



# 9TH ANNUAL WORLD CONGRESS ON PREVENTION OF DIABETES AND ITS COMPLICATIONS



**Georgia World Congress Center  
Atlanta, GA, USA**



**EMORY**  
UNIVERSITY  
SCHOOL OF  
MEDICINE



STATE OF GEORGIA  
OFFICE OF THE GOVERNOR  
ATLANTA 30334-0900

Nathan Deal  
GOVERNOR

December 2, 2016

To: The World Congress on Prevention of Diabetes and Its Complications Forum

GREETINGS:

I am pleased to extend my warmest regards to all those in attendance of the World Congress on Prevention of Diabetes and Its Complications. On behalf of the State of Georgia, it is a pleasure to host your event.

Please allow me to welcome your distinguished guests to this global forum that allows experts to exchange groundbreaking knowledge and technology for type 2 diabetes prevention. I applaud the great strides made on behalf of the citizens of Georgia and the world, and I hope you continue to tirelessly pursue prevention.

I commend all those involved in organizing this event and send my best wishes for a successful and enjoyable symposium.

Sincerely,

A handwritten signature in black ink that reads "Nathan Deal".

Nathan Deal

ND:al



Welcome to Atlanta,

**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 programs 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, Dresden Germany, Madrid Spain and Cartagena Colombia. 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.

**The 9th World Congress on Prevention of Diabetes and its Complications** is to be held in **Atlanta, USA, 2 - 4, December 2016**. Thus, the Congress is now celebrating in Atlanta the 20-year anniversary, a landmark in the history of diabetes prevention. As the earlier Congresses, this 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 Atlanta.

The congress sessions will be broadcast live to more than 20 countries worldwide, we are expecting several hundred participants online out of almost three thousand members on our Facebook page.

On the second day of the congress, there will be a 2-hour Diabetes Prevention Summit aiming at issuing a global statement about the status of diabetes prevention worldwide: at least forty experts representing many international organizations will be attending this Summit.

**Mahmoud Ibrahim, MD**

Director, EDC, Center for Diabetes Education

**Jaakko Tuomilehto**

Chief Scientific Officer  
Dasman Diabetes Institute



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# Diabetic hypoglycemia: Questions and controversies

presented by  
The International Hypoglycaemia Study Group  
Georgia World Congress Center  
Room: A402

TIME	TOPIC	SPEAKER
8:00-8:05 am	Introduction	Elizabeth Seaquist
8:05-8:15 am	Hypoglycemia classification	Simon Heller
8:15-8:30 am	Impaired awareness of hypoglycemia	Stephanie Amiel
8:30-8:45 am	Fear of hypoglycemia	Linda Gonder-Frederick
8:45-9:00 am	Panel Q&A	All

## Chair



*Elizabeth Seaquist*  
MD, CDE

## Speakers



*Simon Heller*  
BA, MB, BChir, DM, FRCP



*Stephanie Amiel*  
MD, FRCP



*Linda Gonder-Frederick*  
PhD

**Stephanie Amiel**, RD Lawrence Professor of Diabetic Medicine, Division of Diabetes and Nutritional Sciences  
King's College London  
London, UK

**Linda Gonder-Frederick**, Associate Professor, Department of Psychiatry and Neurobehavioral Sciences,  
Developed a Biopsychobehavioral Model of Risk of Severe Hypoglycemia, Clinical Director and Training  
Director, Behavioral Medicine Center University of Virginia Health System  
Charlottesville, VA, USA

**Simon Heller**, Professor of Clinical Diabetes, University of Sheffield, Director of Research and Development &  
Honorary Consultant Physician, Sheffield Teaching Hospitals Foundation Trust  
Sheffield, UK

**Elizabeth Seaquist**, Pennock Family Chair in Diabetes Research, Professor of Medicine  
Director, Division of Endocrinology and Diabetes, Department of Medicine, University of Minnesota,  
2014 President of Medicine and Science, American Diabetes Association  
Minneapolis, MN, USA





# GENERAL INFORMATION

## Georgia World Congress Center

Address: 285 Andrew Young International Blvd NW, Atlanta, GA 30313. The GWWC offers a full array of services and amenities in the main entrances and concourses to ensure you have a great visit.

### Information Desks

Greeters and Information Desk attendants are ready to assist you with questions and directions. The GWCC has Information Desks at the entrance to each building where you will find friendly staff ready to help with brochures and maps, lost and found, wheelchairs for individuals in need and information about the location of your event.

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### Monitors

During your visit to the Georgia World Congress Center, keep an eye out for the monitors strategically placed throughout the facility. The monitors serve as the GWCC's wayfinding system with slides that direct visitors to each event taking place in the building as well as other amenities located on site.

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### ATMs

ATMs provided by Welch ATMs are located throughout the Georgia World Congress Center for your convenience. Avail, Plus, Honor, Discover, MasterCard, Visa, Cirrus and Alert cards are accepted.

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### FedEx Office Business Centers

Conveniently located in the Building B and C entrance lobbies, FedEx Office offers virtually everything to meet your convention and business needs.

Services include:

- full service digital color and black and white copying and printing
- computer rentals, laptop docking stations
- document finishing services – binding, collating, cutting, folding, stapling
- presentation services that include production of high quality mounted boards, posters, banners
- wheelchair and mobility scooter rentals
- copier equipment rentals
- FedEx Express® U.S. Package Services
- FedEx Ground®
- Office Supplies

For more information about FedEx Office convention services at the Georgia World Congress Center and to place an order, please go to: [www.fedex.com/us/office/services/conventions/locations/Atlanta.html](http://www.fedex.com/us/office/services/conventions/locations/Atlanta.html)

FedEx Office: 404.223.4660 phone; 404.223.4776 fax; 404.221.0000 after hours; [usa1065@fedex.com](mailto:usa1065@fedex.com)

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## Wireless Internet Zone

Laptop and PDA users will find no trouble accessing the Internet at the Georgia World Congress Center thanks to a wireless network installed throughout the facility. Wireless Internet Zones are located in the common areas of the convention center, including all restaurants and eateries. To utilize wireless Internet:

Connect to the GWCCWIFI network.

Launch the browser. It will automatically be redirected to a registration page.

- Select one of the "Quick Connect" options.
- Complete the name, address and billing information through the Verisign secured check-out page.

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## Gift Shops

If you need a postcard, newspaper or Atlanta souvenir, the Georgia World Congress Center operates two unique gift shops in the Building B and Building C entrance lobbies. In addition to gifts, you'll find film, batteries, gum, candy, periodicals and tobacco products.

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## Accessibility

Accessibility is a top priority at the Georgia World Congress Center. The GWCC was originally designed to provide full access to guests with disabilities. We offer ample designated disabled parking, several passenger drop-off areas and convenient curb cuts for easy wheelchair access. Other services include Braille instructions on elevators and assistive-listening devices at the Information Desks in the main entrance lobbies.

The GWCC has manual push wheelchairs available for use by attendees while in the building. A credit card is required for a deposit; however there is no rental charge for use of the wheelchair. Wheelchairs are available on a first-come, first-served basis and can be found at the Information Desks in Buildings B and C. FedEx Office Business Centers located in the main lobby of Buildings B and C offer mobility scooters and wheelchair rentals.

## Transportation

MARTA: Use Dome/GWCC/Philips Arena/CNN Center Station (W-1)

If you are coming to/from Hartsfield-Jackson Atlanta International Airport, MARTA has a rail station located at the north end of the airport, near baggage claim. This service offers the quickest and least expensive way to get to and from the airport to downtown Atlanta.

For more information on MARTA, visit [www.itsmarta.com](http://www.itsmarta.com)

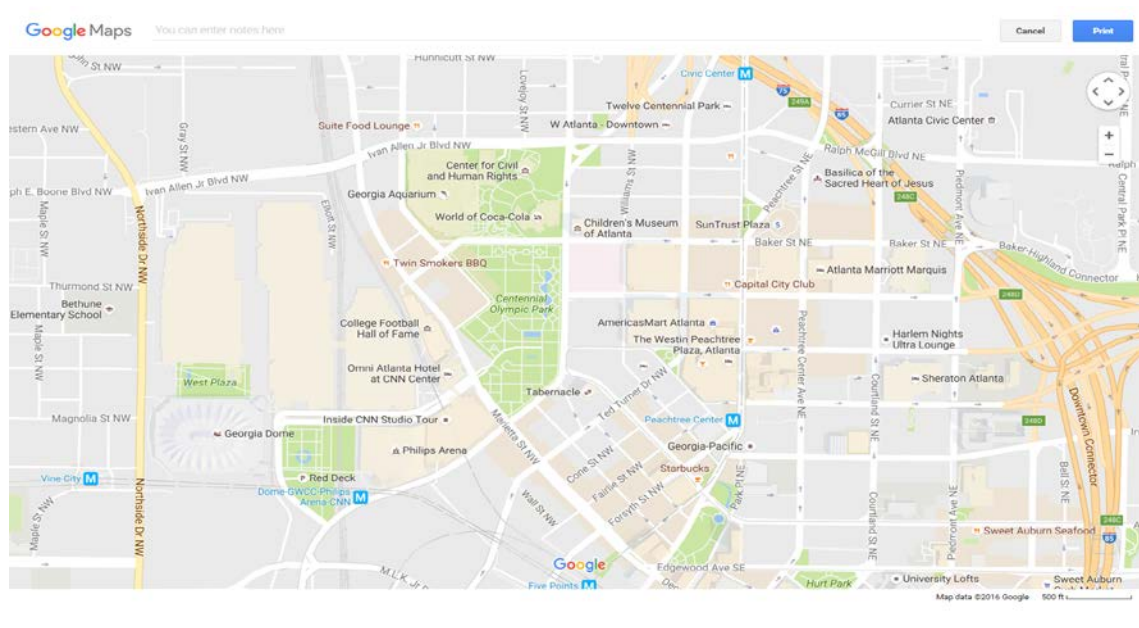
Taxi: Flat Rate Fees from/to the Airport: Downtown \$30.00; Buckhead \$40.00; Midtown \$32.00

There is a \$2.00 charge for each additional person.

Flat Rate Fees Within Downtown and Midtown

Fares originating from a business and concluding at a business within the zone of Downtown or Midtown have a rate of \$8.00 for one person. There is a \$2.00 charge for each additional person.

## Area Attractions (within walking distance)



For a listing of current events and other attractions, visit [www.Atlanta.net](http://www.Atlanta.net)

## Area Restaurants

From cafes and food courts on the concourses to concession stands and specialty food carts on the trade show floor, the Georgia World Congress Center and its food service partner, Levy Restaurants, offer a wide array of dining options. The GWCC operates more than 15 permanent restaurants and eateries, including the fine dining Terraces Restaurant, Southern Roots and Food World, a food court offering tasty entrees from around the world, and Googie Burger located in Centennial Olympic Park next to the fountain of rings. Also there are several options within an easy walking

## Congress Meals

Continental breakfast will be served each morning at 7:00am. There are several dining options within and near the GWCC. The information desk can assist you with your dining options.

## Dress Code

Please dress comfortably. Remember to bring a light sweater or jacket as meeting rooms tend to be chilly.

## BADGE POLICY

All registered attendees are provided with a name badge. Please wear it all times to ensure admission to the World Congress sessions.

## CONTINUING EDUCATION CREDIT

Emory University School of Medicine designates this live activity for a maximum of 18.0 *AMA PRA Category 1 Credits*<sup>TM</sup>. Physicians should only claim credit commensurate with the extent of their participation in the activity. The Emory University School of Medicine is accredited by the ACCME to provide continuing medical education for physicians.

Emory University School of Medicine is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Emory designates this live activity for 2.0 continuing dental education credits.

Concerns or complaints about a CE provider may be directed to the provider or to the Commission for Continuing Education Provider Recognition at [ADA.org/CERP](http://ADA.org/CERP).

**Following the conclusion of the conference, you will receive an email with instructions on how to complete the evaluation and print your CME/CDE certificate/certificate of attendance.**

## DISCLOSURE STATEMENT

It is the intent of Emory University School of Medicine to assure that its education mission, and continuing medical education activities in particular, not be influenced by the special interest of individuals associated with its programs. All faculty participating in a sponsored activity are expected to disclose to the audience two important points:

- (1) any significant financial interest or other relationship with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial services discussed in an educational presentation;
- (2) any significant financial interest with any commercial supporters of the activity. (Significant financial interest or other relationships can include such things as grants or research support, employee, consultant, major stock holder, member of speakers bureau, etc.).

All disclosed financial relationships were reviewed for potential conflicts of interest. Actions were taken to resolve any identified conflicts. CME cannot be awarded when Conflicts of Interest are not resolved. These instances are indicated on the Program Agenda

Name	Company	Role
Pablo Aschner	AstraZeneca, Boehringer-Ingelheim, Lilly, Merck, Sanofi, Novo Nordisk	Speaker, Advisory Board member
Jason Baker	Insulet, BI/Lilly Sanofi	Speaker Consultant
John Buse	PhaseBio  Astra Zeneca, Boehringer-Ingelheim, Bristol Myers Squibb, Eli Lilly, GI Dynamics, Intarcia, J&J, Lexicon, Medtronic, Novo Nordisk, Orexigen, Sanofi, Scion NeuroStim, Takeda, Theracos  Adocia, AstraZeneca, Dance Biopharm, Eli Lilly, Elycyles, F. Hoffman LaRoche, GI Dynamic, Lexicon, Merck, Metaventon,	Consultant; stock options  PI, Research grants paid to institution  Advisor under contracts with employer. Fees paid to institution

	Novo Nordisk, Orexigen, Quest, Takeda, vTv Therapeutics	
Robert Eckel	Novo Nordisk, Sanofi/Regeneron, Pfizer  Esperion	Scientific consultant  PI, Research grant
Martha Funnell	Eli Lilly, Sanofi Aventis, Novo Nordisk	Advisory Board member
Deborah Greenwood	Midmark Corporation  Astra Zeneca	Employee, spouse  Research project subject matter expert
Simon Heller	Novo Nordisk, Eli Lilly AstraZeneca	Consultant, speaker Spealer
Anant Nigam	Sanofi, Eli-Lilly, MSD, AstraZeneca, Janssen	Speaker
Francisco Pasquel	Merck, Boehringer Ingelheim	Consultant
Lawrence Phillips	Boehringer-Ingelheim, Merck, Novartis, Takeda, Janssen  Lilly, GSK, Novartis, Merck, Amylin, Novo Nordisk, Diasome, Roche, Abbvie, Geneteh, Sanofi-Aventis, Vascular Pharma, Janssen, GSK  Diasyst, Inc.	Advisory Board Member, Consultant  PI, Research grant  Co-Founder, Board of Directors
Paolo Pozzilli	Lilly, Sanofi, Medtronic GLG	Speaker Consultant
Jaakko Tuomilehto	Merck, Boehringer Ingelheim, AstraZeneca	PI, Research grant Consultant
Elizabeth Seaquist	Medtronic, Six Degrees Medical Lilly	Consultant  Consultant, PI, Research grant
Norbert Stefan	AstraZeneca, Novo Nordisk, Lilly, OmniaMed	Speaker
Guillermo Umpierrez	Sanofi, NovoNordisk, Merck, Boehringer Ingelheim, AstraZeneca  Sanofi	PI, Research grant  Consultant
Anne Wolf	BMIQ	Co-owner
Sandra Weber	Sanofi	PI, Research grant

Al-Duwairi, Ali, Amiel, Beseler, Besler, Fayfman, Fischl, Gawde, Gerber, Gonder-Frederick, Gregg, Hara, Kumwenda, Lin, Lowery, Siegel, Thule, and Wyne did not disclose.

**All other individuals in a position to control the educational content of this activity (faculty presenters, planners, reviewers, etc) disclosed and they had no financial relationships with commercial interests.**

## **ACKNOWLEDGEMENTS**

Emory University School of Medicine gratefully acknowledges the financial support of the following:

**Boehringer Ingelheim**

**Medtronic**

**Merck**

**Novo Nordisk**

**Sanofi**

## **DISTINGUISHED GUEST FACULTY**

**Ann L. Albright, PhD, RD**  
Centers for Disease Control  
Atlanta, GA

**Mohammed Ali**  
Emory University School of Medicine  
Atlanta, GA

**Qais Al-Duwairi**  
Dasman Diabetes Institute  
Kuwait

**Jessica Alvarez, PhD, RD**  
Emory University School of Medicine  
Atlanta, GA

**Stephanie Amiel**  
King's College  
London, England, UK

**Pablo Aschner, MD, M.Sc**  
Javeriana University School of Medicine  
Bogota, Columbia

**Ijeoma Azonobi, MD, PhD**  
Morehouse School of Medicine  
Atlanta, GA

**Jason Baker, MD**  
Cornell Medical School  
New York, NY

**Lucille Beseler**  
Academy of Nutrition and Dietetics

**Jalit Tanju Besler, PhD**  
Eastern Mediterranean University  
Turkey

**Daniel Blumenthal, MD**  
Morehouse School of Medicine  
Atlanta, GA

**John Buse, MD, PhD**  
University of North Carolina  
Chapel Hill, NC

**Ryan Demmer, MD**  
Columbia University Medical School  
New York, NY

**Robert Eckel, MD**  
University of Colorado  
Denver, CO

**Steven Engebretson, DMD, MS**  
Columbia University Medical Center  
New York City, NY

**Maya Fayfman, MD**  
Emory University School of Medicine  
Atlanta, GA

**Amy Fischl, MS, RD**  
University of Chicago  
Chicago, IL

**Martha Funnell, MS, RN, CDE**  
University of Michigan  
Ann Arbor, MI

**Rafael Gabriel, MD, PhD**  
Hospital University La Paz  
Madrid, Spain

**Peter Gaede**  
University of Copenhagen  
Copenhagen, Denmark

**Ben Gerber, MD**  
University of Illinois  
Chicago, IL

**Linda Gonder-Frederick, MD**  
University of Virginia School of Medicine  
Charlottesville, VA

**Deborah Greenwood, PhD, RN**  
Sutter Medical Foundation  
Sacramento, CA

**Edward Gregg, PhD**  
Centers for Disease Control  
Atlanta, GA

**Mervi Hara**  
Finnish Anti-Smoking Foundation  
Finland

**Simon Heller**  
University of Sheffield  
Sheffield, England, UK

**Ashley Helvig**  
Georgia State University School of Nursing  
Atlanta GA

**Jammie Hopkins, PhD, MS**  
Morehouse School of Medicine  
Atlanta, GA

**Sehnza Karadeniz**  
Istanbul Science University  
Istanbul, Turkey

**Manon Khazrai**  
University Campus Bio-Medico of Rome  
Italy

**Sudhirsan Kowlessur**  
Ministry of Health  
Mauritius

**Mick Kumwenda, MB, CHB**  
Glan Clwyd Hospital  
Rhyl, North Wales, UK

**Evie Lalla, DDS, MS**  
Columbia University Medical Center  
New York City, NY

**David Leslie, MD, FRCP**  
University of London  
London, England, UK

**Ed Lin, MD**  
Emory University School of Medicine  
Atlanta, GA

**Jolene Lowery, MD**  
Morehouse School of Medicine  
Atlanta, GA

**Sue McLaughlin, BS, RD**  
University of Nebraska Medical Center  
Omaha, NE

**Amr Mohamed, MBA**  
Data Scientist  
Pittsburgh, PA

**Andrew Muir, MD, MHS**  
Duke University School of Medicine  
Durham, NC

**Anant Nigam, MD, FRCP**  
Visiting Fellow, Joslin Diabetes Center  
Boston, MA

**Darin Olson, MD, PhD**  
Atlanta Veterans Affairs Medical Center  
Decatur, GA

**Francisco Pasquel, MD**  
Emory University School of Medicine  
Atlanta, GA

**Lawrence Phillips, MD**  
Emory University School of Medicine  
Atlanta, GA

**Paolo Pozzilli, MBBS**  
Barts and the London School of Medicine and Dentistry  
London, England, UK

**Jennifer Rooke, MD, MPH**  
Morehouse School of Medicine  
Atlanta GA

**Elizabeth Seaquist, MD**  
University of Minnesota  
Minneapolis, MN

**Segundo Seclen**  
Peru

**Karen Siegel, MPH, PhD**  
Emory University School of Medicine  
Atlanta, GA

**Abraham Thomas, MD, MPH**

NYU School of Medicine  
New York, NY

**Ruby Thomas, MD, MPH**

Morehouse School of Medicine  
Atlanta, GA

**Peter Thule, MD**

Emory University School of Medicine  
Atlanta, GA

**Kayellen Umeakunne, MS, RD**

Morehouse School of Medicine  
Atlanta, GA

**Guillermo E. Umpierrez, MD**

Emory University School of Medicine  
Atlanta, GA

**Vijay Viswanathan, MD, PhD**

M.V. Hospital for Diabetes  
Chennai, India

**Sandra Weber, MD**

Greenville Memorial Hospital  
Greenville, SC

**Kathleen Wyne, MD**

Wexner Medical  
Center Columbus, OH

**Anne Wolf**

Academy of Nutrition and Dietetics

**Samrawit Yisahak**

Emory University School of Public Health  
Atlanta, GA

**PROGRAM AGENDA**  
(program subject to change)

**Friday, December 2, 2016**

TIME	EVENT	FACULTY	LOCATION
9:00am – 7:00pm	<b>REGISTRATION</b>		A412 Foyer
9:00 am – 1:00 pm	<b>Pre-conference Workshop – Diabetes Prevention Program Update *</b>		A401
	Overview of the National Diabetes Prevention Program	<i>Ann Albright, USA</i>	
	What is a Diabetes Educators role in the National DPP? Describe the AADE DPP Model, Discuss AADE DPP Successes Barriers and Challenges	<i>Joanna Craver DiBenedetto, USA</i>	
	Preventing diabetes using programs other than DPP	<i>Sue McLaughlin, USA</i>	
1:30 – 3:30 pm	<b>Pre-Conference Workshop - Prevention Through the Use of the AACE Algorithm and Guidelines *</b> <b>American Association of Clinical Endocrinologists Symposium (AACE)</b>		A402/403
	Introduction	<i>Sandra Weber, USA</i>	
	Lifestyle and Prediabetes Algorithm	<i>Scott Isaacs, USA</i>	
	Lipid Guidelines	<i>Kathleen Wyne, USA</i>	
	Obesity guidelines	<i>W. Timothy Garvey, USA</i>	
	Panel Q & A		
1:30 – 3:30 pm	<b>Pre-conference Workshop - Academy for Nutrition and Dietetics Nutrition Impact on Diabetes Prevention: A view from schools, communities, and public policy *</b>		A401
	Diabetes and Nutrition Care Center – 3 year Outcome from Diabetes Prevention Program and its effect on the community	<i>Marcy Kyle, USA</i>	
	School Lunch as an ally in the fight against childhood obesity and prediabetes	<i>Donna Martin, USA</i>	
	Public policy and legislative initiatives related to MNT payment for prediabetes	<i>Lucille Beseler, USA</i>	
	Panel Q & A		
4:00 pm	<b>EXHIBIT HALL AND POSTER SESSION OPENING</b>		A411/412
4:15 – 6:30 pm	<b>Opening Session: Keynote Lectures</b> <b>Chairpersons: Jaakko Tuomilehto, Kuwait - Guillermo Umpierrez, USA</b>		A402/403
4:15 – 4:30	Opening Remarks	<i>Jaakko Tuomilehto, Kuwait Mahmoud Ibrahim, USA</i>	
4:30 – 5:00	Diabetes Prevention Program Outcomes Study (DPPOS)	<i>David Nathan, USA</i>	A402/403
5:00 – 5:30	Pharmaceutical Interventions for Diabetes Prevention	<i>John Buse, USA</i>	A402/403
5:30 - 6:00	Metabolic basis of CVD Prevention	<i>Robert Eckel, USA</i>	A402/403
6:00 – 6:30	The Liver as a target organ for understanding Diabetes	<i>Darin Olson, USA</i>	A402/403
6:30 – 6:45	<b>BREAK</b>		A411/412

\* No Emory CME Awarded

6:45 – 7:30 pm	<b>Jaakko Tuomilehto Award Lecture</b> (sponsored by: Dasman Diabetes Institute, Kuwait) Chairpersons: Rafael Gabriel, Spain; Jaakko Tuomilehto, Kuwait		
6:45 – 7:05	Diabetes prevention , closing the gap between theory and practice	<i>Jaakko Tuomilehto , Kuwait</i>	A402/403
7:05 – 7:20	Rising Star in Diabetes Prevention - Jaakko Tuomilehto Award Lecture: Non-Alcoholic Fatty Liver Disease (Nafld) in Native Versus Foreign Blacks in the United States: The Role of Adiposity and Insulin Resistance	<i>Samrawit Yisahak , USA</i>	A402/403
7:20 – 7:30	Commentary and Dasman Award	<i>Qais Al-Duwairi, Kuwait</i>	A402/403
7:30 – 8:30 pm	<b>Chocolate and Human Health</b> (sponsored by: Sabri Ülker Food Research Foundation) Chairpersons: Amy Fischl, USA; Anne Wolf, USA		
7:30 – 7:55	Chocolate and prevention of cardiometabolic disease	<i>Mahmoud Ibrahim , USA</i>	A402/403
7:55 – 8:25	Effect of chocolate on cognitive function and mood	<i>Halit Tanju Besler , Turkey</i>	A402/403
8:25 – 8:30	Commentary	<i>Amy Fischl, USA</i>	A402/403
8:30 – 9:15	<b>OPENING RECEPTION</b>		A411/412

<b>Saturday, December 3, 2016</b>			
<b>TIME</b>	<b>EVENT</b>	<b>FACULTY</b>	<b>LOCATION</b>
7:00 am – 8:00 am	<b>CONTINENTAL BREAKFAST</b>		A411/412
7:00am – 1:00 pm	<b>REGISTRATION</b>		A412 Foyer
8:00 – 9:00	<b>International Hypoglycaemia Study Group Diabetic Hypoglycemia: Questions and Controversies</b>		
8:00 – 8:05	Introduction	<i>Elizabeth Seaquist, USA</i>	A402/403
8:05 – 8:15	Hypoglycemia classification	<i>Simon Heller, UK</i>	A402/403
8:15 – 8:30	Impaired awareness of hypoglycemia	<i>Stephanie Amiel, UK</i>	A402/403
8:30 – 8:45	Fear of hypoglycemia	<i>Linda Gonder-Frederick, USA</i>	A402/403
8:45 – 9:00	Panel Q & A Session		A402/403
9:30 – 11:30am	<b>CONCURRENT SYMPOSIA</b>		
	<b>STATE OF THE ART LECTURES</b> Chairpersons: Pablo Aschner, Colombia; Darin Olson, USA <b>A402</b>	<b>Symposium 1: DIABETES AND CVD</b> Chairpersons: Robert Eckel, USA; Rafael Gabriel, Spain <b>A403</b>	<b>Symposium 2: PREVENTION OF TYPE 1 DIABETES: WHERE DO WE STAND TODAY</b> Chairpersons: Paolo Pozzilli, Italy; Ruby Thomas, USA <b>A401</b>
9:30	Diabetes & Inflammations <i>Guillermo Umperrez, USA</i>	9:30 Childhood Obesity <i>Sue McLaughlin, USA</i>	9.30 Introductory General Lecture ,The Specialty of Public Health & Preventive Medicine and How It Can Contribute to the Prevention of Diabetes <i>Daniel Blumenthal, USA</i>
10:00	Diabetes in Youth and Adolescents <i>Andrew Muir, USA</i>	9:55 Obesity and diabetes: Strategies to optimize cardiovascular health <i>Sandra Weber USA</i>	10.00 Diagnosis of T1D: the case for a kid, an adolescent and an adult. Implications for prevention therapies <i>David Leslie UK</i>
10:30	Phenotypes of Pre-diabetes <i>Norbert Stefan, Germany</i>	10:15 Diabetes, Hypertension and Kidney problems, the killer triad * <i>Mick Kumwenda, UK</i>	10.25 Current primary and secondary trials for prevention of T1 diabetes: An Update <i>Paolo Pozzilli, Italy</i>

\* No Emory CME Awarded

11:00 Follow-up on the Steno-2 Trial <i>Peter Gaede, Denmark</i>	10.35 Hypoglycemia and risk for CVD <i>Anant Nigam, India</i>	10:50 Lifestyle interventions to prevent and treat type 1 diabetes <i>Jason Baker, USA</i>
	10.55 Polycystic Ovary Syndrome and Cardiovascular Disease <i>Abraham Thomas, USA</i>	11:15 Discussion
	11:15 Discussion	
11:30 - Noon	<b>BREAK – VISIT EXHIBIT HALL AND POSTERS</b>	
		A411/412
12:00 – 12:30 pm	<b>Joseph Hoet Lecture ( Menarini Award Lecture ):</b> Prevention of Beta Cell Failure: The changing face of Type 1 Diabetes <i>Paolo Pozzilli, Italy</i> Chairperson: Mahmoud Ibrahim , USA	
		<b>403</b>
12:30 – 2:30 PM	<b>CONCURRENT SYMPOSIA</b>	
<b>Symposium 3: NUTRITION AND DIABETES PREVENTION</b> Chairpersons: Jennifer Rooke, USA; Miriam Vos, USA <b>A402</b>	<b>Symposium 4: DIABETES AND CANCER</b> Chairpersons: Pablo Aschner, Colombia; Francisco Pasquel , USA <b>A403</b>	<b>Symposium 5: NOVEL THERAPIES FOR TYPE 1 DIABETES</b> Chairpersons: Ijeoma Azonobi, USA; Ruby Thomas, USA <b>A401</b>
12:30 Mediterranean Diet, the role of vegetables, oils and legumes <i>Rafael Gabriel, Spain</i>	12:30 Prolonged Hyperglycemia and the Cancer risk <i>Peter Gaede, Denmark *</i>	12:30 Is there any role for SGLT2 in type 1 diabetes? • Yes <i>Kathleen Wyne, USA</i> • No <i>Mick Kumwenda, UK</i>
12:50 Low carb and diabetes prevention, is it a debatable issue? <i>Amy Fischl, USA</i>	1:00 Oral Hypoglycemics and the Cancer risk * <i>Segundo Seclen, Peru</i>	1:10 GLP-1 Could help in type 1 diabetes • Pros <i>Simon Heller, UK</i> • Cons <i>Peter Gaede, Denmark</i>
1:10 Macrobiotic Diet <i>Manon Khazrai, Italy</i>	1:25 Insulin use and the Cancer risk <i>David Leslie, UK</i>	1:50 Immune intervention at disease diagnosis to prevent beta cell failure <i>Jason Baker, USA</i>
1:30 Baltic Diet <i>Jaakko Tuomilehto, Kuwait</i>	1:50 Is Metformin having a protective effect? <i>Anant Nigam, India</i>	2:20 Discussion
1:50 Low Fat Diet <i>Anne Wolf, USA</i>	2:20 Discussion	
2:10 Implementation of a balanced nutrition education program in schools <i>Halit Tanju Besler, Turkey</i>		
2:25 Discussion		
2:30 – 3:30 pm	<b>LUNCH BREAK</b>	
3:30 – 5:30 pm	<b>CONCURRENT SYMPOSIA</b>	
<b>Symposium 6: LIFESTYLE AND DIABETES</b> Chairpersons: Anne Wolf, USA; Jessica Alvarez, USA <b>A402</b>	<b>Symposium 7: CURRENT TECHNOLOGY AND DIABETES PREVENTION</b> Chairpersons: Jammie Hopkins, USA ; Kayellen Umeakunne, USA <b>A403</b>	<b>Symposium 8: PREVENTION OF DIABETES COMPLICATIONS</b> Chairpersons: Sudhirsan Kowlessur, Mauritius; Ashley Helvig, USA <b>A401</b>
3:30 Nutrition and Diabetes Prevention <i>Lucille Beseler, USA</i>	3:30 Social Media and Health Promotion <i>Deborah Greenwood, USA</i>	3:30 If Diabetic Retinopathy is inevitable, can we save the sight? <i>Sehnaz Karadeniz, Turkey</i>
3:55 Lifestyle Interventions to Reverse Pre-Diabetes <i>Jennifer Rooke, USA</i>	4:00 Mobile Health Strategies to Promote Healthy Lifestyles <i>Ben Gerber, USA</i>	3:50 Prevention of Diabetic Foot lesions <i>Vijay Viswanathan, India</i>

\* No Emory CME Awarded

4:20 Effects of physical activity on the liver <i>Darin Olson, USA</i>	4:25 Data Science for targeting communities <i>Amr Mohamed, USA</i>	4:15 Optimizing the renal outcome <i>Mick Kumwenda, UK *</i>	
4:45 Changing the behavior <i>Martha Funnell, USA</i>	4:50 Diabetes technology and lifestyle <i>Linda Gonder-Frederick USA</i>	4:35 Preventing Hypoglycemia complications <i>Stephanie Amiel, USA</i>	
5:15 Discussion	5:15 Discussion	5:00 Prevention of CVD, the late breaking clinical trials <i>Abraham Thomas, USA</i>	
5:30	<b>ADJOURN</b>		
<b>Sunday, December 4, 2016</b>			
9:30 – 11:30	<b>ORAL ABSTRACT PRESENTATIONS I</b> Chairpersons: Anant Nigam, India; Amy Fischl , USA	(no CME)	A401
9:30 – 11:30 am	<b>CONCURRENT SYMPOSIA</b>		
<b>Symposium 9: CENTER FOR DISEASE CONTROL</b> The Status of Diabetes Prevention in the United States: From the Risk Factors to Complications Chairpersons: Francisco Pasquel, USA ; Ann Albright, USA <b>A402</b>		<b>Symposium 10: PREVENTION PROGRAMS</b> Chairpersons: Sue McLaughlin, USA; Mick Kumwenda , UK <b>A403</b>	
9:30 The Epidemiologic Case and Landscape of Diabetes Prevention <i>Edward Gregg, USA</i>	9:30 Diabetes Prevention in Mauritius and Africa <i>Sudhirsan Kowlessur, Mauritius</i>		
10:00 Opportunities in Diet and Nutrition in the Prevention of Diabetes <i>Karen Siegel, USA</i>	9:50 US National Diabetes Prevention Program, Diabetes DDT <i>Lawrence Phillips, USA</i>		
10:25 Lesson from the Field on the Efficacy and Cost of Primary Prevention <i>Mohammed Ali, USA</i>	10:15 Finnish Diabetes Prevention Study Update <i>Jaakko Tuomilehto, Kuwait</i>		
10:50 Six Years Experience of the National Diabetes Prevention Program <i>Ann Albright, USA</i>	10:35 Diabetes Prevention Program in Latin America <i>Pablo Aschner, Colombia</i>		
11:20 Discussion	10:55 Moving forward with NCD prevention Finland: towards tobacco free society <i>Mervi Hara, Finland</i>		
	11:15 Discussion		
11:30 - Noon	<b>BREAK – VISIT EXHIBIT HALL AND POSTERS</b>		A411/412
12:00 – 2:00	<b>ORAL ABSTRACT PRESENTATIONS II</b> Chairpersons: Manon Khazrai, Italy; Rafael Gabriel, Spain	(no CME)	A401
12:00 – 2:00 pm	<b>CONCURRENT SYMPOSIA</b>		
<b>Symposium 11: DEBATE SESSION</b> Chairpersons: Darin Olson, USA; Francisco Pasquel, USA <b>A402</b>		<b>Symposium 12: DIABETES AND ORAL HEALTH</b> Chairpersons: Steven Engebretson, USA; Mahmoud Ibrahim, USA <b>A403</b>	
12:00 A1C: Effective tool for screening • Yes <i>Mick Kumwenda, UK</i> • No <i>Peter Gaede, Denmark</i>	12:00 Epidemiology and Prevention of Periodontal Disease in People with Diabetes <i>Ryan Demmer , USA</i>		
12:30 Is Bariatric Surgery the only tool for everyone with morbid Obesity ? * • Yes <i>Ed Lin, USA</i> • No <i>Peter Thule, USA</i>	12:25 Periodontal Disease as a Risk Factor for Diabetes <i>Ryan Demmer , USA</i>		
1:00 The best Medication to prevent Type 2 diabetes • Metformin <i>Guillermo Umpierrez, USA</i> • GLP1 Agonists <i>Simon Heller, UK</i> • $\alpha$ -glucosidase inhibitor <i>Jason Baker, USA</i>	12:50 Medical-Dental Collaboration in Diabetes and Periodontitis <i>Evanthia Lalla, USA</i>		
1:30 Glycemic Variability and CVD risk • Significant impact <i>Jaakko Tuomilehto, Kuwait</i> • No impact <i>Pablo Aschner, Columbia</i>	1:15 Diabetes and Dental Implants <i>Steven Engebretson, USA</i>		
	1:40 Discussion		

\* No Emory CME Awarded

2:00 – 3:00	<b>LUNCH BREAK</b>	
3:00 – 5:00 pm	<b>CONCURRENT SYMPOSIA</b>	
<b>Symposium 13: WOMEN WITH DIABETES AND PRE-DIABETES</b> Chairpersons: Jenifer Rooke, USA; Jolene Lowery , USA <b>A402</b>	<b>Symposium 14: GLOBAL CHALLENGES IN OBESITY AND PRE-DIABETES</b> Chairpersons: Maya Fayfman, USA; Peter Gaede, Denmark <b>A403</b>	
3:00 CVD Outcome in women How Different ? <i>Abraham Thomas, USA</i>	3:00 Sub Sahara , Africa <i>Mick Kumwenda, UK</i>	
3:25 Gestational Diabetes and the risk of future Diabetes <i>Martha Funnell, USA</i>	3:20 Europe <i>Peter Gaede, Denmark</i>	
3:50 Babies of Diabetic women, Are they at higher risk for future Diabetes ? <i>Jason Baker, USA</i>	3:40 Asia <i>Mohamed Ali , USA</i>	
4:15 Contraception and hormone replacement therapy and CVD risk in diabetic women <i>Rafael Gabriel, Spain</i>	4:00 Latin America <i>Pablo Aschner, Colombia</i>	
4:45 Discussion	4:20 North America <i>Edward Gregg ,USA</i>	
	4:40 Global Burden of obesity <i>Mahmoud Ibrahim, USA</i>	
5:00	<b>MEETING ADJOURNED</b>	

\* No Emory CME Awarded

Special Summit (by invitation only)  
 Global Status of Diabetes Prevention  
 (Pre-Diabetes, Obesity and related risk factors)  
 Saturday, December 3rd  
 5:00 – 7:00 PM  
 Room A 406

List of participants

<b>Name</b>	<b>Organization</b>	<b>Country</b>
Mahmoud Ibrahim	World Community for Prevention of Diabetes WCPD	USA
Jaakko Tuomilehto	World Community for Prevention of Diabetes WCPD	Kuwait
Edward Gregg	Center for Disease Control CDC	USA
Sandra Weber	American Association of Clinical Endocrinology AACE	USA
Nathalie Farpour-Lambert	European Association for the Study of Obesity EASO	Switzerland
Lucille Beseler	Academy of Nutrition and Dietetics	USA
Robert Eckel	University of Colorado	USA
Guillermo Umpierrez	EMORY university	USA
David Leslie	University of London	UK
Paolo Pozzilli	University of Rome	Italy
Rafael Gabriel	Madrid University	Spain
Hans-Ulrich Haering	German Diabetes Research Institute	Germany
Daniel Blumenthal	American College of Preventive Medicine ACLM	USA
George Guthrie	American College of Lifestyle Medicine ACLM	USA
Simon Heller	University of Sheffield	UK
Ibtihal Fadhil	East Mediterranean Office , WHO	Egypt
Temel Yilmaz	Turkish Diabetes Foundation	Turkey
Melissa Spezia Faulkner	Georgia State School of Nursing	USA
Armando Barriguete Meléndez	EPODE , International Obesity Network	Mexico
Mick Kumwenda	NHS Trust Rhyl	UK
Abraham Thomas	Allaiance for Academic Internal Medicine AAIM	USA
Peter Gaede	University of Copenhagen	Denmark
Jason Baker	Cornell Univeristy	USA
Amy Fischl	University of Chicago	USA
Anant Nigam	Jaipur Diabetes Center	India
Martha Funnell	University of Michigan	USA
Jolene Lowery	Morehouse University	USA
Avivit Cahn	Hadassah Hebrew University	Israel
Beverly Taylor	American College of Preventive Medicine ACLM	USA
Sue McLaughlin	National Certification Board of Diabetes Educators NCBDE	USA
Darin Olson	Atlanta VA	USA
Anne Wolf	Academy of Nutrition and Dietetics	USA
Jennifer Rooke	Morehouse University	USA
Sehnaz Karadeniz	Istanbul University	Turkey
Katherine Abraham Evans	Georgia State School of Nursing	USA
Pablo Aschner	Latin America Diabetes Network	Colombia
Mervi Hara	Finnish Anti Smoking Foundation	Finland
Ashley Helvig	Georgia State School of Nursing	USA
Ben Gerber	University of Illinois	USA
Sudhirsan Kowlessur	Ministry of Health	Mauritius

\* No Emory CME Awarded

# Jaakko Tuomilehto Rising Star Award



Presented by

Dasman Diabetes Institute

**CONGRATULATIONS!**

***The Joseph Hoet Memorial Lecture  
Menarini Award on the occasion of the  
World Congress for Prevention of Diabetes and Its Complications***

***In memoriam of Professor Joseph J. Hoet (1925-1999).***

Professor Hoet was one of the founding members of the World Congress for Prevention of Diabetes and Its Complications which was first instituted in 1996. In preparation of the 2<sup>nd</sup> Congress to be held in Fiuggi in 1999 Professor Hoet died of heart attack while swimming. Therefore, the Steering Committee of the congress decided to dedicate to his memory an Award to be given on the occasion of the Fiuggi Congress to a leading figure who highly contributes to the field of prevention of diabetes and its complications. Menarini, a Pharmaceutical Company very active in diabetes, decided to sponsor the award which was officially called “Joseph Hoet Memorial Lecture, Menarini Award”. The first Award was given in Fiuggi on the occasion of the 2<sup>nd</sup> World Congress. Since then, this Award remains a major event in the scientific program of the World Congress for Prevention of Diabetes and its Complications.



**Joseph J. Hoet**

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**Joseph J. Hoet** was born in 1925 and qualified in Medicine in 1951. He specialized in Internal Medicine, Endocrinology and Nutritional Science.

Professor at the Faculty of Medicine of the Catholic University of Louvain in 1969, Joseph Hoet taught diabetology to doctoral students. He also travelled the world at the invitation of academic medical institutions to provide lessons or lectures or to conduct seminars there. Doctors from more than 45 countries have benefited from his enthusiasm and persuasion. Go anywhere in the world where you talk about diabetes, they remember the teaching of Joseph Hoet!

His quality of teaching, his passion to communicate knowledge was also fed but his inexhaustible curiosity and imagination. Above all Joseph Hoet had intuitions and daring.

He encouraged, since the sixties, the development of the radioimmunoassay for insulin, "invention" of Rosalyn Yalow (who later received the Nobel Prize) a discovery which revolutionized Endocrinology. Later he initiated the modern research to discover the role of maternal nutritional environment in the fetal development. He was the first to realize the importance of a multidisciplinary approach to the diabetic patient. The diabetic pregnant woman was his main

preoccupation. He started the multidisciplinary meetings (diabetologists, pediatricians, obstetricians) and allowed the optimal management of the pregnant diabetic woman (including screening for diabetes of pregnancy), His many trips to various countries in South America or Asia not aimed only to gather information, but above all to provide recommendation to the sometimes dramatic local situations.

His research was part of a new perspective assuming a fetal origin to certain diseases of adult age such as type 2 or cardiovascular diseases. He opened the laboratory where he was co-director as "WHO Collaborating Centre for the Biology of the Pancreatic Endocrine Development". Many young doctorates did their thesis and benefited from the contact with Joseph Hoet, who supported them in their efforts for research.

Full member of the Royal Academy of Medicine Belgium in 1988 and Senior Vice President in 1993, member of the Academia Argentina of Nacional Medicine in 1991, founding member of the Diabetes Pregnancy Study Group of the EASD in 1970, President of the International Federation of Diabetes from 1988 to 1991, founding director of the Belgian Diabetes Association, member of many foreign scientific societies, Editor for Europe of Diabetes Research and Clinical Practice, Joseph Hoet still had assumed other relevant mention in science and academia.

He was a member of the Scientific Council of the Queen Elisabeth Medical Foundation, the Association of Doctors out of Leuven (Vice-President and Secretary) of the Belgian Society of Biology, the Physiological Society of England, the Biochemical Society of England, Pharmakologische Gesellschaft Berlin, the Association of French-speaking doctors, the physiologists of the Association, the Society for Advocacy of Diabetics (President ), the Belgian National Work Defence against Tuberculosis (Vice-President), the Medical Society of the Hospitals of Paris, the Canadian Diabetes Association, the Advisory Committee of the Public Health of Washington. It was welcoming to all, sometimes conciliatory to excess, persistent and highly animated in an almost contagious inner life. He was Grand Officer of the Order of the Crown, Knight of the Order of Leopold, Commander of the Order of Leopold and Grand Officer of the Order of Leopold and he received a 1st class Civic Cross. He was Doctor Honoris Causa from the University of Toronto. The hope, no doubt, his faith in man and the belief to do well, brought him to the recognition of this award named after him. Joseph Hoet loved life. He loved sport which he practiced with the passion.

He published approximately 300 scientific papers in the field of medicine and diabetology.

## ***2• World Congress for Prevention of Diabetes and Its Complications***

**Fiuggi, Italy (1999)**

Charles Nicholas Hales was a Biochemist born in Stafford, UK, in 1935 whose career in diabetes research took place at the interface between basic and clinical sciences. He died in 2005. Nick Hales had a passion for science that was tangible to those who worked with him. In particular, they remember him as a researcher who was always willing to engage in scientific discussion with his colleagues. After an education at King Edward VI Grammar School, Stafford, he read medicine at Trinity College, Cambridge University, Cambridge, and did his clinical training at University College Hospital, London, UK. He returned to Cambridge in 1960 for a PhD at the department of bio-chemistry. The biochemistry of diabetes was poorly understood at the time, explains Luzio, and there were no methods to measure serum concentrations of insulin. Hales quickly established his reputation by developing modifications to the technique of immunoassay using radioactive insulin. In 1964, after finishing his doctorate, he was appointed to the post of university lecturer in biochemistry at Cambridge, and elected a Fellow of Downing College where he taught undergraduates while still seeing patients with diabetes at Addenbrooke's Hospital. In 1970, Hales moved to the Welsh National School of Medicine in Cardiff, where he was appointed head of department and honorary consultant in chemical pathology, and where he continued to refine immunoassay methods. "Nick's conceptual development of assay technology made a huge impact", recalls Steve O'Rahilly, Hales' successor as head of the department of clinical biochemistry at Cambridge. However, the work on immunoassays was only one of three major scientific phases in Hales life, O'Rahilly explains. "He just liked to follow things he was interested in". In 1977, Hales returned to Cambridge. Then, during a sabbatical year in Seattle, in 1984, another major phase of his research career developed. In that year, together with Dan Cook, he observed an ATP-sensitive potassium channel in pancreatic cells that helped explain how glucose instructs the pancreas to secrete insulin. Then, in the late 1980s, Hales embarked on the third major phase of his scientific work when he and David Barker, an epidemiologist from University of Southampton, began to work on the associations between fetal development and later disease. Knowing that most insulin-producing cells are laid down during fetal life, Hales thought that poor in-utero nutrition could be harmful.



**Charles Nicholas Hales**

With others, he showed that low birthweight greatly increased the risk of diabetes in later life.

Throughout his career, Hales strongly felt that basic science departments of biochemistry should work closely alongside clinical departments, says O’Rahilly. Hales was a member of the Medical Research Council from 1985 to 1990, and was elected a Fellow of the Royal Society in 1992. Among the many awards he received were those from the British Diabetic Association, the European Association for the Study of Diabetes, the Society for Endocrinology, the Association of Clinical Biochemists, and the Royal College of Physicians. He was the author of more than 300 publications in the field of biochemistry and medicine.

### ***3° World Congress for Prevention of Diabetes and Its Complications*** **Hong Kong, China (2002)**

Peter H. Bennett is regarded internationally as one of the most foundational and forward-thinking researchers to have worked in the field of diabetes. Throughout his career spanning more than fifty years, Dr. Bennett has continuously made contributions to the worldwide scientific community in the understanding of diabetes and its complications, impacting the ways we treat and prevent the disease today, and driving forward progress toward a cure for diabetes in the future. Educated at the Victoria University Manchester



**Peter H. Bennett**

Medical School in Manchester, England, Dr. Bennett served as Chief of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Phoenix Epidemiology and Clinical Research Branch, the National Institutes of Health branch charged with diabetes research. He currently serves as Scientist Emeritus at NIH.

Dr. Bennett was the first to initiate a major longitudinal study of type 2 diabetes and its complications, leading to the initial identification of many risk factors for diabetes such as obesity, lack of physical activity, and insulin resistance. After observing an unusually high prevalence of diabetes in the Pima Indians of Arizona, Dr. Bennett worked with them and initiated this study which lasted more than 40 years. The study resulted in the basis for the development of criteria used internationally for diagnosing diabetes and impaired glucose tolerance, also referred to as pre-diabetes. Adopted by the World Health Organization in 1980, these criteria have endured and remain as the internationally accepted criteria to this day. Dr. Bennett was also the first to introduce the concept that type 2 diabetes is preventable. He played an instrumental role in the Da Qing Diabetes Prevention Study in China which proved that type 2 diabetes can be avoided through increased levels of physical activity and decreased obesity. These findings played a major role in the National Institutes of Health establishment of the Diabetes Prevention Program, which has been translated into far-reaching prevention programs across the United States, and modeled around the world.

He has also contributed to – and in many cases initiated – numerous other international studies of diabetes. Among the accomplishments of these studies were the recognition that there are many specific populations, such as Pacific islanders, with high diabetes rates, and the recognition of the emergence of major epidemics of diabetes in China, India, the Middle East, and other regions where lifestyles are rapidly changing.

Perhaps the most significant lasting impact of all is Dr. Bennett's dedication to mentoring and training the next generation of diabetes researchers, no doubt expanding his influence well beyond the length of his personal career. More than 50 scientists have been directly mentored by Dr.

Bennett since the 1970's, many now holding leadership positions in academic and federal institutions focused on diabetes and its complications.

He continues to this day to encourage novel research in diabetes through a series of international diabetes epidemiology training courses, reaching more than 800 young diabetes researchers around the world. He has organized, led, or taught in courses sponsored internationally by the World Health Organization, International Diabetes Federation, International Diabetes Epidemiology Group, Chinese Academy of Science, and many other diabetes organizations in the Americas, Africa, Asia-Pacific, Cameroon, Japan, Australia, and Saudi Arabia.

He has been bestowed with many awards recognizing his unprecedented contributions to diabetes research. Among others, he has won 19 major awards for diabetes research, virtually all those available in the field, including both the Kelly West Award and the Banting Medal for given by the American Diabetes Association, and recently the Harold Rifkin Award for Distinguished International Service. He also has been awarded 13 honorary memberships, belongs to 14 scholarly societies, and has presented 91 honorary lectureships.

He is author of almost 400 papers in the field of the epidemiology and the pathogenesis of diabetes mellitus and its complications.

## ***4• World Congress for Prevention of Diabetes and Its Complications***

**Chennai, India (2005)**

Brigitte Reusens was born in Belgium on 30 June 1951. She is the group leader with Professor Claude Remacle at the Institute of Life Sciences of the Catholic Université catholique de Louvain (UCL, Belgium). She is Senior Research Associate. She has a Master Degree (1974). She has worked at the Katolieke Universiteit of Leuven (1975) and got a PhD Degree (1985) at the Université Catholique de Louvain. Brigitte Reusens has spent most of her carrier to investigate the role of the maternal environment including the diabetic and nutritional environment on the development of the



**Brigitte Reusens**

endocrine pancreas and the short and long term consequences for the offspring in a first and even in a second generation. Her field of expertise is the maternal and fetal physiology, primary and cell line culture, histology, immunochemistry and morphometry, nutrition metabolism and both type 1 and type 2 diabetes.

In field of diabetes she had confirmed the relationship between poor fetal and early postnatal nutrition and the susceptibility to diabetes later in life and establishing how a reduction in the availability of nutrients during fetal development programs the endocrine pancreas and insulin-sensitive tissues.

She is Member the European Association for the Study of Diabetes (EASD), Diabetic Pregnancy Study Group (DPSG) and the American Diabetes Association (ADA). She participated in NUTRIX programme (QLK1-2000-00083 “Early malnutrition and programming of adult degenerative diseases: experimental, epidemiological and preventive studies”), a trial designed to analyse the early molecular and cellular events induced by an imbalanced nutrition and their late consequences in organs targeted by these degenerative diseases and to determine the key nutrients responsible for the defects and to propose prevention.

Furthermore she collaborated in the EARNEST programme (FOOD-CT-2005-007036 “Early Nutrition Programming”) which brought together a multidisciplinary team of international scientists and leaders in key areas of the early nutrition programming field from 40 major research centers across 16 European countries. This integrated program of work combines experimental studies in humans, prospective observational studies, and mechanistic animal work, including physiologic studies, cell culture models, and molecular biology techniques. She is an author of 66 peer-reviewed publications, 25 chapters and reviews in the field of diabetes, nutrition and fetal programming.

## ***5• World Congress for Prevention of Diabetes and its Complications***

**2008 Helsinki, Finland**

Professor Nick Wareham is Director of the MRC Epidemiology Unit in Cambridge and an Honorary Consultant at Addenbrooke's Hospital, Cambridge. He is also Director of the Centre for Diet and Activity at the University of Cambridge (CEDAR).

He was formerly a Wellcome Trust Senior Fellow in Clinical Science in Cambridge. He qualified in medicine from St Thomas' Hospital Medical School, London, and trained in epidemiology and public health at the London School of Hygiene and Tropical Medicine, London, Harvard University, Boston, USA and at the University of Cambridge.



**Nick Wareham**

He undertakes research into the aetiological determinants of diabetes, obesity and related metabolic disorders and the translation of that epidemiological understanding into preventive action. He is a principal investigator on the EPIC-Norfolk study on which he collaborates with Professors Kay-Tee Khaw and Sheila Bingham. Together with Steve O'Rahilly (University of Cambridge) and Inês Barroso (Wellcome Trust Sanger Institute) he is undertaking a programme of research into the genetic basis of obesity and type 2 diabetes (the Genetics of Energy Metabolism (GEM) consortium. This study is designed to investigate how genetic and lifestyle behavioural factors, particularly diet and physical activity, interact in their influence on the risk of developing type 2 diabetes. A key element of this work is the accurate measurement of lifestyle exposures. The nutritional epidemiology aspects of the Units work are undertaken in collaboration with colleagues in the MRC Dunn Unit (Bingham). The Unit has a specific programme on physical activity epidemiology (lead Ulf Ekelund) which aims to improve objective and questionnaire-based assessment of physical activity. The Unit has developed methods for measuring energy expenditure in free-living individuals in population-based studies using combined heart rate and movement sensing. Prof Wareham is co-lead of the MRC ProActive Trial, an RCT of a theoretical approach to increasing physical activity in sedentary individuals with a family history of diabetes. He is also a lead for the ADDITION study, a trial of intensive cardiovascular risk reduction in people with screen detected diabetes. Half of the patients diagnosed with type 2 diabetes in the ADDITION study went on to receive standard care for type 2 diabetes from their general practice following national guidelines. The other half received an intensive treatment programme to reduce their risk of cardiovascular disease.

He is the author of more than 300 peer-reviewed publications and 9 books or books chapters. Prof Wareham is a member of the MRC Physiological Systems and Clinical Sciences Board and the MRC Public Health Research Oversight Group.

## ***6• World Congress for Prevention of Diabetes and Its Complications***

**Dresden, Germany (2010)**

Professor Haffner is Professor of Internal Medicine at the University of Texas Health Science Center, Department of Medicine, Division of Clinical Epidemiology in San Antonio, Texas. He completed a graduate degree at Columbia University in New York in 1969, received his medical degree in 1975 from Albert Einstein College of Medicine in New York and, in 1982 received a Masters of Public Health (Epidemiology) from the University of Washington.



**Steve Haffner**

Recent honors and awards include: Honorary Membership, Argentine Diabetes Association, 1997; Honorary Membership, Austrian Diabetes Association, 1999 American Diabetes Association, 1997 Kelly West Award. Dr. Haffner is a certified member of the American Board of Internal Medicine, September 1978; Endocrinology and Metabolism, November 1981; and, the American College of Epidemiology, June 1985. He currently belongs to many professional organizations including: American College of Physicians; American Heart Association, Fellow (Council on Epidemiology, Committee on Assessment of Cardiovascular Risk); American Federation of Clinical Research; Endocrine Society; American College of Epidemiology; North American Society for the Study of Obesity; American Society for Clinical Investigation; American Academy of Physicians, as well as sits on the editorial board for the Journal of Clinical Endocrinology and Metabolism. He holds the following positions with the American Diabetes Association: Chairman of the Program Committee; Council on Epidemiology; Professional Needs Task Force; Annual Scientific Sessions Planning Committee; and Task Force on Standardization of Insulin Measurements.

He is Principal Investigator for the Insulin Resistance Atherosclerosis Study, the Diabetes Primary Prevention Project, and the SHOW trial. He chairs the Cardiovascular Events Committee for the Reduction of Endpoints in NIDDM with the AII Antagonist Losartan (RENAAL) study and serves on the Rosiglitazone Advisory Board, as well as the Data Safety and Monitoring Board of the Treat to New Targets (TNT) secondary prevention atorvastatin trial.

He is an invited lecturer at national and international conferences, symposia, and meetings on topics relating to diabetes, hypertension, insulin resistance, and cardiovascular disease. He serves on the editorial board of the Journal of Clinical Endocrinology and Metabolism and is the author or co-author of more than 450 articles, book chapters, reviews, editorials, and abstracts.

## ***7• World Congress for Prevention of Diabetes and Its Complications***

**Madrid, Spain (2012)**

Massimo Porta is Full Professor of Internal Medicine at Turin University, where he graduated in medicine in 1977. He was granted his PhD at the Royal Postgraduate Medical School, London University, UK in 1983, where he worked on diabetic eye disease. Currently, he is Head of the Unit of Internal Medicine 1 at Turin teaching hospital (Molinette).



**Massimo Porta**

Professor Porta's research interests include the pathogenesis of diabetic retinopathy, prevention of diabetes-related blindness and Group Care, a new model to manage chronic diseases based upon patient education according to a systemic approach. Prof. Porta and his group found two SNPs in strong linkage disequilibrium in the SLC19A3 locus associated with reduced rate of severe retinopathy and the combined phenotype of severe retinopathy and end-stage renal disease. The association for the combined phenotype reached genome-wide significance in a meta-analysis including the WESDR cohort. These findings suggest that genetic variations in SLC19A3 may play an important role in the pathogenesis of severe diabetic retinopathy and nephropathy. This may help to explain why some people with type 1 diabetes are less prone than others to develop microvascular complications. These studies were based on the largest group of T1D subjects for which the entire genome was analysed to identify SNPs.

Professor Porta is Past-President of the Study Group on Eye Complications of Diabetes of the European Association for the Study of Diabetes (EASDec), and was Secretary of the Italian Society of Diabetes (1982-84), Convenor of the Working Group of the Saint-Vincent Declaration for the prevention of Diabetes-Related Blindness in Europe, supported by the World Health Organization and the International Diabetes Federation (1985-95) and Honorary Secretary of the European Association for the Study of Diabetes (EASD) in 1999–2001. Prof. Porta is full member of Turin Academy of Medicine.

Professor Porta has authored 161 papers in indexed journals, 99 other articles, 44 chapters, and edited or co-edited 11 books/monographs. He was Editor-in-Chief of *Acta Diabetologica* and Series Editor of *Frontiers in Diabetes*, published by Karger, Basel.

## ***8<sup>o</sup> World Congress for Prevention of Diabetes and Its Complications***

**Cartagena, Colombia (2015)**

Professor Jaakko Tuomilehto is Professor Emeritus of Public Health of the University of Helsinki, Finland, and currently working as the Professor of Vascular Prevention at the Danube-University Krems in Krems, Austria and is also associated with the Diabetes Prevention Unit of the Finnish National Institute for Health and Welfare and Diabetes Research Group, King Abdulaziz University, Jeddah, Saudi Arabia. Previously, he was working as Medical Officer for Cardiovascular and Metabolic Diseases in the WHO Regional Office for Western Pacific in Manila, Philippines, Professor of Public Health at the University of Kuopio, Finland and Research Professor at the National Public Health Institute in Helsinki, Finland.



**Jaakko Tuomilehto**

His research interests include the epidemiology and prevention of non-communicable diseases such as diabetes, cardiovascular disease (CVD), cancer and dementia. He has contributed many landmark studies, including the North Karelia Project, the 1st community-based prevention programme for CVD in the 1970s, the Finnish Diabetes Prevention Study (DPS) that in 2001 demonstrated a remarkable 58% reduction in the incidence of diabetes with lifestyle intervention. He was coordinating the WHO multinational MONICA Project on monitoring trends in cardiovascular disease and their risk factors. His prospective studies have established the importance of vascular risk factors for the development of dementia and Alzheimer's disease. He has participated in several major randomised controlled trials that have provided the basis for the current evidence-based treatment of hypertension.

He has carried out a wide range of studies in type 1 diabetes and is the Principal Investigator of the WHO DIAMOND Project mapping the incidence of childhood type 1 diabetes worldwide. He also established large international collaborative studies of diabetes epidemiology, the DECODE/DECODA (Diabetes Epidemiology-Collaborative analysis of Diagnostic Criteria in Europe/Asia) studies that have assessed the glucose criteria for the diagnosis of diabetes. He has been involved in research aiming at identifying susceptibility genes for type 1 and 2 diabetes and associated traits.

He has been acting as a member several ADA and WHO committees on diabetes and CVD.

He has played an active role within the European Society of Cardiology, and was a member of the recent "Diabetes and Cardiovascular Disease Guideline" task force. He is actively involved in

several committees, scientific organizations and advisory boards nationally and internationally including the Chair of the International Diabetes Epidemiology Group, European Society of Cardiology Working Group on Epidemiology and Prevention, Finnish Hypertension Society and Finnish Epidemiological Society.

He has been a member or Associate Editor for Editorial Boards of many scientific journals, and currently serves as the Editor-in-Chief of Primary Care Diabetes. He has received many prestigious scientific awards, including the ADA Kelly West Award ADA Harold Rifkin Award, EASD Camillo Golgi Award, Sheik Hamdan International Diabetes Award, ESC Geoffrey Rose Award, Folksam Prize of the Karolinska Institute and AHA Fredrick H Epstein Award, and is a member of Finnish Academy of Science and Letters. He is one of the most cited authors in the field of clinical medicine and diabetes worldwide with an h-index of 145 and over 500 papers published.

## ***9<sup>o</sup> World Congress for Prevention of Diabetes and its Complications***

**Atlanta, USA (2016)**

**Paolo Pozzilli** is Full professor of Endocrinology and Metabolic Diseases at University Campus Bio-Medico of Rome where he is also the director of the Post-Graduate School in Endocrinology and of the PhD program in Integrated Biomedical Sciences and Bioethics. He is also Honorary Professor of Diabetes and Clinical Research at the Barts and The London School of Medicine, Queen Mary University of London. He has received his Degree in Medicine from University “Sapienza”, Rome, Italy and he has specialized in Endocrinology and Diabetes at the same University.



**Paolo Pozzilli**

Since his specialization and for more than 30 years he worked in the field of diabetes with particular focus into type 1 diabetes (T1D) pathogenesis and prevention in collaboration with several investigators around the world. He is an internationally recognized leader in this field including studies on the etiology, pathogenesis and novel forms of therapeutic intervention (immunotherapy) of T1D. He set up with others the EURODIAB study on the incidence of childhood T1D that is the most comprehensive mapping of the incidence of type 1 diabetes in Europe. He was the founder of the IMDIAB group (immunotherapy of T1D) in the late 1980s which has published over 30 papers in the field of T1D intervention. He is currently a regional P.I. for TRIGR (the longest and still running trial for the primary prevention of T1D in genetically susceptible 1st degree relatives of T1D probands).

In the nineties with the introduction of genetic studies applied to T1D, he was actively involved in the characterization of HLA and other gene markers in different T1D populations worldwide. He pioneered studies focusing on the link between genetic and immunological markers with clinical findings in different populations and in relation with the residual beta cell function. He was among the first to investigate the epidemiological and pathogenetic mechanisms of latent autoimmune diabetes in adults (LADA) in Caucasian and Asian populations. The most relevant international studies in which he acted as Leader or regional P.I. include ENDIT, TRIGR, Action LADA and 13 IMDIAB trials as P.I.

He has current scientific collaborations with investigators in Europe, US and more recently in China. He has served as consultant on T1D to countries including Middle East (UAE, Egypt), Europe (Belgium, Finland, Spain, Poland, Sweden) and has been on the scientific review committee of JDRF (USA) in different periods for a total of nearly 10 years. He has also served for the EU in the

grant selection for the 5th Framework Programme. He is currently the Editor of Diabetes Metabolism Research & Reviews.

Professor Pozzilli has received several awards, the most significant ones include the Andrew Cudworth Memorial Award by the British Diabetic Association, the Morgagni Award for Best Young Investigators, the Celso Prize by the Italian Society of Diabetology, the Marie Kugel Award by the Juvenile Diabetes Foundation (USA), the Diabetes Honoris Causa by the Paulescu Foundation, Romanian Diabetes Society and the The Joseph Hoet Memorial Lecture, Menarini Award 2016.

He has published a total of over 400 peer-reviewed articles, edited 6 textbooks, mentored over 30 endocrinology fellows and is a frequent invited lecturer on topics of type 1 diabetes pathogenesis, immunotherapy and algorithm for treatment of type 2 diabetes.



The Menarini Group is an Italian pharmaceutical company. It was founded in Naples, Italy, in 1886. Its headquarters is in Florence and has three divisions: Menarini Ricerche, Menarini Biotech and Menarini Diagnostics. It is committed to the search for pharmacological solutions for such therapeutic areas as cardiovascular diseases, oncology, pain/inflammation, asthma and anti-infectives. Menarini's research activities are carried out through Menarini Ricerche, which deals with all R&D activities, from the creation of new projects up to the drug registration. Its Menarini Biotech follows the creation of a biotechnological drug from the very early stages of research, through to the pilot scale and up to industrial production.

In case of Diabetes and in particular of self glucose monitoring, Menarini has improved the quality of people's lives and achieve maximum customer satisfaction by providing services and products. All systems and products comply with strict rules and regulations, fully satisfying the requirements of standards and Menarini quality controls.

# ORAL ABSTRACT PRESENTATIONS I

Sunday, December 4

9:30am – 11:30am

Chairpersons: Anant Nigam, India; Amy Fischl, USA

Room A401

**Each oral presentation is 10 minutes including two minutes discussion**

Abstract # OR-1	Cannabidiol delays type 1 diabetes onset in non-obese diabetic mice by decreasing inflammation within the microvasculature of the pancreas	<i>Nicholas B. Fisher, Juan Zhou, Anna Maria Szczesniak, Christian Lehmann, Canada</i>
Abstract # OR-2	Divided consumption of late-night-dinner improves glycemic excursions in patients with type 2 diabetes; a randomized cross-over clinical trial	<i>Saeko Imai<sup>1</sup>, Shizuo Kajiyama, Yoshitaka Hashimoto, Chikako Yamane, Takashi Miyawaki, Neiko Ozasa, Muhei Tanaka<sup>3</sup>, Michiaki Fukui, Japan</i>
Abstract # OR-3	Organization of podiatric service via the project “Diabetic foot care improvement” in Georgia	<i>Elena Shelestova, Natia Amilakhvari, Simon Gabritchidze, Lika Tsutskiridze, Ramaz Kurashvili, Georgia</i>
Abstract # OR-4	Project diabetes prevention and care improvement realized by Welfare Foundation Georgia in collaboration with Georgian union of diabetes and endocrine associations	<i>Ramaz Kurashvili, Simon Gabritchidze, Elena Shelestova, Lika Tsutskiridze, Ana Zhulina, Georgia</i>
Abstract # OR-5	Nurse education in diabetes – important part of prevention and early detection of diabetes and its complications	<i>Elena Shelestova, Marina Sakhvadze, Lika Tsutskiridze, Ramaz Kurashvili, Georgia</i>
Abstract # OR-6	Diabetes prevention in rural Georgia –Georgian Red Cross Society and Gudeas joint project	<i>Ketevan Mindeli, Ketevan Gordeladze, Shorena Tsiklauri, Nino Osepaishvili, Elena Shelestova, Lika Tsutskiridze, Ramaz Kurashvili, Georgia</i>
Abstract # OR-7	Serum biomarker panel for screening of different stage of diabetic nephropathy	<i>Khalid Siddiqui, Mohammed A Al-Ghonaim, Khalid Al-Rubeaan, Saudi Arabia</i>
Abstract # OR-8	Serum 25-hydroxyvitamin d associates with human leukocyte antigen (HLA) polymorphisms	<i>Leena Kinnunen; Valma Harjutsalo; Heljä-Marja Surcel; Christel Lamberg-Allardt; Jaakko Tuomilehto, Maija E Miettinen, Finland</i>
Abstract # OR-9	Diabetes screening in pregnancy failing rural women in western Australia	<i>Julia V Marley; Kerry Sterry; Sally Singleton; Sarah Moore; David Atkinson; Andrew B Kirke, Australia</i>
Abstract # OR-10	Student-led diabetes quality improvement at an urban safety net clinic: the three year experience of the diabetes improvement team	<i>Byron Crowe, Kristen Flint, Nathan Spell, USA</i>
Abstract # OR-11	Comparison of anti- <b>HYPERGLYCEMIC</b> effects of cinnamon on postprandial blood glucose when ingested before, simultaneously with and after the intake of carbohydrate among normoglycemic subjects	<i>Albert M. Hutapea; Lyna M. N. Hutapea; Kimberley M. M. Hutapea Dwight M. M. Hutapea, USA</i>

## ORAL ABSTRACT PRESENTATIONS II

Sunday, December 4

Noon – 2:00 pm

Chairpersons: Manon Khazrai, Italy; Rafael Gabriel, Spain

**Room A401**

Abstract # OR-12	Unraveling Kuwait-specific metabolic gene regulatory and coding variants: a step towards building a national exome database	<i>Rasheeba Nizam, Dinu Antony, Sumi Elsa John, Prashantha Hebbar, Motasem Melhem, Malak Qaddoumi, Jaakko Tuomilehto, Alphonse Thangavel, Osama Alsmadi, Kuwait</i>
Abstract # OR-13	The <i>Life!</i> program: lessons from 8 years of real-world state-wide diabetes prevention	<i><u>Cara J Büsst</u>; Meg O'Donne; Amy Timoshanko, Australia</i>
Abstract # OR-14	<i>Life!</i> telephone health coaching: an effective approach to diabetes prevention	<i><u>Cara J Büsst</u>; Bianca Caputi; Meg O'Donnell; Amy Timoshanko Australia</i>
Abstract # OR-15	Prevalence of impaired fasting glycemia and related risk factors in population at risk for type 2 diabetes according to the ada criteria: risk study results–III	<i>T. Yilmaz, N. Okumus, M. Sargin, G. Incesu, H. Sur, S. Karadeniz, Turkey</i>
Abstract # OR-16	Diabetes peer education program - preliminary results at the second year	<i><u>M. Temel Yilmaz</u>, Ilhan Yetkin, Ahmet Kaya, Mustafa Kemal Balci, Raziye Gedikli, Gunduz Incesu, Sehnaz Karadeniz on behalf of Diabetes Peer Education (DIPEP) Study Group, Turkey</i>
Abstract # OR-17	Increased circulation level of angptl8/betatrophin and angptl4 in hypertension	<i>Mohamed G. Qaddoumi, Irina AlKhairi, Preethi Cherian, Muath Alanbaei, Jihad Abubaker, <u>Mohamed Abu-Farha</u>, Kuwait</i>
Abstract # OR-18	Development of a tool for identifying 12-14 year olds at high risk of developing type 2 diabetes in the future: a novel approach	<i><u>Laura Gray</u>, Emer Brady, Susann Blüher, Charlotte Edwardson, Deirdre Harrington, Itziar Vergara Mitxeltoarena, Rogerio Ribeiro, Melanie Davies on behalf of the PRE-Start Collaborative, UK</i>
Abstract # OR-19	Prospective validation of the leicester self-assessment score for type 2 diabetes using data from the english longitudinal study of ageing	<i><u>Shaun R Barber</u> , Nafeesa N Dhalwani, Melanie J Davies, Kamlesh Khunti, Laura J Gray, UK</i>
Abstract # OR-20	External validation of the leicester self-assessment diabetes risk score in a population with intellectual disability	<i><u>Laura Gray</u>, Yogini Chudasama, Alison Dunkley, Freya Tyrer, Rebecca Spong, S Bhaumik, Melanie Davies, Kamlesh Khunti On behalf of the STOP Diabetes Team, UK</i>
Abstract # OR-21	The NHS Diabetes Prevention Programme in England: Lessons learnt from process evaluation of the demonstrator site phase	<i><u>Anna Haste</u>, Angela M Rodrigues, Linda Penn, Ruth Bell, Carolyn D Summerbell, Martin White, Ashley J Adamson&amp; Falko F Sniehotta, UK</i>
Abstract # OR-23	Body Habitus and Diabetes Risk, a comparison between ethnic groups	<i>Cother Hajat, Giada Scarpetti, Alawi Alsheikh-Ali, Afzalhussein Yusufali, UAE</i>

**CANNABIDIOL DELAYS TYPE 1 DIABETES ONSET IN NON-OBESE DIABETIC MICE BY DECREASING INFLAMMATION WITHIN THE MICROVASCULATURE OF THE PANCREAS**

*Nicholas B. Fisher<sup>1</sup>, Juan Zhou<sup>2</sup>, Anna Maria Szczesniak<sup>3</sup>, Christian Lehmann<sup>4</sup>,*

*Susan Meek<sup>5</sup>, Barna Tugwell<sup>6</sup>*

1: Department of Biology, Dalhousie University, Canada 2: Department of Biology, Saint Mary's University, Canada 3-Department of Pharmacology (Dalhousie University), Department of Pharmacology (Dalhousie University), Department of Microbiology and Immunology (Dalhousie University),Canada 4-Department of Anesthesia, Pain Management and Preoperative Medicine (Dalhousie University), Department of Physiology and Biophysics (Dalhousie University), Canada 5- Department of Biology (Saint Mary's University),Canada 6-Department of Medicine-Division of Endocrinology (Dalhousie University), Canada

**Objective:** This study was to test the therapeutic potential of CBD in the delay of T1D and to evaluate the immune response during T1D onset by IVM in NOD mice.

**Methods:** Seven-week-old female NOD/ShiLtJ mice were prophylactically administered 5mg/kg CBD or control vehicle (Cremophor EL, 95% ethyl alcohol and 0.9% NaCl sterile saline; in a 1:1:18 ratio) intraperitoneally (IP) for ten weeks (five times per week). T1D diagnosis was confirmed following two fasting blood glucose tests, on two separate days (blood glucose values >13.3mmol/L). Parameters of leukocyte activation and functional capillary density (FCD) were quantified via IVM, following T1D diagnosis.

**Results:** (IP) administration of 5mg/kg CBD significantly reduced leukocyte adhesion and increased FCD in diabetic female NOD mice. CBD-treated individuals were found to consistently develop T1D later than control vehicle-treated individuals throughout the course of the study. When all animals were 27-33 weeks of age, 50% more CBD treated individuals remained living without T1D, compared to that of control vehicle treated individuals.

**Conclusion:** CBD treatment represents a pharmacological option to delay onset of T1D in female NOD mice. Future research will elucidate the mechanisms of action of CBD on the immune system, in order to design novel medical approaches for delaying or preventing T1D in humans.

**DIVIDED CONSUMPTION OF LATE-NIGHT-DINNER IMPROVES GLYCEMIC EXCURSIONS IN PATIENTS WITH TYPE 2 DIABETES; A RANDOMIZED CROSS-OVER CLINICAL TRIAL**

*Saeko Imai<sup>1</sup>, Shizuo Kajiyama<sup>2, 3</sup>, Yoshitaka Hashimoto<sup>3</sup>, Chikako Yamane<sup>4</sup>, Takashi Miyawaki<sup>1</sup>, Neiko Ozasa<sup>5</sup>, Muhei Tanaka<sup>3</sup>, Michiaki Fukui<sup>3</sup>*

1-Department of Food and Nutrition, Kyoto Women's University, Japan, 2- Kajiyama Clinic, Japan, 3- Kyoto Prefectural University of Medicine, Graduate School of Medical Science, Japan

4- St. Mary's Hospital, Japan, 5- Kyoto University, Graduate School of Medicine, Kyoto, Japan

**Objective:** Was to explore the acute effect of late-night-eating-dinner and the divided dinner on postprandial glucose and hormone secretion in patients with type 2 diabetes (T2DM).

**Methods:** Was a randomized, open-label, cross-over, within-participant, clinical trial. During the test period, each participant wore a continuous glucose monitor (CGM) for 5 days and consumed identical test meals. The test meals consisted of white rice, white bread, milk, gluten meat and fried fish of frozen food, tomato (100 g × 3), spinach (80 g × 2), and broccoli (60 g), were provided by the research group. The energy ratios of test meals were 58%, 17%, and 25% from carbohydrates, proteins, and fat, respectively, and contained 21 g of dietary fiber. The energy ratios of breakfast, lunch, and dinner were 25% (400 kcal), 35% (540 kcal), and 40% (620 kcal), respectively. The participants consumed the first dish of vegetables for 5 min, then the main dish for 5 min, and rice/bread for 5 min of each test meal. The test meals were consumed in their entirety 15 min. Each participant consumed the test meals of breakfast at 0800 h, lunch at 1300 h, and dinner at 2100 h (D21h) or divided dinner (DD: tomatoes and rice at 1800 h and the spinach and gluten meat at 2100 h) on the second or the fourth day, and 1800 h (D18h) on the third day. Blood samples were taken at various time intervals: 0, 30, 60, 120 min after dinner on the D21h and the D18h, and 0, 30, 60, 120 min at 18:00, and 0, 30, 60, 120 min at 21:00 in the DD. The daily glucose parameters and pre- and postprandial levels for insulin were evaluated and compared among D18h, D21h, and DD.

**Results:** Sixteen patients with T2DM (Age  $70.6 \pm 5.6$  years, HbA1c  $7.2 \pm 0.6\%$ , BMI  $22.7 \pm 2.6$  kg/m<sup>2</sup>, mean  $\pm$  SD) were assigned to the study. The mean amplitude of glycemic excursion (MAGE: D21h  $6.9 \pm 0.6$  vs. D18h  $5.6 \pm 0.5$  mmol/L,  $P < 0.05$ , mean  $\pm$  SEM), and incremental area under the curve (IAUC 2300-0800) for glucose were significantly higher in the D21h compared to those in the D18h (D21h  $643.5 \pm 155.9$  vs. D18h  $147.0 \pm 63.7$  mmol/L $\times$ min,  $P < 0.01$ ). On the other hand, MAGE (DD  $5.5 \pm 0.5$  mmol/L,  $P < 0.05$ ) and IAUC 2300-0800 for glucose of the DD ( $142.1 \pm 60.0$  mmol/L $\times$ min,  $P < 0.01$ ) were ameliorated compared to those of the D21h. In addition, compared with the D21h, the DD significantly reduced IAUC 0-60 min for insulin after dinner (D21h  $1,233 \pm 213$  vs. DD  $452 \pm 158$  pmol/L $\times$ min,  $p < 0.01$ ).

**Conclusion:** We firstly showed that consuming the late-night-dinner led to postprandial hyperglycemia and this postprandial hyperglycemia of the late-night-dinner can be ameliorated by consuming dinner dividedly in patients with T2DM. The strategy of consuming dinner dividedly might help patients with T2DM who cannot avoid eating late-night-dinner to lower the risk of obesity and the crucial contribution to prevent diabetic complications.

**ORGANIZATION OF PODIATRIC SERVICE VIA THE PROJECT “DIABETIC FOOT CARE IMPROVEMENT” IN GEORGIA**

*Elena Shelestova<sup>1</sup>, Natia Amilakhvari<sup>2</sup>, Simon Gabritchidze<sup>2</sup>, Lika Tsutskiridze<sup>1</sup>, Ramaz Kurashvili<sup>1</sup>*

1- Georgian Union of Diabetes and Endocrine Associations, Georgia 2-Welfare Foundation, Tbilisi, Georgia

**Objective:** DFS prevention and care improvement in 6 regions of Georgia.

**Methods:** The Government implements 2 programs for people with DM – 1) Diabetes Management, and 2) Provision of Prosthesis and Orthopaedic Facilities. Unfortunately, no DFS service exists in Georgia at present. No Diabetic Foot Rooms and nurse-podiatrists (NPs) are available to provide qualified diabetic foot care, prevention and education. Several private Centers try to organize the service with a complex approach that includes consultations of an endocrinologist, neurologist, angiologist, surgeon, etc. The weak points of such an approach are: 1) no specialist besides podiatrist can provide qualified care to a patient with DFS; 2) complexity of this approach increases time and money expenditures both for a medical facility and patient. The problem becomes even worse in regions. Properly educated nurse-podiatrists working in specialized medical facilities are able to solve the problems.

**Results:** After 1 year of the Project implementation 14 nurse- podiatrists, 105 healthcare providers (HCP) and 20 peer-educators were trained; 11 Foot Rooms were opened and fully quipped in 6 target regions; 2 Manuals for nurse-podiatrists, 1 Manual for HCPs and 3 Booklets for people with DM were published; 1000 people with DM were screened and 1488 instructed and educated in foot care; 1 National Round Table, 6 Media and 3 Awareness Campaigns were conducted; 150 web-resources and media tools were produced. In coming year refreshment trainings for nurse-podiatrists; HCPs trainings (+75 doctors); screening (+1000 people with DM), education of people with DM/DFS (+1960 persons) and more Media/ Awareness Campaigns are planned.

**Conclusion:** Major achievement for this period is that the targeted medical personnel has been very effectively trained in diabetes foot care issues that represents solid ground for the success of other Project activities. Successful implementation of the Project is the basis for the decrease in the incidence of DFS and amputation rates in Georgia.

**PROJECT DIABETES PREVENTION AND CARE IMPROVEMENT REALIZED BY WELFARE FOUNDATION  
GEORGIA IN COLLABORATION WITH GEORGIAN UNION OF DIABETES AND ENDOCRINE ASSOCIATIONS**

*Ramaz Kurashvili<sup>1</sup>, <sup>2</sup>Simon Gabritchidze, <sup>1</sup>Elena Shelestova, <sup>1</sup>Lika Tsutskiridze, <sup>2</sup>Ana Zhulina*

1- Georgian Union of Diabetes and Endocrine Associations, Georgia 2- Welfare Foundation, Georgia  
Tbilisi, Georgia

**Objective:** Diabetes prevention and diabetes care improvement in targeted areas and among targeted populations (approximately 62 000 people).

**Methods:** All Project activities were set according to the basic needs of the target groups. The Project team conducted trainings for general practitioners (GPs), regional endocrinologists, nurses (HCPs) and peers. HCPs were trained in diabetes-related issues to use the up-to-date information in their everyday practice. Patient Support Groups were trained to achieve leadership, fundraising, advocacy skills to improve their organizational capacity.

**Results:** In the 4 Target Regions: 1. Nine Diabetes Patient Centers were established, the Centers were provided with basic screening equipment; 2. Education programs, materials and tools for people with diabetes and HCPs were produced; 3. Diabetes Care Quality Metric Tool, Curriculum on Diabetes Prevention for GPs were published; 4. Totally, 2 950 patients and their caregivers were educated; 5. GPs were trained in organization of screening and implementation of preventive measures; 6. Screening was carried out; 7. Patient navigation process related to access to care was improved; 8. Patient Support Groups were formed; 9. Patient resource website was created; 10. Advocacy and media campaigns were conducted; 11. Public awareness on DM prevention and healthy lifestyle was raised.

**Conclusion:** Major lessons learnt: 1. Strengthening of cooperation with local authorities and all stakeholders is essential for the sustainability of the Project; 2. Patient resource web-site can be used only by those who live in big cities, not in the regions. Therefore, developing and distribution of visual/printed materials is important; 3. The Diabetes Map Education Tools are successfully used in the regions; 4. Covering more medical workers rather than train the same HCPs gives better results; 5. Informing medical workers about the State Insurance Program (on diabetes) is essential, as many HCPs have no information about the Program, hence patients suffer from this; 6. To increase the visibility of the Project and its outcomes, mass-communication tools must be widely used. Thus, social media tool and TV-shows were used to inform people about the project. Such Projects help to introduce screening and prevention, to obtain data on diabetes and pre-diabetes prevalence and to improve the quality of diabetes care provided.

**NURSE EDUCATION IN DIABETES – IMPORTANT PART OF PREVENTION AND EARLY DETECTION OF DIABETES AND ITS COMPLICATIONS**

*<sup>1</sup>Elena Shelestova, <sup>2</sup>Marina Sakhvadze, <sup>1</sup>Lika Tsutskiridze, <sup>1</sup>Ramaz Kurashvili*

1-Georgian Union of Diabetes and Endocrine Associations/GUDEAS, Georgia , 2- Association of Professional Development of Georgian Nurses and Nurse Assistants, Tbilisi, Georgia

**Objective:** Nurse role in Prevention and Early Detection of Diabetes and Its Complications

**Methods:** Under the initiative of the Association of Professional Development of Georgian Nurses and Nurse Assistants nurse Post Diploma Training was initiated in 2015. The Association has signed a Memorandum of Understanding and Support with Georgian Union of Diabetes and Endocrine Associations (GUDEAS), and DM was included as one of the 10 Modules of the Training Program. A Diabetes Module for nurses started in February, 2016. The Module is a 2-day, 10 hour training; basic aspects of DM and its complication screening, diagnosis, management and prevention are discussed. As knowledge on DM is very low among nurses no practical workshops are carried out during the first year training. Contracts were signed with several Hospital Networks (in-hospital and out-hospital medical facilities).

**Results:** Since February 2016 training was carried out in 4 cities and 165 nurses working in cardiology, surgery, endocrinology, obstetrics/gynecology, laboratories were trained. The initial testing showed poor level of knowledge (15-20 out of 25 replies were wrong). The final tests are planned for September – October, when all 10 Modules will be done. A Manual for Nurses was prepared and printed. Trainings will continue starting from autumn 2016, it is planned to train up to 200 new nurses from other medical facilities. Besides, together with the Georgian Physicians Postgraduate Association a Summer School on Diabetes for Nurses started to function in July 2016.

**Conclusion:** Diabetes as one of non-communicable diseases has allocated a large proportion of cost, time and human resources of health systems. Nurses are health care providers who should be actively involved in prevention and early detection of diabetes and its complications. After adoption of the UNO Political Declaration on Diabetes and WHO Resolutions Governments start to pay more attention to DM. The role of the nurse in DM management and care will change. We need not only train nurse-podiatrists, diabetes educators, diabetes nurses, but to train all nurses in DM. There is an increased need for more involvement by nurses, particularly specialist nurses, in diabetes care.

**DIABETES PREVENTION IN RURAL GEORGIA –GEORGIAN RED CROSS SOCIETY AND GUDEAS JOINT PROJECT**

*Ketevan Mindeli<sup>1</sup>, <sup>1</sup>Ketevan Gordeladze, <sup>1</sup>Shorena Tsiklauri, <sup>1</sup>Nino Osepaishvili, <sup>2</sup>Elena Shelestova, <sup>2</sup>Lika Tsutskiridze, <sup>2</sup>Ramaz Kurashvili*

1- Georgia Red Cross Society, Georgia 2- Georgian Union of Diabetes and Endocrine Associations/GUDEAS, Tbilisi, Georgia

**Objective:** Improvement of primary prevention and detection of DM, and strengthening of secondary prevention in one of the regions of Georgia.

**Method:** The Project was carried out in Gardabani district, located in a rural region inhabited by Georgian and Azeri population. This area was selected as for local population it is time consuming and very difficult to get to nearest centers where they can receive adequate medical/DM care; quality of locally provided care (at ambulatories and out-patient departments), healthcare providers (HCPs) knowledge on diagnosis, management, screening and prevention of DM, public awareness on DM and its risk factors among the local population are very low. Very often DM stays undiagnosed and at the time of diagnosis a number of complications are already present.

**Results:** In total 73 local HCPs (general practitioners, endocrinologists, nurses), working at rural medical settings, including ambulatories were trained. Throughout 2014 two 3-day trainings for HCPs were carried out, the 3-rd training was carried out in 2015. HCPs received latest information on DM and its complications diagnosis, management and patient education; they were trained to carry out screening and preventive interventions. Besides, 216 volunteers and 50 master trainers were trained; 62 037 accumulated number of people were reached directly with DM prevention messages; 13 614 people were screened, 1468 fresh cases of DM were diagnosed; patients were referred to medical institutions and received improved DM care, education and follow up. DM awareness campaigns were organized, they enrolled 6 673 participants. In total 685 screenings were performed; 1 557 awareness and 1 018 self-support group meetings, 287 small public events and 165 big village ones were organized. Besides, 45 Self-Support Groups, uniting 525 persons with DM and their carers; 10 Walk and Talk Clubs; 10 Cooking Clubs and 22 Information and Education Centers were founded. Brochures, flyers and posters were printed and delivered. Data obtained are now statistically processed and will be ready by the autumn.

**Conclusion:** It is of utmost importance to have HCPs that can not only provide adequate support, but increase public awareness in all age groups, unite people with DM and their caregivers and those at risk of DM, carry out primary and secondary screening for DM and its complications, and accumulate reliable data on the prevalence of DM and Impaired Glucose Tolerance in rural communities. Implementation of this and other Projects permits to provide culturally appropriate education and increase public awareness among people with DM and those at risk, obtain reliable data on DM prevalence, increase access to DM care and improve the quality of care provided.

**SERUM BIOMARKER PANEL FOR SCREENING OF DIFFERENT STAGE OF DIABETIC NEPHROPATHY**

*Khalid Siddiqui\**, *Mohammed A Al-Ghonaim<sup>#</sup>*, *Khalid Al-Rubeaan\**

\*Strategic Center for Diabetes Research, King Saud University, Saudi Arabia

<sup>#</sup> King Khalid Universe Hospital, Collage of Medicine, King Saud University, Saudi Arabia

**Objective:** To examine the relationships of known serum biomarker with diabetic nephropathy risk factor and to design a diagnostic panel for screening of diabetic nephropathy at different stage of its progression.

**Methods:** In a cross-sectional hospital based study, we recruited total 1166 patients with type 2 diabetes (T2D) aged 38–70 years. The patient clinical information and DN risk factor with all biochemistry parameter were analyzed. Stages of DN were define according to albuminuria creatinine ratio (ACR) with eGFR. Serum biomarker were assessed using immunoassays. Multinomial logistic regression was used to assess the associations between serum markers and risk factor of DN.

**Results:** In this study, a total 627 patient with T2D at different stages of diabetic nephropathy was analyzed. Serum marker with higher sensitivity and specificity was further analyzed with DN risk factor. Some individual marker were not significantly associated with disease progression at different stage of DN. Panel with combination of markers with different biochemical and risk factor were design.

**Conclusions:** A novel panel of serum biomarker involved in different function in DN progression improve the predication on the top of established marker in DN.

**Funding:** This study was funded by King Abdulaziz City for Science and Technology (KACST), grant for project no: A-T-34-194

**SERUM 25-HYDROXYVITAMIN D ASSOCIATES WITH HUMAN LEUKOCYTE ANTIGEN (HLA)  
POLYMORPHISMS**

*Leena Kinnunen<sup>1</sup>; Valma Harjutsalo<sup>1</sup>; Heljä-Marja Surcel<sup>1</sup>; Christel Lamberg-Allardt<sup>1</sup>; Jaakko Tuomilehto<sup>1</sup>, Maija E Miettinen<sup>1</sup>*

1- National Institute for Health and Welfare, Finland

**Objective:** Investigated the association between serum 25-hydroxyvitamin D (25OHD) concentrations and HLA genetic polymorphisms.

**Methods:** 25OHD concentration was measured during the first trimester of pregnancy in mothers whose children later developed type 1 diabetes and in mothers of non-diabetic children (case and control mothers). HLA-B (n=395), HLA-DRB1 (n=501) and HLA-DQB1 (n=475) alleles were genotyped in these mothers. HLA-B alleles were divided into super types that share similar peptide binding specificity. Multiple testing was controlled for using the false discovery rate (FDR) method.

**Results:** An association was found between 25OHD concentration and HLA-B44 supertype (p=0.009); women with HLA-B44 super type (B\*18, B\*37, B\*40, and B\*44 alleles) had lower 25OHD concentrations. No association was found between HLA-DRB1 or DQB1 alleles and 25OHD concentration, and no interaction according to the mother type was detected.

**Conclusions:** We found for the first time an association between HLA genetic polymorphisms and 25OHD concentration. The mechanistic background of this association and the role of vitamin D in the regulation of HLA gene expression should be investigated.

**DIABETES SCREENING IN PREGNANCY FAILING RURAL WOMEN IN WESTERN AUSTRALIA**

*Julia V Marley<sup>1</sup>; Kerry Sterry<sup>1</sup>; Sally Singleton<sup>1</sup>; Sarah Moore<sup>1</sup>; David Atkinson<sup>1</sup>; Andrew B Kirke<sup>1</sup>*

1-The Rural Clinical of Western Australia, The University of Western Australia, Australia

**Objective:** To determine the rate of screening for diabetes during pregnancy in rural WA after universal screening was introduced in 2012.

**Methods:** Antenatal records of 551 women aged 16 years or more without pre-existing diabetes and with singleton pregnancies delivered in 2013 were retrospectively audited (39.0% Australian Aboriginal; 8.3% other high risk ethnicities). GDM was primarily diagnosed using criteria at the time (OGTT: fasting glucose  $\geq$  5.5 mmol/L, or 2-hr glucose  $\geq$  8.0 mmol/L). Other tests included fasting and random blood glucose, HbA1c and glucose challenge test. Risk factors recorded included previous GDM, ethnicity, maternal age, family history of diabetes / GDM, obesity, hypertension prior to 20 weeks, previous macrosomia, history of unexplained stillbirth, previous baby with congenital abnormalities, and polycystic ovarian syndrome. Health service(s) providing the majority of antenatal care were categorized by the current remoteness index for Australia, the Modified Monash Model (MMM). A linear regression model was created using a backwards step-wise approach to identify factors that were associated with OGTT screening.

**Results:** The health services of most Aboriginal women audited were located in MMM3 (rural towns; 42.3%), MMM6 (remote towns; 23.7%) and MMM7 (very remote towns / communities; 32.6%), while most non-Aboriginal women (92.2%) received their care in rural towns (MMM2 and MMM3). Only 276 (50.0%) of women were screened with OGTT; 119 (21.6%) women had no record of being screened for GDM. There was a significant decrease in OGTT recorded (56.1% to 38.4%;  $P < 0.001$  for trend) and concomitant increase in other tests recorded (16.4% to 47.9%;  $P = 0.001$  for trend) as remoteness classification of health services increased. In multivariate analysis women with a previous GDM diagnosis (OR 6.2; 95% CI 1.8-22.0;  $P = 0.004$ ), high risk GDM ethnicity other than Aboriginal (OR 3.0; 95% CI 1.4-6.2;  $P = 0.004$ ) and Aboriginal ethnicity were associated with being screened with OGTT (OR 0.47; 95% CI, 0.33-0.68;  $P < 0.001$ ). Of those screened with OGTT there was a high rate of GDM diagnosed (14.8% v WA average of 6.2%). The GDM diagnosis rate was only 4.4% for those screened with other tests. There was no difference in diagnosis rates between Aboriginal and non-Aboriginal women, or across remoteness classification. However the frequency of GDM diagnosis using OGTT significantly increased with increasing numbers of risk factors excluding ethnicity (12.0% to 27.3%;  $P = 0.044$  for trend).

**Conclusions:** These results suggest there are problems with the OGTT as a screening test for GDM in rural WA. For screening to be effective it should be acceptable and available to all at risk. Further work is required into alternative screening strategies for GDM.

**STUDENT-LED DIABETES QUALITY IMPROVEMENT AT AN URBAN SAFETY NET CLINIC: THE THREE YEAR EXPERIENCE OF THE DIABETES IMPROVEMENT TEAM**

*Byron Crowe<sup>1</sup>, Kristen Flint<sup>1</sup>, Nathan Spell<sup>1,2</sup>*

1- Emory University School of Medicine, Atlanta, GA, USA, 2 - Emory Healthcare, Atlanta, GA, USA

**Objective:** We created the Diabetes Improvement Team (DIT), an interdisciplinary student-led QI team, to conduct diabetes QI projects in collaboration with an urban safety net clinic.

**Methods:** We describe the structure, projects and evolution of the Diabetes Improvement Team during our three years conducting the program. Additionally, we include results from a program evaluation in which past participants describe successes, challenges and value of the program.

**Results:** Since December 2012, the Diabetes Improvement Team (DIT) has engaged 20 Emory University students from medicine, public health, nursing, business and allied health over the course of three projects conducted at the Good Samaritan Health Center in Atlanta, Georgia. Projects included developing clinic-level guidelines for the management of pre-diabetes, developing a diabetes self-management tool and improving access to low-cost medications. Student participants received formal training on QI methods through the Institute for Healthcare Improvement, were educated on diabetes care through team activities and were advised by the Chief Quality Officer of Emory University Hospital in Atlanta. Through interviews conducted as part of our first program evaluation, student participants expressed an improved understanding of the complexities of diabetes care. Successful aspects of the project included the opportunity to gain practical experience applying QI, the interdisciplinary nature of the team and project sustainability. Challenging aspects included balancing schedules and navigating workflows in a busy clinic. Clinic staff reported that the DIT increased their focus on systems-level issues and provided ongoing value to patients through improved processes.

**Conclusion:** Student-led diabetes QI projects provide a valuable opportunity to improve understanding of the complexities of diabetes care, gain practical experience conducting QI projects and begin working meaningfully across disciplines. Student participants and clinic staff identified the DIT as providing ongoing value to participants, the clinic and patients alike. The DIT experience can inform development of similar student-led teams at other institutions.

**COMPARISON OF ANTI-HYPERGLYCEMIC EFFECTS OF CINNAMON ON POSTPRANDIAL BLOOD GLUCOSE WHEN INGESTED BEFORE, SIMULTANEOUSLY WITH AND AFTER THE INTAKE OF CARBOHYDRATE AMONG NORMOGLYCEMIC SUBJECTS**

*Albert M. Hutapea<sup>1</sup>; Lyna M. N. Hutapea<sup>2</sup>; Kimberley M. M. Hutapea<sup>3</sup>; Dwight M. M. Hutapea<sup>2</sup>*

1-Faculty of Life Sciences, Universitas Advent Indonesia, Bandung, Indonesia, 2-Faculty of Nursing, Prince of Songkla University, Hatyai, Thailand, 3- School of Nursing, Azusa Pacific University, Azusa, CA, USA.

**Objective:** Investigate anti-hyperglycemic effects of cinnamon on postprandial blood glucose as influenced by the timing of ingestion among normoglycemic subjects.

**Methods:** Thirty healthy subjects fasted for 10-12 hours prior to each experiment and each of this experiment has a 1 week wash-out period. For the treatment group, the subjects ingested 6 g of cinnamon at different time points such as 30 minutes before (B), 30 minutes after (A) and simultaneously with (S) glucose. For the control (C) experiment, the subjects just ingested 75 g of D-(+)-glucose monohydrate alone. Blood samples were collected and analysed using Accu-chek Performa<sup>®</sup> at 0, 30, 60, 90 and 120 minutes after ingestion of glucose.

**Results:** The total incremental area under curve then the  $iAUC \pm SEM$  were calculated. One-way ANOVA test was used to compare means of  $iAUC$  among the control and treatment groups and the significance of the difference of each pair is C & B ( $p < .05$ ), C & S ( $p < .001$ ), C & A ( $p < .001$ ), B & S ( $p < .05$ ), B & A ( $p < .001$ ), S & A ( $p < .05$ ).

**Conclusion:** It is concluded that cinnamon significantly attenuates postprandial hyperglycemia and it has higher efficacy when taken 30 min after ingestion of glucose.

**UNRAVELING KUWAIT-SPECIFIC METABOLIC GENE REGULATORY AND CODING VARIANTS: A STEP TOWARDS BUILDING A NATIONAL EXOME DATABASE**

*Rasheeba Nizam, Dinu Antony, Sumi Elsa John, Prashantha Hebbar, Motasem Melhem, Malak Qaddoumi, Jaakko Tuomilehto, Alphonse Thangavel, Osama Alsmadi\**

\*Dasman Diabetes Institute, Kuwait

**Objective:** Kuwait has one of the highest prevalence of type 2 diabetes (T2D) globally. Modern advancements in genome sequencing technologies with the interest to catalogue global pathogenic and benign genomic variants, had led to substantial volume of data. Universality of such variants' impact on common diseases (e.g. diabetes, hypertension) or rare monogenic disorders in different populations and individuals remain controversial. Herein, we aim to identify the spectrum of population-specific rare metabolic variants contributing towards the development of diabetes and obesity, as a step towards building Kuwait specific exome database.

**Methodology:** In applying these points to the State of Kuwait, we extracted variants in a subset of genes recently replicated in multi-continental studies for their association with different metabolic trait dysregulation. We carried out a pilot study by sequencing 272 exomes from 98 T2D and 174 non-diabetic individuals to examine the presence/absence of gene variants using INGENUITY variant calling software.

**Results:** Representative genes and their coding/regulatory variants related to diabetes and obesity found were as follows: *ZNF248 rs114578096; RFTN1 rs34276015; MUC15 rs533559859; TRAM1L1 rs755565688; ITPR3 rs745712909; RTN4 rs370446381, rs7840893; GIPR rs115338345; BDNF rs8192466; RBP4rs37076315, rs57029781, rs116736522; TSP1 rs2228262; NTS rs546594364, rs560139347; SEC16B rs77277070, rs200132735, rs34246968, rs73045027; COL18A1 rs571541763, rs370673713, rs372973695, rs144147445, rs12483377; TM6SF2 rs186811910; NQO1 rs1131341, rs11555215, rs114238154. Some of commonly detected variants conferring risk for total cholesterol such as *TM6SF2*(P.Glu167Lys, coding) or T2D like *ANK1* (rs508419, promotor) were not detected in our cohorts, while rare variants with a global minor allele frequency (MAF) of < 0.01 were readily detected, and subsequently are modifying the paradigm of our current research.*

**Conclusion:** Genome-wide arrays typically include genomic markers at frequency of 5% or higher, and hence variants at lower frequency are lacking. The overwhelming majority of these variants are either intronic or intergenic. The magnitude of effect caused by these rare variants remain largely uncharacterized in the literature, raising the question; Could these variants rationalize the missing heritability and the rising rates of diabetes in Kuwait? The biological impacts of these rare variants in Kuwait or elsewhere need to be investigated in a relatively large-well characterized population cohort. Deciphering the genotype-phenotype correlation of rare variants with reference to specific population may cater individual therapeutic efficacy (personalized medicine), emphasizing the ultimatum for a global database that put into account the geographic and demographic entities, so an expressive interpretation of the genetic makeup and its relation to health in general is realized.

**THE *LIFE!* PROGRAM: LESSONS FROM 8 YEARS OF REAL-WORLD STATE-WIDE DIABETES PREVENTION**

*Cara J Büsst<sup>1</sup>; Meg O'Donnell<sup>1</sup>; Amy Timoshanko<sup>1</sup>*

1- Diabetes Victoria, Australia

**Objective:** Describe the experiences of implementing a real-world state-wide T2D and CVD prevention program.

**Methods:** The *Life!* Program is subjected to constant monitoring and evaluation for quality assurance purposes and program development. Program data were examined to determine program reach and program activities that influenced program referrals and delivery.

**Results:** Over 68,000 people have undertaken risk screening and referral to the *Life!* program since implementation. Majority of referrals were generated via a 'call to action' through social marketing or community engagement activities, or via health screening through primary care, allied health or workplace programs. Mass media advertising campaigns have been responsible for the greatest number of 'call to action' referrals, particularly when in conjunction with additional campaigning on public transport. Incentivising risk screening and referral of eligible patients through a case-finding agreement has been an essential component of primary care engagement, and a *Life!* program staff member dedicated to primary care engagement has been an important contributor to building and maintaining relationships in the health care sector. Over 45,000 people have gone on to commence a *Life!* program, with participants from all 79 Victorian Local Government Areas. Analysis of participants who commenced in 2015 indicates a 65% program completion rate, and a proportionally high level of delivery to priority populations including low socioeconomic status, rural or regional, CALD, Aboriginal and/or Torres Strait Islander populations.

**Conclusion:** Over the 8 years since implementation, *Life!* has developed a state-wide model for prevention of T2D and CVD in those at risk, including hard-to-reach priority populations. Understanding the successes, barriers and challenges to real-world implementation will be invaluable for informing future implementation of the program.

**LIFE! TELEPHONE HEALTH COACHING: AN EFFECTIVE APPROACH TO DIABETES PREVENTION**

Cara J Büsst<sup>1</sup>; Bianca Caputi<sup>1</sup>; Meg O'Donnell<sup>1</sup>; Amy Timoshanko<sup>1</sup>

1-Diabetes Victoria, Australia

**Objective:** to establish an effective approach to diabetes prevention using the Telephone coaching

**Methods:** Participants who commenced the *Life!* THC program between January 2013 and December 2015 were included in analyses. Health behavior including physical activity and dietary behaviors and self-efficacy (as estimated via questionnaires), and anthropometric measures including participant weight, waist circumference and BMI were examined at program commencement and completion (6 months). Within-group differences over time were assessed using two-tailed paired t-tests.

**Results:** A total of 1814 participants completed both baseline and 6 month data collection. There were equal proportions of male and female participants (48.7% male) and average age was 54. In comparison to participants who opted for the group based program, THC participants were more likely to be male, younger, employed and had a higher level of education. At commencement, average weight was 88.7 kg, waist circumference was 103.1 cm and BMI was 31.0. At commencement, THC participants were on average heavier, had poorer dietary and physical activity levels and higher levels of depression and anxiety than group program participants. At completion, THC participants had significantly reduced their weight (-2.9 kg;  $p < 0.0001$ ), waist circumference (-4.5 cm;  $p < 0.0001$ ) and BMI (-1.0;  $p < 0.0001$ ), and increased daily physical activity levels (24.2 min;  $p < 0.0001$ ). The weight loss goal (5% reduction of initial body weight) was achieved by 30% of participants, with a further 44% reducing weight by less than 5%.

**Conclusion:** Participation in *Life!* THC led to improvements in dietary behaviors and physical activity levels, and reductions in weight and waist circumference, thereby reducing risk of T2D and CVD. The flexible, telephone based mode of program delivery appears to attract a slightly different population, and may be the preferred option for younger, employed males. Overall, *Life!* THC appears to be an effective approach to T2D and CVD prevention

**PREVALENCE OF IMPAIRED FASTING GLYCEMIA AND RELATED RISK FACTORS IN POPULATION AT RISK FOR TYPE 2 DIABETES ACCORDING TO THE ADA CRITERIA: RISK STUDY RESULTS–III**

*T. Yilmaz<sup>1</sup>, N. Okumus<sup>1</sup>, M. Sargin<sup>2</sup>, G. Incesu<sup>1</sup>, H. Sur<sup>3</sup>, S. Karadeniz<sup>4</sup>*

*on behalf of the RISK Study Group, Turkey;*

1- Endocrinology and Metabolism Dept., Istanbul University, Turkey 2- Endocrinology and Metabolism Dept., Istanbul Medeniyet University, Istanbul, Turkey 3-Faculty of Health Sciences, Uskudar University, Turkey 4-Hospitals, Group Florence Nightingale, Istanbul, Turkey

**Objective:** To evaluate efficacy and validity of the ADA risk criteria by taking impaired fasting glycemia (IFG), impaired glucose tolerance at 1.h (IGT1) and impaired glucose tolerance at 2.h (IGT2) as the primary diagnostic criteria for determination of glucose intolerance.

In Risk Study results-III, we aim to determine the prevalence of impaired fasting glycemia (FBG: 100-125 mg/dl) and diabetic fasting glycemia (FBG>126mg/dl) and the relation of IFG with other risk factors in people at risk for type 2 diabetes according to the ADA criteria.

**Methods:** The multicentric RISK study is population based and cross-sectional. It comprises 13.209 subjects (F/M: 1.75, mean chr. age: 52.95±11.5 years) randomly selected from 191 centers in Turkey. Inclusion criteria for the study were to be at a chr. age of >45 years or have risk factors for type 2 diabetes according to ADA criteria regardless of age. Family history of diabetes and history of gestational diabetes (GDM) among female subjects were interrogated. The examination measurement of body mass index (BMI), blood pressure and lipid profile. FBG less than 100 mg/dl, between 100–125 mg/dl and above 126 mg/dl were considered as NFG, IFG and DFG, respectively.

**Results:** In the Risk study group, the prevalence of IFG was 34.2% and DFG was 19.9%. Mean age was 53.68±11.1 yrs. in IFG group. NFG/IFG ratio was 1.44, 1.36, 1.18 and 1.28 in age groups 40-49, 50-59, 60-69 and above 70, respectively. Female/Male ratio was higher in IFG group than the study group (1.89 vs. 1.75). Ratio of positive family history of diabetes was 55.7% in IFG group. The prevalence of subjects with BMI>25 kg/m<sup>2</sup> was 84.2% in IFG group. The ratio of NFG/IFG was 1.88, 1.26, 1.17, 0.98 and 0.94 when the subjects were grouped according to BMI as less than 25 kg/m<sup>2</sup>, 25-29 kg/m<sup>2</sup>, 30-34 kg/m<sup>2</sup>, 35-39 kg/m<sup>2</sup> and above 40kg/m<sup>2</sup>, respectively. Hypertension prevalence was 50.4% in IFG group. The prevalence of subjects with systolic blood pressure>120 mmHg was 89.6% and subjects with diastolic blood pressure>80 mmHg was 85.2% in IFG group. NFG/IFG ratio was 0.89 and 0.71 in subjects with systolic BP>160 mmHg and with diastolic BP>100 mmHg, respectively.

**Conclusion:** In the evaluation of people at risk for type 2 diabetes according to ADA criteria, IFG can be considered as prominent diagnostic criteria, with the high prevalence and positive correlation of IFG with other risk factors (BMI and HT).

## DIABETES PEER EDUCATION PROGRAM - PRELIMINARY RESULTS AT THE SECOND YEAR

*M. Temel Yilmaz<sup>1,2</sup>, Ilhan Yetkin<sup>1,3</sup>, Ahmet Kaya<sup>1,4</sup>, Mustafa Kemal Balci<sup>1,5</sup>, Raziye Gedikli<sup>1,6</sup>, Gunduz Incesu<sup>1</sup>, Sehnaz Karadeniz<sup>1,7</sup>*  
*on behalf of Diabetes Peer Education (DIPEP) study group*

1- Turkish Diabetes Foundation, Turkey <sup>2</sup>- Istanbul University, Istanbul Faculty of Medicine, Istanbul, Turkey  
<sup>3</sup> - Gazi University, Faculty of Medicine, Ankara, Turkey <sup>4</sup> - Necmettin Erbakan University, Faculty of Medicine, Konya, Turkey <sup>5</sup> - Akdeniz University, Faculty of Medicine, Antalya, Turkey <sup>6</sup> - Maltepe University, Institute of Social Sciences, Istanbul, Turkey <sup>7</sup> - Istanbul Science University Faculty of Medicine and Istanbul Florence Nightingale Hospital, Istanbul, Turkey

**Objective:** To make diabetes education available for more people with diabetes.

**Methods:** This project is run in 21 centers with an aim to have an equal distribution among seven regions across Turkey. Another two centers dropped from the study due to natural disaster/insufficient number of personal. The study is coordinated locally by a Faculty Member from the local Medical Faculty. One or two peer advisers for each center were selected who had to successfully finish the two "Education of Peer Educators" Courses organized. The second educator education course included also speaking techniques and using technical devices, alongside diabetes education. The criteria for nomination as "Peer Educator" was to be a person with diabetes, having good knowledge about diabetes, the ability to share this knowledge, and not being a physician.

Educational material: Standard slide sets were prepared by the Faculties in the coordinating board. They included five main topics: introduction to diabetes, diet and exercise, medical treatment, organ damage, home-monitoring and body care. A diabetes education book was also prepared. Diabetes educational kits, educational book, a PC and a projector were sent to all centers.

The meetings were planned as a 3 hour interactive presentation to patient groups made up by 10-20 patients each). A questionnaire was prepared to assess the diabetes knowledge of the participants before and at the end of the programme.

**Results:** A total of 1440 courses were conducted in 21 centers. 27.992 PwD received diabetes education during those courses. Patient knowledge is documented separately for each center. The distribution of the patients and the program efficacy are evaluated according to different parameters. Patient satisfaction in this program was up to 95%. In an post-program analysis, participants with type 2 diabetes found the program more satisfying than the participants with type 1 diabetes. 72% of the participants mentioned that they have not received diabetes education before. 57% of the participants expressed their will to attend the program again. 55% of the participants mentioned that their metabolic control improved after the program.

**Conclusion:** Several models for diabetes education has been discussed since at least 30 years. The upsurge in the number of diabetes cases, and so the high number of PwD, remains as a main obstacle in reaching all or at least most of PwD for diabetes education. This peer educator program with a well-designed structure shows that peer education can serve as an effective alternative for diabetes education. The support from Ministry of Health and the public support will pave the way for further success.

**INCREASED CIRCULATION LEVEL OF ANGPTL8/BETATROPHIN AND ANGPTL4 IN HYPERTENSION.**

*Mohamed G. Qaddoumi<sup>1</sup>, Irina AlKhairi<sup>1</sup>, Preethi Cherian<sup>1</sup>, Muath Alanbaei<sup>1</sup>, Jehad Abubaker<sup>1</sup>, Mohamed Abu-Farha<sup>1</sup>*

1- Biochemistry and Molecular Biology, Dasman Diabetes Institute, Kuwait. Kuwait University, Kuwait

**Objective:** To compare the plasma and adipose tissue level of ANGPTL3, 4 and 8 in age and BMI matched subjects with or without hypertension.

**Methods:** A total of 119 subjects were enrolled in this study, 50 non-hypertension and 69 with hypertension. Plasma level of ANGPTL 3, 4 and 8 were measured by ELISA. Real time PCR was used to measure their level in adipose tissue.

**Results:** In this study, we showed that ANGPTL 4 and 8 were higher in subjects with hypertension. ANGPTL4 level in subjects with hypertension was  $202.49 \pm 17.44$  ng/mL compared to subjects without hypertension  $160.64 \pm 10.36$  ng/mL, (p-Value=0.04). ANGPTL8 level in subjects with hypertension was  $2310.96 \pm 194.88$  pg/mL vs  $1583.35 \pm 138.27$  pg/mL in subjects without hypertension (p-Value=0.001). ANGPTL3 level was not significantly different between the two populations. Dividing the subjects according to their diabetes status showed a similar trend for both ANGPTL4 and 8 where T2D subjects with hypertension had higher levels of ANGPTL4 and 8. ANGPTL4 and 8 showed a similar expression profile in adipose tissues.

**Conclusion:** our data show that ANGPTL 4 and 8 are increased in subjects diagnosed with hypertension in both plasma and adipose tissue. ANGPTL3 was not significantly different between both groups. ANGPTL4 and 8 increased level in hypertension highlights their potential involvement in this disease and their potential role as biomarkers for hypertension and even their therapeutic value given their role in regulating lipid metabolism.

**DEVELOPMENT OF A TOOL FOR IDENTIFYING 12-14 YEAR OLDS AT HIGH RISK OF DEVELOPING TYPE 2 DIABETES IN THE FUTURE: A NOVEL APPROACH**

*Laura Gray*<sup>1</sup>, *Emer Brady*<sup>2</sup>, *Susann Blüher*<sup>3</sup>, *Charlotte Edwardson*<sup>4</sup>, *Deirdre Harrington*<sup>4</sup>, *Itziar Vergara Mitxelorena*<sup>5</sup>, *Rogério Ribeiro*<sup>6</sup>, *Melanie Davies*<sup>4</sup>

on behalf of the PRE-Start Collaborative

1. Department of Health Sciences, University of Leicester, Leicester, UK. 2. University Hospitals of Leicester, NHS Trust, UK, 3. University of Lipzig, Germany, 4. Diabetes Research Centre, University of Leicester, Leicester, UK, 5. Kronikgune Department of Health of the Basque Country, Spain, 6. Associação Protectora dos Diabeticos de Portugal

**Objective:** To develop a risk tool for community use to identify 12-14 year olds at high risk of developing Type 2 diabetes (T2DM).

**Methods:** Data on which to develop such a risk tool were not available, therefore a novel approach was employed. Firstly, to identify the risk factors for possible inclusion in the tool we conducted a systematic review, used the existing ADA guidance for screening young people for T2DM and sought expert opinion. Secondly, the identified risk factors were then ranked using a Delphi study. The most important risk factors were included in the risk tool.

**Results:** The risk factors included in the tool are (1) Overweight (BMI above the 85th percentile); (2) Sedentary (> 2 hours of TV viewing per day); (3) High waist circumference; (4) Diagnosis of acanthosis nigricans, pre-diabetes, fatty liver disease, polycystic ovary syndrome or metabolic syndrome; (5) Family history of diabetes; (6) Non-white ethnicity; (7) Rapid weight gain in early life (more than 2 lb a month between 0-4 months old); (8) High sugar intake (e.g. more than 1.5 cans of fizzy drinks per day). To be defined at high risk 12-14 years old should be both overweight and sedentary and have at least one other risk factor.

**Conclusion:** We have developed a risk tool for identifying 12-14 year olds at high risk of developing T2DM in the future. As this tool requires validation, we are collecting extensive data on 500 12-14 year olds from five European countries. Each participant will be assessed and defined at low/high risk of developing T2DM by at least two expert clinical adjudicators. This will be the reference standard to which the outcome of the risk tool is compared. The study will be completed in early 2017.

**PROSPECTIVE VALIDATION OF THE LEICESTER SELF-ASSESSMENT SCORE FOR TYPE 2 DIABETES USING DATA FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING**

*Shaun R Barber<sup>1,2</sup>, Nafeesa N Dhalwani<sup>2</sup>, Melanie J Davies<sup>2</sup>, Kamlesh Khunti<sup>2</sup>, Laura J Gray<sup>1</sup>*

1. Department of Health Sciences, University of Leicester, UK; 2. Diabetes Research Centre, University of Leicester, UK.

**Objective:** To externally validate the Leicester Self-Assessment (LSA) score for the risk of developing Type 2 diabetes (T2DM) over ten years.

**Methods:** Data were taken from the English Longitudinal Study of Ageing (ELSA), a nationally representative dataset of people aged 50 years and over. The LSA was calculated for individuals aged 50–75 years old, diabetes free in 2004/05 and with complete data for the seven risk factors included in the LSA. The area under the receiver operator curve (AUROC), along with metrics for the performance of the LSA at the recommended cut-point ( $\geq 16$ ), were calculated for the binary outcomes of HbA1c  $\geq 6.0\%$  at baseline and self-reported doctor diagnosed T2DM within ten years.

**Results:** 3,203 individuals had a baseline HbA1c measurement, of which 247 (7.7%) had HbA1c  $\geq 6.0\%$ . AUROC was 69.4% (95% CI: 66.0%, 72.9%) for baseline HbA1c  $\geq 6.0\%$ . 3,550 individuals had diabetes status recorded at ten years, of which 324 (9.1%) were diagnosed with T2DM within the ten year period; AUROC was 74.9% (95% CI: 72.4%, 77.5%). Using a cut-point on the LSA of  $\geq 16$  had a sensitivity of 89.2% (95% CI: 85.3, 92.4%) and a specificity of 42.3% (95% CI: 40.5, 44.0%) for diagnosed diabetes within ten years.

**Conclusions:** The LSA has been validated for use across England to identify people with Non-diabetic hyperglycemia or undiagnosed T2DM. Those with a high score are also at high risk of developing diabetes within the next ten years.

**EXTERNAL VALIDATION OF THE LEICESTER SELF-ASSESSMENT DIABETES RISK SCORE IN A POPULATION WITH INTELLECTUAL DISABILITY**

*Laura Gray<sup>1</sup>, Yogini Chudasama<sup>2</sup>, Alison Dunkley<sup>2</sup>, Freya Tyrer<sup>2</sup>, Rebecca Spong<sup>1</sup>, S Bhaumik<sup>3</sup>, Melanie Davies<sup>2</sup>, Kamlesh Khunti<sup>2</sup>*

On behalf of the STOP Diabetes Team

1 Department of Health Sciences, University of Leicester, Leicester, UK. 2 Diabetes Research Centre, University of Leicester, Leicester, UK. 3 Learning Disabilities Service, Leicestershire Partnership NHS Trust, Leicester, UK

**Objective:** Externally validate the Leicester Self-Assessment diabetes risk score using data from the STOP Diabetes screening study.

**Methods:** We used data from a population-based screening study for Type 2 diabetes mellitus (Type 2 DM) in those with Intellectual disability (ID). The Leicester Self-Assessment diabetes risk score was compared to the outcome HbA1c  $\geq 6.0\%/42\text{mmol/L}$ , i.e. undiagnosed non-diabetic hyperglycaemia (NDH)/Type 2 DM. Sensitivity, specificity, positive predictive value (PPV), and negative predictive values (NPV) were calculated for a cut point of  $\geq 16$  points (equating to high or very high risk of having NDH/Type 2 DM).

**Results:** 930 participants were recruited into the screening study. Diabetes status was assessed for 675 (72.6%) participants, of these 365 (54.1%) also had data recorded for the 7 risk factors. Of the 22 (6.0%) participants with NDH/Type 2 DM and full risk score data, 18 were correctly classified as high or very high risk by the risk score; sensitivity 81.8% (95% CI 59.7%, 94.8%). Of the 343 participants without NDH/Type 2 DM, 204 were correctly identified as low or medium risk; specificity 59.5% (95% CI 54.1%, 64.7%). The PPV for a cut point of  $\geq 16$  was 11.5% (95% CI 6.9%, 17.5%) and NPV was 98.1% (95% CI 95.1%, 99.5%).

**Conclusions:** These data suggest that the Leicester Self-Assessment diabetes risk score can be reliably used as part of a multi-stage Type 2 DM screening programme in those with ID. Further research should assess the acceptability and feasibility of self or proxy completion in this group.

**THE NHS DIABETES PREVENTION PROGRAMME IN ENGLAND: LESSONS LEARNT FROM PROCESS EVALUATION OF THE DEMONSTRATOR SITE PHASE**

*Anna Haste<sup>1,4</sup>, Angela M Rodrigues<sup>1,4</sup>, Linda Penn<sup>1,4</sup>, Ruth Bell<sup>1,4</sup>, Carolyn D Summerbell<sup>2,4</sup>, Martin White<sup>3</sup>, Ashley J Adamson<sup>1,4</sup> & Falko F Sniehotta<sup>1,4</sup>*

1- Newcastle University, UK 2- Durham University, UK 3- MRC Epidemiology Unit, University of Cambridge, UK 4- Fuse, the Centre for Translational Research in Public Health, UK

**Background:** The National Health Service diabetes prevention programme (NHS DPP) in England, which was announced in 2014, aims to identify people at high risk of type 2 diabetes and offer them an evidence-based behavioural intervention. The NHS DPP will be rolled out to the whole country by 2020, with an expected 100,000 referrals each year after. The implementation of the NHS DPP is planned in phases, starting with a demonstrator site phase. In this phase local health economies were invited to provide details of their existing diabetes prevention programmes, and seven sites were selected to test NHS DPP activities and procedures.

**Objective:** Demonstrator site phase process evaluation aims to provide evidence on how to maximize implementation and effectiveness of the NHS DPP in subsequent phases.

**Methods:** Process evaluation involved mixed methods, including: review, and appraisal of documents provided by demonstrator sites at baseline and the NHS DPP draft service specification, review of service user materials (with public involvement); qualitative research with key stakeholders to examine feasibility and acceptability of the service; investigation of provider data-systems; and workshops to discuss findings from other work streams.

**Results:** The document review highlighted elements, actors and responsibilities needed to implement an evaluable service. Findings suggested the need to improve referral processes by offering community-based recruitment, structured risk communication, and reduced time between referral and start of intervention. Stakeholders discussed the challenges of recruiting and retaining service users and the importance of flexibility in intervention content to address any cultural sensitivities. Stakeholders also highlighted the importance of provider collected data to include individual risk score data and detailed information on specific recruitment pathways.

**Conclusion:** Findings from the demonstrator site phase evaluation were used to make recommendations for subsequent phases of the NHS DPP on: improving recruitment, specifying intervention more clearly, addressing inequalities, and detailing training and quality assurance measures. Improved clarity and detail in programme specification and data systems will support implementation, fidelity assessment and evaluability of the NHS DPP. The planned national implementation of the NHS DPP and the current process and definitive evaluations will provide valuable information to other health systems wanting to adopt a systematic universal coverage DPP.

**NON-ALCOHOLIC FATTY LIVER DISEASE (NAFLD) IN NATIVE VERSUS FOREIGN BLACKS IN THE UNITED STATES: THE ROLE OF ADIPOSITY AND INSULIN RESISTANCE**

*Samrawit Yisahak<sup>1</sup>, Mary Beth Weber<sup>2</sup>, K.M. Venkat Narayan<sup>3</sup>*

- 1- Nutrition and Health Sciences, Laney Graduate School, Emory University, Atlanta, USA
- 2- Department of Global Health, Rollins School of Public Health, Emory University, Atlanta, USA
- 3- Department of Global Health, Rollins School of Public Health, Emory University, Atlanta, USA

**Objective:** To compare the prevalence of NAFLD in foreign-born (FB) versus native-born (NB) blacks in the United States and assess the contribution of adiposity and insulin resistance in explaining possible differences.

**Methods:** We analyzed data from seven cycles of the National Health and Nutrition Examination Survey (1999-2012) restricting to men and non-pregnant women (age  $\geq 20$ ) who self-identify as Non-Hispanic Black. We defined NAFLD as having elevated alanine aminotransferase ( $> 30$  U/L for men and  $>19$  U/L for women) that is not attributable to positive hepatitis B surface antigen, hepatitis C antibody or excess alcohol ( $>2$  drinks/day for men and  $>1$  drink/day for women). We compared the crude prevalence of NAFLD by nativity stratified by gender. Using multivariable regression, we estimated the model-adjusted prevalence ratio of nativity on NAFLD while adjusting for adiposity (BMI and waist circumference) and insulin resistance (HOMA-IR).

**Results:** FB women compared to NB women had significantly lower BMI ( $30.00 \pm 0.67$  vs.  $32.75 \pm 0.37$ ), waist circumference ( $96.99 \pm 1.43$  vs.  $102.73 \pm 0.77$ ) and HOMA-IR ( $3.65 \pm 0.40$  vs.  $4.77 \pm 0.28$ ). In men, only HOMA-IR was significantly lower in FB compared to NB ( $3.02 \pm 0.22$  vs.  $4.36 \pm 0.44$ ). Crude NAFLD prevalence was higher in FB women (24.80% [17.23%, 34.32%]) than NB (15.23% [12.59%, 18.32%]). Conversely, in men, it was lower in FB (9.67% [5.85%, 15.55%]) than NB (12.29% [10.13%, 14.83%]). Prevalence ratios comparing FB to NB were statistically significant only in women, with adjustment for waist circumference having the strongest effect (PR= 1.68 [1.13, 2.49]). Adjustment for HOMA-IR increased the risk of NAFLD in FB men but not women.

**Conclusions:** Prevention efforts in blacks should consider heterogeneity by nativity and sex. Foreign black women seem to be a high risk subgroup within blacks for NAFLD. The differential effect of adiposity and insulin resistance on NAFLD by sex requires further study.

**Body Habitus and Diabetes Risk, a comparison between ethnic groups**

Cother Hajat, Giada Scarpetti, Alawi Alsheikh-Ali, Afzalhussein Yusufali

Institute of Public Health, UAE University, UAE

**Background**

Diabetes rates vary considerably between ethnic groups with two-fold higher rates reported in UAE Emiratis compared with Asians although Asians are more likely to remain undiagnosed.<sup>1</sup> This study investigates body habitus associated with diabetes in UAE ethnic groups.

**Methods**

Data from the DISCOVERY Study<sup>1</sup> compared body-mass-index (BMI) and waist circumference between ethnic groups and for those with a new onset of diabetes, using Pearson correlation and linear regression in SPSS software.

**Results**

In 4128 subjects, mean age, BMI and waist were highest in Emirati and non-Emirati Arabs, and lowest in Asians (Table 1). Rates of pre-diabetes were very high in all ethnic groups (52-70%) and almost all Emirati Arabs were either pre-diabetic or diabetic (98.5%).

BMI was highly correlated with waist overall and more so in Emirati and non-Emirati Arabs than in Asians (table 2). Central obesity had greater association with diabetes than BMI obesity (ORs 1.5; 1.2). Central obesity was strongly associated with diabetes in Emiratis and non-Emirati Arabs (ORs 2.2; 2.2) but not in Asians (ORs 1.2; 1.1, non-significant).

At time of new diagnosis of diabetes, mean BMI and waist were 30.5 (95%CI 30.2-30.9) and 0.95 (95%CI 0.947-0.955) in males; 32.7 (95%CI 32.4-33.1) and 0.89 (95%CI 0.895-0.904) in females and there was a striking 5-unit difference for females and 3.5 for males in BMI level between Asian and Arab populations.

**Conclusion**

This multi-ethnic in an opportunistic sample has demonstrated stark differences in the rates of diabetes and pre-diabetes; the extreme rates of pre-diabetes in Asians warrant concern and further investigation. Central obesity is strongly associated with diabetes risk in Arab groups but less so in Asians and less so for BMI. These findings support the use of central obesity rather than BMI for screening purposes in this population with high endemic rates of glycaemic dysfunction. Tailored screening approaches according to ethnic group may also be warranted in the region, due to the high rates of pre-diabetes and lesser association with central obesity for Asians.



## Poster Sessions

Abstract # P-1

### USE OF TYPE 2 DIABETES SCREENING GUIDELINES IN PRIMARY CARE: CONCORDANCE BETWEEN PHYSICIAN SURVEY AND MEDICAL RECORDS

*Michelle Mocariski, Sandhya Mehta; Karin Gillespie; Tami Wisniewski; KM Venkat Narayan; Kathy Lang*  
USA

Abstract # P-2

### IMPROVEMENT OF HEPATIC FUNCTION BY SGLT2 INHIBITOR IS ACCOMPANIED WITH ELEVATION OF SERUM ADIPONECTIN IN JAPANESE PATIENTS WITH TYPE 2 DIABETES

*Masataka Kusunoki, Yukie Natsume, Tetsuro Miyata, Yoshiharu Oshida*  
\* Department of Diabetes, Motor Function and Metabolism, Research Center of Health, Physical Fitness and Sports, Naogya University\*\* Vascular Center, Sanno Medical Center  
Japan

Abstract # P-3

### EVALUATION OF ANTIDIABETIC, ANTIOXIDANT AND OTHER PHYTOCHEMICAL PROPERTIES OF THAI FRUITS, VEGETABLES AND SOME LOCAL FOOD PLANTS

*Suree Nanasombat, Kanokwan Yansodthee; Ilada Jongjaited*  
Thailand

Abstract # P-4

### SCHOOL EXPERIENCES OF STUDENTS IN THE CARIBBEAN LIVING WITH DIABETES

*Bernice Dyer-Regis, Keisha James, Denise Mills, Isabel Turner*  
Trinidad & Tobago

Abstract # P-5

### INCLUSION OF WALNUT IN THE DIETS OF ADULTS AT RISK FOR TYPE 2 DIABETES AND THEIR DIETARY PATTERN CHANGES: A RANDOMIZED, CONTROLLED, CROSSOVER TRIAL

*Valentine Yanchou Njike; Niloufarsadat Yarandi, , Paul Petraro, Rockiy G. Ayettey, ; Judith A. Treu ; David L. Katz MD*  
USA

Abstract # P-6

### ROBUST GLUCOSE AND HBA1C LOWERING AFTER A SINGLE DOSE OF RN909 (PF-06293620) IN TYPE 2 DIABETES (T2D) SUBJECTS

*Barry Gumbiner<sup>1</sup>, Brooke Esteves<sup>1</sup>, Vanessa Dell<sup>1</sup>, Tenshang Joh<sup>1</sup>, Pamela D. Garzone<sup>1</sup>, Alison Forgie<sup>1</sup>, Chandrasekhar Udata<sup>1</sup>*  
USA

Abstract # P-7

### INTRODUCTION OF CARBOMEDTHERAPY

*Nadia Boudjenah*  
Algeria

Abstract # P-8

### UMBELLIFERONE IN TREATMENT OF DIABETIC NEPHROPATHY

*Mayuresh S Garud; Yogesh A. Kulkarni, Shobhaben Pratapbhai*  
India

Abstract # P-9

**BAUHINIA VARIEGATA DECREASES RENAL DAMAGE IN STREPTOZOTOCIN INDUCED DIABETIC RATS.**

Mayuresh S Garud<sup>1</sup>, Yogesh A. Kulkarni<sup>1</sup>

*(Shobhaben Pratapbhai) <<< not author part of aff*  
India

Abstract # P-10

**A TYPICAL SYMPTOMS OF ACUTE MYOCARDIAL INFARCTION IN HOSPITALIZED HISPANIC DIABETES MELLITUS PATIENTS IN PUERTO RICO**

*Roberto Zevallos; Juan A Gonzalez; Juan Gabriel Ruiz; Noel C Barengo, Juan Carlos Zevallos*  
USA

Abstract # P-11

**METABOLIC AND GLUCOREGULATORY ASSOCIATIONS OF CIRCULATING ADIPOCYTOKINES IN NORMOGLYCEMIC AFRICAN AMERICAN AND EUROPEAN AMERICAN OFFSPRING OF PARENTS WITH TYPE 2 DIABETES**

*Deirdre James, Ibiye Owei, Nkiru Umekwe, Samuel Dagogo-Jack*  
USA

Abstract # P-12

**EFFECTS OF CLIMATIC VARIABLES ON WEIGHT LOSS: A GLOBAL ANALYSIS**

*Morena Ustulin, Changwon Keum, Junghoon Woo, Jeong-taek Woo<sup>4</sup>, Sang Youl Rhee*  
South Korea

Abstract # P-13

**CHARACTERISTICS OF KOREAN T2DM PATIENTS WITH DIABETIC RETINOPATHY AND MACULAR EDEMA: A STUDY BASED ON A STANDARDIZED CLINICAL DATA**

*Sang Youl Rhee<sup>1</sup>, Sejeong Park, Ki Young Kim<sup>3</sup>, Suk Chon, Seung-Young Yu, Jeong-taek Woo*  
South Korea

Abstract # P-14

**PLASMA FETUIN-A (A2-HS-GLYCOPROTEIN) CORRELATES NEGATIVELY WITH INFLAMMATORY CYTOKINES, CHEMOKINES AND ACTIVATION BIOMARKERS IN INDIVIDUALS WITH TYPE-2 DIABETES**

*Nadeem Akhter, Steve Shenouda; Ajit Wilson; Rasheed Ahmad<sup>1</sup>; Sardar Sindhu*  
Kuwait

Abstract # P-15

**INCREMENTAL BURDEN OF TYPE 2 DIABETES MELLITUS IN PATIENTS HOSPITALIZED FOR HEART FAILURE**

*Aditya D. Raju, Anna D. Coutinho, Weijia Wang, Sharash Shetty, Stephen D. Sander, Craig I. Coleman*  
USA

Abstract # P-16

**ASSOCIATION OF NUCLEAR FACTOR KAPPA B1 GENE POLYMORPHISM (RS28362491) WITH LEVELS OF INFLAMMATORY BIOMARKERS AND SUSCEPTIBILITY TO DIABETIC NEPHROPATHY IN ASIAN INDIANS**

*Stuti Gupta, Mohini Sharma, Mohit Mehndiratta, Amar Gautam, Om P Kalra, Jasvinder K Gambhir*  
India

Abstract # P-17

**ASSOCIATION OF NQO1 (RS1800566) POLYMORPHISM WITH NQO1 LEVELS AND RISK OF DIABETIC NEPHROPATHY IN INDIAN POPULATION**

*Mohini Sharma, S Gupta, M Mehndiratta, OP Kalra, R Shukla, JK Gambhir*  
India

Abstract # P-18

**ECONOMIC BURDEN OF TYPE 2 DIABETES MELLITUS IN PATIENTS WITH CARDIOVASCULAR DISEASE IN COMMERCIALY-INSURED PATIENTS IN THE UNITED STATES**

*Weijia Wang, Eileen M. Farrelly, Sharash Shetty, Dana Stafkey-Mailey, Stephen D. Sander, Craig I. Coleman*  
USA

Abstract # P-19

**PREDICTORS OF PRIMARY NON-ADHERENCE, SECONDARY NON-ADHERENCE AND NON-PERSISTENCE TO ORAL ANTIDIABETIC MEDICATIONS IN PATIENTS WITH TYPE-2 DIABETES**

*Sandhya Mehta, Elise Kaufman; Stephen Sander; Ray Gani, ; Kathy Lang*  
USA

Abstract # P-20

**11B-HYDROXYSTEROID DEHYDROGENASE 1 REGULATION IN HIGH FAT DIET INDUCED INSULIN RESISTANT RATS AND RATS TREATED WITH SUTHERLANDIA FRUTESCENS**

*Ngozi F. Nnolum-Orji, Prof Saartjie Roux, Janine Mackenzie, Disang Lekutlane*  
South Africa

Abstract # P-21

**INCREASED PLASMA LEVEL OF ANGPTL3, 4 AND 8 IN OBESITY AND T2D**

*Abdulmohsen AlTerki, Mohamed Abu-Farha, Irina Al-Khairi, Preethi Cherian, Betty Chandy, Devarajan Sriraman, Asma Alhubail, Faisal Al-Refaei, Jehad Abubaker*  
Kuwait

Abstract # P-22

**INCREASED EXPRESSION OF IL-18R AND IL-18 IN THE ADIPOSE TISSUE IS ASSOCIATED WITH INSULIN RESISTANCE (HOMA-IR) IN OBESITY**

*Shihab Kochumon, Reeby Thomas, Ajit Wilson, Sardar Sindhu, Rasheed Ahmad*  
Kuwait

Abstract # P-23

**NECK CIRCUMFERENCE HELPS IN THE CHARACTERIZATION OF ATHEROGENIC PROFILE IN MIDDLE-AGED INDIVIDUALS WITHOUT DIABETES: THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH**

*Bianca de Almeida-Pititto, Isis T Silva, Fernando Flexa Ribeiro Filho, Marilia I H Fonseca, Paulo A Lotufo, Isabela Bensenor, Sandra RG Ferreira*  
Brazil

Abstract # P-24

**ADIPONECTIN IS ASSOCIATED WITH COGNITIVE FUNCTION INDEPENDENTLY OF GLUCOSE INTOLERANCE IN THE LONGITUDINAL STUDY OF ADULT HEALTH (ELSA-BRASIL).**

*Sandra R.G. Ferreira, Adriana Cezaretto, Bianca de Almeida-Pititto, Isabela Bensenor, Paulo Lotufo, Cláudia K Suemoto*  
Brazil

Abstract # P-25

**THE PRE-START PROJECT: DEVELOPMENT OF A DIABETES PREVENTION EDUCATIONAL INTERVENTION FOR 12-14 YEAR OLDS FOR USE ACROSS FIVE EUROPEAN COUNTRIES**

*Jacqui Troughton* , Janet Jarvis , Deidre Harrington , Charlotte Edwardson , Emer Brady , Laura Gray , Susann Blüher, Itziar Vergara Mitxelorena, Rogerio Ribeiro, Melanie Davies  
Portugal

Abstract # P-26

**ARE INTRAUTERINE NUTRITION, MATERNAL AND CHILDHOOD BODY WEIGHT ASSOCIATED WITH GLUCOSE METABOLISM IN YOUNG ADULTS?**

*Angélica MM Valente*, Bianca de Almeida-Pititto, Alexandre A Ferraro, Luciana GD Folchetti, Isis T Silva, Sandra RG Ferreira  
Brazil

Abstract # P-27

**ON INVESTIGATION OF RELATIONSHIP BETWEEN GUT MICROBIOTA AND HEMOGLOBIN GLYCATION INDEX IN EUROPEAN AND ASIAN POPULATIONS**

*Jian Li, Xueying Wang, Yaozhong Liu*  
China( USA)

Abstract # P-28

**IMPROVED CLINICAL OUTCOMES WITH THE DUAL THERAPIES OF A SGLT-2I AND A GLP-1RA IN OVERWEIGHT/OBESE PEOPLE WITH T2 DIABETES, REAL WORLD DATA FROM THE INDIAN SUBCONTINENT.**

*Anant Nigam*  
India

Abstract # P-29

**GWA STUDY FROM KUWAIT HIGHLIGHTS JUNK DNA AS A POTENTIAL HOTSPOT IN HYPERTENSION RESEARCH**

*Rasheeba Nizam, Prashantha Hebbar, Dinu Antony, Fadi Alkayal, Sumi Elsa John, Daisy Thomas, Motasem Melhem, Malak Qaddoumi, Jaakko Tuomilehto, Alphonse Thangavel, Osama Alsmadi*  
Kuwait

Abstract # P-30

**Non-Invasive, Self-Monitoring of Glucose Level by People with Prediabetes and T2DM**

Avner Gal, Keren Horman<sup>1</sup>, *Yulia Mayzel*, Andrew Drexler, Tamar Lin, Ilana Harman-Boehm  
Israel

Abstract # PO-1

**ASSOCIATION BETWEEN STRUCTURAL BRAIN ABNORMALITIES AND COGNITIVE FUNCTIONING IN PATIENTS WITH TYPE 2 DIABETES MELLITUS**

*Zherdova N., Mankovsky B., de Bresser J., van den Berg E, Biessels G.J.*  
Ukraine

Abstract #PO-3

**DIABETIC RETINOPATHY SCREENING: AN EXAMPLE OF HOW PRIMARY HEALTHCARE CAN TRULY MAKE A DIFFERENCE IN DIABETIC RETINOPATHY PREVENTION.**

*Andreas Mitsios, Efthymiadi G., Giagkoulis T., Vasileiou F., Kania E., Sakellariou I.*  
Greece

Abstract #**PO-4**  
**PREVENTION OF DIABETES AND ITS COMPLICATIONS IN KARNATAKA STATE, INDIA**  
*Ashok R Sonnad*  
India



**USE OF TYPE 2 DIABETES SCREENING GUIDELINES IN PRIMARY CARE: CONCORDANCE BETWEEN  
PHYSICIAN SURVEY AND MEDICAL RECORDS**

*Michelle Mocarski<sup>2</sup>, Sandhya Mehta<sup>1</sup>; Karin Gillespie<sup>2</sup>; Tami Wisniewski<sup>2</sup>; KM Venkat Narayan<sup>3</sup>; Kathy Lang<sup>1</sup>*

1- Quintiles Inc., Cambridge, MA, USA 2- Novo Nordisk Inc., Plainsboro, NJ, USA 3-Emory University, Atlanta, GA, USA

**Objective:** To examine alignment between primary care physicians' (PCPs) self-reported adherence to screening guidelines and actual practice.

**Method:** Online survey of PCPs linked with patient data from electronic medical records (EMRs) of each surveyed physician. Survey included questions about factors influencing decisions to screen and knowledge/use of US Preventive Services Task Force (USPSTF) 2008 and American Diabetes Association (ADA) guidelines. Survey responses were compared with patients' EMR data to assess concordance.

**Results:** 261 PCPs were included in the USPSTF analysis. Of these, 32.2% PCPs reported (and linked EMR data for their patients confirmed) that they frequently use USPSTF; 18.4% reported (and EMR data confirmed) they do not follow USPSTF; 13.0% reported (but EMR data did not confirm) they follow USPSTF; 36.4% reported not following USPSTF, but EMR indicated they did. Physician characteristics that predicted concordance between survey responses and EMR data were region, age, and self-reported use of screening guidelines. Similar findings were obtained for ADA guidelines.

**Conclusion:** In 2017, under the Affordable Care Act, health plans are required to cover screening for T2DM with no co-pay for patients at risk according to USPSTF. More education is needed so that PCPs are aware of which of their patients are eligible for covered T2DM screening.

**IMPROVEMENT OF HEPATIC FUNCTION BY SGLT2 INHIBITOR IS ACCOMPANIED WITH ELEVATION OF SERUM ADIPONECTIN IN JAPANESE PATIENTS WITH TYPE 2 DIABETES**

*Masataka Kusunoki\**, *Yukie Natsume\**, *Tetsuro Miyata\*\**, *Yoshiharu Oshida\**

\* Department of Diabetes, Motor Function and Metabolism, Research Center of Health, Physical Fitness and Sports, Naogyu University, Japan \*\* Vascular Center, Sanno Medical Center, Japan

**Objective:** To investigate relationship between the effects of SGLT2 inhibitor and serum adiponectin in type 2 diabetic patients.

**Methods:** 83 Japanese patients with type 2 diabetes were administered luseogliflozin (2.5 mg/day) for 6-month, and were defined as decreased (D group) and increased (I group) serum adiponectin level at the end of the administration period. We then compared some parameters (HOMA-IR etc) and before (baseline) and after the treatment.

**Results:** 6-month after the administration of SGLT2 inhibitors, while body weight was significantly lowered in both the groups, the drugs significantly reduced HbA1c level and HOMA-IR in the I group. There were no effects in the same parameters in the D group. Regarding hepatic function, serum AST, ALT, and  $\gamma$ -GTP levels in the I group were significantly reduced whereas no significant changes in these parameters were seen in the D group.

**Conclusion:** These results suggest that the body weight loss induced by luseogliflozin is not relevant to serum adiponectin level, but that the elevation of adiponectin level after the administration of luseogliflozin may be related to improvement of glycemic control, lipid metabolism, insulin resistance, and hepatic function. Since type 2 diabetic patients often associate with hepatic disorder, luseogliflozin would be one of superior approaches to treatment.

**EVALUATION OF ANTIDIABETIC, ANTIOXIDANT AND OTHER PHYTOCHEMICAL PROPERTIES OF THAI FRUITS, VEGETABLES AND SOME LOCAL FOOD PLANTS**

Suree Nanasombat<sup>1</sup>, Kanokwan Yansodthee<sup>1</sup>, Ilada Jongjaited<sup>1</sup>

1-Department of Biology, Faculty of Science, KMITL, Bangkok, Thailand

**Objective:** Study the effect of Intake of fruits and vegetables rich in phytochemicals with protection against chronic diseases, i.e., diabetes and others.

**Methods:** Antidiabetic and antioxidant activities, and phenolic, flavonoid and indigestible polysaccharide contents of 33 crude ethanolic extracts of Thai local plants were evaluated. Based on these properties, five plant extracts were selected to study their effects on growth of *Lactobacillus acidophilus*, *Lactobacillus bulgaricus* and *Streptococcus thermophilus* during yogurt fermentation.

**Results:** Mangosteen (*Garcinia mangostana*) fruit peel and Indian gooseberry (*Phyllanthus emblica*) fruit extracts had strongest antioxidant activity, phenolics and flavonoids. Bamboo grass (*Tiliacora triandra*) leaf extract had highest alpha-amylase inhibitory activity (78.28% inhibition), while mulberry (*Morus alba*) fruit extract had strongest alpha-glucosidase inhibitory activity (59.63% inhibition). Mangosteen fruit peel extract contained highest amount of indigestible polysaccharides (188.62 mg/g extract), while those with relatively high indigestible polysaccharide content were the extracts of pineapple fruits (*Ananus comosus*), lotus seeds (*Nelumbo nucifera*), black rice grains (*Oryza sativa*) and pisang mas fruits (*Musa acuminata*). Addition of lotus seed extract in milk resulted in highest proliferation of the starter bacteria in yogurt after 24-hour fermentation at 37 C, whereas addition of black rice grain, pisang mas and pineapple fruit extracts in milk also cause good growth of these bacteria.

**Conclusion:** Consumption of these plants with high antioxidant activities may be possible to provide health benefits, e.g., preventing diabetes, stimulating growth of probiotic bacteria ,etc.

**SCHOOL EXPERIENCES OF STUDENTS IN THE CARIBBEAN LIVING WITH DIABETES**

*Bernice Dyer-Regis<sup>1</sup>, Keisha James<sup>1</sup>, Denise Mills<sup>1</sup>, Isabel Turner<sup>1</sup>*

1-School of Education, Faculty of Humanities and Education, The University of the West Indies, St Augustine, Trinidad and Tobago

**Objective:** This study sought to determine how students were coping with either Type 1 or Type 2 diabetes while at school.

**Methods:** Qualitative case studies were conducted in 2013 and 2015 in Tobago, Antigua and Trinidad with seven male and female students 7-16 years with either Type 1 or Type 2 diabetes.

**Results:** Findings revealed students experienced lethargic feelings such as drowsiness, weakness and dizziness when blood glucose levels were low and symptoms of Attention Deficit Hyperactivity Disorder when high. Affected students were unable to be attentive in class; time spent in the sick bay reduced contact teaching time. Teachers sometimes misunderstood students' symptoms as signs of laziness or attempts to escape from school work. Insulin was administered in insanitary washrooms. Suitable foods to meet the needs of diabetic students were generally unavailable at the cafeterias; nutrition education not generally offered to student body.

**Conclusion:** Students with diabetes experienced challenges in managing the disease condition in a less than supportive school environment, with the potential to ultimately affect academic performance adversely.

**INCLUSION OF WALNUT IN THE DIETS OF ADULTS AT RISK FOR TYPE 2 DIABETES AND THEIR DIETARY PATTERN CHANGES: A RANDOMIZED, CONTROLLED, CROSSOVER TRIAL**

*Valentine Yanchou Njike, MD, MPH<sup>1,2</sup>; Niloufarsadat Yarandi<sup>2</sup>, MD, Paul Petraro, ScD<sup>2</sup>, Rockiy G. Ayyetey, MS<sup>1,2</sup>; Judith A. Treu, MS, RD<sup>1,2</sup>; David L. Katz MD, MPH<sup>1,2</sup>*

1- Yale University Prevention Research Center (VN, RA, JT, DK), USA 2- Griffin Hospital - Derby, CT (VN, NY, PP, RA, JT, DK), USA

**Objective:** Examining the food groups displaced during walnut inclusion in the diets of those adults with pre-diabetes.

**Methods:** Randomized, controlled, modified Latin square parallel design with two treatment arms. The 112 participants (31 men, 81 women) were randomly assigned to a diet with or without dietary counseling to adjust calorie intake in a 1:1 ratio. Within each treatment arm, participants were further randomized to one of two sequence permutations to receive a walnut-included diet with 56 g (366 kcal) of walnuts per day and a walnut-excluded diet. Participants in the calorie-adjusted arm received advice from a dietitian to preserve an isocaloric condition while including walnuts. We analyzed the 12 components of the 2010 Healthy Eating Index to examine dietary pattern changes of study participants.

**Results:** Seafood and plant protein intake significantly increased with walnut inclusion, compared to their exclusion ( $2.14 \pm 2.06$  vs.  $-0.49 \pm 2.33$ ;  $p=0.003$ ). The ingestion of healthful fatty acids also significantly increased with walnut inclusion, compared to their exclusion ( $1.43 \pm 4.53$  vs.  $-1.76 \pm 4.80$ ;  $p=0.02$ ). Dairy ingestion increased with walnut inclusion in the calorie-adjusted phase, compared to walnut inclusion without calorie adjustments ( $1.06 \pm 4.42$  vs.  $-2.15 \pm 3.64$ ;  $p=0.02$ ).

**Conclusions:** Our data suggest that walnut inclusion in the diets of adults at risk for diabetes led to an increase in intake of other healthful foods.

**ROBUST GLUCOSE AND HBA1C LOWERING AFTER A SINGLE DOSE OF RN909 (PF-06293620) IN TYPE 2 DIABETES (T2D) SUBJECTS**

*Barry Gumbiner<sup>1</sup>, Brooke Esteves<sup>1</sup>, Vanessa Dell<sup>1</sup>, Tenshang Joh<sup>1</sup>, Pamela D. Garzone<sup>1</sup>, Alison Forgie<sup>1</sup>, Chandrasekhar Udata<sup>1</sup>*

1-Pfizer, Inc, USA

**Objective:** To assess safety, tolerability, pharmacokinetic and pharmacodynamics of single-doses of RN909

**Methods:** Forty-four (33 active + 11 placebo) T2D subjects on daily metformin ( $\geq 1500$  mg) received one injection with RN909 (0.3, 1, 3, 6 mg/kg SC, or 1.0 mg/kg IV) or placebo (PBO) and were followed for 12 weeks.

**Result:** In subjects treated with RN909, dose-dependent fasting plasma glucose (FPG)-lowering, durability of FPG lowering and decreased HbA1c were observed. Mean ( $\pm$ SD) baseline FPG and HbA1c were  $176 \pm 36$  mg/dL and  $8.1 \pm 0.8\%$ , respectively. The mean ( $\pm$ SD) FPG decrease at 4 weeks ranged from  $-21 \pm 23$  to  $-98 \pm 30$  mg/dL with an overall maximal decrease on Day 4 that ranged from  $-49 \pm 34$  to  $-105 \pm 35$  mg/dL in RN909 subjects. At 12 weeks, maximal HbA1c decrease was  $1.5 \pm 0.9\%$  in RN909 subjects. Five (5) RN909 subjects and 1 PBO subject had transaminase elevations 3 x upper limit of normal.

**Conclusion,** a single dose of RN909 significantly reduced FPG and HbA1c in T2D subjects on maximal daily doses of metformin.

## INTRODUCTION OF CARBOMEDTHERAPY

*Nadia Boudjenah*<sup>1</sup>

1 - GENERAL SURGEON-MEDICAL CENTER-BOUZAREAH-ALGIERS, Algeria

**Objectives:** Emerged in 1932 in France, it allows us to reduce the rate of amputation to 0.5%, in spite of the absence of vascular surgery.

**Methods:** Consists of, a transcutaneous injection of carbon dioxide on the lower limbs, in and around the wound. Peripheral vasodilatation, obtained during the injection, perpetuated by neo-angiogenesis generated by repetition of sessions is explained by the Bohr Effect. Consequence: faster healing and improved vascular and neurological damage. **PATIENTS:** More than 16.000 patients, 30% without wounds in 07 years. In 2014 and 2015, in a period of 18 months, 7216 new cases 31% without wounds.

**Results:** Immediate amputation, in view of the importance of vascular lesions: 45 patients. 15 patients that we thought we could help, despite the absence of vascular surgery and the existence of contraindications to the use of carbomed therapy and due to the aggravation of the vascular disease, had to be amputated. No amputation when there was only an infectious problem. Improvement in the walking perimeter, reduction or better say disappearance of neurological pain, and recovery of sensation. Sometimes, bad functional results because local population refuse amputation.

**Conclusions:** Simple technique, simple treatment protocol at home, low cost, very rare short time hospitalization, to rebalance the diabetes or tares, halt an important infection or do a minor amputation or a drainage. A quick learning; it is worth and deserves to be used.

## UMBELLIFERONE IN TREATMENT OF DIABETIC NEPHROPATHY

Mayuresh S Garud<sup>1</sup>, Yogesh A. Kulkarni<sup>1</sup>

1-Shobhaben Pratapbhai Patel School of Pharmacy & Technology Management,  
SVKM's NMIMS, Mumbai, India

**Objective:** Evaluate the effect of umbelliferone in streptozotocin (STZ) induced diabetic nephropathy in rats.

**Methods:** In present study, effect of umbelliferone was evaluated in streptozotocin (STZ) induced diabetic nephropathy in rats. Diabetes was induced in male Sprague Dawley rats by administrating STZ at dose of 55 mg/kg (*i. p.*). Four weeks after the induction of diabetes, animals were treated with umbelliferone at the dose of 20 and 40 mg/kg for next four weeks.

**Results:** Animals showed signs of well-developed diabetes after four weeks of STZ administration like poly urea, polyphagia and polydipsia. Increased levels of plasma glucose, creatinine and blood urea nitrogen and decreased levels of plasma total protein and albumin levels were observed in diabetic control animals. Treatment with umbelliferone significantly shifted these levels towards the normal. Creatinine clearance was decreased in diabetic animals which was improved after treatment with umbelliferone. Significant amount of protein was excreted in urine of diabetic animals. Excretion of protein in urine was decreased significantly ( $p < 0.01$ ) in umbelliferone treated animals. Kidney of diabetic animals showed significant changes in oxidative stress markers. Treatment with umbelliferone decreased the oxidative stress significantly at the dose of 20 & 40 mg/kg. Glomerular damage was observed in Hematoxylin-Eosin (HE) stained sections of kidney tissues of diabetic animals. Periodic Acid Schiff (PAS) staining revealed increased mesangial matrix deposition in diabetic kidney while Masson Trichrome staining showed increased deposition of collagen. Treatment with umbelliferone showed amelioration of kidney damage with decreased deposition of mesangial matrix and collagen. Immunohistochemical analysis showed increased expression of transforming growth factor beta (TGF- $\beta$ ) in kidney. Expression of TGF- $\beta$  was significantly decreased after treatment with umbelliferone. Optical density of immune stained sections of diabetic kidney was as high as  $0.3793 \pm 0.0084$ , which was reduced significantly ( $p < 0.05$ ) to  $0.3216 \pm 0.0117$  at dose of 40 mg/kg of umbelliferone.

**Conclusion:** Results of the study show that umbelliferone ameliorates the streptozotocin induced diabetic nephropathy in rats and can be effectively used in management of diabetic nephropathy.

**BAUHINIA VARIEGATA DECREASES RENAL DAMAGE IN STREPTOZOTOCIN INDUCED DIABETIC RATS**

Mayuresh S Garud<sup>1</sup>, Yogesh A. Kulkarni<sup>1</sup>

1-Shobhaben Pratapbhai Patel School of Pharmacy & Technology Management,  
SVKM's NMIMS, Mumbai, India

**Objective:** Present study evaluates the effectiveness of aqueous extract of leaves of *B. variegata* (AE) in diabetic nephropathy (DN).

**Methods:** Aqueous extract was prepared by maceration and standardized by HPTLC method. Male Sprague Dawley rats were used for the *in-vivo* study. Diabetes was induced by administration of streptozotocin (STZ) at dose of 55 mg/kg (*i. p.*). After administration of STZ, animals were kept for 28 days for development of DN. Then the animals were treated with AE at the dose of 250, 500 and 1000 mg/kg for next 28 days. At the end of the treatment plasma, urine and kidney tissue were collected for evaluation of various parameters.

**Results:** Extract was found to contain  $0.18 \pm 0.02$  % w/w of quercetin. Evaluation of plasma biochemical parameters showed elevated levels of glucose as well as creatinine and blood urea nitrogen, while the levels of total protein and albumin were depleted in diabetic control group. Treatment with the AE reduced the levels of plasma glucose, creatinine and blood urea nitrogen significantly whereas the levels of total protein and albumin were increased significantly after treatment. Urine output was increased significantly in diabetic animals because of polyuria which was reduced significantly in AE treated animals. Creatinine clearance in diabetic animals was significantly decreased to  $1.39 \pm 0.06$  ml/min ( $p < 0.05$ ). Creatinine clearance was improved in AE treated animals at dose of 500 and 1000 mg/kg. Renal hypertrophy was found to decrease in AE treated animals. Determination of various oxidative stress parameters showed increased oxidative stress in diabetic kidney which was reduced after treatment of AE. Histopathological analysis showed glomerular damage in Hematoxylin-Eosin stained diabetic kidneys. Periodic Acid Schiff (PAS) staining showed increased mesangial matrix deposition and Masson Trichrome staining showed increased collagen deposition in kidney of diabetic animals. Treatment with AE found to decrease the histopathological changes significantly.

**Conclusion:** Results of this study have provided the scientific evidence for use of the aqueous extract of leaves of *B. variegata* in effective treatment of diabetic nephropathy.

**A TYPICAL SYMPTOMS OF ACUTE MYOCARDIAL INFARCTION IN HOSPITALIZED HISPANIC DIABETES MELLITUS PATIENTS IN PUERTO RICO**

*Juan Carlos Zevallos*<sup>1</sup>, *Roberto Zevallos*<sup>1</sup>; *Juan A Gonzalez*<sup>2</sup>; *Juan Gabriel Ruiz*<sup>1</sup>; *Noel C Barengo*<sup>1</sup>

1-Florida International University, USA 2- University of Puerto Rico Medical Science Campus, San Juan, Puerto Rico

**Objective:** this study was to determine if there is an association between DM and the presentation of atypical symptoms in the emergency room in those suffering from an AMI in Puerto Rico.

**Methods:** A secondary data analysis of the Puerto Rico Cardiovascular Disease Surveillance system (PRCDS) was conducted. The PRCDS is an observational, non-concurrent, prospective study that collected information on hospitalized Hispanic patients in 2007, 2009 and 2011. DM was defined as glucose >200mg/dl during hospitalization, use of oral anti-diabetic medication or insulin, or previously diagnosed DM. The main study outcome was the presence of atypical symptoms at the time of hospital admission such as dizziness, syncope, abdominal, right arm or back pain. The prevalence of atypical symptoms in patients with diabetes and those without was compared. Univariate and multivariate logistic regression models were used to test for independent association. Odds ratio and their respective 95% confidence intervals are reported. Statistical significance was considered for an alpha level of 0.05.

**Results:** The study population consisted of a total of 2,965 patients (45% women) mean age (67+/- 14 years). The prevalence of DM among the study patients was 72% (n=2,114). DM was independently associated with an increased risk of atypical presentation of AMI (OR=1.39, 95% confidence interval (CI) 1.12-1.73) after adjustment for age, gender, congestive heart failure, stroke history and body mass index. When men and women were analyzed separately, the OR for atypical presentation of AMI was 1.63 (95% CI 1.21-2.18) in men and 1.19 (95% CI 0.86-1.64) in women, respectively.

**Conclusion:** The increased risk of atypical presentation of AMI symptoms in DM patients is important to be taken into account at hospital admission to avoid delays of the correct diagnosis. Probably, an ECG and laboratory measures of acute infarction markers should be taken in any DM patients presenting above mentioned atypical symptoms. The high prevalence of DM in hospitalized Puerto Rican patients is of concern.

**METABOLIC AND GLUCOREGULATORY ASSOCIATIONS OF CIRCULATING ADIPOCYTOKINES IN  
NORMOGLYCEMIC AFRICAN AMERICAN AND EUROPEAN AMERICAN OFFSPRING OF  
PARENTS WITH TYPE 2 DIABETES**

*Deirdre James<sup>1</sup>, Ibiye Owei<sup>1</sup>, Nkiru Umekwe<sup>1</sup>, Samuel Daqogo-Jack<sup>1</sup>*

1-Department of Medicine, Division of Endocrinology, Diabetes and Metabolism, University of Tennessee Health Science Center Memphis, TN 38163, USA

**Objective:** Investigate the association of adipocytokines with adiposity, insulin secretion, and insulin action in a biracial cohort.

**Methods:** The study population (N=376) consisted of normoglycemic African American (AA) and European American (EA) offspring of parents with type 2 diabetes. At enrollment each subject underwent clinical assessments, screening OGTT, anthropometrics, blood biochemistries and adipocytokines (TNF-alpha, IL-6, IL-1, resistin, high sensitivity {hs} CRP and adiponectin). Insulin sensitivity was assessed using the hyperinsulinemic euglycemic clamp (Si-clamp) and HOMA-IR; beta-cell function, using IVGTT and calculation of acute insulin response (AIR); and body composition by dexa.

**Results:** The mean ( $\pm$  SD) age of the subjects was  $44.2 \pm 10.6$ yr; BMI was  $30.2 \pm 7.2$ kg/m<sup>2</sup>, fasting plasma glucose (FPG) was  $91.8 \pm 6.8$ mg/dl and 2hr plasma glucose (2HPG) was  $121.8 \pm 24.4$ mg/dl. African Americans had higher hsCRP ( $4.67 \pm 6.62$  mg/L vs.  $2.77 \pm 4.55$  mg/L,  $P < 0.0001$ ) and lower adiponectin ( $8.34 \pm 4.95$   $\mu$ g/ml vs.  $10.7 \pm 5.44$   $\mu$ g/ml,  $P = 0.003$ ) levels compared to EA. Women had higher levels than men for adiponectin ( $10.3 \pm 5.68$   $\mu$ g/ml vs.  $7.27 \pm 3.41$   $\mu$ g/ml,  $P < 0.0001$ ), resistin ( $9.47 \pm 4.79$  ng/ml vs.  $7.95 \pm 2.78$  ng/ml,  $P = 0.004$ ) and hsCRP ( $4.43 \pm 6.33$  mg/L vs.  $2.25 \pm 3.99$  mg/L,  $P = 0.002$ ). Significant associations were seen between metabolic measures (BMI, waist circumference, total and trunk fat, and 2HPG) and individual adipocytokines ( $P = 0.04 - < 0.0001$ ). The strongest positive association was between BMI and hsCRP ( $r = 0.52$ ,  $P < 0.0001$ ). Adiponectin levels were inversely associated with total and trunk fat mass ( $P = 0.001 - < 0.0001$ ). Significant associations also were observed between insulin sensitivity vs. hsCRP ( $r = -0.21$ ,  $P = 0.003$ ) and resistin ( $r = -0.19$ ,  $P = 0.0013$ ). In contrast to the negative associations between insulin sensitivity and the aforementioned pro-inflammatory cytokines, adiponectin levels positively predicted higher insulin sensitivity ( $r = 0.33$ ,  $P < 0.0001$ ). Furthermore, insulin secretion was significantly associated with adiponectin ( $r = -0.21$ ,  $P = 0.0002$ ), resistin ( $r = 0.18$ ,  $P = 0.0023$ ) and hsCRP ( $r = 0.15$ ,  $P = 0.01$ ). The associations among hsCRP and adiponectin vs. insulin sensitivity were generally consistent in AA and EA with some variations in the strengths.

**Conclusion:** In this biracial cohort of nondiabetic subjects, circulating adipocytokines showed congruent relationships with total and visceral adiposity, insulin sensitivity, and insulin secretion. These findings suggest a role for inflammation in the pathogenesis of early dysglycemia.

## EFFECTS OF CLIMATIC VARIABLES ON WEIGHT LOSS: A GLOBAL ANALYSIS

Morena Ustulin<sup>1</sup>, Changwon Keum<sup>2</sup>, Junghoon Woo<sup>3</sup>, Jeong-taekWoo<sup>4</sup>, Sang Youl Rhee<sup>5</sup>

1- Department of Medicine, Graduate School, Kyung Hee University, Seoul, South Korea, 2- Division of Biomedical Research Institute, Geference Inc., Seoul, South Korea, 3- Data and Analytics, KPMG LLP, New York, New York, USA, 4- Department of Endocrinology and Metabolism, Kyung Hee University School of Medicine, Seoul, South Korea, 5- Department of Endocrinology and Metabolism, Kyung Hee University School of Medicine, Seoul, South Korea

**Objective:** Analyze directly the effect of weather on intentional weight loss using global-scale data provided by smartphone application.

**Methods:** Through Weather Underground API and the Noom Coach application, we extracted information on weather and body weight for each user located in each of several geographic areas on all login days. We identified meteorological information (pressure, precipitation, wind speed, dew point, and temperature) and self-monitored body weight data simultaneously. A linear mixed-effects model was performed analyzing 3274 users. Subjects in North America had higher initial BMIs than those of users in Eastern Asia. During the study period, most subjects who used the smartphone application experienced weight loss (80.39%). Users who infrequently recorded information about dinner had smaller variations than those of other users ( $\beta$  freq. users dinner\*time=0.007, p-value < 0.001). Colder temperature, lower dew point, and higher values for wind speed and precipitation were significantly associated with weight loss.

**Conclusion:** We found a direct and independent impact of meteorological conditions on intentional weight loss efforts for the first time on a global scale.

**CHARACTERISTICS OF KOREAN T2DM PATIENTS WITH DIABETIC RETINOPATHY AND MACULAR EDEMA: A STUDY BASED ON A STANDARDIZED CLINICAL DATA**

*Sang Youl Rhee<sup>1</sup>, Sejeong Park<sup>2</sup>, Ki Young Kim<sup>3</sup>, Suk Chon<sup>4</sup>, Seung-Young Yu<sup>5</sup>, Jeong-taek Woo<sup>6</sup>*

1- Department of Endocrinology and Metabolism, Kyung Hee University School of Medicine, Seoul, South Korea, 2- Department of Endocrinology and Metabolism, Kyung Hee University School of Medicine, Seoul, Korea, South Korea, 3- Department of Ophthalmology, Kyung Hee University School of Medicine, Seoul, South Korea, 4- Department of Endocrinology and Metabolism, Kyung Hee University School of Medicine, Seoul, South Korea, 5- Department of Ophthalmology, Kyung Hee University School of Medicine, Seoul, South Korea, 6- Department of Endocrinology and Metabolism, Kyung Hee University School of Medicine, Seoul, South Korea

**Objective:** To Identify the characteristics of Korean T2DM patients with diabetic retinopathy and macular edema.

**Methods:** This study was carried out as a national project to secure standardized biomedical resources of Korean subjects with type 2 diabetes mellitus (T2DM). It was conducted as a part of the Korea Biobank Project. In a single university hospital, clinical data and samples were collected prospectively from T2DM subjects whose duration of DM was over 20 years. Data and samples were collected according to the common data element and the standard of procedure which was developed by the Korean Diabetes Association research council for the standardization of clinical data. The presence of diabetic retinopathy and macular edema was evaluated by ophthalmologic specialists.

**Results:** Among 198 patients enrolled in the first year of the study, 183 patients completed the evaluation on diabetic retinopathy and macular edema. Mean age of the participants was 66.8 years, median duration of DM was 22.6 years, and 49.7% were male.

**Conclusion:** When the characteristics of the patients were analyzed according to the presence of diabetic retinopathy and macular edema, various clinical characteristics showed significant difference between two groups. Age, fasting glucose level, duration of T2DM, family history of chronic disease, use of sulfonylureas or insulin were identified as independent risk factors for DM retinopathy. Sex, age, height, weight, duration of DM and the use of insulin were confirmed as independent risk factors for macular edema.

**PLASMA FETUIN-A (A2-HS-GLYCOPROTEIN) CORRELATES NEGATIVELY WITH INFLAMMATORY CYTOKINES, CHEMOKINES AND ACTIVATION BIOMARKERS IN INDIVIDUALS WITH TYPE-2 DIABETES**

*Nadeem Akhter<sup>1</sup>, Steve Shenouda<sup>1</sup>; Ajit Wilson<sup>1</sup>; Rasheed Ahmad<sup>1</sup>; Sardar Sindhu<sup>1</sup>*

1- Immunology & Innovative Cell Therapy Unit, Dasman Diabetes Institute (DDI), Kuwait

**Objective:** This study was to determine the plasma fetuin-A levels in 53 T2D (BMI=29.7±4.5kg/m<sup>2</sup>) and 72 non-diabetic individuals (BMI=28.2±5.8kg/m<sup>2</sup>)

**Methods:** Therefore, using premixed 38-plex MAP human cytokine/chemokine magnetic bead immunoassays and the data (mean±SEM) were statistically analyzed to determine Pearson's correlation (*r*) between fetuin-A and detected analytes; *P*-values ≤0.05 were considered significant.

**Results:** The data show that plasma fetuin-A levels were comparable in both groups (*P*=0.27) and in T2D individuals, fetuin-A associated negatively (*P*≤0.05) with a large number of proinflammatory cytokines/chemokines and activation biomarkers including TNF-α, IFN-α2, IFN-γ, IL-1α, IL-1β, IL-1RA, IL-3, IL-4, IL-7, IL-9, IL-12p40/p70, IL-15, CCL-2, CCL-4, CCL-11, CCL-22, CXCL-8, CX3CL-1, EFF-2, EGF, G-CSF, GM-CSF, GRO, sCD40L, and VEGF. In non-diabetics, fetuin-A also correlated positively with certain TH2 cytokines (IL-5, IL-13) and chemokines (CCL-3, CCL-5, CCL-7). Notably, *in vitro* fetuin-A production was significantly suppressed in HepG2 cells treated with TNF-α, IL-1β, and IFN-γ which supported the clinical findings of a negative association between fetuin A and inflammatory mediators.

**Conclusions:** The negative association between circulatory fetuin-A and systemic inflammatory mediators in T2D patients suggests that plasma fetuin-A may have predictive significance as a negative APP in metabolic disease.

## INCREMENTAL BURDEN OF TYPE 2 DIABETES MELLITUS IN PATIENTS HOSPITALIZED FOR HEART FAILURE

*Aditya D. Raju<sup>1</sup>, Anna D. Coutinho<sup>1</sup>, Weijia Wang<sup>2</sup>, Sharash Shetty<sup>2</sup>, Stephen D Sander<sup>2</sup>, Craig I. Coleman<sup>3</sup>*

1- Xcenda, LLC, Palm Harbor, FL, USA, 2- Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT, USA, 3- University of Connecticut, Storrs, CT, USA

**Objective:** To evaluate the incremental economic burden of T2DM in patients hospitalized for HF.

**Methods:** A US-based integrated healthcare claims database was used to identify patients  $\geq 18$  years hospitalized for HF (during 07/01/2011 to 06/30/2014). The 1-year period prior to the first HF hospitalization (index) was used to identify the study cohorts, T2DM and non-T2DM, based on diagnoses codes and use of non-insulin antidiabetic agents. All outcomes were assessed among patients surviving the index HF hospitalization during a variable follow-up period of up to 4 years until earliest occurrence of end of continuous health plan enrollment, or end of available data. Time to subsequent HF hospitalization was evaluated with Cox proportional hazards model. All-cause (AC) and HF-related length of stay, bed-days, healthcare resource use, and costs were computed per patient per month (PPPM), and evaluated using generalized linear models with outcome-appropriate distributions. All models controlled for demographic and clinical characteristics.

**Results:** Of 40,066 patients hospitalized for HF, 35% had comorbid T2DM. The average age of the total population was  $68.5 \pm 13.1$  years and 57.5% were male. A total of 625 (1.6%) died during the index HF hospitalization - same proportion for both cohorts. The adjusted costs of the index HF hospitalization were significantly higher by \$530 (95% CI: \$61, \$1010;  $P=0.027$ ) for T2DM compared to non-T2DM patients. The relative risk of a subsequent HF hospitalization was 1.11 (95%CI: 1.06, 1.16;  $P<0.001$ ) for patients with T2DM compared to those without T2DM. Following discharge from the index HF hospitalization, T2DM was significantly associated with higher mean PPPM number of hospitalizations (AC: 0.19 vs. 0.16; HF: 0.05 vs. 0.04;  $P<0.001$ ) and longer mean PPPM bed-days (AC: 1.42 vs. 1.24; HF: 0.33 vs. 0.29;  $P<0.001$ ). Patients with T2DM had a significantly higher mean PPPM adjusted all-cause cost of \$599 (95% CI: \$358, \$847;  $P<0.001$ ) and mean PPPM HF-related cost of \$204 (95%CI: \$136, \$275;  $P<0.001$ ) following discharge from the index HF hospitalization.

**Conclusion:** Comorbid T2DM is associated with higher HF-related hospitalization costs, and an increased risk of subsequent HF-related hospitalizations, higher costs and healthcare resource use following discharge

**ASSOCIATION OF NUCLEAR FACTOR KAPPA B1 GENE POLYMORPHISM (RS28362491) WITH LEVELS OF INFLAMMATORY BIOMARKERS AND SUSCEPTIBILITY TO DIABETIC NEPHROPATHY IN ASIAN INDIANS**

*Stuti Gupta<sup>1</sup>, Mohini Sharma<sup>1</sup>, Mohit Mehndiratta<sup>1</sup>, Amar Gautam<sup>2</sup>, Om P Kalra<sup>2</sup>, Jasvinder K Gambhir<sup>1</sup>*

1- Molecular Diagnostic Laboratory, Department of Biochemistry, University College of Medical Sciences (University of Delhi) and G.T.B. Hospital, Dilshad Garden, Delhi-110095, India. 2- Department of Medicine, University College of Medical Sciences (University of Delhi) and G.T.B. Hospital, Dilshad Garden, Delhi-110095, India.

**Objective:** This novel study was planned to establish association of functional -94 ATTG insertion/deletion (rs28362491) gene polymorphism with their downstream target urinary monocyte chemoattractant protein-1 (uMCP-1), plasma TNF- $\alpha$  levels and DN in Asian Indians.

**Methods:** A total of 300 subjects were recruited (100 each), normoglycemic, (NG); Type 2 DM without any complications (DM) and Type 2 DM with diabetic nephropathy (DM-CKD). Analysis was carried out by PCR-RFLP and ELISA.

**Results:** The allelic frequencies of -94 ATTG insertion/deletion were 0.655/0.345 (NG), 0.62/0.38 (DM) and 0.775/0.225 (DM-CKD). The -94 ATTG ins allele was associated with significantly increased levels of uMCP-1 ( $p=0.026$ ) and plasma TNF- $\alpha$  ( $p=0.030$ ) and almost doubled the risk of DN (OR=1.91, 95% CI=1.080-3.386,  $p=0.025$ ).

**Conclusions:** -94 ATTG ins/ins polymorphism might be associated with increased risk of developing nephropathy in Asian Indian subjects with diabetes mellitus

**ASSOCIATION OF NQO1 (RS1800566) POLYMORPHISM WITH NQO1 LEVELS AND RISK OF DIABETIC NEPHROPATHY IN INDIAN POPULATION**

*Mohini Sharma<sup>1</sup>, S Gupta<sup>1</sup>, M Mehndiratta<sup>1</sup>, OP Kalra<sup>2</sup>, R Shukla<sup>1</sup>, JK Gambhir<sup>1</sup>*

1- Departments of Biochemistry and Medicine, India 2- University College of Medical Sciences (University of Delhi) and & Guru Teg Bahadur (GTB) Hospital, Dilshad Garden, Delhi-110095,India

**Objective:** This study was to evaluate the association of NQO1 609C/T (rs1800566) polymorphism with NQO1 levels and DN.

**Methods:** 600 participants including healthy controls (HC), type 2 diabetes mellitus without complications (T2DM) and diabetic nephropathy (DN): 200 each were screened for studying 609 C/T polymorphism of NQO1 gene using PCR-RFLP. NQO1 levels in plasma were measured by ELISA.

**Results:** The allelic frequencies of 609C/T were 0.88/0.12 in HC, 0.765/0.235 in T2DM and 0.65/0.35 in DN. 609T allele carriers had significantly lower NQO1 levels ( $p < 0.05$ ) and unveiled higher risk towards the development of DN (OR = 1.717,  $p = 0.010$ ).

**Conclusion:** NQO1 609C/T SNP is a functional polymorphism having significant effect on NQO1 levels. This work concludes that NQO1 609C/T genotypic variants may increase the susceptibility to DN in individuals with T2DM of north Indian population.

**ECONOMIC BURDEN OF TYPE 2 DIABETES MELLITUS IN PATIENTS WITH CARDIOVASCULAR DISEASE IN  
COMMERCIALY-INSURED PATIENTS IN THE UNITED STATES**

*Weijia Wang<sup>1</sup>, Eileen M. Farrelly<sup>2</sup>, Sharash Shetty<sup>1</sup>, Dana Stafkey-Mailey<sup>2</sup>, Stephen D. Sander<sup>1</sup>, Craig I. Coleman<sup>3</sup>*

1- Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT, USA, 2- Xcenda, LLC, Palm Harbor, FL, USA, 3- University of Connecticut, Storrs, CT, USA

**Objective:** To evaluate the economic burden of T2DM in patients with CVD.

**Methods:** A descriptive, cross-sectional study of CVD patients with and without T2DM was conducted using integrated healthcare claims data from a commercially-insured population in the US. Patients aged  $\geq 18$  years with a diagnosis for a CVD condition were identified in the index year (2014). The pre-index year (2013) was used for identification of the study cohorts: T2DM and non-T2DM. Patients with T2DM were identified based on diagnoses codes and use of non-insulin antidiabetic drugs. Demographic and clinical characteristics were assessed during the pre-index year. Outcomes of all-cause and CVD-related healthcare resource use and costs per patient per year were measured during the index year, and compared between cohorts using t-tests and chi-square tests.

**Results:** A total of 691,934 CVD patients were identified, of which 20% had comorbid T2DM. The T2DM cohort was older ( $64.1 \pm 10.4$  vs  $59.7 \pm 13.2$ ) with more males (65.0% vs 57.6%), and had a significantly higher percentage of patients with atherosclerosis/other ischemic heart disease, stroke, heart failure, myocardial infarction, and revascularization procedures compared to the non-T2DM cohort (all comparisons  $P < 0.001$ ). The T2DM cohort had a significantly higher percentage of patients with all-cause hospitalizations (29.9% vs 26.6%;  $P < 0.001$ ) and total bed days (12.3 vs 10.1;  $P < 0.001$ ) compared to the non-T2DM cohort. Among CVD patients, patients with comorbid T2DM had incremental all-cause costs of \$5,303 (\$29,782 vs \$24,479;  $P < 0.001$ ) relative to those without T2DM. Average CVD-related incremental costs were \$1,474 for T2DM vs. non-T2DM ( $P < 0.001$ ). Over half of the incremental CVD-related costs (54.9%) were contributed by hospitalizations for CVD-related conditions.

**Conclusions:** Among patients with CVD, comorbid T2DM was associated with increased all-cause and CVD-related costs compared to patients without T2DM. The results highlight the importance of treating comorbid T2DM in patients with CVD.

**PREDICTORS OF PRIMARY NON-ADHERENCE, SECONDARY NON-ADHERENCE AND NON-PERSISTENCE TO ORAL ANTIDIABETIC MEDICATIONS IN PATIENTS WITH TYPE-2 DIABETES**

*Sandhya Mehta<sup>1</sup>, Elise Kaufman<sup>1</sup>; Stephen Sander, <sup>2</sup>; Ray Gani, <sup>1</sup>; Kathy Lang, <sup>1</sup>*

1.Quintiles, Inc. 2. Boehringer Ingelheim, Inc., USA

**Objective:** this study was to identify key predictors of primary non-adherence (PNA), secondary non-adherence (SNA) and non-persistence (NP) to OADs in T2D patients.

**Methods:** A large, US, EMR-linked-administrative claims database was used to identify patients aged  $\geq 18$  years with a diagnosis of T2D, a new prescription order for OAD (index OAD) of interest between Jan 2011 and Sep 2013, and at least 12 months of continuous data prior to and at least 3 months following their index OAD. Use of linked data allowed for measurement of PNA and a more accurate measurement of NP by providing a way to discern between patient discontinuation and physician discontinuation. Patients were followed from first index OAD prescription to the earliest of the following: change in the index regimen, switch to another OAD or addition of another diabetes medication, disenrollment from the health plan, or the end of one year. Demographic, clinical, behavioral, and resource-use covariates measured in the 12-month period prior to index OAD were assessed in multivariable stepwise logistic regression models to estimate key predictors of PNA, SNA and NP. PNA was defined as the absence of a prescription fill in the claims data corresponding to a prescription order in the EMR data within 90 days of the index prescription. SNA was defined using medication possession ratio (total days of drug supplied divided by total duration between first and last prescription fill)  $< 80\%$ . Patients were considered NP if the treatment duration in the claims data was at least 90 days shorter than in the EMR data or when the duration was the same and the EMR physician indicated medication was stopped due to 'patient preference, cost, or other reason'.

**Results:** A total of 7,832 T2D patients were identified, of which 1,741 (22%) were PNA, 2,744 (35%) were SNA and 4,830 (62%) were NP. The table below describes the top predictors of each outcome. Other significant predictors of PNA were comorbidities, outpatient visits, number of any treatments already prescribed, and HbA1C level; of SNA were history of SNA with antihypertensives, dosing frequency, and HbA1c level; and of NP were combination therapy vs monotherapy, history of NP with antihypertensives, and number of prescriptions filled.

**Conclusion:** This analysis highlights key predictors of non-adherence and non-persistence to OADs in T2D patients, which have the potential to be used in clinical practice to identify patients at high risk. Once identified, these patients can be targeted with interventions to improve adherence and persistence and, potentially, improve clinical outcomes.

**11B-HYDROXYSTEROID DEHYDROGENASE 1 REGULATION IN HIGH FAT DIET INDUCED INSULIN RESISTANT RATS AND RATS TREATED WITH SUTHERLANDIA FRUTESCENS**

*Ngozi F. Nnolum-Orji<sup>1</sup>, Saartjie Roux<sup>1</sup>, Janine Mackenzie<sup>1</sup>, Disang Lekutlane<sup>1</sup>*

1 - Nelson Mandela Metropolitan University, Port Elizabeth 6000, South Africa

**Objective:** To investigate the role of 11B-HSD1 in the development of observed IR and the effect of *S. frutescens* on the enzyme expression.

**Methods:** Using qRT-PCR, periodic (days 7, 14, 28, 56, 86) mRNA expressions of 11B-HSD1, GR and PEPCCK were measured in rat liver tissues. Also, 11B-HSD1 protein expression was analysed using immunohistochemical techniques.

**Results:** There was no significant change in 11B-HSD1 expression up till day 56, but increased mRNA and protein levels were observed at day 86 (i.e 30 days after IR had developed). Increased mRNA levels of PEPCCK was observed prior to IR in rats fed HFD, indicating increased gluconeogenesis, but did not increase in rats fed HFD and *S. frutescens*. mRNA levels of GR showed no pattern of GR regulation.

**Conclusion:** Increased 11B-HSD1 activity is possibly a consequence of IR rather than cause. Increased gluconeogenesis was induced via other mechanisms, while *S. frutescens* prevented increased gluconeogenesis in rats fed HFD supplemented with *S. frutescens*.

**INCREASED PLASMA LEVEL OF ANGPTL3, 4 AND 8 IN OBESITY AND T2D**

*Abdulmohsen AITerki*<sup>1</sup>, *Mohamed Abu-Farha*<sup>2</sup>, *Irina Al-Khairi*<sup>2</sup>, *Preethi Cherian*<sup>2</sup>, *Betty Chandy*<sup>3</sup>,  
*Devarajan Sriraman*<sup>3</sup>, *Asma Alhubail*<sup>1</sup>, *Faisal Al-Refaei*<sup>1</sup>, *Jehad Abubaker*<sup>2</sup>

- 1- Clinical Services Department; Dasman Diabetes Institute, Kuwait City, Kuwait, 2- Biochemistry and Molecular Biology Unit, Dasman Diabetes Institute, Kuwait City, Kuwait, 3- Tissue Banking Unit, Dasman Diabetes Institute, Kuwait City, Kuwait.

**Objective:** Angiotensin like proteins particularly 3, 4 and recently 8 are well established regulators of plasma triglyceride level through regulating the activity of lipoprotein lipase. This study was designed to establish the level of ANGPTL3, 4 and 8 in plasma and adipose tissues and investigate the association between ANGPTL8 with ANGPTL3 and 4 in T2D and non-diabetics subjects.

**Methods:** A total of 235 subjects were enrolled in this study, 144 non-diabetics and 91 T2D. Using ELISA ANGPTL 3, 4 and 8 levels were measured in plasma by ELISA and using real time RT-PCR in adipose tissues.

**Results:** In this study, we showed that ANGPTL3, 4 and 8 were higher in T2D subjects. Dividing the non-diabetic subjects according to their BMI showed higher level of ANGPTL3, 4 and 8 in obese subjects compared to non-obese subjects. ANGPTL8 showed positive correlation with ANGPTL3 in the non-diabetic subjects in the non-obese ( $r=0.2437$ ,  $p\text{-Value}=0.0543$ ) and obese subjects ( $r=0.418$ ,  $p\text{-Value}=0.0125$ ). On the other hand, ANGPTL4 was positively associated with ANGPTL8 in the obese non-diabetics ( $r=0.3322$ ,  $p\text{-Value}=0.0316$ ) and the obese T2D subjects ( $r=0.3161$ ,  $p\text{-Value}=0.0211$ ).

**Conclusion:** In conclusion, our data shows that ANGPTL3, 4 and 8 are increased in obesity and T2D. Taken together, this data highlight the role of these proteins in metabolic diseases and how they interact with each other's under different physiological and pathophysiological conditions.

**INCREASED EXPRESSION OF IL-18R AND IL-18 IN THE ADIPOSE TISSUE IS ASSOCIATED WITH INSULIN RESISTANCE (HOMA-IR) IN OBESITY**

*Shihab Kochumon<sup>1</sup>, Reeby Thomas<sup>1</sup>, Ajit Wilson<sup>1</sup>, Sardar Sindhu<sup>1</sup>, Rasheed Ahmad<sup>1</sup>.*

1-Immunology Unit, Dasman Diabetes Institute, Kuwait

**Objective:** To investigate whether: (i) IL-18R and IL-18 expression in the adipose tissue was simultaneously increased in obese individuals; and (ii) their expression levels associated with HOMA-IR.

**Methods:** Subcutaneous adipose tissue samples were obtained from 30 individuals with different body mass index (BMI). The expression of IL-18R and IL-18 (IL-18R/IL-18) was detected by immunohistochemistry, real-time RT-PCR and confocal microscopy. Insulin resistance was estimated using HOMA-IR. The data were compared using unpaired t-test and the dependence between two variables was assessed by Pearson's correlation test.

**Results:** Obese individuals showed higher IL-18R expression (IL-18R:  $852 \pm 34$ ) in the adipose tissue as compared with lean ( $376 \pm 23$ ) individuals ( $P < 0.0001$ ). The elevated IL-18R expression correlated positively with BMI ( $r = 0.83, P = 0.0002$ ) and percent body fat (PBF) ( $r = 0.51, P = 0.06$ ). The increased IL-18R expression in obesity was also confirmed by qRT-PCR (Obese:  $3.7 \pm 0.6$  Fold; Lean:  $1.003 \pm 0.01$  fold;  $P = 0.002$ ). Similarly, IL-18 expression was also elevated in the adipose tissue which correlated positively with BMI and PBF. HOMA-IR correlated positively with the expression of both IL-18R ( $r = 0.70, P = 0.006$ ) and IL-18 ( $r = 0.83, P = 0.0002$ ). Interestingly, such association was not found in diabetic obese individuals.

**Conclusion:** Obesity is a positive modulator of IL-18R/IL-18 expression in the adipose tissue which relates to insulin resistance in these individuals

**NECK CIRCUMFERENCE HELPS IN THE CHARACTERIZATION OF ATHEROGENIC PROFILE IN MIDDLE-AGED INDIVIDUALS WITHOUT DIABETES: THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH**

*Bianca de Almeida-Pititto<sup>1</sup>, Isis T Silva<sup>2</sup>, Fernando Flexa Ribeiro Filho<sup>3</sup>, Marilia I H Fonseca<sup>2</sup>, Paulo A Lotufo<sup>4</sup>, Isabela Bensenor<sup>4</sup>, Sandra RG Ferreira<sup>2</sup> on the behalf of the ELSA Research Group<sup>4</sup>*

1 Department of Preventive Medicine, Federal University of Sao Paulo, Brazil, 2 School of Public Health, University of São Paulo, Brazil, 3 Medicine Department, Federal University of Pará, Brazil, 4 Internal Medicine Department, University of Sao Paulo, Brazil

**Objective:** This sub-study of the Longitudinal Study of Adult Health (ELSA-Brasil) evaluated whether neck circumference (NC), an easily obtained measure, could be useful to identify a worse atherogenic profile based on biomarkers of inflammation, endothelial dysfunction, and fractions of lipoproteins, in middle-aged participants at low-to-moderate cardiovascular risk.

**Methods:** A sample of 998 individuals (35-54years) without diabetes or cardiovascular disease was enrolled in this analysis. After being characterized as BMI<25kg/m<sup>2</sup> or BMI≥25kg/m<sup>2</sup>, they were stratified into 2 categories of NC: normal or elevated (≥34cm for women and ≥37cm for men). Traditional risk factors, C-reactive protein (CRP), E-selectin and Vertical Auto Profile (VAP) lipid profile were compared by Student t-test. In linear regression models, associations of NC with biomarkers of atherogenic profile, adjusted for HOMA-IR, were tested.

**Results:** In both categories of BMI, those with elevated NC had a worse profile regarding traditional risk factors and greater mean values (DP) or median (IQR) of HDL-cholesterol-2 [BMI<25kg/m<sup>2</sup>:17.3(6.3) vs 14.9(8.0)mg/dl, p<0.002; BMI≥25kg/m<sup>2</sup>: 16.6(6.0) vs 12.4(5.2)mg/dl, p<0.001], LDL-cholesterol-Small [BMI<25kg/m<sup>2</sup>:47.5(22.2) vs 53.6(25.4)mg/dl, p<0.002; BMI≥25kg/m<sup>2</sup>: 48.8(21.4) vs 63.2(26.5)mg/dl, p<0.001] and E-selectin [BMI<25kg/m<sup>2</sup>:62.9(38.2-102.6) vs 74.1(47.8-124.8)ng/ml, p<0.002; BMI≥25kg/m<sup>2</sup>: 69.6(41.6-109.4) vs 81.9(51.2-125.9)ng/ml, p<0.001], but not CRP. Linear regression models showed a direct association of NC with LDL-cholesterol-small [BMI<25kg/m<sup>2</sup>: β 2.28(95%CI1.49to3.07); BMI≥25kg/m<sup>2</sup>: β 2.59(95%CI2.00to3.17)] and E-selectin [BMI<25kg/m<sup>2</sup>: β 0.026(95%CI-0.001to0.05); BMI≥25kg/m<sup>2</sup>: β 0.02(95%CI0.01to0.04)], and an inverse association with HDL2 [BMI<25kg/m<sup>2</sup>: β -0.86(95%CI-1.08to-0.63); BMI≥25kg/m<sup>2</sup>: β -0.70(95%CI-0.81to-0.58)], adjusted for HOMA-IR.

**Conclusion:** Neck circumference might be a useful anthropometric measurement to identify a worse atherogenic profile independent of BMI and insulin resistance in middle-aged individuals without diabetes.

**ADIPONECTIN IS ASSOCIATED WITH COGNITIVE FUNCTION INDEPENDENTLY OF GLUCOSE INTOLERANCE  
IN THE LONGITUDINAL STUDY OF ADULT HEALTH (ELSA-BRASIL).**

Sandra R.G. Ferreira<sup>1</sup>, Adriana Cezaretto<sup>2</sup>, Bianca de Almeida-Pititto<sup>3</sup>, Isabela Bensenor<sup>4</sup>, Paulo Lotufo<sup>5</sup>, Cláudia K Suemoto<sup>6</sup>.

- 1- Full professor at the Department of Epidemiology, School of Public Health, University of Sao Paulo, Brazil, 2 - Research assistant at the Department of Epidemiology, School of Public Health, University of Sao Paulo, Brazil, 3- Associate professor at the Preventive Medicine Dept, Medicine School, Federal University of Sao Paulo, Brazil 4- Associate professor at the Internal Medicine Dept, Medicine School, University of Sao Paulo, Brazil, 5- Full professor at the Internal Medicine Dept, Medicine School, University of Sao Paulo, Brazil, 6- Associate professor at the Internal Medicine Dept., Medicine School, University of Sao Paulo, Brazil

**Objective:** Examined the association between cognitive function and adipocytokines in at-risk individuals.

**Methods:** From 938 participants of the ELSA-Brasil (55% women), 660 were pre-DM. Their cognitive function was evaluated by the *Consortium to Establish a Registry for Alzheimer's Disease*, verbal fluency tests, and the Trail-Making Test. Associations between cognitive domains (outcomes) and pre-DM and adipocytokines (TNF- $\alpha$ , IL-6, leptin, adiponectin) were tested using multiple linear regression, adjusted for confounders (age, sex, education, lifestyle, BMI, depression, thyroid dysfunction).

**Results:** Mean age was 49 $\pm$ 5.7 years and 43% completed high school. In crude analysis, some cognitive domains were associated with age, while only the memory recall showed to be associated with pre-DM and adiponectin ( $\beta$ =0.084; 95%CI:0.03;0.26;p=0.022). In age-adjusted model of multiple linear regression, pre-DM was significantly associated with memory recall anymore. Even using all adjustments, adiponectin – but not other adipocytokines – maintained positively associated with memory recall ( $\beta$ =0.080; 95%CI: 0.004;0.228; p=0.042).

**Conclusion:** This association between memory and adiponectin was previously described. We added that this is independent of body adiposity and glucose intolerance. We suggest that this neuroprotective adipocytokine may be useful to early diagnosis of neurocognitive dysfunction. Prospective analyses in ELSA-Brasil are needed to investigate such hypothesis.

**THE PRE-START PROJECT: DEVELOPMENT OF A DIABETES PREVENTION EDUCATIONAL INTERVENTION FOR 12-14 YEAR OLDS FOR USE ACROSS FIVE EUROPEAN COUNTRIES**

*Jacqui Troughton*<sup>1</sup>, Janet Jarvis<sup>1</sup>, Deidre Harrington<sup>2</sup>, Charlotte Edwardson<sup>2</sup>, Emer Brady<sup>1</sup>, Laura Gray<sup>3</sup>, Susann Blüher<sup>4</sup>, Itziar Vergara Mitxelorena<sup>5</sup>, Rogerio Ribeiro<sup>6</sup>, Melanie Davies<sup>2</sup>,

1.University Hospitals of Leicester, NHS Trust, UK, 2. Diabetes Research Centre, University of Leicester, Leicester, UK, 3. Department of Health Sciences, University of Leicester, Leicester, UK, 4.University of Lipzig, Germany, 5. Kronikgune Department of Health of the Basque Country, Spain, 6. AssociaÇão Protectora dos Diabeticas de Portugal

**Objective:** To develop a diabetes prevention educational intervention for 12-14 year olds for use across five European countries (Germany, Greece, Portugal, Spain and UK) for testing in a randomised controlled trial (RCT).

**Method:** A framework for developing this intervention was followed. Firstly, ideas from all countries regarding content was gathered. This led to countries agreeing a draft programme outline of eight, 90 minute sessions. Topics covered: increasing physical activity, healthy eating and less sitting. A document detailing shared theories and philosophies underpinning the intervention was developed to standardise educator delivery. Learning outcomes for each session were developed and the curriculum was drafted using minimal narrative to allow for easy translation. This allowed countries to make country specific changes to session content but not overall learning outcomes. Focus groups were run in the UK and the curriculum was refined based on observation and feedback. Visits to countries for meetings to discuss the curriculum were invaluable to prevent understanding being lost in translation. A pilot intervention was run in the UK and more refinements were made to the curriculum

**Results:** Following a systematic approach to intervention development has meant that the intervention is ready for testing within an RCT. The focus now is to provide educator training across all countries to ensure consistent delivery.

**Conclusion:** Working across countries to develop an educational intervention that is suitable for all is challenging. Having a more flexible curriculum with shared learning outcomes to allow country specific changes works well. Having shared underpinning theories and philosophies is key to ensure the intervention is delivered by educators across countries in a consistent way.

**ARE INTRAUTERINE NUTRITION, MATERNAL AND CHILDHOOD BODY WEIGHT ASSOCIATED WITH GLUCOSE METABOLISM IN YOUNG ADULTS?**

*Angélica MM Valente<sup>1</sup>, Bianca de Almeida-Pititto<sup>1</sup>, Alexandre A Ferraro<sup>2</sup>, Luciana GD Folchetti<sup>1</sup>, Isis T Silva<sup>1</sup>, Sandra RG Ferreira<sup>1</sup>.*

1- Health of Public School of the University of São Paulo, 2- Medical School of the University of São Paulo, Brazil

**Objective:** This study was to evaluate whether pre-conception, gestational and postnatal factors are associated with glucose metabolism in healthy young adults from the Nutritionists' Health Study(NutriHS),

**Methods:** A cohort study of undergraduates/graduates from Nutrition courses in Brazil. This cross-sectional analysis included 121 adults(90%women), who answered online questionnaires about their early life events, and underwent clinical examination and blood sampling. Associations between exposures: maternal prepregnancy BMI(pre-conception-factor); maternal weight gain during pregnancy and birth weight(gestational-factors); delivery type and lactation(postnatal-factors), and

**Results:** glucose, insulin, HOMA-b and HOMA-IR were tested. Current mean values of age, BMI, glucose, HOMA-b and HOMA-IR were 24.4±5.2years, 23.5±4.3kg/m<sup>2</sup>, 82.8±8.3mg/dL, 46.5±27.9 and 1.9±0.9, respectively. The mean of birth weight: 3,228±440g(50%cesarean delivery); prepregnancy BMI:22.5±3.5kg/m<sup>2</sup> and maternal weight gain:12.6±4.9kg.In univariate linear regression a direct association of maternal weight gain tertiles with HOMA-b in adulthood was observed[b:20.87;95%CI3.48-38.26; r<sup>2</sup>=0.08; p=0,05].

**Conclusion:** In multiple regression, after adjustments for confounders, this association didn't remained significant. Our negative findings point to the limitations of using proxies of intrauterine nutrition and early life events as predictors of glucose metabolism disturbances, at least in healthy adults. Prospective analyses of the NutriHS could clarify the role of early life events for glucose homeostasis.

**ON INVESTIGATION OF RELATIONSHIP BETWEEN GUT MICROBIOTA AND HEMOGLOBIN GLYCATION INDEX IN EUROPEAN AND ASIAN POPULATIONS**

*Jian Li<sup>1</sup>, Xueying Wang<sup>1</sup>, Yaozhong Liu<sup>1</sup>*

1-Department of Global Biostatistics and Data Science, Tulane School of Public Health and Tropical Medicine, USA

**Objective:** This study investigated the relationship between one of the important environmental factors, gut microbiota, and HGI.

**Methods:** Two samples with shotgun sequencing data for gut metagenomes from previously published studies were used: one European sample of 145 women with normal, impaired or diabetic glucose control, and the other Chinese sample of 345 men and women including both diabetic and non-diabetic subjects. To account for the ethnic difference, HGI was calculated following literatures and was conducted within each ethnic group separately (e.g.,  $HGI = HbA1c - (0.009 \times FBG + 6.8)$  in European sample). Ethnic-specific association studies were conducted between previously identified metagenomic markers and HGI, with appropriate covariates (such as age/sex) adjusted. Subsequently, the significantly associated markers were compared across the two ethnic groups. Functional characterization were also conducted using pathway and GO (gene ontology) analyses.

**Results:** Overall 25 and 52 markers significantly associated with HGI were found, respectively, in European sample and in Chinese sample, when the significance level was set to 0.005. However, the majority of these markers were group-specific. For example, for genes been shown previously associated/linked with diabetes, *trpC* ( $9.4 \times 10^{-4}$ ) and *Mrr* type IV REases ( $1.5 \times 10^{-3}$ ) were only significant in European sample, and *PagP* ( $3.3 \times 10^{-6}$ ) and glycerate/sugar phosphate transporter ( $4.3 \times 10^{-5}$ ) only in Chinese sample. When compared between two groups, example markers significant in both groups included Na/H antiporter domain, transcriptional regulatory protein *OmpR*, and chemotaxis methyl-accepting receptor. The former two have been shown associated with functions relevant to diabetes. In addition, there were five overlapping markers without known functions.

**Conclusion:** Various metagenomics markers are associated with HGI, and ethnic differences are present. Insights into the effect of gut microbiota on HGI will shed light on the biological and environmental basis of HGI, and may aid in an improved consideration and usage of HGI in future diabetic management and prevention.

**IMPROVED CLINICAL OUTCOMES WITH THE DUAL THERAPIES OF A SGLT-2I AND A GLP-1RA IN OVERWEIGHT/OBESE PEOPLE WITH T2 DIABETES, REAL WORLD DATA FROM THE INDIAN SUBCONTINENT.**

*Anant Nigam MD, FRCP<sup>1</sup>*

1- Nigam Diabetes Centre, Jaipur, India

**Objective:** to observe the effect of the add-on of a glucagon-like peptide-1 receptor agonist (GLP-1 RA) to an ongoing sodium-glucose co-transporter-2 (SGLT2) inhibitor therapy on HbA<sub>1c</sub> and weight in patients who had suboptimal glycemic control on their previous antidiabetic agents.

**Methods:** We retrospectively observed the effects of the addition of a GLP-1 RA (inj. Dulaglutide 1.5mg/week) on HbA<sub>1c</sub> and weight in patients who had been on a SGLT-2i (Canagliflozin 100mg/day) therapy for a minimum of 16 weeks in addition to other antidiabetic therapies. HbA<sub>1c</sub> and weight were measured at week 16 and 32. Side effects of GLP-1 RA therapy were also noted.

**Results:** A total of 43 patients (22 males, 21 females) who had been on SGLT-2i and other antidiabetic therapies were enrolled. Forty patients (2 males were lost to follow up and 1 female underwent bariatric surgery) completed the study. The list of antidiabetic therapies including metformin (15% intolerant) and insulin (in 65%), before they were initiated on a GLP-1RA. Their mean (SD) age was 49.4 (10.7) years, mean (SD) weight 92.6 (6.6) kg and mean (SD) BMI was 30.6 (2.3) kg/m<sup>2</sup>. The mean (SD) duration of diabetes was 8.1 (3.2) years. The mean (SD) reduction in HbA<sub>1c</sub> (%) from week 16 until the end of the observation at week 32 was - 1.3 % [8.4 (0.7) to 7.1 (0.3), p<0.01, and mean (SD) weight (kg) loss was - 5.5 kg [92.6 (6.6) to 87.9 (7.02); p<0.00001, Nausea and vomiting with the GLP-1 RA was observed in 20% patients but were not severe enough to stop therapy.

**Conclusion:** There was a statistically significant improvement in glycemic control and weight after the addition of a GLP-1 RA to a SGLT-2i. These therapies with complimentary mechanism of action can be useful options in overweight/obese T2DM patients.

**GWA STUDY FROM KUWAIT HIGHLIGHTS JUNK DNA AS A POTENTIAL HOTSPOT IN HYPERTENSION RESEARCH**

*Rasheeba Nizam, Prashantha Hebbar, Dinu Antony, Fadi Alkayal, Sumi Elsa John, Daisy Thomas, Motasem Melhem, Malak Qaddoumi, Jaakko Tuomilehto, Alphonse Thangavel, Osama Alsmadi\**

**Dasman Diabetes Institute, Kuwait**

**Objective:** The state of Kuwait ranks among the countries with highest incidence of diabetes, affecting nearly 25% of the overall population. Hypertension is one of the commonly associated comorbidity affecting approximately one fourth of the individuals suffering from diabetes in Kuwait. Herein we aim to elucidate the genetic background of hypertension by adopting genome wide association study (GWAS) in an ethnic group with relatively little pertinent information.

**Methods:** Herein we report the results from our recent GWA study on 1353 subjects (with and without diabetes) for its association with the development of hypertension under additive genetic model. A total of 12 genetic loci harboring 17 markers associated with hypertension were detected. These include 9 variants marginally associated ( $p \leq 1.0e-05$ ) with **SYSTOLIC** blood pressure (*VPS8* rs6773272; *GRIK2* rs512051; *SDK1* rs512051; *CHN2* rs11973501; *DLC1* rs12533816; *PTPRD* rs12677920; *CYFIP1* rs833438; *SLC13A5* rs12594495; *NCAM2* rs16956192) and 8 variants associated with **DIASTOLIC** blood pressure (*TPO* rs4927616; *CCDC85A* rs2869529; *NEIL2* rs6982453; *LINGO2* rs4399024; *PTPRO* rs11056575; *OCA2* rs4640131; *MBD1* rs11663629; *EYA2* rs914828). The immediate biological impact of these variants remains largely unidentified as they belong to intronic regions of genes involved in protein transport (*VPS8*, *CYFIP1*, *OCA2*), neuronal function (*GRK2*, *SDK1*, *MBD1*), cell growth and differentiation (*CHN2*, *PTPRD*), immunoglobulin (*NCAM2*, *LINGO*) and retinal function (*EYA2*).

**Results:** Significant eQTL's were found for *CCDC85A* rs2869529 ( $p = 2.5e-8$ ) and *NEIL2* rs6982453 ( $p = 0.000032$ ) SNPs in thyroid tissue further suggesting the possible pathophysiological link between thyroid function and diastolic blood pressure. One of the prominent variant associated with diastolic pressure is rs4927616 in the *TPO* gene, which features the functional significance of thyroid gland in hypertension. Literature data indicates that the levels of *TPO* measures are significantly higher in pulmonary hypertension patients compared to the control group. The non-coding intronic regions were historically referred as "Junk DNA" with no specific/ known function. The lack of interest in these region persisted for an extended period until recently the arch of its deleterious effect on transcriptional and splice regulatory mechanisms were furnished. An attempt to identify the mechanistic role played by these markers may propose the secondary hypothesis of the intronic variants and their pathogenic perspective in relation to genetic diversity and susceptibility to hypertension. While the immediate link between rs4927616 (*TPO*) and rs6982453 (*NEIL2*) with hypertension is not obvious, we could detect several missense mutations in these two genes in our exome database.

**Conclusion:** Our study highlights the likelihood of intronic variants as proxy for the associated genes contribution to disease pathophysiology.

## Non-Invasive, Self-Monitoring of Glucose Level by People with Prediabetes and T2DM

Avner Gal <sup>1</sup>, Keren Horman <sup>1</sup>, Yulia Mayzel <sup>1</sup>, Andrew Drexler <sup>2</sup>, Tamar Lin <sup>1</sup>, Ilana Harman-Boehm <sup>3</sup>

<sup>1</sup>- Integrity Applications Ltd., Ashdod, Israel , <sup>2</sup>- Division of Endocrinology, Diabetes and Hypertension, David Geffen School of Medicine, University of California, Los Angeles, CA, USA , <sup>3</sup>- Internal Medicine and the Diabetes Unit, Soroka University Medical Center, Beer-Sheva, Israel.

**Background:** Prediabetes, which is defined by glucose levels higher than normal but lower than diabetes thresholds, is one of the well-known risks for developing Type 2 diabetes. These higher than normal glucose levels can be detected either after meal consumption (impaired glucose tolerance) or after fasting (impaired fasting glucose). Studies show that people with Type 2 diabetes may benefit from tight glycemic control with respect to the disease outcomes, such as cardiovascular and/or micro-vascular disease, myocardial infarction and mortality even beyond a finite period of intensive management. This continuing positive effect of self-monitoring of glucose levels has also been demonstrated on pre-diabetic subjects whose state has deteriorated to Type 2 diabetes (i.e., newly diagnosed Type 2 individuals). Taken together, these findings suggest that self-monitoring of glucose level may also be useful to postpone, or even, in certain cases prevent diabetes in people with prediabetes. However, compliance with self-monitoring is limited, mainly due to the pain associated with current invasive devices. Hence, a non-invasive approach could potentially be the ideal solution for this population. In this study, we evaluated the performance of GlucoTrack<sup>®</sup>, a truly non-invasive glucose monitoring device in subjects with prediabetes, newly diagnosed Type 2 diabetes and subjects with long-duration of Type 2 diabetes.

**Methods:** Device performances were assessed and compared between 7 people with prediabetes, 6 people with newly diagnosed Type 2 diabetes (diabetes duration < 5 years) and 48 people with long-duration Type 2 diabetes. The accuracy of the device was clinically evaluated using Clarke error grid (CEG) analysis and numerically evaluated using median absolute relative difference (MARD) and mean absolute difference (MAD).

**Results:** Overall, 98.2% of 2265 points were in the clinically accepted A and B zones of the CEG. Similar proportions were found in the pre-diabetic, newly diagnosed and long-duration Type 2 diabetic groups (100.0 %, 98.5 % and 98.2 % respectively). MARD was 16.8 %, 15.2%, 17.6 % and 16.8 % for all subjects, pre-diabetic, newly diagnosed and long-duration Type 2 diabetic groups, respectively. Following the same order, MAD was 32.2 mg/dL, 19.4 mg/dL, 27.7 mg/dL and 32.9 mg/dL.

**ASSOCIATION BETWEEN STRUCTURAL BRAIN ABNORMALITIES AND COGNITIVE FUNCTIONING IN PATIENTS WITH TYPE 2 DIABETES MELLITUS**

*Zherdova N.\* , Mankovsky B.\* de Bresser J. \*van den Berg E\* Biessels G.J.\**

\* National medical academy post graduate education, Ukraine

**Objective:** This study was to investigate the association structural brain abnormalities and cognitive functioning in patients with T2DM

**Methods:** We examined 93 patients with T2DM (mean age 62.3±5.5 years, diabetes duration 9.7±6.7 years, BMI 32.5±10.4 kg/m<sup>2</sup>, HbA1c 8.1±1.3%

or depressive episodes. Cognitive functioning was assessed by means of a standardized psychometric test battery covering the domains Memory, Processing Speed and Executive functioning. All cognitive tests were performed in the morning. All subjects were scanned on a 1.5T MRI scanner. Total brain volume (TBV), grey\_matter\_volume(GMV), white matter volume (WMV), and white matter hyperintensity (WMH) volume were determined on the MRI scans automatically by kNN-based probabilistic segmentation. Regression tests were performed with adjusted for sex, education, age.

**Results:** We found statistically significant negative correlations between Processing Speed and WMH (B(95% CI)= -0.228(-0.417/-0.039)); p=0.019). The correlations between domain scores and other brain volumes did not reach the level of statistical significance

**Conclusion:** Our analysis indicates that function of processing speed was negatively affected by WMH. We have shown that certain structural brain abnormalities are associated with cognitive functioning in patients with T2DM

**DIABETIC RETINOPATHY SCREENING: AN EXAMPLE OF HOW PRIMARY HEALTHCARE CAN TRULY MAKE A DIFFERENCE IN DIABETIC RETINOPATHY PREVENTION.**

*Andreas Mitsios<sup>1</sup>, Efthymiadi G.<sup>1</sup>, Giagkoulis T.<sup>1</sup>, Vasileiou F.<sup>1</sup>, Kania E.<sup>1</sup>, Sakellariou I.<sup>1</sup>*

1- Community Medical Center of Farkadona, Trikala, 5th Health Region of Thessaly and Central Greece, Greece

**Objective:** The goal was to introduce an annual diabetic retinopathy screening programme in a primary healthcare setting for diabetic patients of medically underserved areas.

**Methods:** We have examined 288 patients with diabetes mellitus during the time period between January and August 2016. We have used a standardized form to obtain medical history in addition to a questionnaire specific to quality aspects of screening for diabetes mellitus complications. The funduscopy was performed with the use of a slit lamp together with a digital non-contact slit lamp lens. Staging of the observed findings and further referral to hospital services was based on evidence from the NHS diabetic eye screening programme.

**Results:** From the total number of patients (n= 288) that were screened 51%(146/288) had no clinical signs of the disease, 36%(104/288) had findings consistent with background retinopathy, 9%(27/288) demonstrated lesions of preproliferative diabetic retinopathy and 4%(11/288) presented with a condition characteristic of proliferative diabetic retinopathy. Further analysis of the medical history and the specific questionnaire yielded the following findings: 1)68%(196/288) had their first funduscopy for the presence of the disease through the implementation of this programme, 2)72%(207/288) were informed about the need to have screening for diabetic retinopathy by a primary healthcare doctor(GP or Internist) versus 28%(81/288) that were respectively informed by a specialist doctor in the management of the disease(Endocrinologist or Ophthalmologist), 3) 67%(194/288) had average or below average knowledge about diabetic retinopathy and other complications of diabetes mellitus, 4)80%(231/288) believe that introduction of a screening programme for diabetic retinopathy in a primary healthcare setting would increase compliance with regular follow up visits.

**Conclusion:** This project was the first coordinated effort to introduce a diabetic retinopathy screening programme in a primary healthcare setting in this geographical area. The results of this effort indicate that primary healthcare could serve a vital role in management of diabetic patients, in terms of increased awareness and education regarding the disease and its complications and also through provision of effective screening services.

**PREVENTION OF DIABETES AND ITS COMPLICATIONS IN KARNATAKA STATE, INDIA**

*Ashok R Sonnad*<sup>1</sup>

1- Matoshri Parvatibai Sonnad Clinic Karnatak State, India

**Objectives:** Survey the target area for the presence of diabetes in the population regardless of religion, gender, age group, food habits and attitude towards the disease. Understand the causes and predisposing factors of diabetes as well as their relation to different types of diabetes. 3. Develop a real-time database about the disease from the survey. 4. Conduct free diabetes awareness camps regularly in the area. Establish a full-fledged training and counseling center to educate and enhance diabetes awareness, focusing on new remedies and the advantages of early and timely management of the disease. Establish and develop a state of the art diabetes center housing various specialties focused on timely diagnosis and disease prevention and maintenance. Inform policy makers and government officials of the seriousness of the disease, and aid them in the development of long term policies and planning for future prevention of diabetes and its complications.

**Methods:** Two districts in Northern Karnataka, namely Bagalkot and Vijaypur (Bijapur), were chosen for the study because of their uniqueness with respect to lifestyle, food habits, and above all their innocence and naïveté about diabetes. In the study area general information, demographic details, health and clinical related information were collected using structured questionnaires as well as personal interviews. Our research has clearly demonstrated that diabetes and its complications can in fact be managed, prevented, and controlled with vigilant-implementation and observation. A methodical approach and regular follow-ups to assess proper lifestyle modification are main stays for achieving our goals. This is an ongoing study, and the final findings will be provided at the submission of the thesis.

**Results:** After the initial intake, patients were stressed the importance of diet, behavior and exercise modifications. We emphasized to them that effective management of the disease is 70% their effort and only 30% medical management.

**Conclusion:** Diet is an extremely important component in the management of diabetes, and we take pride in the diet developed in our center. It is vegetarian and consists of regional ingredients that are economical, understandable and easy to prepare by the people of North Karnataka. Western dishes were avoided as patients often lacked comprehension about such recipes, and the diet was explained by a qualified nutritionist.



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