SGLT2 inhibitor use in this population. To our knowledge, this will be the first prospective study in Canada assessing SGLT2 inhibitor use in diabetic kidney transplant patients.

Diabetes Mellitus and Glucose Metabolism

DIABETES COMPLICATIONS AND COMORBIDITIES

Enhanced Insulin Signaling Through Its Receptor Is Needed for the Development of Hyperuricemia in Humans

Rasha Haykal, MD[1], Alexandra Kinzer, BS[2], Brent Abel, BS[2], Megan S. Startzell, RN, MPH[2], Elaine Cochran, MSN[2], Rebecca J. Brown, MD, MHSc[2].
[1]National Institute of Child Health and Human Development, Bethesda, MD, USA, [2]National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, USA.

Background: There is an association between insulin resistance (IR) and hyperuricemia but the direction of causalityand mechanisms are unclear. In obesity and lipodystrophy, IR is "selective", with lack of insulin signalingcausing hyperglycemia, but enhanced insulin signaling causing dyslipidemia and possibly hyperuricemia. Rare human conditions exist in which there is extreme, non-selective, IR impairing all insulin signalingpathways (e.g. mutations of the insulin receptor, *INSR*). We hypothesized that hyperinsulinemia withenhanced signaling through the insulin receptor causes hyperuricemia in selective IR, whereas lack ofinsulin signaling through its receptor despite hyperinsulinemia results in normal uricemia in non-selective IR. **Method:** Cross-sectional retrospective analysis comparing fasting insulin and serum uric acid in patients withsevere IR that was either selective (due to lipodystrophy) or non-selective (due to *INSR* mutation orautoantibody to the insulin receptor). Visits were chosen based on availability of serum uric acid andinsulin. If multiple visits were available, the visit with the highest insulin value was chosen. **Results:** We analyzed data of 68 patients with selective IR and 14 patients with non-selective IR. Fasting seruminsulin median [interquartile range] was 23.4 [14, 53] mcU/mL in selective IR vs 215 [73.7, 604] in non-selective IR, p <0.0001. Serum uric acid was 4.8 [2, 6] mg/dL in selective IR vs 3.5 [2, 4] in non-selectiveIR, p=0.0003. **Conclusion:** Patients with selective IR due to lipodystrophy had elevated serum uric acid, consistent with thehyperuricemia seen in selective IR caused by obesity. By contrast, patients with non-selective IR hadlower serum uric acid despite more severe IR as evidenced by almost 10-fold higher fasting insulin. These observations are consistent with a model in which enhanced insulin signaling through its receptorleads to hyperuricemia in post-receptor IR. Further studies are needed to understand the mechanism bywhich insulin leads to hyperuricemia.

Diabetes Mellitus and Glucose Metabolism

DIABETES COMPLICATIONS AND COMORBIDITIES

Evaluation of Small Fiber Peripheral Neuropathy With Infrared Thermographic Camera in Prediabetes

Larissa Frazao Vasconcellos, MD[1], Felipe Rodrigues Lima Mágero, MD[1], Maria Elba Bandeira de Farias, MD[2], Francisco Farias Bandeira, FACE, MD[1].
[1]University of Pernambuco Medical School, Recife, Brazil, [2]Hospital Agamenom Magalhes, SUS-MH/UPE,Recife-PE-Brazil, Recife, Brazil.

Introduction: The typical microvascular complications of diabetes may ocasionaly occur in patients with prediabetes (PD). Diabetic peripheral neuropathy (DPN) is associated with poor glycemic control as well as with the metabolic syndrome components independently of HbA1c levels. Small fiber DPN is one of the most chalenging diagnosis due to the usualy normal physical examination as well as electrophysiological nerve evaluation. The thermographic camera has emerged as a novel tool for the detection of small nerve fiber dysfunction. The aim of the present study was to evaluate thermography of the plantar foot in individuals with PD. **Methods:** This was a cross-sectional study with a sample of 51 patients aged 27 to 71 years. Patients were divided into the following three groups: control (n = 18), diabetic (n = 17), and prediabetic (n = 16). The diagnosis of PD was made according to ADA standards. Thermographic analysis of the plantar region was performed using a FLIR C2 camera. **Results:** Overall, 510 foot regions were analyzed. There were significant diferences in plantar temperatures between prediabetes vs controls as follows: hallux (L: 25.24 ± 2.02 vs 23.6 ± 1.79 ºC; p=0.009/ R: 25.44 ± 2.05 vs 23.89 ± 1.73 ºC; p=0.01); fifth metatarsal (L: 26.31 ± 1.72 vs 24.88 ± 1.38 °C; p=0.006 /R: 26.12 ± 1.60 vs 24.74 ± 1.41 °C; p= 0.006); and calcaneus (L: 26.46 ± 1.71 vs 24.93 ± 1.41 °C; p=0.005 / R: 26.58 ± 1.85 vs 25.07 ± 1.18 °C; p=0.004). There were no similar results for temperatures in individuals with diabetes comparing with prediabetes: hallux (L:25.24 ± 2.02 vs 25.76 ± 2.30 °C; p=0.24 /R: 25.44 ± 2.05 vs 25.64 ± 1.92 °C; p=0.38); fifth metatarsal (L: 26.31 ± 1.72 vs 26.03 ± 1.27 °C; p=0.3 / R: 26.12 ± 1.60 vs 26.21 ± 1.57 °C; p=0.43); and calcaneus (L26.46 ± 1.71 vs 26.82 ± 1.41 °C; p=0.23 / R: 26.58 ± 1.85 vs 26.99 ± 1.42 °C; p=0.24). **Conclusion: We found siginificant abnormalities in temperature of various sites of the plantar region in PD feets suggesting that small fiber damage may occur before the onset of type 2 diabetes.**

Diabetes Mellitus and Glucose Metabolism

DIABETES COMPLICATIONS AND COMORBIDITIES

Evaluation of the Prognostic Significance of Adipose Tissue Hormones in the Development of Diabetic Retinopathy in Patients With Type 2 Diabetes Mellitus

Mykhailo L. Kyryliuk, MD, DMSci, prof[1], Sergiy Yu Mogilevskyy, MD, DMSci, prof[2], Valeriy M. Serdiuk, MD, DMSci[3].
[1]Academic Medical Centre, Kyiv, Ukraine, [2]National Medical Academy of Postgraduate Education named after P. L. Shupyk of the Ministry of Public Health of Ukraine, Kyiv, Ukraine, [3]Dnipropetrovsk Medical Academy of the Ministry of Public Health of Ukraine, Dnipro, Ukraine.

Relevance: There are evidences of the participation of adipose tissue hormones (ATH) in the development of diabetic microangiopathy and retinal neovascularization. The disign of methods for the mathematical evaluation of the prognosis of the development of diabetic retinopathy (DR) with the participation of ATH is an actual problem in modern diabetology. **Goal:** Elaboration of a mathematical model for assessing the prognostic significance of ATH to study the likelihood of developing and progressing DR in patients with type 2 diabetes mellitus (T2DM). **Materials and Methods:** An open observational single-center one-stage selective study was conducted. The study was approved by the Local Ethics Committee. 59 patients (187 eyes) with T2DM and DR (men and women; mean age - 58.20±0.18 years; mean T2DM duration - 9.19±0.46 years; mean HbA_{1C} - 9.10±0.17 %), were assigned to 3 groups, based on the stage of DR (according to fundus instrumental examination), and underwent the study. The diagnostic predictive value was assessed by discriminant analysis. Models with linear combinations of the serum leptin, adiponectin and resistin, triglyceride (TG), also HbA_{1C}, type of antidiabetic therapy (ADT) were developed, and, subsequently, formulas for classification-relevant discriminant functions were derived. ADT included metformin, either alone (type 1 ADT), or in combination with oral anti-hyperglycemic medication (type 2 ADT) or insulin therapy (type 3 ADT). The classification functions (CF) computed based on the variables found from the above developed models provided the basis for predicting the development of DR. **Results:** The formulas for CF from model are as follows: ***CF1*** = 0.29 * TG + 1.55 * HbA_1 + 1.81 * ADT_Type + 0.04 * Leptin + 0,34* Adiponectin + 0,91* Resistin – 13,82; ***CF2*** = 0.05*TG + 1.36 * HbA_1 + 3.01 * ADT_Type + 0.08 * Leptin + 0,35* Adiponectin + 1,01 * Resistin – 15.95. A step-by-step approach to diagnostic decision making should be used. *First*, blood samples are tested for serum leptin, adiponectin and resistin, TG, blood HbA_1, and the patient is assigned a code for ADT_Type (1, 2 or 3). *Second*, CF1 and CF2 values are calculated. *Finally*, the two values are compared to determine which is greater. The predictive decision is made by selecting the classification function with the greater value. Thus, if CF1>CF2, the process can be stabilized at this stage given an adequate glycemic control (through compensation of carbohydrate metabolism) and body-mass control as well as patient compliance. If CF1<CF2, the pathological process may progress to the next stage or even within stage 3, and there is an urgent need to reduce BMI, and to correct the ADT and the blood lipid profile. **Conclusion:** Informativeness and statistical significance of model is 71.4 % and p=0.040, respectively.

Diabetes Mellitus and Glucose Metabolism

DIABETES COMPLICATIONS AND COMORBIDITIES

Extracellular Vesicle Influence on Wound Healing.

Erica C. Visentin, Endocrinologist, Robert E. Pogue, PhD, Thiago Rosa, PhD, Brenda Marra, student.
Universidade Católica de Brasilia, Braslia, Brazil.

Diabetes is a highly prevalent disease in the world and it is involved in several chronic complications, such retinopathy, nephropathy, neuropathy, cardiovascular disease and the diabetic foot. Up to 28% of diabetic foot ulcers result in some form of amputation that lead to reduced productive activity and quality of life, as well as increased social costs. Advance in the understanding of the healing process changes in diabetic individuals is fundamental to improve diabetic foot care. Extracellular vesicles are intercellular communication agents that influence physiological and pathological processes. The objective of this research was to examine the influence of extracellular vesicles collected of diabetic individuals on cell proliferation, viability and migration in wounds. The procedures included *in vitro* assay of migration, senescence, cellular viability and oxide nitric production. Extracellular vesicles have been shown to stimulate the cell migration process and this function was not poorly influenced by metabolic control. **References:**
1. International Diabetes Federation. Diabetes Atlas, 2019. www.diabetesatlas.org. 2. Than UTT, Guanzon D, Leavesley D, Parker T. Association of Extracellular Membrane Vesicles with Cutaneous Wound Healing. Int J Mol Sci. 2017;18(5):956. 3. Van Niel G, D'Angelo G, Raposo G. Shedding light on the cell biology of extracellular vesicles. Nat Rev Mol Cell Biol. 2018;19(4):213–228.
4. Lampugnani MG. Cell migration into a wounded area in vitro. Methods Mol Biol. 1999;96:177–182.5. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade de Diabetes 2017–2018. ISBN: 978-85-93746-02-4. São Paulo: Editora Clannad, 2017.6. Sociedade Brasileira de Cardiologia. Atualização da Diretrizes da Sociedade de Dislipidemia e Prevenção da Aterosclerose - 2017. ISBN: 0066-783X, vol 109, nº2, supl 1, agosto, 2017.7. Leroyer AS, Tedgui A, Boulanger CM. Microparticles and type 2 diabetes. Diabetes Metab. 2008;34 Suppl 1:S27-S32.8. International Society for Extracellular Vesicles. Minimal information for studies of extracellular vesicles 2018 (MISEV2018): a position statement of the International Society for Extracellular Vesicles and update of the MISEV2014 guidelines. Journal of Extracellular Vesicles, 7:1, 2018.9. Deng F, Wang S, Zhang L. Endothelial Microparticles Act as Novel Diagnostic and Therapeutic Biomarkers of Diabetes and Its Complications: A Literature Review. Biomed Res Int. 2016;2016:9802026.

Diabetes Mellitus and Glucose Metabolism

DIABETES COMPLICATIONS AND COMORBIDITIES

Fetuin-A as a Marker of NAFLD

Mala Dharmalingam, MD, DM[1], Ganavi Pattabhi, DR, MD, DM[2].
[1]MS Ramaiah Medical College/Hospital, Bangalore, Karnataka, India, [2]MS RAMAIAH HOSPITAL, Bangalore, India.

Fetuin-A has been implicated in the causation of metabolic disorders such as obesity, diabetes, and hepatic steatosis. There are numerous studies which have shown the association between levels of fetuin-A in Type 2 diabetes mellitus (T2DM) and Nonalcoholic fatty liver disease (NAFLD). The levels of fetuin-A in newly detected type 2 diabetic patients (NDD) and its correlation with presence