women with GDM,

Results. As compared with women who maintained (-/+ 2 kg) or who gained weight (> 2 kg), women who lost > 2 kg had statistically significant ($p < 0.05$) decreased levels of fasting glucose [mean (SD): 99.5 (10.7) *vs.* 93.1 (10.8) mg/dL], fasting insulin [12.7 (6.3) *vs.* 7.5 (6.3) µU/mL] and 2-h insulin [71.1 (39.0) *vs.* 35.8 (24.1) µU/mL]. In linear regression models adjusted for age, weight at 6-wk and breastfeeding, 1 kg of weight loss between

6-wk and 12-m postpartum was associated with a significant decrease in fasting glucose, 2-h glucose, and 2-h insulin [difference in mean change (95%CI): -0.47 (-0.91 to -0.03) mg/dl, p = 0.04; -2.43 (-3.97 to -0.89) mg/dL, p = 0.002; and -2.44 (-4.42 to -0.46) µU/mL, p = 0.02, respectively], and a non- statistically significant decrease in fasting insulin [-0.12 (-0.42 to 0.18) µU/mL]

Conclusions. Postpartum weight loss resulted in improved glucose and insulin homeostasis. Interventions are needed to help women with GDM manage postpartum weight to prevent diabetes.

Poster Session 2.7
Primary Care

Poster no. 131. – DEMOJUAN-Demonstration area for the primary prevention of type 2 diabetes, Barranquilla and Juan Mina, Colombia

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Background. In Colombia, the prevalence of type 2 diabetes (T2D) varies between 4 and 8%. Recent estimates give reason to believe that the predicted number of diagnosed T2D patients will increase and a large number of asymptomatic cases of T2D will remain undiagnosed. A high prevalence of overweight (more than 30%) and a sedentary lifestyle are the underlying factors of this epidemic. Impaired glucose tolerance is almost as frequent as diabetes. T2D ranks among the first five causes of death in Colombia.

Objectives. The main aim of the DEMOJUAN study is to investigate to what extent it is possible to reach normal glucose metabolism and optimal cardiovascular disease (CVD) risk factor levels with early lifestyle interventions in people at high risk of T2D compared with those who receive standard therapy (usual care) only.

Methods. The design of this study is a randomized clinical trial. The study includes all people 34-60 years-of-age with Impaired Glucose Tolerance (IGT) and/or Impaired Fasting Glucose (IFG) who are willing to participate. The study participants are currently being recruited in five study centers in Barranquilla (Camino El Pueblo, Camino Simon Bolívar, Camino El Bosque de María, COOSALUD and Paso Juan Mina) using the Finnish Diabetes Risk Score (FINDRISC). People with more than 13 FINDRISC points undergo an oral glucose tolerance test (OGTT). The enrollment of participants will end in August 2012 and the interventions started in February 2012. The study is designed to have a 90% power to detect a 20% percentage unit difference in recovery from IGT and/or IFG between the treatment groups at 5% significance level. Assuming a 30% loss to follow up at the end of the 24 months intervention, a total of 200 participants are needed in both treatment groups (total sample size of 600 individuals). The study participants are continuously randomized into three groups. These are: 1) Lifestyle intervention starting with 6 months nutritional intervention followed by 6 months nutritional and physical activity interventions; 2) Lifestyle intervention starting with 6 months physical activity intervention followed by 6 months physical activity and nutritional interventions; 3) Control group. In the second year, both intervention groups will receive physical activity and nutritional interventions. The length of the follow-up is two years. Validated, interview-based questionnaires are used to assess lifestyle habits at baseline and during the follow-up. Anthropometric measurements and laboratory measurement are conducted at each of the visits of the study participants.

Results. Financial support: This project is supported by a BRIDGES Grant from the International Diabetes Federation. BRIDGES, an International Diabetes Federation project, is supported by an educational grant from Lilly Diabetes. The project also receives support of the Health Secretariat of the city of Barranquilla.

Conclusions. The DEMOJUAN will be the first tool of prevention at the Latin American level addressing the health priorities of the Agenda as it develops and implements strategies for assessment, prevention and communication to respond to increasing non-communicable disease threats, particularly T2D in the Caribbean region and Latin America.

Poster no. 132. — Clinical validation of the SCOUT DS noninvasive prediabetes and diabetes screening device

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Background. Screening for type 2 diabetes is an important step in identifying candidates for primary prevention or secondary intervention because subjects can be asymptomatic for a number of years. Seminal clinical trials such as the Finnish Diabetes Prevention Study and the Diabetes Prevention Program have clearly demonstrated that type 2 diabetes can be prevented or at least delayed in subjects with impaired glucose tolerance. In addition, the United Kingdom Prospective Diabetes Study established that management of glycemia in those with type 2 diabetes can reduce the incidence of microvascular complications of the disease.

TABLE.—*Clinical Validation of the SCOUT DS Noninvasive Prediabetes and Diabetes Screening Device.*

Test	Threshold	Sensitivity (%) [95% CI]	FPR (%) [95% CI]	pAUC (20 to 50% FPR) [95% CI]
SCOUT	50 AU	68.2 [58.2 75.2]	37.8 [32.6 43.3]	0.193 [0.161 0.224]
FPG	100 mg/dL 110 mg/dL	51.8 [42.6 60.9] 32.7 [24.7 42.0]	19.4 [15.4 24.1] 5.1 [3.2 8.1]	0.178 [0.147 0.208]
A1C	5.7% 6.0%	64.6 [55.3 72.9] 37.3 [28.8 46.6]	30.8 [26.0 36.1] 7.3 [4.9 10.7]	0.207 [0.170 0.243]

Objectives. A clinical validation of the SCOUT DS noninvasive diabetes screening device was performed in a cohort that had risk factors for but not a pre-existing diagnosis of type 2 diabetes. The skin fluorescence-based SCOUT measurement was compared to fasting plasma glucose (FPG) and A1C for detection of abnormal glucose tolerance (AGT) as defined by a 75 gm, 2 hour OGTT ≥ 140 mg/dL (7.8 mmol/L).

Methods. Subjects at risk for type 2 diabetes were recruited at 9 US clinical sites with a representative mixture of gender, age and ethnicity. Subjects made two visits to a clinic on separate days. The firstt visit was in the morning and required an overnight fast. During this visit FPG, A1C, OGTT and SCOUT measurements were made. Two SCOUT measurements were made on the second visit with the subject in a non-fasting state. FPG and A1C were measured at local laboratories to replicate real world diabetes screening and the OGTT reference was measured by a central lab. Test accuracy for detection of AGT was determined by receiver operator characteristic (ROC) analysis and the partial areas under the ROC curve (pAUC) between 20 and 50% false positive rates (FPR) were compared. In addition, intra and inter-day subject coefficients of variation (CV) were computed for SCOUT.

Results. The cohort had a representative mixture of subject ages, gender and ethnicity (caucasian, Hispanic or African American). 425 of 478 subjects were measureable by SCOUT, including 110 cases of AGT. In this particular cohort, subject age in years was marginally associated with AGT (p=0.06) while gender and ethnicity were not significant. Table 1 compares the pAUC and test threshold sensitivity/FPR pairs for SCOUT, FPG and A1C. SCOUT had a pAUC of 0.193 that was not significantly different from the 0.178 pAUC of FPG or the 0.207 pAUC of A1C for detection of AGT. The intra and inter-day subject CVs for SCOUT were 5.5 and 7.6%, respectively.

Conclusions. SCOUT had equivalent pAUC to FPG and A1C and significantly higher sensitivity than FPG (100 or 110 mg/dL thresholds). SCOUT's immediate results and noninvasive, non-fasting nature may make it attractive for screening of patients at-risk for prediabetes and type 2 diabetes.

Poster no. 133. — Effectiveness of a program for the primary prevention of type 2 diabetes in routine context of primary health care

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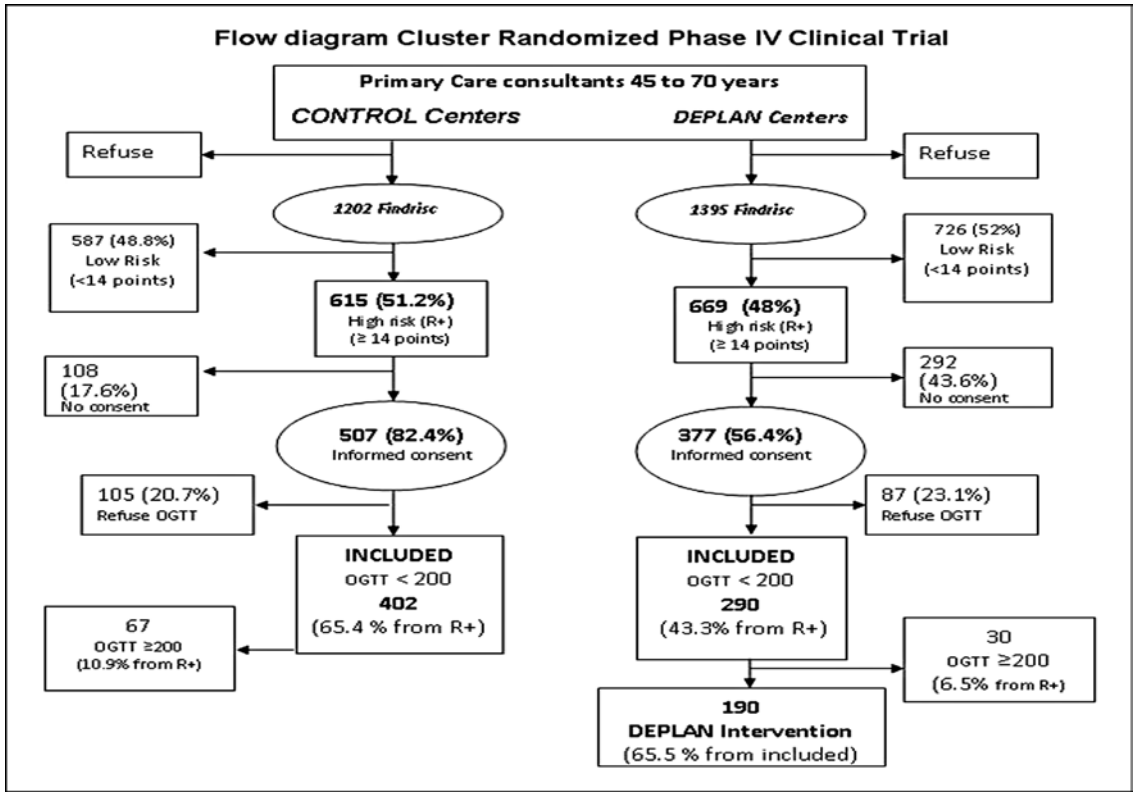

Figure.—Effectiveness of a program for the primary prevention of type 2 diabetes in routine context of primary health care.

Background. The Department of Health and Consumer Affairs of the Basque Country, the public authority in charge of policy, planning, funding and regulation of health issues, has recently launched the regional "A Strategy to Tackle the Challenge of Chronicity". The strategy defines health priorities and develops policies to improve the health status of the population and involves government areas, research organizations, stakeholders and associations to change healthcare for chronic patients, with focus on prevention and promotion, education and empowerment of patients and sustainability of the system and industrial development.

Objectives. To evaluate the effectiveness and feasibility of the DE-PLAN program for the primary prevention of type 2 diabetes in high-risk population seen in primary care centers (Osakidetza) in which such intervention is implemented, compared to usual care control centers.

Methods. Cluster Randomized Phase IV Clinical Trial conducted in the Primary health care (PHC) routine conditions. Fourteen Osakidetza PHC centers were randomly assigned to intervention (IG) or control group (CG), that will capture in routine conditions a sample of 1022 patients aged 45 to 70 years, without diabetes but at high risk to develop it (FINDRISC scale ≥ 14), who will be followed for two years. IG centers nurses have implemented DE_PLAN program, and CG centers patients receive standard care for prevention and treatment of T2D in force in Osakidetza. The effectiveness of the program in reducing the risk of developing T2D and improving healthy habits will be determined by comparing the changes observed in patients exposed to the intervention program and the patients of CG centers. In terms of feasibility, program's coverage and implementation indicators will be assessed.

Results. Preliminary process indicators obtained from April 2011 to June 2012 are shown in figure. Patients in the CG centers are more likely to participate 61.1% as compared to 34.4% in the IG. Regarding the assessment of glucose metabolism: 31.8%, participants showed normoglycemia; 27.2% impaired fasting glucose, 28% impaired Tolerance Glucose and 13% diabetes.

Conclusions. Patients at high risk of T2D are more likely to accept a shorter intervention than participation in workshops throughout time. The main reason appears to be lack of time, but nurses also perceived that there is lack of active involvement in changing lifestyle. DEPLAN intervention is highly valued by nurses who provide it and the people involved. PHC Professionals easily forget to propose patients screening for diabetes risk within the routine context.

Poster no. 134. — ICT in motivating people to do better self-care management

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Background. This study was done as part of the international Emotionaal Village project. The use of Information and Computer Technology (ICT) solutions are becoming more popular in the prevention and self-care management of chronic diseases. ICT changes the use of resources and that is why the costs and benefits of this ICT based model were taken under review in this study.

Objectives. The aim of this study was to find out the possibilities, usability and benefits of ICT based diabetes self-care management as part of primary health care in Finland.

Methods. The project organized pilots such as a health corner in a village shop and ICT as part of health monitoring. The participants (N=15) of the most recent ICT pilot used a web-based portal or cell phone which were combined to the fast feedback from nurse. Due to the short time and the low number of participants in our pilot, the literature review was used to find out the effectiveness of ICT and fast feedback in the prevention and self-care management of type 2 diabetes. The outcomes of this pilot are based on the end-user experiences. The calculation of costs is based on the results of Finland's national diabetes programme. The calculation of different kinds of resource use was based on the interviews and on the recommendations according to Finnish Current Care Guidelines.

Results. The health monitoring pilots' participants were satisfied with these offered ICT solutions, albeit there were some problems with usability. The users felt that this system motivates them better than the traditional system and supports more self-care management. The comments of the nurse were also promising. The time resource needed for this process, in our pilot, was minimal, only 1-5 min/patient/check. If the contacts were on a continuous basis weekly, the costs of care might stay the same than in the traditional system (face-to-face meetings with a nurse 3-4 times/year) but the outcomes of care would be better. However, if the nurse gave feedback every second week, this system would enable the care for a larger number of people than in the traditional system and this would be more cost-effective. In Finland the investment in diabetes prevention and intensive support for the self-care management could bring good value for money especially for municipalities because most of the health care costs are allocated to them.

Conclusions. The ICT based systems suit well chronic disease management. The use of ICT enables fast feedback from health care professionals and supports self-care management. The ICT can decrease the problems which long distances cause in the rural areas.

Poster no. 135. — The role of standards and guidelines in diabetes' management for general practicioners in Ukraine

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Background. The prevalence of diabetes in Ukraine is great. Now management of diabetes is conducted by endocrinologists which have the large loading. The patients with the high risk of diabetes remain without enough attention.

Objectives. The experience of the most countries, where the management of diabetes is carried out by gen-

eral practitioners, showed reduction of morbidity, good control of diabetes and improvement of life quality.

Methods. Now there is reformation of the Ukrainian health system on principles of family medicine, that supposes passing of diabetes' management to the general practitioners. A family doctor, looking after family during great while, knows all possible features and risk factors - inherited, ethnic, professional, cultural, psychosocial and can correct the lifestyle of every family member and most effectively to carry out the preventive measures of many diseases.

Results. Today there is a problem of absence of the special standards and guidance of diseases' management in general practice. After study of international clinical recommendations, experience and guidelines on diabetes' management in other countries, we developed on its basis and own experience the clinical protocol and standard of diabetes' management, quality indicators for Ukrainian general practitioners, which underlay at National guidance of diabetes' management in general practice and are on assertion in the Health Ministry of Ukraine. These documents will provide the competence of actions of general practitioner.

Conclusions. In obedience to the offered normative documents the general practitioner will carry out preventive measures and educational work in families with the high risk of diabetes, and also management of patients with the compensated diabetes in a close touch with endocrinologist. Due to the close collaboration of general practitioner with a patient and endocrinologist it will be succeeded to save the health of every separate family and society member on the whole.

Poster no. 136. — Diabetes and dental interface: a measuring and management tool for primary care dental practitioners and their teams

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Background. There has been an established link between diabetes and oral health for a number of years. More recent evidence supports a reciprocal link, we have developed a measuring and management tool aimed at primary care dental practitioners. This tool will enable dental teams to identify areas in a patient's mouth that may be impacting on their glycaemic control, and allows monitoring over time to help measure improvement. It also allows the impact of these changes on glycaemic control to be correlated. In creating the tool consideration was given to the factors of time and investment as primary care practitioners will need to consider these when offering additional services to patients. As most diabetic patients who see the dentist are likely to be seen in the primary care setting it is clear that the tool needs to be fulfil these requirements.

Objectives. To create a tool that can be used by primary care dental practitioners and their teams to identify oral inflammation that may be having an impact on glycaemic control, and use it to prescribe appropriate management.

Methods. The patients were assessed using the diabetes/dental matrix as a baseline. A treatment plan was formulated based on the results. The aim of the treatment plan was to eradicate inflammation or factors that may be leading to inflammation. They were reassessed at 3 months and 6 months.

Results. The measurements will be continued over a longer period of time, however as the results showed positive outcome after 6 months we have presented these preliminary findings. In all cases the dental component of the scoring system improved (as one would expect). In all but 1 case the HBA1c improved. That patient was very well controlled at the outset. In 3 patients there was an improvement in blood pressure.

Conclusions. We believe this matrix is a useful tool that can be utilised by general practitioners/dental providers in primary care to help them identify areas in a patient's mouth that could be impacting on their glycaemic control. Most practices would be able to use the system with very little additional investment, and once it has been used a few times it only takes 20-30 minutes of clinical time much of which can be as part of a normal examination, and most, if not all, can be carried out by hygienist and therapists. Some aspects can be carried out by an appropriately trained nurse.

Poster no. 137. — Diabetes clinic in remote rural area

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Background. A new diabetes clinic was established in One-day surgery hospital, Samalout, Minia Governorate, 250 km south to Cairo. It was designed as a structured diabetes care with a complex intervention comprising diabetes registry, patient education, educated diabetes nurse, local clinical protocol and structured communication across the primary-secondary care interface. Population of Minia is 4.14 Milions. 5.8% total egyptian population. Urban:19.3% total population. Covering area --32279-- square kilometers.(3.2%)

Objectives. Objective: The aim of the study is to assess the feasibility and effectiveness of a structured diabetes shared care service in a remote area and to analyse the impact on total patient care.

Methods. This study was carried out at diabetes clinic in One-day surgery hospital,Samalout,Minia Governorate during 2010. The files of 800 patients with type 2 diabetes who attended the clinic during 2006-2008 were evaluated. Biophysical outcomes (HbA1c, blood pressure, body mass index, lipid profile,CVS mortality and morbidity,microvascular complications), psychosocial measures (smoking status and Diabetes Clinic Treatment Satisfaction and Diabetes Well-being scores) and process outcomes were collected.

Results. The total number of diabetics who attended the clinic 2006-2010 was 2100. Body mass index : BMI improved through follow-up period of 18 months where significant reduction occurred in the group with BMI 18-24 at registration and 18 months later. The changes were less prominent in females than males. • Glyco-

sylated haemoglobin(HBA1C) 2006-2008: the percentage of better glycemic control.(<7) increased across years2006-2008 where it was only10% at registration in 2006,increased to 30% in 2007 and finally reached 60% of patients at 2008.) • Controlled blood pressure: optimum blood pressure control130/80 increased from20% in 2006 to 60% in2008. • Lipid profile changes: LDL>100 mg/dl decreased from 48% (2006) to23%(2008) P-value .000 (,TG >150 mg/dl : decreased from 56%(2006)to 32% at 2008& HDL>40mg/dl Increased 18% 2006 to 35% 2008) • Hypoglycemia: This means attacks need other

Poster no. 138. — The role of the chartered physiotherapist in a community based diabetes prevention programme

Clair Haseldine BSc (physio) MISCP, Bernadette O'Riordan RN, BSc (Nurs with Educ) MPhil

Health Service Executive Ireland. Attendance at conference supported by Novo Nordisk and |Merck Sharp and Dohme

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Background. The number of people developing Type 2 diabetes around the world is increasing at an alarming rate. Decreasing physical activity is one of the main factors contributing to this rise. Chartered Physiotherapists, as the movement experts, are the obvious choice to be involved in a Community Based Diabetes Prevention Programme.

Objectives. To deliver self management education to people at risk of Type 2 diabetes in a community setting.

Methods. The diabetes prevention team consists of the community chartered physiotherapist and the community nurse. All of the primary care team is involved in the screening of patients and anyone on that team can refer patients to the diabetes prevention programme. Patients are identified by opportunistic screening at outpatient visits and also by screening at local events such as health promotion days. The screening tool used is a simple questionnaire called the FINDRISC (1). It is a validated questionnaire and can predict the risk of developing diabetes in the next 10 years. Patients may also be referred directly from the GPs when they have raised blood glucose on testing. Patients who have a history of gestational diabetes or polycystic ovary syndrome are automatically accepted into the programme as they are at a very high risk of developing diabetes. If the patient is found to be at a moderate risk of developing diabetes they are offered a three and a half hour structured education programme, Walk away from Diabetes, which encourages physical activity and reduced fat intake. The programme uses pedometers to enable patients to take control of their own activity levels. This programme is given by all of the diabetes prevention team. If they are at a high risk of developing diabetes and have impaired glucose tolerance they are referred for one to one support. Patients are seen 6 times over 5 months with the aims of achieving the following: 5% weight loss, physical activity of 30mins a day, reduced fat intake, increased fibre in the diet and smoking cessation if needed. This part of the programme is delivered by the community nurse with the option to refer to physiotherapy if more support is needed to reach the physical activity goals.

Results. The evaluations of the people who attended the Walk Away from Diabetes Programme are positive in support of the programme. The patients receiving one to one sessions had statistically significant reductions in fasting glucose (mean 6.4 dropping to 5.94, p=0.0061), weight, BMI, abdominal circumference, cholesterol and LDL.

Conclusions. The Mizen Primary Care Team is running an effective programme for the prevention of diabetes in West Cork Ireland. Chartered Physiotherapists with their specialist knowledge of physical activity should be an integral part of diabetes prevention.

Poster no. 139. — Evaluation of an intervention for early detection and prevention of overweight among school children in Denmark – using the "realistic evaluation" framework

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Background. Increasing prevalence of overweight among Danish school children constitutes a significant

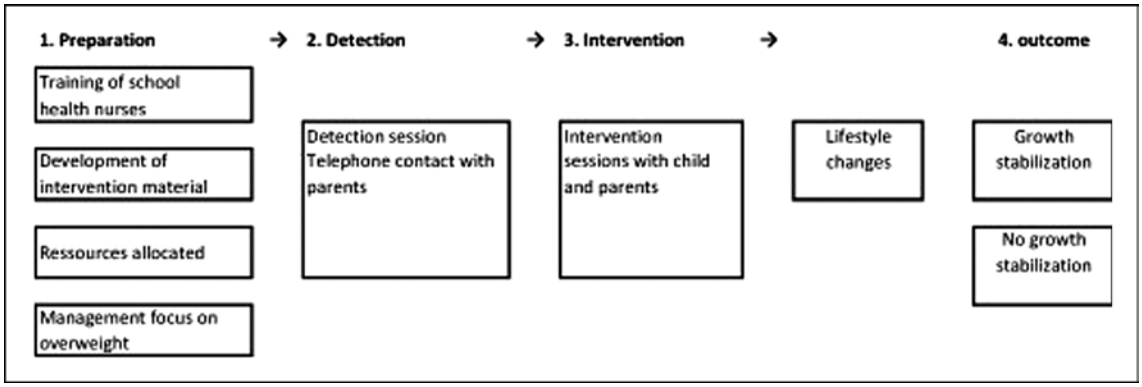

Figure.—Evaluation of intervention early detection overweight among school children.

public health challenge and scientific evidence on effective interventions is scarce. As obesity is a key risk factor for the development of diabetes, population based strategies for the prevention of diabetes should include prevention of childhood overweight and obesity. Following several years monitoring growth trend among school children, and in response to the findings, a Danish municipality has introduced a two track preventive intervention. One track takes place in a specialized, multidisciplinary centre that provides a counselling and treatment intervention for obese children and their families. The alternate track takes place in schools, where child healthcare nurses offer a counselling intervention of one to three sessions for overweight children and children in risk of overweight and their parents. This paper is based on an evaluation of the pilot phase of the child healthcare nurses' intervention. The focus of the paper is on the detection of children and the participation of parents in the intervention.

Objectives. The objective of the evaluation was to investigate how the intervention was translated into practice by the child healthcare nurses

Methods. The "Realistic evaluation" framework was employed to design the evaluation. The hypothesis of the causal change mechanism in the intervention, also called the "intervention theory", was put forward as shown in figure 1. A mixed methods approach was selected. Registration forms were collected from 44 nurses, involving 253 children identified during the pilot period (March 2011 to March 2012). In addition to the registration form data, nine nurses participated in semi-structured interviews about the counselling sessions.

Results. Less than half of identified children (42%), were from the intended target group of overweight children and children at risk of overweight. The others (58%) were obese and thus not in the target group of this intervention. There are several explanations for this, the most important being (i) unclear written material about the target groups and (ii) obese children or parents who would not accept the intervention at the specialized centre. Overall, 34% of identified children participated in one, two or three intervention sessions. The children participated alone in almost a third of the sessions (31%) although the intended intervention was a "family intervention". Explanations for the lack of parental participation included parents not being available and children not wanting their parents to be involved. Telephone contact replaced face to face counselling in some cases to address the availability issue, while the school nurses respected the children's wishes if they did not want a parent present.

Conclusions. This evaluation revealed deviations in practice from the intervention theory, in terms of identifying the target group and delivery of the intervention as a face to face counselling session for children and their parents.

Poster no. 140. — Incidence of diabetes in madrid: a 5 year prospective study

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Background. There is very limited information on the incidence of diabetes in Spain.

Objectives. To determine the incidence of diabetes mellitus (DM) in a population treated in primary care in Madrid.

Methods. Five-year longitudinal follow-up study (2006-2010) of a cohort of 227,984 patients over 24 year with at least one visit to the primary care clinic in 2006 in an area of the city of Madrid. Information was extracted from electronic medical records. Prevalence of DM was calculated for 2006 and incidence rates for 2007-2010 by sex, age groups and cardiovascular diseases comorbidities.

Results. Mean age was 52.87 (SD:18.14) and 52.10% were women. Prevalence of DM in 2006 was 8%. Incidence of DM was 78.56 cases/100.000 person-month in 2007 and 71.58 in 2010. Groups in which higher incidence was observed were men (92.06 vs 69.14 in women), those >64 year (148.13 vs 86.63 among 45-64 and 22.29 for those <45), And patients with a diagnosis of heart failure (287.13), ischemic heart disease (229.90) or obesity (197.26).

Conclusions. Prevalence and incidence rates obtained in this work are lower than those reported by other authors in Spain, probably reflecting differences in the methodology. The groups at higher risk for developing DM identified in this work are similar to what have been previously reported. Males, patients of advanced ages, with heart failure, ischemic heart disease or obesity are at higher risk for developing DM, and have to be targeted for effective strategies to prevent the onset of the disease. Electronic extraction of information from medical records appears to be a suitable method for the population assessment of DM incidence.

Poster no. 141. — The prevalence of diabetes' risk factors and their correction among citizens and villagers in primary care

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Background. The widespread of diabetes type 2 increases each year. About 1,5 million patients are suffering from diabetes in Ukraine. The actual number is higher in 2-3 times due to undiagnosed forms of diabetes. Principal reasons of morbidity' growth are: urbanization, hypodinamia, bad quality of food, stresses, senescence of population.

Objectives. The aim of our study was to analyse the most widespread risk factors of diabetes among the citizens and villagers of Kiev and Kiev region, to estimate the knowledge of patients about possibility of diabetes and using of preventive measures.

Methods. The 136 patients with diabetes, age 62,9±3,8 years (65% women and 35% men) were interviewed about risk factors they have before diabetes. Duration of diabetes – 7,9±1,9. We used the modified questionnaire for estimation of diabetes risk factors, offered by ADA. The questions about the knowledge of diabetes possibility and using of preventive measures before diabetes were added. Also we analysed blood pressure, body mass index (BMI), lipids, level of glucose and HbA1 by standard methods.

Results. The most widespread risk factors of diabetes in patients before onset of diabetes were increased BMI (53%), dyslipidemia (46%), hypertension (43%), hypodynamia (31%). The villagers had more frequent noncontrolled hypertension, obesity and limited possibilities of lipid diagnostics in comparison to citizens. All patients did not see connection between diabetes and these states. 44% patients had relatives with diabetes and only 32% patients were known about possibility of diabetes in them and only 15% connected diabetes with heredity. BMI>25 had 87% patients, >30 – 59% patients, only 9% of them connected diabetes with overweight. Even after manifestation of diabetes people did not change their lifestyle, physical activity and badly adhere to the diet, that lead to abnormal levels of HbA1.

Conclusions. The citizens and villagers had high risk of diabetes and were not well-informed concerning its prevention. In the situation of considerable growth of diabetes morbidity, large loading to endocrinologists, the prevention has to be done by general practitioners, that we try to inculcate after health system reformation in Ukraine.

14.30 - 16,00 Oral Communications

Track 1: Session 2.1.3

Controversies of glucose control on microvascular and macrovascular complications

Positive Effects of Angotensin Receptor Blockers on the Course of Microvascular Complications of Diabetes Mellitus

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Background. To evaluate in dynamics the regulatory mechanisms of some clinical and hemodynamic indices in patients with diabetes mellitus type 1 and type 2 (DMT1 and T2) on early stage of diabetic retinopathy (DR) and their correction with angiotensin II type 1 receptor blocker (AT1) – candesartan.

Objectives. Totally 250 patients (pts) with DMT1 and T2 were allocated to the study, they were divided into 3 groups (Gr.): Gr.1 (n=115) – pts without DR; Gr. 2 (n=43) – pts with DMT1 and DR; Gr.3 (n=92) - pts with DMT2 and DR.

Methods. Physical examinations were used to assess their clinical status, lipid profile, microalbuminuria and urine creatinine, as well as glycemia levels. Patients were treated with candesartan (16 or 32 mg) or placebo. When necessary, other antihypertensive agents (except ACE-inhibitors) were initiated. Eye fundus monitoring was performed with evaluation of 7, 300 standard zone stereoscopic pictures of the retina according to ETDRS (Early Treatment of Diabetic Retinopathy Study).

Results. 3 years post treatment initiation we still observed no pathologic changes on the retina in normotensive and normoglycemic pts. At 3 years repeated examination, pts with mild diabetic retinopathy at baseline demonstrated that normal levels of ABP and blood glucose resulted in the regression of the changes observed. When more serious changes of various severity were present, 3 years repeated examination revealed either no positive shifts (72/75, 96%) or DR deterioration (proliferative DR, neovascularisation stage) in 3 pts (4%).

Conclusions. Results of the study showed that candesartan treatment of pts with DM resulted in positive shifts in the pathologic changes, registered on the retina and decrease in urine albumin excretion rate. Thus, we recommend to include candesartan in the standard treatment, as the have positive effect on the course microvascular complications of diabetes mellitus both in males and females.

Track 2: Session 2.2.3.

Minorities

A culturally appropriate lifestyle modification education intervention in at risk Indian and Bangladeshi migrant communities in Melbourne, Australia: lessons from a pilot study

Gurjeet K. Gill [1], Rizwana Kousar [1], Carol Wildey [2], Dan Vander Westhuizen [3], Aditi Khendhe [1], Harvinder Kaur [2], Jafrine Vaqarun [3], Parul Bansal [1]

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Background. South Asian migrants are known to have high rate of T2D, metabolic syndrome and cardio-vascular disease (CVD) and related health issues in Canada, U.S. and the U.K. It has also been shown that Asian Indians living in the U.S. have a strong predisposition for diabetes and heart disease, and they carry a high rate of insulin resistance despite having a low rate of obesity. In addition, a variant of TCF7L2 gene may be a susceptibility gene for T2D in different ethnic groups including the South Asian Indians. Exact prevalence of T2D and related diseases like metabolic syndrome and CVD amongst South Asians in Australia is not known. However, the Indian ethnic group has been identified "at especially high risk" by Victorian Government in Australia in its 2007-2010 Victorian Strategic Framework for Diabetes. Strong evidence suggests that the risk factors linked with the adult onset of T2D are preventable; modification to lifestyle such as increased physical activity and weight loss can reduce the overall risk significantly. Whilst the constraints preventing South Asian diaspora undertaking physical exercise are not known, evidence suggests that a complex interplay of personal considerations, social norms and cultural expectations contribute to their lack of adoption and maintenance of physical activity regimes.

Objectives. • To determine the effectiveness of a culturally appropriate lifestyle modification (diet and exercise) education intervention • To determine the effect

of lifestyle modification education intervention on anthropometric, health and lifestyle behaviour outcomes • To understand the barriers and facilitators of a family based lifestyle modification education intervention in a community setting

Methods. This nonrandomised prospective intervention study used a one-group design to test the effectiveness of a family-based lifestyle modification intervention. Participants from two South Asian communities Bangladeshi (n = 9) and Indian (n = 10) at risk of developing type 2 diabetes took part in a 12-week intervention around diet and exercise. Pre and post-test measurements included anthropometric – Weight (kg), Height (cm), Waist Circumference (cm), Body Mass Index (BMI- kg/m2), health outcomes - Glycosylated/ Glycated Haemoglobin (HbA1c), Blood Pressure (BP), Patient Health Questionnaire (PHQ-9), and behaviour modification through dietary changes and physical activity questionnaires. Participants were contacted during the intervention period to document their progress on their lifestyle modification goals.

Results. No significant changes were observed in weight loss in participants whereas waist circumference decreased considerably for both male and females. A slight decline in blood pressure was noted for male participants whereas females' diastolic blood pressure increased while systolic remained stable. No significant HbA1c level changes were observed within the participants however the levels remained within the general range of what is regarded as good blood glucose control. A slight improvement was noted in participants' PHQ-9 score. A notable improvement was observed in participants' self-perception of their diet and physical activity. Qualitative data showed participants struggled within their own powerful social and cultural contexts and individual family frameworks to make a complete lifestyle change. Family based intervention model appeared to be successful.

Conclusions. Measurements indicate that culturally appropriate lifestyle intervention worked as participants had achieved better outcomes on some measurements than others. The qualitative data shows that participants' busy lives and commitments coupled with social and cultural imperatives prevented them to modify their diet and undertake exercise to a full extent.

Physical activity level six months after a randomised controlled physical activity intervention for Pakistani immigrant men living in Norway

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Background. To our knowledge, no studies have aimed at improving the PA level in south Asian immigrant men residing in Western countries, and few studies have considered the relevance of SCT constructs to the PA behaviour of this group in the long term. The observed low physical activity (PA) level among south Asian immigrants in Western countries may partly explain the high prevalence of cardiovascular diseases (CVD) and type 2 diabetes (T2D) in this group. We have shown previously in a randomised controlled trial that a social cognitive based intervention can beneficially influence PA level and subsequently reduce waist circumference and insulin resistance in the short-term.

Objectives. In an extended follow-up of the Physical Activity and Minority Health study: we aimed 1) to determine if the intervention produced long-term positive effects on PA level six months after intervention (follow-up 2 (FU2)), and 2) to identify the social cognitive mediators of any intervention effects.

Methods. Physically inactive Pakistani immigrant men (n = 150) who were free of CVD and T2D were randomly assigned to a five months PA intervention or a control group. Six months after the intervention ended, we telephoned all those who attended FU1 and invited them for a second follow-up test (FU2) (n = 133). PA was measured using ActiGraph accelerometers. Statistical differences between groups were determined by use of ANCOVA.

Results. Significant differences (baseline to FU2) between the groups were found for all PA variables (e.g., total PA level, sedentary time, PA intensity). Support from family and outcome expectancies increased more in the intervention group compared with the control group. Self-efficacy did not differ significantly between groups.

Conclusions. Our results show that a multi component PA programme can increase PA over the short and long term in a group of immigrant Pakistani men. However, we could not identify the factors that mediated these changes in PA.

Design and baseline characteristics of the PODOSA (Prevention of Diabetes & Obesity in South Asians) trial: a randomised lifestyle intervention in Indian and Pakistani adults with impaired glycaemia in Central Scotland

Anne Douglas, Raj Bhopal, Sunita Wallia, Gordon Murray on behalf of the PODOSA Investigators Group

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Background. Diabetes is extremely common in UK South Asians (those of Indian or Pakistani origin), with an adult prevalence up to six times that of the general population. There is compelling scientific evidence that diabetes can be delayed or prevented. The risk factors, principally weight gain and physical inactivity, need tackling but there are no UK trial data to guide either practice or policy. The current challenge is to adapt existing interventions to meet the cultural needs of South Asians, and to demonstrate efficacy in the UK context.

Objectives. PODOSA (Prevention of Diabetes & Obesity in South Asians) is a controlled, cluster, randomised trial taking place in central Scotland. The main aim is to evaluate an adapted, lifestyle intervention aimed at reducing weight and increasing physical activity in Indians and Pakistanis at high risk of developing type 2 diabetes. The primary outcome is weight change at 3 years. Progression to diabetes will be examined in the longer term via data linkage to national health re-

TABLE.—*Design and baseline characteristics podosa trial.*

Variables	All participants No. (column %)
a) Demographic	
No. of families with-	
1 IGT/IFG recruit	143 (91.7)
2 IGT/IFG recruits	12 (7.7)
4 IGT/IFG recruits	1 (0.6)
family volunteer(s)	85 (54.5)
No. of IGT/IFG individuals	171 (100)
No. family volunteers	124 (100)
Individual IGT/IFG recruits	
Sex – male	78 (45.6)
Age – mean (SD)	52.3 (10.1)
Age – range	35-80
Location	
– Glasgow	132 (77.2)
– Edinburgh	39 (22.8)
Ethnic group	
– Indian	57 (33.3)
– Pakistani	114 (66.7)
b) Social circumstances	
Cook was a participant	85 (49.7)
Cook was a family volunteer	59 (34.5)
Cook was simply cooperating	27 (15.8)
Blood relative with diabetes	118 (69.0)
Years lived in UK (mean, SD)	31.4 (13.1)
Education:	
no qualifications	56 (32.7)
school level	49 (28.7)
further or higher education	66 (38.6)
c) Lifestyle	
Physical activity (mean minutes per day, SD)	
– Total (moderate, vigorous, walking)	51.0 (61.0)
– Moderate and vigorous only	23.3 (44.7)
– Walking only	27.7 (37.1)
– Sitting time (mean hours per day, SD)	6.5 (3.0)
d) Anthropometric (Values are given as mean and SD)	
Height (cm)	161.9 (9.3)
Weight (kg)	80.2 (15.6)
BMI (kg/m^2)	30.5 (4.8)
Waist (cm)	103.0 (11.10)
Hip (cm)	107.1 (9.5)
Waist/hip ratio	0.96 (0.07)
BMI ≥ 30 (n,%)	84 (49.1)
e) Biomedical measures (Values are mean and SD)	
Fasting plasma glucose (mmol/l)	5.8 (0.6)
2-hr post OGTT plasma glucose (mmol/l)	8.3 (1.6)

cords. Cost effectiveness of the intervention will be considered. Qualitative research aims to understand the factors that motivate participation and retention in the trial.

Methods. 1319 participants, aged 35 years or over, with waist sizes ≥ 90 cm for men and ≥ 80 cm for women, were screened with an Oral Glucose Tolerance Test over a 27 month period ending in October 2009. 196 were found to have dysglycaemia. Of these, 171 (95%) plus 124 family volunteers were randomised into either an intensive intervention of 15 dietitian visits, or a light intervention of 4 visits, over 3 years. PODOSA focuses on the family and is largely home-based.

Results. Baseline characteristics of the trial participants are shown in the table. 13 of the 156 trial families had more than one recruit with IGT/IFG. 54% of families included family volunteers. The trial population are well established in the UK with mean residency time of 31 years and 69% had a family history of diabetes. Nearly a third of the trial recruits had no formal educational qualifications. Participants reported an average 23 mins/day of moderate and/or vigorous activity. Average sitting time was 6.5 hours per day. Mean BMI was 30.5kg/m2 and in total 49% of participants had BMI > 30 kg/m2, the conventional cut-off point to classify obesity.

Conclusions. PODOSA is one of few randomised, lifestyle intervention trials in an ethnic minority population in the UK. The trial has shown that South Asians in central Scotland are willing to engage in research such as randomised trials. We emphasised the need for family involvement as a means of motivating behaviour change. Our only entry criterion relating to the family was that the main cook participated and this was always achieved. PODOSA is important for weight control and diabetes specifically, however, its long-term legacy will be the experience and lessons gained in the evaluation of complex interventions in ethnic minority populations within a UK community setting. The main trial results will be submitted for publication in 2013.

The project VIVA - Minorias in Spain: diabetes, obesity, lifestyle, cardiovascular risk factor, metabolic syndrome and psychosocial factors in the immigrant population of Spain

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Objectives. 1) To determine the prevalence of glucose metabolism alterations, MS and its components in the immigrant population of Spain; 2) to assess the relationship between socio-demographic, psychosocial factors and obesity, T2DM and MS in immigrants in Spain; 3) to compare estimations between immigrant and authoctone Spanish populations; 4) to analyze the use and access of immigrants to the Spanish Health Care System.

Methods. Cross-sectional epidemiological study. Random sample of immigrants 35-64 years old (n=906, subject to screening) registred in 9 Spanish health areas. Structured interview, with standardized anthropometrical measurements, CV risk factors, lifestyles, health-care services utilization, psychosocial factors.

Results. 30/03/2010 completed 2nd visit of 519 participants (54%; 459 PTOGs). Preliminary analysis in Madrid and Castilla-Leon diabetes risk with high prevalence: 14% (Castilla-León) and 9% (Latin America-Madrid). Results subpopulation of Madrid Latin American origin (n=233, mean age: 41 years, 59% women). Prevalence: Diabetes: 3%; Impaired fasting glycemia: 4.6%; Overweight (BMI 25-29): 18%; Obesity (BMI> 30): 20.7%; Abdominal obesity (waist circumference:> 102cm men /> 88cm women): 19%; Sedentary (<30min physical exercise/day/5 days per week): 92%; 21% smokers; 14% hypercholesterolemia (> 240 mg / dl); 9% HBP criteria.

Conclusions. Comparing Spanish and Latin American immigrant population: Risk DT2 similar. Lifestyle and risk factors similar DT2 men, higher prevalence of obesity and abdominal obesity in Latin American women. Prevalence of diabetes without differences.

High prevalence of obesity, overweight and abdominal obesity grade 2 in both populations. Worst indicators in the Latin American population compared to the Spanish major risk factors for diabetes. Physical inactivity and improper eating habits are fundamental in the prevention of diabetes, obesity and cardiovascular disease.

Usefulness of glycated hemoglobin (A1c) as a diagnostic test for diabetes in a high risk population - the Xavante Brazilian Indians

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Background. The Brazilian Xavante Indians live in the scrubland of Central Brazil and started to be in permanent contact with the Brazilian society in the mid-fifties; presently they are under a very rapid change in their traditional way of living and changed from a low-risk to a high-risk group to develop diabetes. Presently, the prevalence of diabetes among adults is 25.9% (95% CI: 23.2-28.9). In this population it is very difficult to assure the fasting state, since they do not have a regular schedule to eat. The use of the OGTT for early diagnosis of diabetes has operational problems to keep them waiting for two hours and in a resting state. The proposal for using the A1c to diagnosis diabetes in this population seems very attractive.

Objectives. To examine the properties of the use of A1c in the diagnosis of diabetes mellitus in a high risk population - the Xavante Brazilian Indians.

Methods. A survey was carried out between October 2010 and January 2012 in the Xavante Reservation of São Marcos in the State of Mato Grosso - Brazil and was based on a 75g glucose tolerance test performed early in the morning. Basal and two-hour capillary glycemia were measured by HemoCue Glucose 201. Basal blood samples were collected for A1c and other laboratory measurements. The samples for A1c were kept refrigerated for no longer than 10 days and were measured with HPLC using an automated analyzer. ROC curve analyses were performed to compare A1c values against the diagnosis of diabetes by the 2-hour glucose value >=200 mg/dl. Two ROC curves were constructed, one for all participants and other excluding those with previously diagnosed diabetes.

Results. We examined 630 individuals aged 20 years or more and 101 had basal glucose >= 200 mg/dl or previous diagnosis of diabetes. The area under the ROC curve was 0.9133 (95%CI: 0.8827-0.9438) for all participants and 0.8767 (95%CI: 8264-0.9270) when excluding those with diabetes. The sensitiviy, specificity and accuracy for A1c >= 6.5% was 81.03% , 90.53% and 87.9% for all participants and 73.33% , 90.35% and 87.5% when excluding those with previous diagnosis of diabetes. The best cut-off value for A1c in this population when considering all participants seems to be 6.4% (sensitivity: 84.48%; specificity: 85.9% and accuracy: 85.51%). For impaired glucose tolerance the values of A1c in the range of 5.7 to 6.4% presented a sensitivity of 76.47% , a specificity of 38.84% and an accuracy of 55.96%..

Conclusions. The use of A1c for early diagnosis of diabetes among the high risk Brazilian Xavante Indians seems very usefull, due to limitations of the fasting glycemia and difficulties to perform the OGTT. The proposed 6.5% cut-off point still misses several individuals with diabetes. Unfortunately, for prediabetes the use of A1c presented a low specificity and is not suitable to identify those individuals at higher risk to develop diabetes.

Changes in anthropometric measurements in Asian Indians enrolled in a lifestyle intervention program: six month results of the D-CLIP trial

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Background. The Diabetes Community Lifestyle Improvement Program (D-CLIP) is a randomized, controlled, translation trial in Chennai, India testing a step-up model of diabetes prevention (six months of weekly lifestyle classes plus metformin for those not responding by four months). Previous studies of lifestyle for diabetes prevention have shown that reductions in measures of adiposity (weight, body mass index [BMI], and waist circumference) significantly predict reduction in diabetes incidence.

Objectives. This study aims: (1) to assess the ability of the D-CLIP lifestyle program to enable participants to lose weight, decrease BMI, and reduce their waist circumference by comparing changes in these measures over the first six months of the study in participants in the standard of care and intervention arms of the trial; and (2) to evaluate heterogeneity of intervention effect on changes in waist circumference, weight, and BMI across subgroups, i.e., gender, age category, education level, household income, BMI level, and type of glucose intolerance (isolated impaired fasting glucose [iIFG], isolated impaired glucose tolerance [iIGT], or IFG + IGT)) of the study population.

Methods. This analysis used data entered by January 1, 2012, representing follow-up data for approximately 75% of the D-CLIP trial participants. Mixed methods modeling was used to compare change over time for weight, BMI, or waist circumference in control (n = 304) and intervention participants (n = 294). Heterogeneity in the effect of the intervention on each outcome by age category, BMI category, type of glucose intolerance, education, income, and gender was evaluated by adding each variable to the model individually and assign significance of the interaction term.

Results. Mean decreases in weight, BMI, and waist circumference between months 0 and 6 were as follows: for controls, 0.73 kg, 0.31 kg/m2, and 1.58 cm, respectively; and, for intervention participants, 2.86 kg, 1.05

kg/m2, and 3.72 cm, respectively ($p < 0.0001$ for all outcomes). Results were consistent across sub-groups of the study populations, except that intervention participants with iIFG at baseline showed significantly greater reductions in waist circumference than individuals with iIGT or IFG + IGT ($p = 0.02$, change in waist circumference: iIFG 4.33 cm, iIGT 2.58 cm, IFG+IGT 4.04 cm).

Conclusions. Six-month results from the D-CLIP trial show participation in a low-cost, culturally tailored lifestyle program for diabetes prevention can help Asian Indians at high risk for diabetes to lose weight and decrease waist circumference. Decreases in waist circumference were affected by type of glucose intolerance at baseline, which may indicate that glucose tolerance plays an important role in weight loss in this population, with individuals with more advanced glucose intolerance or established insulin resistance having a greater difficulty with weight loss.

Track 3: Session 2.3.3
National Diabetes Prevention Programs. Latin-American countries

Glycosylated hemoglobin as a predictor of undiagnosed type 2 diabetes, the Mexico City diabetes study

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Background. In Mexico, the fasting plasma glucose (FPG) is used for screening for T2D. Data of the use of glycosylated hemoglobin (A1C) as a predictor of undiagnosed diabetes in Mexican population are still lacking.

Objectives. To evaluate the performance of A1C and FCG as mass screening tools for newly diagnosed type 2 diabetes (NDT2D).

Methods. Cross sectional data from 1,174 (60.5% women) individuals aged between 48-88 years who participated in the last phase (2008) of a population-based diabetes cohort study, the Mexico City Diabetes Study (MCDS), were analyzed. ADA definition by 2-h 75-g OGTT (≥ 200mg/dL, n=888), FPG (≥ 126mg/dl, n=1,174) and A1C (≥ 6.5%, n=1,174) was used to define newly diagnosed diabetes (NDT2D). The performance of A1C and FPG was tested among the biochemical tests and evaluated by using receiver operating characteristic curve (ROC). Sensitivity (SE), specificity (SP), area under the ROC curve (AUC) and the proportion of false negatives (FN) by calculating the complement of sensitivity (1-SE) was used. The optimal cut off point was estimated using the Youden Index (IY). Self-reported diabetic subjects were excluded from all the analysis.

Results. Self-reported prevalence of T2D was 25.2%. The prevalence of NDT2D by FPG and OGTT was 23.6%. Using A1C was 21%. The correlation coefficients between A1C with FPG (r=0.74) and OGGT (r=0.66) where higher in diabetic individuals Vs. non diabetic (r=0.69) and (r=0.62). The FN for NDT2D for isolated FPG and isolated OGTT was 19.3% and 5.6% respectively. The optimal cutoff point for NDT2D for this study population at 6.3% was lower than the recommended value of 6.5%. At the optimal cutoff point of 6.3% for NDT2D, SE was 74.5% and SP was 91.3% (FN=25.5%). In the recommended cut off point of 6.5%, the SE was 70.7%, SP was 93.5% and FN was 29.3%. The AUC was lower for A1C than FPG and OGTT in detecting NDT2D: 0.77 (95 CI% 0.70, 0.84) Vs. 0.91 (95 CI% 0.86, 0.95).

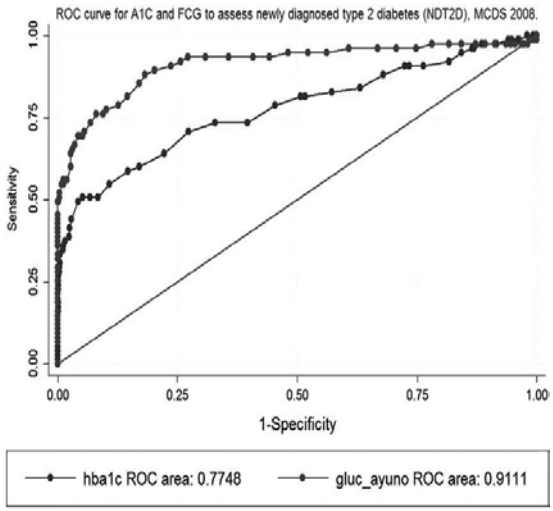

Figure.—Glycosylated hemoglobin as a predictor of undiagnosed type 2 diabetes, the mexico city diabetes study.

Conclusions. FPG performed better than A1C in Mexican population as a mass screening tool.

Vida Nueva Detection and management of Gestational Diabetes in Barranquilla, Colombia

H. Mendoza [1], A. Arrieta [2], C. Ricaurte [2], T. Acosta [2], N.C. Barengo [3], J. Tuomilehto [4], A. Solano [5], J. Iglesias [6], E. Navarro [7], T. Varela [8], N. Lohse [9], A. Bonde [10], B.B. Jensen [10], J. Aagaard-Hansen [10], P. Damm [11], J. Armenta [12], A. Diaz Bernier [13]

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Background. Even though there is sufficient scientific evidence regarding the adverse health effect of gestational diabetes mellitus (GDM) on mother and child, only little is known regarding its prevalence in Barranquilla and Colombia in general. There are clinical guidelines on management of GDM, however, they are not up-to-date and their implementation is poor.

Objectives. to contribute to the improved detection and management of GDM in the city of Barranquilla by strengthening the preventive education for pregnant women through training of health professionals, strengthening the health care system, ensuring the availability of updated guidelines for detection and management of GDM, and thus increasing the awareness of GDM while promoting a healthy lifestyle.

Methods. In 2010, the District Health Secretariat of Barranquilla recorded a total population of 28,000 pregnant women, of which 18,000 belong to the contributory scheme of health insurance (for middle and high income citizens)) and 10,000 to the subsidized scheme (low income citizens). This project aims at including 90% of the pregnant population of the subsidized (the lowest income) and 40% of the contributory regime.

Results. All in all, the project aims to monitor and control 72% of the pregnant population during the first two years of the project. It is expected to cover up to 85% of the pregnant population by the end of the 3-year project. According to the local statistics 5%, of pregnant women have GDM. Thus, some 1,000 pregnant women will be diagnosed with GDM and will receive the management protocol. Furthermore, the dissemination of informative material and participatory talks at the health centres will reach 25,000 pregnant women. Finally, this project will train all health professionals dealing with GDM in the diagnosis and management of the GDM, according to protocols and guidelines developed by the Ministry of Health in Barranquilla during the project period.

Conclusions. Financial support: This project is supported by a grant from the World Diabetes Foundation (WDF), Novo Nordisk A/B and by the Health Secretariat of the city of Barranquilla.

Evaluation of the FINDRISC score as a screening tool for people with impaired glucose regulation in Latin America using modified score points for waist circumference according to the validated regional cutoff values for abdominal obesity

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Background. Recent long-term studies have demonstrated that diabetes can be prevented by early intervention in people with impaired fasting blood glucose (IFG) and/or impaired glucose tolerance (IGT). At these stages people can only be identified by screening and blood tests may not always be available or accepted. Therefore risk scores become very useful to screen for impaired glucose regulation including unknown diabetes (uknDM). The FINDRISC score (FRS) is the most widely used and it includes well known metabolic risk factors such as abdominal obesity (AO), but it categorizes the latter using the cutoffs for waist circumference (WC) adopted for people from Europe and the USA. Recently we demonstrated that the cutoffs for WC to identify AO were different in Latin American people and therefore we incorporated them in a modified version of the FRS.

Objectives. The aim of this study was to evaluate the performance of the modified FRS (mFRS) in Latin American populations to screen people with impaired glucose regulation.

Methods. Subjects aged 20 years or over without known diabetes were invited to participate. After informed consent they were screened with the FRS questionnaire and anthropometrics and then tested for IFG/IGT/uknDM with an oral glucose tolerance test, using IDF criteria for diagnosis. In the mFRS, the score points for WC were = 4 in men with WC ≥94 cm or women with WC ≥90 cm and zero score for lower values. The power to discriminate people with IFG/IGT/uknDM was evaluated using ROC curves and comparing areas under the curve (AUC). Pregnant women were excluded. The study was done in two populations: At the Colombian Diabetes Association (CDA) in Bogotá, volunteers were invited by advertisements offering free testing. At the Cardiometabolic unit (CMU) in Barquisimeto (Venezuela) subjects attending the clinic (mainly obese) were included.

Results. In Colombia (CDA) we screened 141 men and 281 women. In men there was no difference in the discrimination power between the original FRS (oFRS) and the mFRS (AUC 0.771 vs. 0.769, p=0.8) but in women the mFRS showed a significant improvement in the ability to discriminate people with IFG/IGT/uknDM (AUC 0.779 vs. 0.749, p=0.002). In Venezuela (CMU) we screened 130 men and 204 women and had similar.

Results. No difference in the discriminative power between the mFRS and the oFRS in men (AUC 0.912 vs. 0.910, p=0.4) but mFRS performed significantly better in women (AUC 0.920 vs. 0.913, p=0.03). In general both the mFRS and the oFRS performed better in this population which was younger and considerably heavier. In both groups the prevalence of IFG/IGT/uknDM was 24%. Data on sensitivity, specificity and +LR of score levels were calculated to help in the selection of the best cutoffs for the mFRS as a screening tool.

Conclusions. We conclude that the FRS is a good screening tool in Latin American population and the mFRS using the regional WC cutoffs for AO could replace the oFRS in men with a similar performance but improves the ability to discriminate women with impaired glucose regulation who would be eligible for blood glucose testing.

Screening for people at high risk for type 2 diabetes in the DEMOJUAN (Demonstration area for primary prevention of type 2 diabetes, JUAN Mina and Barranquilla, Colombia) project

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Background. In Colombia, the prevalence of type 2 diabetes (T2D) varies between 4 and 8%. Recent estimates give reason to believe that the predicted number of diagnosed T2D patients will increase and a large number of asymptomatic cases of T2D will remain undiagnosed. Thus, there is a need to screen for people at high risk for type 2 diabetes in the primary health-care system in order to identify people that will benefit from early lifestyle interventions to prevent the onset of T2D.

Objectives. To study the prevalence of glucose metabolism disorders in five catchment areas of the primary health-care system in Barranquilla in Colombia during 2011 and 2012.

Methods. This randomized clinical trial includes all people 34-60 years-of-age with Impaired Glucose Tolerance (IGT) and/or Impaired Fasting Glucose (IFG) who are willing to participate. The first stage of the study consisted of screening for people with IGT and/or IFG. The study participants have been recruited in five study centers in Barranquilla (Camino El Pueblo, Camino Simon Bolívar, Camino El Bosque de María, COOSALUD and Paso Juan Mina) using the Finnish Diabetes Risk Score (FINDRISC). People with 13 or more FINDRISC points underwent an oral glucose tolerance test (OGTT). A complete clinical assessment (dietary & lifestyle interview, BMI, blood pressure, lipid profile and a standard oral glucose tolerance test) was performed in persons with 13 or more FINDRISC points.

Results. At the current stage of the project, 11618 FINDRISC has been received of which 34% (n=3979) had a FINDRISC of > 13. The prevalence of overweight (25 < BMI < 30 kg/m2) was 39% and 23% for obesity (BMI > 30 kg/m2), respectively. Central obesity was very prevalent in both men (28%; > 102 cm) and women (70%, >88 cm). Only 23% reached the recommended daily 30 min of physical activity and 32% were eating daily fruits and vegetables. Among those with a FINDRISC > 13, 47% (n=1853) visited the laboratory for and OGTT. Screened-detected T2D was observed in 12% (n=228) individuals, 8% (n=152) were classified as having both IFG and IGT, 8% had IGT (n=150) and 13% IFG (n=237).

Conclusions. Glucose metabolism disorders are very prevalent in Barranquilla with approximately 40% of the population having IFG and/or IGT or diabetes. This is most likely due to the high prevalence of overweight and obesity in combination with a sedentary lifestyle. It is of concern that the majority of women presented central obesity. Financial support: This project is supported by a BRIDGES Grant from the International Diabetes Federation. BRIDGES, an International Diabetes Federation project, is supported by an educational grant from Lilly Diabetes. The project also receives support of the Health Secretariat of the city of Barranquilla.

16.30-17.30 Oral Communications

Key Notes I: Gut macrobiotica and the oathogenesis of insulin resistance possibles implication for prevention or management

The effectiveness of Diamel in the treatment of type 2 diabetic patients receiving insulin therapy: a randomized, controlled clinical trial

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Background. Diamel is a natural product composed of trace elements: amino acids, oligoelements, vitamins, cranberry extract, and lettuce extract that have been activated by means of a magnetization process which enhances the biological properties of each of every component. Their ingredients improve the secretion of insulin, favour lipid movement and protect cells from the damaging effects of the free radicals respectively Moreover, the lettuce extract decreases the amount of glucose absorbed by the intestine by 30%. Studies published before suggested the effectiveness of Diamel on metabolic syndrome and the diabetes treated with Glibenclamide.

Objectives. Effectiveness of Diamel® on the biochemical variables: fasting blood glucose, postprandial glucose, cholesterol, triglycerides, and glycosylated haemoglobin [Hb A1C] in type-2 diabetic patients receiving insulin terapy.

Methods. Randomized, double-blind, comparator-controlled clinical trial. A central randomization centre used computer generated tables to allocate treatments. 116 patients suffering from type-2 diabetes mellitus treated with insulin at the Diabetes Care Centre in Pinar del Rio (Cuba), were recruited and randomly. The patient, investigators, data collectors or data analysts had not access to the randomization schedule. The subjects were separated into two groups: Group A (n= 59), who were administered Diamel and Group B (n= 57) using

placebo. Both products (Diamel and Placebo) were in capsule form and identical in appearance, taste and smell. The method of administration was similar. The clinical and biochemical variables (baseline and postprandial glucose; Hb A1C, cholesterol, and triglycerides) were assessed for 24 weeks.

Results. Two subjects were excluded from the Diamel treatment group during the clinical trial. From the statistical point of view, a significant drop in the levels of the baseline glucose, postprandial glucose, glycated haemoglobin, and triglycerides was observed in in the group taking Diamel (Group A). There was observed an increase in insulin requirements and in waist circumference in the subjects of Group B There was not reported any severe or serious adverse reactions during this clinical trial.

Conclusions. Diamel (nutritional supplement) together with the administration of insulin in type-2 diabetic patients is useful to optimize the biochemical variables (baseline and postprandial glucose, Hb A1C, plus triglycerides), as well as to prevent the increase of insulin requirements at medium-term. This trial was registered with ClinicalTrials.gov (no. NCT00994266).

MA-PI macrobiotic diet intervention during 21 days in adults with type 2 diabetes mellitus, Rome 2012

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Background. The intervention on lifestyle (diet and exercise) is the primary choice in the treatment of type 2 diabetes mellitus (DM2), but is often difficult to make. Some reports out of Europa Continent indicate that diabetic type 2 patients (DM2) take an advantage of vegetarian macrobiotic MA-PI diet as proposed by UPM (Un Punto Macrobiotico Association).

Objectives. For this purpose we studied the effect of this non-conventional low fat and protein (2000 kcal/die) diet, personally and residential supplied from UPM for 3 weeks in 24 DM2. The study aim was to evaluate the reproducibility of previous results in Rome, as a part of the multicentre study promoted by UPM, Italy.

Methods. A 21 days intervention with macrobiotic Ma-Pi diet (whole cereals, vegetables, leguminous, sesame seeds, seaweeds, soy fermented products and Bancha tea) was carried out in 24 adults DM2 patients (13 untreated, 11 treated with oral agents of which 2 with also insulin), selected from people of Rome municipality afferent to Preventive Medicine Centre. Patients were lodged in a hotel structure, where they received all the foods and medical services. In order to evaluate the effect of the diet, records of anthropometrical measurements, body composition, biochemical indicators, blood pressure, clinical evolution and medication adjustments, were carried out. Data before the diet and at termination were compared.

Results. Independently of all intervention limitations (small and non random selected sample), after 3 weeks of the diet, in comparison with before (mean±DS), fasting and 2hrs after meals blood glucose (mg/dl) were significantly ($p<0001$) reduced (147±31 vs 96±14; 158±55 vs 97±14; 179±45 vs 101±9) as well as were significantly ($p<0.0001$) reduced plasma insulin (μU/ml) and HOMA-IR index (15.5±5.6 vs 4.9±2.1; 2.1±0.79 vs 0.66±0.24), plasma cholesterol, LDL and triglycerides (194±53 vs 149±36; 123±26 vs 93±30; 209±130 vs 98±33 mg/dl), blood urea and plasma creatinine (36±6 vs 20±8; 0.89±0.17 vs 0.84±0.2, mg/dl) and microalbuminuria (37.2±29.5 vs 6.9±8.5, mg/l), plasma homocysteine (14.9±3.9 vs 12.3±3.8 μmol/l) and systo-dyastolic blood pressure (131±10 vs 120±11; 81±5 vs 75±5, mm/Hg). The main anthropometric measures significantly improved. All these results were obtained despite a decrease in the oral hypoglycemic drugs and insulin consumption.

Conclusions. These results are impressive and seem to suggest that even a short period of MA-PI diet may be useful to improve carbohydrate and lipid metabolism, to reduce insulin resistance of these subjects and likely to improve diabetic complication. Long-term trials and trials with controls need to better define the usefulness of this new diet approach in the treatment of type 2 diabetes mellitus.

Key Notes II: Diabetes and Mental Health

Stress-related eating and drinking behavior and body mass index among 16-year olds

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Background. Stress-related eating is associated with increased risk of obesity among women and with unhealthy eating and drinking habits among men and women. Eating habits adopted in young age may reflect the future eating habits.

Objectives. To study the prevalence of stress-related eating and the association between stress-related eating and dietary and drinking habits, and body weight among adolescents.

Methods. Study population consisted of the Northern Finland 1986 Birth Cohort, and included 3455 boys and 3747 girls at 16 years of age. Stress-related eating and drinking habits were investigated using data from postal inquiry. Anthropometric measures and blood samples were taken in health examinations.

Results. The proportion of stress-related eaters was 16% among boys and 43% among girls. Boys and girls with stress-related eating had higher weight (girls mean (95% confidence interval, CI,) 21.5 kg/m2 (21.3; 21.6) vs. 21.0 (20.9; 21.1) and boys 21.8 (21.4; 22.1) versus 21.0 (20.9; 21.1) and higher waist circumference (girls

72.6 cm (72.2; 73.0) versus 71.4 (71.1; 71.8) and boys 77.2 (76.2; 78.1) vs. 75.5 (75.1; 75.8) compared to those without stress-related eating. There were no significant differences in serum total cholesterol, HDL-cholesterol, triglycerides, blood glucose or blood pressure between those with and without stress-related eating. Among girls, the proportion of those who ate chocolate and sweets and drank sugary soft drinks frequently (twice a week or more often) was higher among those with stress related eating than among the others. Among boys, the proportion of those who ate sausages, chocolate, hamburgers and pizza twice a week or more often was higher among stress-related eaters compared to others. The proportion of boys and girls, who drank alcohol once a month or more often, was higher among stress-related eaters than among those without stress-related eating.

Conclusions. Stress-related eating occurs already among 16-year-old adolescents and it associates with higher BMI and waist circumference, and also with unhealthy dietary and drinking habits. Thus, it seems that eating may be used as a passive way of coping even among adolescents, and this habit can be a risk for the development of obesity. Learning healthier ways to cope with stress already in adolescence might help coping with stressors of working life in the future, and thus prevent the development of obesity and diseases related to it.

17.30 - 19.00 Oral Communications

Track 1: Session 2.1.4
Miscellanea/General

Changes in consumer awareness and understanding of type 2 diabetes between 2008 and 2012

Amy Timoshanko, Amelia Vercoe, Jane Shill, Greg Johnson

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Background. The Life! Taking Action on Diabetes program was launched in 2007, is funded by the Victorian Government and delivered by Diabetes Australia–Victoria. The Life! program has seen the statewide implementation of evidence based, lifestyle behaviour change interventions to reduce the risk of progression to type 2 diabetes for people who are at high risk. One of the program aims is to raise community awareness of type 2 diabetes and prevention.

Objectives. To analyse the change in the level of consumer awareness and understanding of type 2 diabetes in 2008 compared with 2012.

Methods. Telephone interviews (n=603) were conducted in 2008 to assess awareness of type 2 diabetes, risk factors and consequences. Eight focus groups with men and women aged 50 years and above (n=57) were also conducted in 2008 to gain insight into what people know and understand about diabetes in terms of risk factors, management and consequences. In 2012, an online survey (n=1000) and four focus groups (n=20 both sexes, aged 45 years old and above) were conducted to explore current consumer awareness, attitudes and beliefs about type 2 diabetes. Qualitative and quantitative findings in 2008 were compared with findings in 2012 to analyse changes in awareness and understanding of type 2 diabetes.

Results. In 2008, 70% of individuals sampled aged 50 years and above were aware that type 2 diabetes is preventable; 90% were aware of the health complications associated with diabetes; 90% stated overweight was a risk factor, while only 70% and 76% respectively were aware that waist circumference and a family history of diabetes were a risk factors. The focus groups indicated a reasonable level of awareness of the prevalence of diabetes. There was a high awareness that type 2 diabetes was associated with weight and reasonable awareness that it was associated with a family history, however the level of understanding of the causal link varied considerably. Knowledge of diabetes symptoms, treatments and complications varied considerably and there were common misunderstandings. In 2012, the online survey indicated that 96% of consumers were aware of type 2 diabetes, however did not appear to be concerned by the condition personally (only 8% rated it as the most concerning health condition for them). Misinformation about the condition was frequent, for example, 19% of respondents thought diabetes was curable. The focus groups indicated limited understanding of the aetiology, seriousness and consequences of diabetes. Most participants were aware of risk factors for type 2 diabetes however there was a low self-attribution in that majority did not acknowledge that they could be at risk personally.

Conclusions. Consumer awareness of diabetes as a condition is improving however there is poor understanding of the seriousness of the condition and it remains less of a concern to individuals than other health conditions such as cancer and heart disease. There is a need to continue to promote the 'You could be at risk' message and to build awareness of the importance of healthy lifestyles.

In vivo anti-diabetic activity of thujone in streptozotocin-induced diabetic rats

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Background. Thujone, an ingredient of essential oils of a great many different herbs, was recently found to has an effective insulin-sensitizing action by in vitro bioassays. The present study thus aimed at confirming the antidiabetic potential of thujone in in vivo model of insulin resistance and diabetes, notably the streptozotocin (STZ) type 2 diabetic rat.

Objectives. Confirming the antidiabetic potential of thujone in in vivo model of streptozotocin (STZ) type 2 diabetic rat. This aim will be accomplished by investigating the following parameters: -Blood glucose level -Plasma insulin level -Total GLUT4 expression, plasmalemmal GLUT4, AS160 phosphorylation and AMPK2 phosphorylation in soleus muscles.

Methods. Induction of Diabetes Mellitus: Type2 diabetes mellitus(T2DM) in male Sprague-Dawley rats

(weighting 250–300 g) was established by a single intraperitoneal injection of 55 mg kg−1 STZ freshly dissolved in cold citrate buffer (0.1 M, pH 4.5). One week after STZ injection, blood samples were collected and serum glucose concentrations were measured only those animals with serum glucose higher than 250 mg dl−1 were selected as diabetics for the following experiments. Experimental Design and Tissue Collection: Rats were randomly divided into three groups: control group, STZ diabetic rats, STZ diabetic rats that received thujone by daily oral administration (60mg/kg body weight) for 4 weeks. At the end of the experimental period rats blood samples were collected for the subsequent measurement of glucose and insulin in animals fasted for 16 h, rats then were sacrificed and soleus muscles were immediately removed, frozen in liquid nitrogen, and stored at -70 C for the determination of the following parameters: total GLUT4expression , plasmalemmal GLUT4, phosphorylation of AS160, and phosphorylation of AMPK2.

Results. After treatment for 4 weeks, blood glucose, plasma insulin, total GLUT4 expression, plasmalemmal GLUT4, AS160 phosphorylation and AMPK phosphorylation were examined. The STZ diabetic rats showed hyperglycemia and decrease in plasma insulin. STZ diabetic rats also showed decrease in total GLUT4 expression, plasmalemmal GLUT4, and AS160 phosphorylation but without any change in AMPK phosphorylation. Administration of thujone fully rescued total GLUT4 expression, plasmalemmal GLUT4 and AS160 phosphorylation, and almost fully restored blood glucose. Thujone also increased AMPK phosphorylation but had no effect on plasma insulin.

Conclusions. Our results indicated that thujone displays an in vivo anti-diabetic efficacy. Its mechanism appears to occur via an AMPK-dependent mechanism involving restoration of AS160 phosphorylation, and GLUT4 translocation to the cell surface, which in turn normalized blood glucose level.

Prevalence of hypertension in type 2 diabetes in urban settings in Pakistan and its trend from 1972 - 2009

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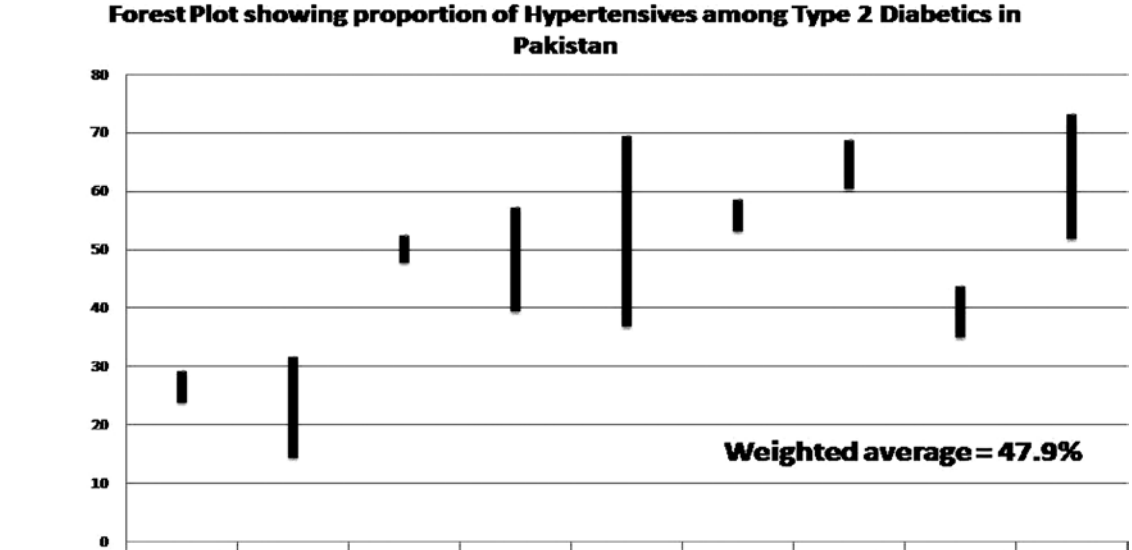
Background. Diabetes and hypertension are two major pre-disposing factors for cardiovascular diseases (CVD). There is a higher risk of development of hypertension in patients with type 2 diabetes. About 75% of the CVD in diabetics can be attributed to hypertension. Prevalence of hypertension in type 2 diabetics in urban settings of Pakistan varies and its exact estimate is not known. Moreover its trends have not been studied so far.

Objectives. To determine the prevalence and trends of hypertension in Type 2 diabetes patients in urban settings in Pakistan

Methods. A systematic review was conducted including the studies looking at the occurrence of hypertension in adult (>18 years) type 2 diabetes patients in urban areas. Proportion of hypertension in diabetics

TABLE.—*Prevalence of hypertension in type 2 diabetes in urban settings in pakistan and its trend from 1972 - 2009.*



	Haider Z 1976	Shera AS 1994	Basit A 2001	Habib SS 2001	Rafique G 2003	Ahmedani MY 2003	Shera AS 2004	Hassan M 2005	Ahmed N 2009
UL	23.8	14.4	47.7	39.5	36.9	53.1	60.3	35	51.8
Mid point	26.4	21.8	50	48.3	58.3	55.8	64.6	39.5	63.1
LL	29.2	31.7	52.4	57.2	69.5	58.6	68.7	43.6	73.2

UL: Upper limit; LL: Lower limit

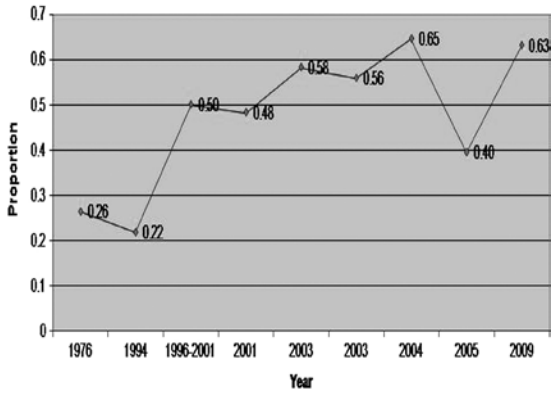


Figure 1.—Diagram prevalence of hypertension in type 2 diabetes in urban settings in pakistan and its trend from 1972 - 2009.

was calculated for individual studies followed by calculation of weighted average. Its trends were also studied from 1972 – 2009.

Results. Of 242 studies extracted, nine were included in the review and analysis. Weighted average of hypertension in Type 2 diabetes patients was found to be 47.9%. It was more in females (53.2%) as compared to males (45.3%). The proportion of hypertension in diabetics was found to be 26.4% in 1970's, which gradually increased to 63% in 2009, depicting a percentage increase of 58%.

Conclusions. Almost half of the type 2 diabetes patients living in urban areas in Pakistan are hypertensive. This co-morbidity has shown an increasing trend. Factors responsible for it should be studied further for implementation of effective interventions for prevention of CVD in this risk group.

Safety and efficacy of empagliflozin as monotherapy or add-on to metformin in a 78-week open-label extension study in patients with type 2 diabetes

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Background. Empagliflozin is a potent and selective sodium glucose cotransporter-2 inhibitor in development for the treatment of type 2 diabetes mellitus.

Objectives. This Phase IIb, randomized, open-label extension study investigated safety and efficacy of empagliflozin (EMPA), an SGLT-2 inhibitor, as monotherapy or add-on to metformin IR (MET) for 78 weeks in patients with T2DM.

Methods. After completing one of two 12-week, randomized, controlled trials, patients who took 1, 5 or 50 mg EMPA or placebo in the first trial were randomized to 10 mg or 25 mg EMPA (monotherapy or add-on to MET). Patients who took 10 mg or 25 mg EMPA, MET only, or sitagliptin as add-on to MET (SITA) in the first trial continued the same treatment. In the 78-week extension, 272 patients received 10 mg EMPA (166 as add-on to MET), 275 received 25 mg EMPA (166 as add-on to MET), 56 received MET only and 56 received SITA.

Results. Of all patients in the 78-week extension, adverse events (AEs) were reported in 63.2–74.1%

TABLE.—*Empagliflozin 78-week open-label extension study.*

Parameter	Type of therapy	EMPA, n (10/25 mg)	Comparator (n)	Adjusted mean change from baseline (95% CI) [mean baseline]		
				Comparator	10 mg EMPA	25 mg EMPA
HbA_{1c} (%)	Monotherapy	80/88	MET (56)	-0.56 (-0.79, -0.33) [8.15]	-0.34 (-0.54, -0.14) [7.88]	-0.47 (-0.66, -0.27) [7.99]
FPG (mg/dL)	Monotherapy	80/88	MET (56)	-26.0 (-33.5, -18.4) [176]	-30.4 (-37.1, -23.7) [181]	-27.8 (-34.3, -21.3) [178]
Body weight (kg)	Monotherapy	80/88	MET (56)	-1.28 (-2.30, -0.26) [85.8]	-2.24 (-3.12, -1.36) [83.4]	-2.61 (-3.46, -1.77) [83.5]
HbA_{1c} (%)	Add-on to MET	137/139	SITA (56)	-0.40 (-0.60, -0.20) [8.03]	-0.34 (-0.47, -0.21) [7.92]	-0.63 (-0.76, -0.50) [7.89]
FPG (mg/dL)	Add-on to MET	137/139	SITA (56)	-15.6 (-23.6, -7.62) [179]	-21.3 (-26.4, -16.2) [177]	-31.8 (-36.8, -26.7) [179]
Body weight (kg)	Add-on to MET	137/139	SITA (56)	-0.41 (-1.49, 0.67) [88.6]	-3.14 (-3.89, -2.38) [90.7]	-4.03 (-4.77, -3.29) [89.7]

on EMPA and 69.6% on MET only or SITA. Over 90% of AEs were mild or moderate. Hypoglycemic events were reported in 0.9–3.6% of patients on EMPA, 7.1% on MET only and 5.4% on SITA. AEs related to UTIs were reported in 3.8–12.7% of patients on EMPA, 3.6% on MET only and 12.5% on SITA. AEs related to genital infections were reported in 3.0–5.5% of patients on EMPA, 1.8% on MET only and none on SITA. Efficacy is reported for patients who took EMPA, MET only, or SITA over 90 weeks (including preceding trials) (Table). Compared with baseline of the preceding trial, patients on EMPA showed reductions in HbA1c, FPG and body weight at the end of the extension study (Table).

Conclusions. Long-term EMPA treatment was well tolerated and provided sustained glycemic control and weight loss in patients with T2DM. These data were presented at ADA 2012. Funded by Boehringer Ingelheim.

Long-term treatment with testosterone undecanoate injections results in substantial weight loss in hypogonadal men

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Background. Obesity is the major risk factor for type 2 diabetes. Obesity is associated with reduced testosterone, and low testosterone induces weight gain.

Objectives. This study analyzed the effects of normalization of serum testosterone in mainly elderly, hypogonadal men.

Methods. Open-label, single-center, cumulative, prospective registry study of 255 men (aged 38 – 83 years, mean 60.6 ± 8.0 years), with testosterone levels between 1.7 – 3.5 ng/mL (mean: 2.87 ± 0.4). Cut-off point for diagnosing testosterone deficiency was serum testosterone ≤ 3.5 ng/mL). 215 men were studied for at least 2 years, 182 for 3 years, 148 for 4 and 116 for at least 5 years. They received parenteral testosterone undecanoate 1000 mg/12 weeks after an initial interval of 6 weeks. Weight and waist circumference as a measure of visceral fat were assessed every three month and BMI calculated.

Results. At baseline, 5% of the patients had normal weight (BMI ≤ 24.9 kg/m2), 24% were overweight (BMI 25-29.9), 57% obese (BMI 30-40) and 14% morbidly obese (BMI ≥ 40). After 5 years the following changes were observed: weight (kg) decreased by 16.15 kg from 106.22 ± 16.93 (minimum: 70, maximum: 139) to 90.07 ± 9.51 (min 74.00, max 115). The statistical significance was p<0.0001 vs baseline and vs the previous year over 5 years indicating a continuous weight loss over the full observation period. Waist circumference (cm) declined from 107.24 ± 9.14 (min 86, max 129) to 98.46 ± 7.39 (min 84, max 117) (p<0.0001 vs baseline and vs the previous year over 5 years). Body mass index (BMI, kg/m2) declined from 33.93 ± 5.54 (min 21.91, max 46.51) to 29.17 ± 3.09 (min 22.7; max 36.71) (p<0.0001 vs baseline and vs the previous year over 5 years). The mean per cent weight loss after 1 year was 4.12 ± 3.48%, after 2 years 7.47 ± 5.01%, after 3 years 9.01 ± 6.5%, after 4 years 11.26 ± 6.76% and after 5 years 13.21 ± 7.24%. At baseline, 96% of men had a waist circumference of ≥ 94 cm. This proportion decreased to 71% after 5 years. At 60 months, 94.8% of men had lost any weight, 31.0% had lost ≥ 20 kg, 53.4% ≥ 15 kg, 75.9% ≥ 10 kg, 89.7% ≥ 5 kg, and 5.2% had gained weight. At 60 months, 97.4% had any reduction in waist circumference, 6.9% had lost ≥ 15 cm, 45.7% had lost ≥ 10 cm, 86.2% ≥ 5 cm, and 2.6% had an increase in waist circumference.

Conclusions. Raising serum testosterone to normal resulted in loss of body weight, waist circumference and BMI. These improvements were progressive over the full 5 years of the study. More than 95% of hypogonadal men responded to testosterone replacement therapy by improving their body composition.

Therapeutic education and training of trainers, their role in the prevention of diabetes mellitus and its late complications

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Background. Diabetes causes immeasurable personal suffering and cost to the society, though diabetes and its late complications are largely preventable. Today there are proven and affordable preventions available that can stop or significantly delay development or progression of diabetes and its late complications. Political Declaration, adopted by UNO High Level Summit on prevention and control of NCDs stresses the importance of educational measures to promote health education and literacy. "The Toolkit on the Prevention of Type 2 Diabetes in Europe" prepared by IMAGE Working Group outlines education as cornerstone of creation motivation for behaviour changes(MBC) in persons with high risk of diabetes development . For this it is essential to train and educate educators, who will be able to provide high quality therapeutic patient education (TPE), and MBC. In Eastern European countries TPE is practiced mostly voluntarily, though systematic education and training of educators/trainers is rarely performed, besides, education materials are always lacking.

Objectives. Our aim was to train healthcare professionals (HCPs) , who are practicing TPE, and introduce principles of TPE to medical resident/interns, using Conversation Map Tools,(CMap Tools) created by Healthy International (Canada) in collaboration with International Diabetes Federation (IDF), and to provide all the participants with the sets of CMap Tools.

Methods. Three 2-day trainings were carried out for: 1) 21 HCPs from 7 Eastern European countries 2) 30 HCPs from 24 districts of Kiev, Ukraine, and 3) 10 Tbilisi State Medical University interns/residents. Trainings were carried out under the aegis of IDF-Global as a part of its Policy on Education and IDF-Europe, as a part of the Business plan, and under the initiative of GUDEAS. The HCPs were endocrinologists, working in the primary and tertiary health care, pediatrician endocrinologists, cardiologists/endocrinologists, psychologists, GPs, family medicine and nursing trainers and nurses. Two-day Agenda included 4 lectures and 7 small group activities (Metaplans, Role Plays).

Results. Participants appreciated possibility to discuss problems and share views. Deep interest was shown I n CMap Tools, their implementation in everyday practice, ranging from education of people with diabetes, their family and HCPs, to training of school staff and various civil services and to increasing public awareness. All 3 groups stated that they learnt absolutely new approaches of people interactions and MBC, and that this method makes education and MBC, flexible; more interesting both for people with diabetes and educators; helps to avoid professional burnout and create strong and stable MBC, and solve the problem with education materials.

Conclusions. Global Diabetes Plan 2011-2021, issued by IDF includes continuous self-management education and support of people with diabetes and professional education in its core components. This training was important from the standpoint of Political Declaration, European strategies for diabetes prevention and interest that Governments are paying lately to TPE. Our challenge is to reduce human and financial burden of diabetes; TPE is an important tool in achieving this goal. Involving medical students and residents in TPE is important to change mentality and vision of new generation of HCPs, To make the process stable and progress sustainable, TPE needs to be included in University curriculum, and education of educators - further development .

Societal Correlates of Hypertension and Implications for Policy

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Background. Approximately one-third of adults worldwide have hypertension, a condition that is increasingly common and causes half of all deaths from stroke and heart disease. People with hypertension are also at increased risk for developing type 2 diabetes, and would be ideal targets for prevention.

Objectives. While it is understood that individual risk factors for hypertension are modified by societal-level influences, the extent of their influence is unknown. Given the important implications for identifying policy levers to reduce the burden of hypertension, we quantified relationships between societal factors and hypertension prevalence at the country level.

Methods. Using publicly available data from World Health Organization, World Bank, and Food and Agricultural Organization, we extracted recent estimates for country-level variables: hypertension prevalence (systolic blood pressure≥140 mmHg or diastolic blood pressure≥90 mmHg or taking hypertension medication); total caloric availability; animal fat, fruit and vegetable availability as a percentage of total caloric availability; physical inactivity markers (vehicles per capita and value-added from service sector); gross domestic product per capita (GDP); and age-adjusted mortality rate. We also extracted data on salt consumption per capita: urinary sodium excretion (mmol per day) from the INTERSALT study (most recent estimates were from 28 countries in 1981-1982) and on processed/packaged food and fresh food (meat, fish, nuts, fruits, and vegetables) consumption from the Euromonitor International (retail volume in kg per capita in 2008) across 80 high-income countries. We used generalized linear models to investigate relationships between these factors and hypertension prevalence.

Results. Median global hypertension prevalence was 41.7% (Range: 29.7% to 52.3%) in 2008. Salt intake, measured as urinary sodium excretion or processed/packaged food, was not associated with hypertension prevalence (OR for mmol per day: 0.99, 95% CI 0.99-1.00, p=0.104 and OR for each retail volume in kg per capita: 0.99 95%CI: 0.998-1.00, p=0.513, respectively), after adjusting for availability of fruit, animal fat, and total calories; vehicles per capita, value-added from the service sector, and mortality rate. However, total caloric availability (OR 1.03 for each kilocalorie per person per day, 95% CI 1.002-1.05, p=0.033) and animal fat availability (OR 1.04 for each percentage point of animal fat per total calories per person per day, 95% CI 1.02-1.07, p=0.002) were significantly associated with hypertension prevalence.

Conclusions. Our results suggest that underlying societal factors are associated with hypertension prevalence. Although reduction of salt intake has been highlighted as a priority for prevention of hypertension, our results suggest that factors, such as intake of total calories and animal fat, may have stronger ecological associations with hypertension in populations. Interventions should thus consider all factors rather than focus on salt reduction as a single policy lever.

A comparative study on quality and actors associated with glycemic control among patients with type 2 diabetes between a tertiary referrall hospital and a district hospital in Kenya

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Background. There has been an increase in the prevalence of type 2 diabetes mellitus Worldwide. Un-

til recently Diabetes Mellitus was considered a disease of high income countries, however during the past few decades a rapid increase has been observed in low-and middle income countries as well. According to IDF Diabetes Atlas 4th edition an estimated 285million people are now living with diabetes, with that figure expected to reach nearly 440 million by year 2030.It further states that 4 out of 5 people with diabetes will live in developing countries and the men and women most affected are of working age –the family bread winner. That the newly diagnosed PLWDs find themselves alone on a crippling path that leads them to complications, depression, poor mental health and early death. It is therefore imperative that care strategies are effected at a minimal cost where possible without compromising outcomes, especially in limited resource settings such as in Kenya.

Objectives. To assess the quality and factors associated with glycemic control in T2DM at the Kenyatta national referral hospital and Thika District hospital and relate this to patient load, attitude and cost.

Methods. A cross sectional, comparative study. Setting: Diabetic outpatient clinic at KNH and THIKA Hospital. during routine diabetic care at the diabetic clinics subjects will be interviewed and blood sample drawn for measurement of AIC level.

Results. Yet To Be Concluded

Conclusions. Decentralization very key

Track 2: Session 2.2.4
Experience of diabetes prevention programs (North-America, Spain and Latin America)

Ten years after the diabetes prevention program: lessons learned for community translation

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Background. Approximately 10 years ago, the Diabetes Prevention Program results were published demonstrating a 58% reduction in risk for diabetes, and 41% lowered risk for the metabolic syndrome for participants assigned to the lifestyle intervention arm of the trial. The Diabetes Prevention Support Center (DPSC) of the University of Pittsburgh was established to promote translation of the DPP lifestyle intervention for diabetes prevention and cardiovascular risk reduction in the community. At the core of DPSC prevention activities is the Group Lifestyle Balance (GLB) program, a comprehensive lifestyle behavior change program adapted directly from the successful DPP lifestyle intervention. DPSC activities include the provision of training and support for implementation of the GLB program, as well as ongoing evaluation of translation efforts in a variety of community settings.

Objectives. The purpose of this presentation is to discuss real world issues encountered with translation of lifestyle intervention to the community, and to review practical lessons learned for facilitation of prevention efforts in a variety of real world settings.

Methods. To date, the DPSC has trained over 1,200 health professionals across the United States and internationally to deliver the program, and currently provides support to more than 40 ongoing programs in the US and Canada, as well as several research evaluation projects. The GLB program has been successfully implemented in a variety of community settings including primary care practices, through out-patient diabetes education clinics, hospital systems, US Military bases, community centers, fitness centers, worksites and churches. Through interaction with multiple providers, and support efforts for GLB implementation, the DPSC has gained insight into issues encountered during intervention delivery, as well as practical considerations.

Results. Issues and challenges to implementation in the community vary by site; however, several common themes emerge such as 1) adaptation of the DPP program for the specific local community setting, 2) training for program providers (coaches), 3) community site engagement, 4) definition and identification of those at risk, 5) participant recruitment and engagement, 6) program cost, 7) coach support for program delivery, and 8) ongoing program evaluation. The DPSC experience has provided insight for the development of strategies to address these issues, focusing specifically on key components such as the importance of community partner engagement and input, and assessment of opportunities for flexibility in all aspects of implementation.

Conclusions. Issues and challenges regarding translation of a clinical trial diabetes prevention and cardiovascular risk reduction intervention to the community setting certainly exist; however, common themes allow for effective strategies for resolution. Lessons learned in translation may provide insight and be useful to others in planning primary prevention programs within the community.

Track 3: Session 2.3.4
National Diabetes Prevention Program and Middle-East Europe countries

Secular changes in glucose intolerance and cardiovascular risk factors over 20 years in sweden: results from the population-based vasterbotten intervention programme

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Background. Alongside individual high-risk approaches to prevention, population-based strategies are needed to stem the rising prevalence of type 2 diabetes.

An individual- and community-based intervention programme was introduced in Västerbotten County – the Västerbotten Intervention Programme (VIP) – to help reduce the morbidity and mortality associated with diabetes and cardiovascular disease.

Objectives. We aimed to examine secular changes in the distribution of glucose concentration and other cardiovascular risk factors in Västerbotten County between 1991 and 2010.

Methods. Community-based intervention programme including population-level health promotion activities and invitation for all individuals aged 40, 50 and 60 years to attend for a health assessment followed by motivational interviewing. Assessment included an OGTT, anthropometric and other biochemical measures and a self-administered questionnaire. Complete data are available for 120,929 men and women attending from 1991 to 2010 (35,629 were repeat visits). Linear regression modelling was used to examine age-adjusted differences in the means of continuous CVD risk factors over time, separately by sex. Data were direct age-standardised to compare diabetes and CVD risk factor prevalence.

Results. Between the calendar periods 1991-1995 to 2005-2010, the mean age-adjusted 2-hour plasma glucose increased by 0.19 (95% CI: 0.15 to 0.23 mmol/L) and 0.12 (95% CI: 0.10 to 0.14 mmol/L) in men and women respectively (Figure 1). Age-standardised prevalence of diabetes increased between the same calendar periods from 4.7 (95% CI: 4.4 to 5.1%) to 6.6 (95% CI: 6.2 to 6.9%) in men and from 3.6 (95% CI: 3.3 to 3.9%) to 4.3 (95% CI: 4.0 to 4.6) in women. Similarly, mean BMI values increased in men by 1.1 kg/m2 (95% CI: 1.0 to 1.2 kg/m2) and in women by 0.6 kg/m2 (95% CI: 0.5 to 0.7kg/m2) from 1991-1995 to 2005-2010. A corresponding rise in the prevalence of overweight and obese were seen during this calendar period; for example, the age-standardised prevalence of obesity increased from 14.0% (95% CI: 13.5 to 14.7) and 16.8% (95% CI: 16.1 to 17.4), to 22.7% (95% CI: 22.1 to 23.4) and 22.7 (95% CI: 22.0 to 23.3) in men and women respectively. Over the same time period, mean age-adjusted total cholesterol de-

TABLE.—*Intensive lifestyle intervention for prevention of type 2 diabetes in adults with impaired glucose tolerance the european diabetes prevention study.*

EDIPS cases identified by FINDRISC[10] and high risk cut-points for fasting plasma glucose (FPG) and glycated Haemoglobin (HbA1c) as specified by NICE, ADA and WHO with risk statistics for intervention and control groups compared

	FINDRISC score cut-points	
	Moderate or greater risk (≥12)	High or greater risk (≥15)
FINDRISC [a] score only		
EDIPS cases n (%)	*519 (69·3)*	*330 (44·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·42(0·20 to 0·15) P <0·001*	*0·30 (0·20 to 0·51) P<0·001*
FPG (mmoll^{-1})		
NICE high risk range (5·5 to 6·9)		
EDIPS cases n (%)	*354 (49·4)*	*224 (31·2)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·48 (0·28 to 0·83) P = 0·008*	*0·39 (0·20 to 0·78) P = 0·008*
ADA high risk range (5·6 to 6·9)		
EDIPS cases n (%)	*328 (45·7)*	*209 (29·1)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·51 (0·30 to 0·87) P = 0·014*	*0·41 (0·21 to 0·83) P = 0·007*
WHO high risk range (6·1 to 6·9)		
EDIPS cases n (%)	*198 (27·6)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·37 (0·90 to 0·72) P = 0·003*	*0·31 (0·13 to 0·73) P = 0·007*
HbA1c [b] (%)		
NICE and UK-NSC high risk range (6·0 to 6·4)		
EDIPS cases n (%)	*96 (13·7)*	*62 (8·9)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·46 (0·19 to 1·10) P = 0·08*	*0·35 (0·12 to 1·00) P = 0·05*
ADA high risk range		
EDIPS cases n (%)	*227 (32·4)*	*158 (22·6)*
Hazard ratio (95% CI) and P value for intervention/control incidence	*0·43 (0·24 to 0·76) P = 0·004*	*0·28 (0·13 to 0·59) P = 0·001*

[a] n = 717 [b] n = 732

creased by 0.5 (95% CI: 0.5 to 0.6 mmol/L) in men and 0.5 (95% CI: 0.4 to 0.5 mmol/L) in women (Figure 1). Systolic blood pressure decreased by 3.1 (95% CI: 2.7 to 3.4 mmHg) and 5.3 (95% CI: 4.9 to 5.6 mmHg), in men and women respectively. Age-standardised prevalence of hypertension decreased from 38.3 (95% CI: 37.5 to 39.1%) to 34.3 (95% CI: 33.6 to 34.9%) in men and from 33.2% (95% CI: 32.5 to 33.9) to 27.1 (95% CI: 26.5 to 27.7%) in women. Legend to Figure 1. Distribution of cardiovascular risk factors in participants of the Västerbotten Intervention Programme. Graphs show distributions of the following CVD risk factors over the calendar periods 1991 to 1995 (solid black lines) versus 2006 to 2010 (hashed green lines) in female and males respectively; (A) Fasting plasma glucose (PG), (B) 2-h PG, (C) BMI, (D) Cholesterol, (E) Systolic Blood Pressure. Data is comprised of 120,929 male and female VIP participants aged 40, 50 or 60 years old from Västerbotten county in Northern Sweden.

Conclusions. Improvements in cholesterol and blood pressure values between 1991 and 2010 were observed in Västerbotten County. This may represent detection and better management of high risk individuals and improved awareness in the general population as a result of the VIP. In spite of the VIP, mean BMI and glucose concentration increased over the same time period, albeit perhaps less than in other settings that did not receive such health promotion activities.

Intensive lifestyle intervention for prevention of type 2 diabetes in adults with impaired glucose tolerance: the European diabetes prevention study, a pooled analysis of three randomised controlled trials, from Finland, the Netherlands and the UK

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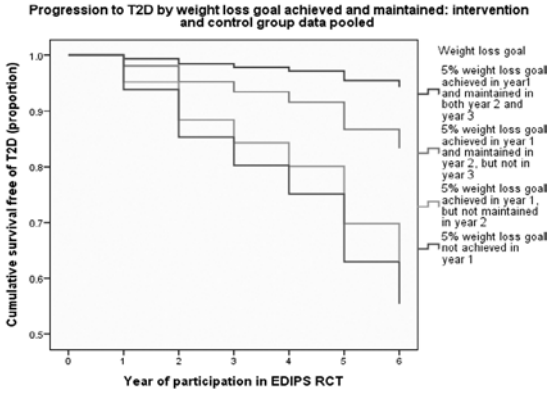

Figure.—Intensive lifestyle intervention for prevention of type 2 diabetes in adults with impaired glucose tolerance the european diabetes prevention study.

Background. Prevalence of type 2 diabetes (T2D) is increasing worldwide. We report analyses of pooled data from three European trial cohorts from Finland, The Netherlands, and the UK: the European Diabetes Prevention Study (EDIPS).

Objectives. We aimed to evaluate effectiveness of T2D prevention by lifestyle intervention; analyse the impact of sustained weight loss on T2D incidence; and explore risk predictors.

Methods. We analysed data on 749 adults with impaired glucose tolerance (278 men and 471 women, mean age 56 years, mean BMI 31kgm^{-2}) recruited between 1993 and 2003, and randomised (ratio 1:1) to intensive lifestyle intervention or lifestyle advice control. The intensive intervention aimed to increase physical activity, modify diet, and promote weight loss ≥5%. All three EDIPS cohorts used a common protocol. Using Cox-regression, we assessed T2D incidence and, in explanatory analyses, the impact on T2D incidence of sustained weight loss and of baseline levels of FINDRISC score, fasting plasma glucose (FPG) and HbA_{1c}.

Results. Mean duration of follow-up was 3·1 years. T2D was diagnosed in 139 participants (I= 45/379, C = 94/370). Cumulative T2D incidence was 57% lower in the intervention compared with the control group (HR 0·43 (95% CI 0·30 to 0·61) P<0·001) Participants with ≥5% weight loss at one year had 65% lower T2D incidence (HR 0·35 (95% CI 0·22 to 0·56) P<0·001); maintaining this weight loss for two and three years further reduced T2D incidence. Proposed cut-points for high T2D risk would have identified 69·3% (FINDRISC ≥12), 66·8% (NICE FPG), 42·2% (ADA HbA1c), but only 17·9% (NICE HbA1c), of EDIPS participants with hazard ratios for intervention effect: 0·42, 0·48, 0·38, and 0·34 respectively.

Conclusions. The EDIPS data-analysis reinforces evidence for T2D prevention and extends generalisability to European populations. Explanatory analysis showed the effectiveness of ≥5% weight loss, especially if maintained, for T2D prevention in adults with IGT. Individual assessment for T2D prevention needs to balance risk, intervention cost, and potential to benefit from the intervention.

Trial registrations

The Finnish Diabetes Prevention study, Helsinki, Finland: ClinicalTrials.gov NCT00518167

The SLIM diabetes prevention study, Maastricht, The Netherlands: Clinical Trials.gov NCT00381186.

The EDIPS-Newcastle diabetes prevention study, Newcastle upon Tyne, UK: International Standard Randomised Controlled Trial Number ISRCTN 15670600

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