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ADA 82ND SCIENTIFIC SESSIONS New Orleans, 2022

Presents

AMERICAN DIABETES ASSOCIATION

82nd SCIENTIFIC SESSIONS

DAILY COVERAGE

TOP 7 SESSIONS: DAY–2

TOPIC OF CONTENT

SESSION-1 : Stigma in Diabetes Care (with Richard R. Rubin Award Lecture)

Simplifying Therapy to Assure Glycemic Control and Engagement (STAGE) for Patients with Clinic Refractory Diabetes

Saturday, 4th June 2022

This paper was presented by Drs. Anastasia-Stefania Alexopoulos, Diana Soliman, from Durham, NC; as a part of the Symposium "Solving the Riddle of Perplexing Diabetes Foot Topics in Primary Care" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Patients with type 2 diabetes (T2D) who maintain poor glycemic control despite use of complex insulin regimens may not benefit from this costly and burdensome treatment approach. In a 16-week feasibility pilot, we proactively simplified the insulin regimens of patients with clinic refractory T2D, or maintenance of an HbA1c ≥8.5% for ≥1 year despite engagement with Primary or Endocrinology care. We recruited 12 patients with clinic-refractory T2D on 3-4 daily insulin injections. Using an algorithm created for this study, insulin regimens were simplified to 2 daily injections of pre-mixed 70/30 insulin (NPH/regular vial and syringe or Aspart 70/30 Flexpen) or U-500 regular insulin pens. Simplification was followed by weekly telephone calls for 4 weeks to ensure safety and continued insulin adjustments.

The next and final scheduled follow-up was at 16 weeks. Primary feasibility and acceptability outcomes were treatment acceptability by the Treatment Acceptability and Preferences (TAP) measure, adherence by the Voils Medication Nonadherence measure and T2D distress by the Diabetes Distress Scale. HbA1c was examined as a secondary outcome at baseline and 16 weeks. Mean patient age was 68.8 (SD 8.9), 2/12 were female, and 7/12 were African American. At baseline, mean HbA1c was 9.5%, 6/12 reported nonadherence to insulin and 5/12 reported high regimen-related T2D distress.

At 16 weeks, retention rate was 100% and 2/12 patients had reverted back to a 3-4 shot regimen due to development of a diabetic foot infection (as a precaution) and gastrointestinal side effects. Mean TAP score was 3.33 (range 0-4); 1 less patient reported nonadherence to insulin and 4 less patients reported regimen-related distress at study conclusion. Mean HbA1c improved by 0.66% during the study period. This pilot study demonstrates feasibility and acceptability of insulin simplification for patients with clinic refractory T2D on complex insulin regimens.

African-American Youth and Parent Perspectives on Advanced Technologies in Diabetes Management: Closing the Loop on Health Disparities

Saturday, 4th June 2022

This paper was presented by Drs. Alan M. Delamater, Elizabeth R. Pulgaron from Miami, FL, New Orleans, LA; as a part of the Symposium "Stigma in Diabetes Care (With Richard R. Rubin Award Lecture)" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Research has shown that African American (AA) youth with type 1 diabetes (T1D) are at increased risk for suboptimal glycemic control, and less often utilize advanced technologies for diabetes management (DM).

The objective was tobetter understand challenges to optimal DM for AA youth and willingness to use advanced technologies.

Twenty-one AA youth with T1D and their parents participated in multi-family focus groups or individual family semi-structured interviews addressing barriers to DM and attitudes about new technologies such as the advanced hybrid closed loop (AHCL) insulin pump. Groups and interviews were recorded and conducted either in-person or using telehealth methods. Based on verbatim transcripts, content analysis was conducted using NVivo to develop a code book; two independent raters coded responses into themes and a third rater resolved discrepancies.

The 21 youth participants (8 girls and 13 boys) had a mean age of 14.0 years and mean HbA1c of 9.6%; 16 (76%) had Medicaid; 10 (47.6%) were using CGM and six (28.5%) had insulin pumps. Qualitative analyses revealed six main themes encompassing current regimens, life with diabetes, parenting, ethnicity, willingness to try new DM technologies, and hesitancy to utilize an AHCL system. Thirteen (62%) youth-parent dyads reported being very willing to try the AHCL system while just two (9.5%) reported they preferred to stay with their current regimen of injections and blood glucose checks; six dyads (28.5%) were open but not ready to commit, citing concerns about reliance on technology, potential side effects, and need for more information.

Innovative technology such as the AHCL insulin pump system may help to improve glycemic outcomes and reduce health disparities for AA youth. Many AA youth with T1D and their parents are ready to try advanced technologies but may require individualized support from the health care team to achieve optimal outcomes.

SESSION-2 :
Precision Diabetes Medicine: A Joint ADA/EASD Initiative

ADA, EASD Teaming Up to Bring Precision Medicine to Diabetes Care

Saturday, 4th June 2022

The ADA and the European Association for the Study of Diabetes (EASD) published a consensus report on precision diabetes medicine in 2020. This symposium was presented on June 4th at the 82nd Scientfic Sessions of the American Diabetes Association (ADA).

"People with type 2 diabetes vary greatly in their age at onset and clinical characteristics such as body weight and blood glucose control," said John M. Dennis, PhD, Senior Research Fellow at the University of Exeter Medical School, United Kingdom. "There are also considerable differences in diabetes progression and outcomes. Some people seem to progress very rapidly to diabetes complications, while others seem to have a milder disease course. Precision diabetes medicine is aiming to use these differences between individuals to target treatment and improve clinical care."

Dr. Dennis will discuss new approaches to using the pathophysiology and clinical phenotypes of type 2 diabetes patients to help optimize diabetes care and outcomes during the session. A main focus for Dr. Dennis is using clinical data that are routinely collected during medical visits—including age, sex, BMI, A1C, kidney function, and liver function—to build predictive models to optimize clinical care.

"We are using cutting-edge data science to build models to predict response to treatment and long-term diabetes complications based on the specific characteristics of individual people," he explained. "We show these models work well and have the potential to transform care for people with type 2 diabetes by providing accurate, personalized information on risks and benefits of different treatments, moving away from a one-size-fits-all approach. We want to make these models available, for free, at the point of care for health professionals to support decision making. Critically, the models require only clinical data that are routinely collected in people with diabetes, meaning the precision medicine approach is cheap to implement. Precision diabetes medicine need not be reliant on genetics or other technology."

Technology offers other avenues to better personalize diabetes medicine. David Kerr, MD, Director of Research and Innovation at Sansum Diabetes Research Institute, will discuss the evolving role of wearable health devices in personalizing diabetes care.

The most effective way to individualize diabetes medicine is to learn more about each person with diabetes, he explained. And the most effective way to learn more about an individual is consistent and constant self-monitoring using a growing array of new devices and technologies, from continuous glucose monitors to fitness trackers, sleep trackers, and, in the future, devices that log food choices, mental health, and other factors that can influence diabetes outcomes. Ideally, data capture is automated to deliver actionable insights, he said.

"The holy grail of diabetes care and improving outcomes on an individual and at the population level is to nudge people into behavioral change," Dr. Kerr said. "The future of diabetes care could be related to just-in-time adaptive interventions—micro interventions — based on digital health data from wearable digital health devices.

"We're already seeing new insights into physiology that is not quite normal using wearables, particularly in underserved populations at high risk of diabetes," he continued. "These new digital observations make it possible to develop further lifestyle interventions, as well as optimize the use of existing and new pharmaceutical interventions."

The Use of OGTT and Phenotypic Characteristics to Identify GDM Subtypes in Mexican Women, an Approach Towards Precision Medicine

Saturday, 4th June 2022

This paper was presented by Drs. Hector Gallardo-Rincón, Janinne Ortega-Montiel, Luis Alberto Martinez-Juarez, from Guadalajara, Mexico, Mexico City; as a part of the Symposium "Precision Diabetes Medicine: A Joint ADA/EASD Initiative" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

GDM is a heterogeneous disease. Three subtypes of GDM have been identified, insulin sensitivity defect, insulin secretion defect, and both. Insulin sensitivity defect is associated with higher risk for fetal overgrowth and GDM associated adverse outcomes. Based on the 2hr-OGTT-75g values, the phenotype of GDM-sensitivity is associated with elevated fasting glucose and GDM-secretion by elevated one and/or two hours post-load glucose values. We evaluated the 2hr-OGTT-75g values of 1713 in Mexican pregnant women without previous diagnosis of T2D from the cohort study Cuidomi Embarazo between April 2019 and December 2021. We identified 251 cases of GDM

(14.6%). Based on the distribution of 2hr-OGTT-75g values related to known GDM subtypes, 132 (52.6%) had elevated fasting glucose but normal post-load glucose values (GDM-sensitivity), 90 (35.8%) had elevated post-load glucose but normal fasting glucose values (GDM-secretion), and 29 (11.6%) patients with elevated fasting and post-load glucose values (GDM-mixed).

Women in the GDM-sensitivity group were younger (27.3 + 6.5 yr), nulliparous (56.1%) and more often had a family history of T2D (50.0%) compared to the women in the GDM-secretion and GDM-mixed groups. However, there was no statistical difference between the principal groups regarding pregestational BMI (GDM-sensitivity: 27.7 + 5.5; GDM-secretion: 27.4 + 4.4; GDM-mixed: 28.4 + 6.2 kg/m^2, p=0.90); although this last group showed the higher prevalence of obesity (29.4% - 23.3% - 38.0% respectively for each group). To our knowledge, this is the first analysis of GDM subtypes in Mexican pregnant women.

The high proportion of GDM diagnoses with normal fasting glucose supports the importance of unavoidably offering a complete OGTT. This strategic approach by classifying GDM subtypes according to OGTT values takes clinical importance in the offering of personalized and timely management care to minimize perinatal and newborn adverse outcomes.

SESSION-3 :
Solving the Riddle of Perplexing Diabetes Foot Topics in Primary Care

HbA1c Variability Is Independently Associated with Lower-Extremity Amputation and Death among Patients with Diabetic Foot Ulcers

Saturday, 4th June 2022

This paper was presented by Drs. Ram Jagannathan, Marcos Coutinho Schechter, Jessica A. Alvarez, from Atlanta, GA; as a part of the Symposium "Solving the Riddle of Perplexing Diabetes Foot Topics in Primary Care" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Higher HbA1c on admission is associated with increased amputation risk in patients with diabetic foot ulcers (DFUs); however, the impact of long-term glycemic control and glycemic variability after hospital discharge on amputation risk is unclear.

"We performed retrospective analyses of hospitalized patients with a DFU who were followed for >1 year after index admission with at least two HbA1c measurements and > 1-year follow-up (n=479). Using multivariable logistic regression analysis, we examined the associations of HbA1c measures [HbA1c nadir change (difference between the baseline HbA1c and the single lowest prospective HbA1c level during the follow-up), standard deviation (SD-HbA1c), mean HbA1c change, and HbA1c variability score (HVS)] with a composite outcome [minor and major lower extremity amputations (LEA) and mortality]."

Table. Odds ratios of composite LEA outcomes, according to HbA1c variability metrics

	Unadjusted	Model-1	Model-2	Model-3
HbA1c nadir change				
Continuous	1.33 [1.09, 1.64]	1.35 [1.09, 1.69]	1.40 [1.11, 1.77]	1.60 [1.14, 2.26]
Tertile-1 (-5.1, 0.89)	Ref	Ref	Ref	Ref
Tertile-2 (0.9, 3.1)	1.23 [0.76, 1.98]	1.30 [0.80, 2.12]	1.42 [0.84, 2.41]	1.75 [0.98, 3.19]
Tertile-3 (3.2, 9.9)	2.33 [1.42, 3.86]	2.52 [1.49, 4.32]	2.67 [1.52, 4.73]	4.39 [1.93, 10.27]
SD-HbA1c				
Continuous	1.47 [1.19, 1.83]	1.44 [1.15, 1.82]	1.37 [1.09, 1.75]	1.40 [1.05, 1.90]
Tertile-1 (0.0,0.74)	Ref	Ref	Ref	Ref
Tertile-2 (0.75, 1.51)	1.86 [1.15, 3.01]	1.83 [1.12, 3.00]	1.77 [1.05, 2.98]	1.88 [1.08, 3.31]
Tertile-3 (1.52, 4.69)	2.85 [1.74, 4.73]	2.88 [1.71, 4.92]	2.56 [1.47, 4.51]	2.88 [1.48, 5.74]
Mean HbA1c change				
Continuous	1.19 [0.98, 1.46]	1.21 [0.99, 1.50]	1.28 [1.03, 1.61]	1.30 [0.96, 1.76]
Tertile-1 (-5.27, 0.19)	Ref	Ref	Ref	Ref
Tertile-2 (0.20, 1.89)	1.12 [0.70, 1.81]	1.11 [0.68, 1.82]	1.31 [0.77, 2.25]	1.45 [0.83, 2.54]
Tertile-3 (1.9,8.53)	2.12 [1.29, 3.50]	2.30 [1.37, 3.90]	2.68 [1.54, 4.71]	3.57 [1.75, 7.46]
HVS (%)				
Continuous	1.16 [0.95, 1.41]	1.14 [0.93, 1.40]	1.79 [1.04, 3.12]	1.06 [0.84, 1.33]
Tertile-1 (0.0, 49.0)	Ref	Ref	Ref	Ref
Tertile-2 (50.0,83.2)	1.73 [1.07, 2.83]	1.81 [1.09, 3.03]	1.79 [1.04, 3.12]	1.64 [0.91, 2.96]
Tertile-3 (83.3, 100)	1.35 [0.83, 2.18]	1.32 [0.80, 2.17]	1.20 [0.71, 2.04]	1.09 [0.61, 1.94]

Composite LEA outcomes – minor, major amputation, or death. Model-1: adjusted for age, sex, BMI, race, and smoking status; Model-2: model-1 plus previous history of amputation, peripheral artery disease, chronic kidney disease; Model-3: model-2+baseline HbA1c level. HVS: HbA1c variability score.

The median age was 55.3 (IQR: 47.9, 62.8) years. During a mean follow-up of 2.4 years, 250 (52.2%) patients had a LEA or death [minor LEA: 116 (24.2%); major LEA: 113 (23.4%); death: 21 (4.4%)]. In the fully adjusted model, HbA1c variability metrics were significantly associated with higher LEA and/or death rates, except HVS (Table).

"Our findings indicate that visit-to-visit HbA1c variability, especially HbA1c nadir change, and SD-HbA1c are independent biomarkers of LEA risk in patients with DFU."

Long-Term Consequences of Diabetic Foot Infection: The Atherosclerosis Risk in Communities (ARIC) Study

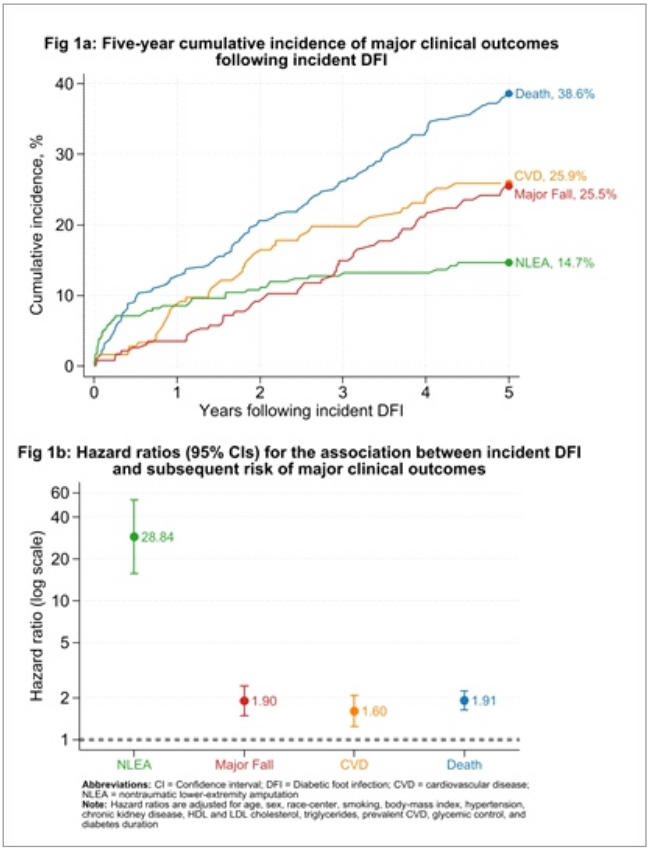
Saturday, 4th June 2022

This paper was presented by Drs. Jiaqi Hu, Kunihiro Matsushita, Elizabeth Selvin, from Baltimore MD; as a part of the Symposium "Solving the Riddle of Perplexing Diabetes Foot Topics in Primary Care" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the

American Diabetes Association at New Orleans.

Foot infections are a common complication of type 2 diabetes. However, the clinical sequelae of diabetic foot infection (DFI) in the general population remain poorly characterized.

"We conducted a prospective cohort analysis of 1,451 participants with diabetes (mean age, 63 years [SD: 5.6]; 33% black; 47% female) in the ARIC study (visit 4: 1996-1998). DFI was ascertained using ICD-9/10 codes from Medicare claims and hospital discharge records. We used Kaplan-Meier analyses to estimate the 5-year cumulative incidence of nontraumatic lower-extremity amputation (NLEA), major fall, cardiovascular disease (CVD) [coronary heart disease, stroke, or heart failure], and death following incident DFI. We evaluated the association between incident DFI (modeled as a time-varying exposure) and the subsequent risk of clinical outcomes with Cox models."



During over two decades of follow-up (1996-1998 to 2017), there were 328 incident DFIs, 72 NLEAs, 502 major falls, 748 CVD events, and 915 deaths. Following incident DFI, the five-year cumulative incidence of major clinical outcomes ranged from 14.7% (NLEA) to 38.6% (death) (Fig 1a). Incident DFI was significantly associated with all clinical outcomes after multivariable adjustment (Fig 1b).

DFI is a high-risk marker for major morbidity and mortality in the general population of adults with diabetes.

SESSION-4 : NAFLD in Diabetes: An Overlooked Complication?

Prevalence of Nonalcoholic Fatty Liver Disease (NAFLD) in Children with Type 1 Diabetes (T1D) and Its Association with Arterial Stiffness

Saturday, 4th June 2022

This paper was presented by Drs. Rawah Zeiad, Maricruz Crespo, Jamie R. Wood, Ryan M. Farrell from Cleveland, OH; as a part of the Symposium "NAFLD in Diabetes: An Overlooked Complication?" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Nonalcoholic fatty liver disease (NAFLD) is the most common chronic liver disease in children. NAFLD has become increasingly recognized in pediatric populations with type 1 diabetes (T1D). Also, NAFLD is emerging as an inde-

pendent risk factor for cardiovascular disease (CVD). Arterial stiffness is an index of subclinical atherosclerosis and can predict cardiovascular events and mortality.

The aim of this pilot study was to estimate the prevalence of NAFLD in children with T1D and to examine the relationship between NAFLD and arterial stiffness.

Subjects and Methods: A cross-sectional pilot study of 18 children (age 7-20 years) with a diagnosis of T1D for at least 5 years without secondary causes of chronic liver disease. The main study measures included: 1. Detection of fatty liver in children with T1D measured by controlled attenuation parameter (CAP) using FibroScan and 2. Measurement of arterial stiffness by pulse wave velocity (PWV) using SphygmoCor. We also aimed to measure hepatic fibrosis by FibroScan and insulin sensitivity (IS) by using a validated surrogate marker.

The prevalence of NAFLD was approximately 19% of study participants. We found positive correlations between CAP and PWV values, which suggests higher arterial stiffness with higher degree of fatty liver. Median PWV was higher in participants with steatosis compared to those without steatosis, 6.10 vs. 6.5 m/s. We also found negative correlations between IS and both arterial stiffness and steatosis (R=-0.56, p=0.038), (R=-0.56, p=0.063), respectively.

Our findings suggest that NAFLD is common in participants with T1D and in this study was associated with higher arterial stiffness. Our study is consistent with previously reported associations between decreased IS and presence of microvascular complications. Larger randomized controlled trials are required to evaluate whether NAFLD predicts the incidence of CVD events in T1D.

Nonalcoholic Fatty Liver Disease and Type 2 Diabetes Are Mutually Independent Predictors of Major Cardiovascular Events in Patients with Established Cardiovascular Disease

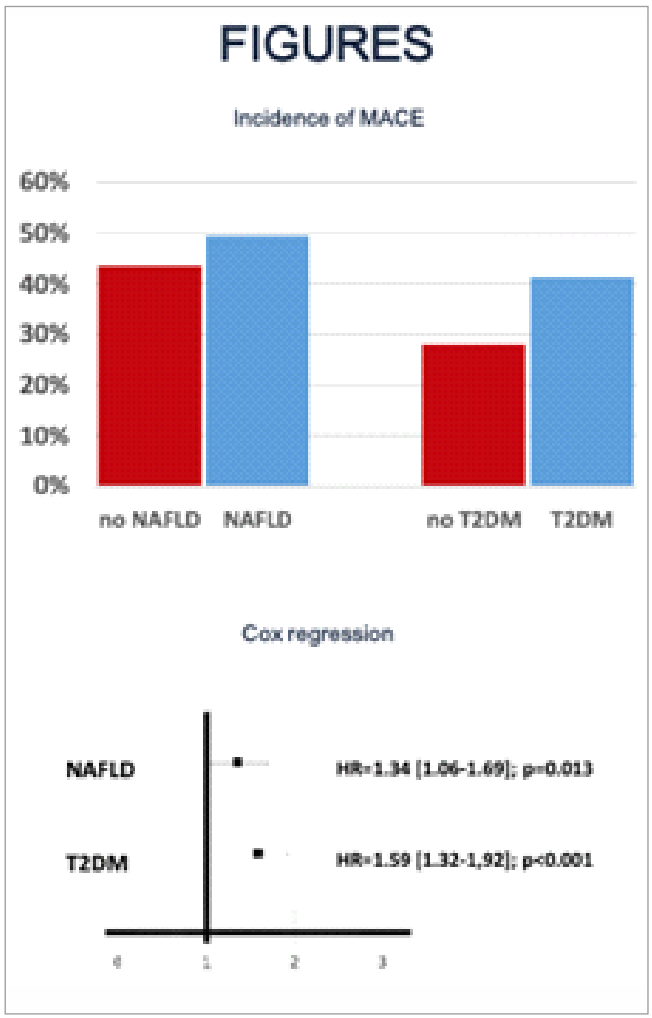
Saturday, 4th June 2022

This paper was presented by Drs. Lukas Sprenger, Maximilian Maechler, Alexander Vonbank,from Feldkirch, Austria, Philadelphia, PA,; as a part of the Symposium "NAFLD in Diabetes: An Overlooked Complication?" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Non-Alcoholic Fatty Liver Disease (NAFLD) is associated with insulin resistance, type 2 diabetes (T2DM) and cardiovascular disease. However, data on NAFLD in patients with established cardiovascular disease (CVD) are scarce.

Here, we therefore aimed at investigating the association of NAFLD with T2DM as well as its impact on the incidence of major cardiovascular events (MACE) in a large series of 1517 patients with established CVD (1199 patients with angiographically proven coronary artery disease and 318 patients with sonographically proven peripheral artery disease), using the validated fatty liver index for the diagnosis of NAFLD.

At baseline, the prevalence of NAFLD was significantly higher in patients with T2DM than in non-diabetic subjects (61.3% vs. 39.8%; p<0.001) respectively. Prospectively, we recorded 498 MACE over a mean follow-up period of 10.0±4.5 years. The risk of MACE was higher in NAFLD patients than in those who



did not have NAFLD (49.5 vs. 43.5%; p=0.020) and in patients with T2DM than in non-diabetic subjects (41.4 vs. 28.1%; p<0.001). Cox regression models adjusting for conventional cardiovascular risk factors proved NAFLD and T2DM to be mutually independent predictors of MACE, with adjusted hazard ratios of 1.34 [1.06-1.69] p=0.013 and 1.59 [1.32-1.92]; p<0.001, respectively.

We conclude that NAFLD and T2DM are mutually independent predictors of MACE in patients with established CVD.

High Rate of Histologically Proven NASH and Advanced Fibrosis in Outpatients with Type 2 Diabetes Screened for NAFLD

Saturday, 4th June 2022

This paper was presented by Drs. Ean-François Gautier, Laurent Castera, Tiphaine Vidal-Trecan, from Clichy, France, as a part of the Symposium "NAFLD in Diabetes: An Overlooked Complication?" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

In patients with type 2 diabetes (T2D), studies on nonalcoholic steatohepatitis (NASH) and hepatic fibrosis have been hindered by the constraints of histopathological diagnosis. We assessed the prevalence of, and features associated with, histologically proven NASH and fibrosis in a large group of T2D patients routinely screened for nonalcoholic fatty liver disease (NAFLD).

T2D outpatients with suspected NAFLD at their annual workup (based on ultrasound and liver function test results) were prospectively referred to an hepatologist. Patients with persistently elevated ALT (> 20 IU/L in females or > 30 IU/L in males) and no other causes for liver disease were proposed liver biopsy. Histological lesions were blindly analyzed by a single expert pathologist. Between October 2018 and March 2021, among 1,159 T2D patients screened, NASH and advanced fibrosis were found in 58% and 38% of 330 patients with adequate liver biopsy, respectively. Sequential use of FIB-4 and liver stiffness to rule in/out advanced fibrosis according to EASL algorithm, resulted in a 27% rate of false negative results in patients with FIB-4 <1.3, and in 32% rate of

false positive results in patients with FIB-4 >1.3 and liver stiffness >8 kPa.

Hypertension, waist circumference, triglycerides, aspartate aminotransferase, serum albumin and creatinine, were independently associated with NASH (AUROC 0.81 (95% CI 0.76-0.86)). Waist circumference, gamma-glutamyl transpeptidase, FIB-4 and HDL cholesterol were independently associated with advanced fibrosis (AUROC 0.77 (0.72-0.83)). Vascular complications of T2D were not associated with liver lesions.

In conclusion, more than half of T2D patients with NAFLD displayed severe hepatic injuries. Liver lesions were independently associated with metabolic syndrome, but not with complications of T2D. Screening for NASH and advanced fibrosis should be part of regular workup of T2D patients. Models based on easily available variables may be useful.

SESSION-5 : Weighing the Evidence: Should Obesity Be the Primary Target ?

Physical Activity and Glycemia among Young Adults with Type 1 Diabetes and Overweight or Obesity–Results from Advancing Care for Type 1 Diabetes and Obesity Network (ACT1ON)

Saturday, 4th June 2022

This paper was presented by Drs. Franklin R. Muntis, Daria Igudesman, Angelica Cristello, from Chapel Hill, NC, Stanford, CA, as a part of the Symposium "Weighing the Evidence: Should Obesity Be the Primary Target?" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

The ACT1ON pilot study evaluated the feasibility of three dietary strategies to optimize weight and glycemic management among young adults with T1D and overweight or obesity. As a secondary measure, self-reported physical activity (PA) was collected at baseline, 3-, 6-, and 9-months from 68 young adults with T1D (age 25.5 ± 3.1 years, 72.1% female, HbA1c 7.9 ± 1.8%, BMI 30.4 (27.9 - 33.9)).

Using the Global Physical Activity Questionnaire (GPAQ, n=195) and Previous Day Physical Activity Recalls (PDPAR, n=123), we estimated weekly minutes of moderate-to-vigorous physical activity (MVPA). Following the COVID-19 outbreak, a subset of participants wore Garmin Vivosmart4® PA trackers for two weeks at each visit (44 measurements from 27 participants). Mixed effects regression models assessed the relationship between weekly minutes of MVPA and HbA1c using each PA measure.

Median weekly minutes of MVPA were 33% lower following the COVID-19 outbreak compared to pre-pandemic PA levels (p=0.02) per the GPAQ, but not PDPAR (-7.7%, p=0.34). After adjusting for design, demographic, clinical, and dietary variables, a 1 standard deviation increase in weekly minutes of MVPA (GPAQ) was associated with an absolute increase of 0.27% HbA1c (p>0.001). A small, statistically non-significant association was observed for PDPAR (β=0.13, p=0.19); however, we observed a borderline statistically significant association using the PA tracker data (β=0.231, p=0.08), despite a smaller sample size (n=44).

These results suggest that among young adults with T1D and overweight and obesity, higher levels of PA may lead to challenges in achieving

Table 2. Results of Linear Mixed Effects Regression Models of the Covid-19 Pandemic Association of Covid-19 Pandemic on Self-Reported Weekly Minutes of MVPA

Measure of Physical Activity	N	Estimate*	95% CI	p-value
Global Physical Activity Questionnaire (GPAQ)	145	-597.81†	(168.5, 1027.1)	<0.01
Previous Day Physical Activity Recalls (PDPAR)	93	99.8	(-280.8, 480.4)	0.60

*Models were adjusted for study site and measurement visit number.
†Approximately 61% reduction in weekly minutes of MVPA following the onset of Covid-19

Table 3. Post-Imputation† Results For Mixed Effects Regression Models of Weekly Minutes of Moderate-to-Vigorous Physical Activity (MVPA) on HbA1c and CGM Metrics (N=163)

	Global Physical Activity Questionnaire (GPAQ)			Previous Day Physical Activity Records (PDPAR)			Wearable Physical Activity Tracker		
	Estimate*	95% CI	P-Value	Estimate*	95% CI	P-Value	Estimate*	95% CI	P-Value
Percent Hemoglobin A1c (%HbA1c)	**0.14**	**(0.06, 0.22)**	**<0.001**	0.04	(-0.03, 0.11)	0.27	**0.23**	**(0.05, 0.42)**	**0.01**
Percent Time in Range (TIR)	-0.86	(-2.56, 0.72)	0.28	-0.70	(-2.12, 0.81)	0.37	0.92	(-1.92, 3.83)	0.53
Percent Time Above Range (TAR)	1.28	(-0.51, 3.08)	0.16	0.77	(-1.06, 2.54)	0.39	-1.16	(-4.33, 1.96)	0.46
Percent Time Below Range (TBR)	-0.64	(-1.54, 0.10)	0.08	-0.36	(-1.06, 0.35)	0.31	-0.27	(-1.44, 0.91)	0.65

*Estimates are presented as the estimated effect per a half a standard deviation increase in weekly minutes of moderate-to-vigorous physical activity (MVPA)

Table 4. Post-Imputation† Results For Mixed Effects Regression Models of Daily Minutes of Moderate-to-Vigorous Physical Activity (MVPA) on CGM Metrics for the Day of and the Day Following Physical Activity (n=307)

	Day of Activity			Day Following Activity		
	Estimate*	95% CI	P-Value	Estimate*	95% CI	P-Value
Time < 54mg/dL	0.1%	(-0.3%, 0.4%)	0.76	-0.2%	(-0.5%, 0.3%)	0.46
Time 54mg/dL - 69 mg/dL	-0.2%	(-0.7%, 0.4%)	0.52	**-0.7%**	**(-1.4%, 0.0%)**	**0.05**
Time 70mg/dL - 180mg/dL	-1.6%	(-3.5%, 0.4%)	0.11	**-2.8%**	**(-4.6%, -1.0%)**	**<0.01**
Time 181mg/dL - 250mg/dL	-0.3%	(-1.5%, 0.9%)	0.65	**1.8%**	**(0.6%, 3.1%)**	**<0.01**
Time > 250mg/dL	**2.0%**	**(0.3%, 3.6%)**	**0.02**	**1.8%**	**(0.2%, 3.4%)**	**0.03**

optimal glycemia. Future work is needed to determine how to best support young adults with T1D and overweight and obesity in attaining both their PA and glycemic management goals.

Systolic Blood Pressure Reduction with Tirzepatide Across SURPASS Program: A Mediation Analysis Using Weight Loss as a Factor

Saturday, 4th June 2022

This paper was presented by Drs. Ildiko Lingvay, Ofri Mosenzon, Katelyn Brown, from Dallas, TX, Jerusalem, Israel,as a part of the Symposium "Weighing the Evidence: Should Obesity Be the Primary Target?" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Tirzepatide (TZP) is a novel dual GIP/GLP-1 receptor agonist for the treatment of type 2 diabetes. Across the SURPASS 1-5 clinical studies, TZP 5, 10 and 15 mg demonstrated significant improvements in HbA1c (-1.9 to -2.6%), body weight (-6.6 to -13.9%) and systolic blood pressure (SBP) (-2.8 to -12.6 mmHg) at primary endpoint.

Post-hoc mediation analyses were conducted to evaluate weight loss dependent (WL-D) and independent (WL-IND) effects of TZP on SBP reductions across 5 SURPASS studies. The difference in mean SBP change from baseline at 40-weeks (Total effect) between TZP and comparator group was -1.3 to -5.1 mmHg (TZP 5 mg), -1.7 to -6.5 mmHg (TZP 10 mg) and -3.1 to -11.5 mmHg (TZP 15 mg).

The contribution of WL-D and WL-IND effects on these treatment differences are presented below (Figure). In SURPASS-4 study which enrolled patients with established cardio-

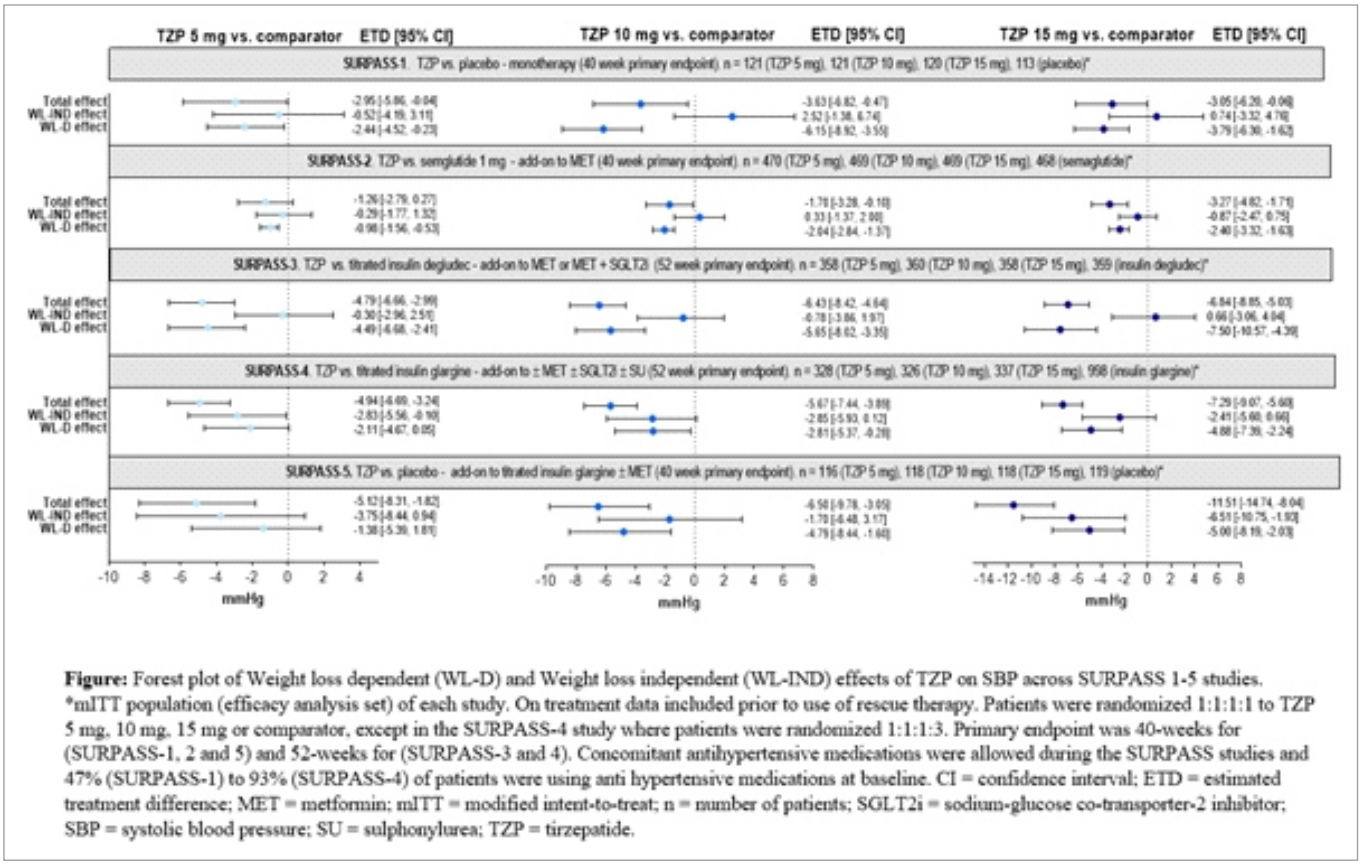


Figure: Forest plot of Weight loss dependent (WL-D) and Weight loss independent (WL-IND) effects of TZP on SBP across SURPASS 1-5 studies. *mITT population (efficacy analysis set) of each study. On treatment data included prior to use of rescue therapy. Patients were randomized 1:1:1:1 to TZP 5 mg, 10 mg, 15 mg or comparator, except in the SURPASS-4 study where patients were randomized 1:1:1:3. Primary endpoint was 40-weeks for (SURPASS-1, 2 and 5) and 52-weeks for (SURPASS-3 and 4). Concomitant antihypertensive medications were allowed during the SURPASS studies and 47% (SURPASS-1) to 93% (SURPASS-4) of patients were using anti hypertensive medications at baseline. CI = confidence interval; ETD = estimated treatment difference; MET = metformin; mITT = modified intent-to-treat; n = number of patients; SGLT2i = sodium-glucose co-transporter-2 inhibitor; SBP = systolic blood pressure; SU = sulphonylurea; TZP = tirzepatide.

vascular disease, WL-IND effects explained 33% to 57% of difference in SBP change between TZP and insulin glargine groups, with the remainder of 67% to 43% of the effect being WL-D. In a pooled analysis of SURPASS 1-5 studies, there was a significant ($p<0.001$) but weak correlation ($r = 0.18$ to 0.22) between change in body weight and SBP.

In conclusion, TZP induced SBP reduction was primarily mediated through weight loss, with different degrees of contributions from weight loss independent effects across the different trials.

SURMOUNT-1 Study Finds Individuals with Obesity Lost Up to 22.5% of their Body Weight When Taking Tirzepatide

Saturday, 4th June 2022

The findings from SURMOUNT-1, the first investigational phase 3 trial evaluating the safety and efficacy of tirzepatide for the treatment of obesity, were announced, representing a new class of medicines being studied for the treatment of obesity. **The trial was presented at a symposium on June 4th 2022 at the 82nd Scientific Sessions of the American Diabetes Association® (ADA) in New Orleans, LA, and simultaneously published in The New England Journal of Medicine.**

Obesity impacts 650 million people worldwide and nearly half of Americans. Obesity is a chronic disease with limited treatment options that increases the risk of other weight-related conditions and negatively impacts overall health. This study aimed to evaluate tirzepatide, a once-weekly GIP (glucose-dependent insulinotropic polypeptide) and GLP-1 (glucagon-like peptide-1) receptor agonist, for the treatment of obesity.

The study enrolled 2,539 participants who were obese or overweight with at least one weight-related condition, who do not have diabetes. The co-primary endpoints were percent change in body weight from baseline and greater percentage of participants achieving body weight reductions of at least 5% compared to placebo. The most commonly reported adverse events were gastrointestinal-related and generally mild to moderate in severity, usually occurring during the dose-escalation period. Nausea, diarrhea, and constipation were the most frequent adverse events.

The findings indicate tirzepatide may be a potential therapeutic option for individuals living with obesity, with participants losing between 16% and 22.5% of their starting weight. The overall average weight reduction for the highest dose of tirzepatide (15 mg) was about 52 pounds. Substantial weight loss was also achieved on lower doses of tirzepatide: 35 pounds for the 5 mg dose and 49 pounds for the 10 mg dose. Tirzepatide had an overall safety and tolerability profile similar to other incretin-based therapies approved for the treatment of obesity.

"Obesity should be treated like any other chronic disease—with effective and safe approaches that target underlying disease mechanisms, and these results underscore that tirzepatide may be doing just that," said Ania Jastreboff, MD, PhD, associate professor Yale University School of Medicine, director of Weight Management and Obesity Prevention at the Yale Stress Center and co-director of the Yale Center for Weight Management, New Haven, Connecticut. "These results are an important step forward in potentially expanding effective therapeutic options for people with obesity. Notably, about 9 out of 10 individuals with obesity lost weight while taking tirzepatide."

Tirzepatide was recently approved by the U.S. Food & Drug Administration as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes.

SESSION-6 : Is Time in Range the Gold Standard in Glucose Management?

Real-World Evidence on Health Care Costs Related to Self-Monitoring of Blood Glucose (SMBG) Compared with Continuous Glucose Monitoring (CGM) in Noninten-sively Treated Type 2 Diabetes Mellitus (T2DM)

Saturday, 4th June 2022

This paper was presented by Drs. David Kerr, Ian Duncan, Francesco Giorgino, from Santa Barbara, CA, Bari, Italy; as a part of the Symposium "Precision Diabetes Medicine: A Joint ADA/EASD Initiative" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Type 2 diabetes poses an economic burden to healthcare systems. For individuals with non-

intensively treated T2DM, it is unclear whether the use of CGM would add health-economic value. The aim of this study was to compare the costs of SMBG compared to CGM in non-intensively treated T2DM.

A retrospective cost-analysis using the IBM® MarketScan® Databases was conducted. T2DM patients aged ≥18 years who were using SMBG or initiated CGM between Jan 2018 and March 2019 were eligible for inclusion. Inclusion criteria included two consecutive claims for T2DM or one claim for T2DM and a claim for glucose lowering therapy, at least one pharmacy claim for SMBG strips or CGM sensors and continuous enrollment for 1-year before and after the index date. Individuals with CGM in pre-index period, pregnancy, rapid-acting insulin, glucagon, T1DM, gestational or secondary diabetes were excluded. SMBG and CGM patients were matched using a propensity score and all cause costs during a one-year follow-up period were compared.

A total of 3,498 patients were included in each matched cohort. For CGM patients, 77% used flash monitoring and 23% a real-time CGM. 35% of SMBG and 37% of CGM users were on basal insulin. Considering median values, SMBG total healthcare costs per person/year were $1,934 less vs. CGM users ($p < 0.05$). SMBG patients had significantly lower pharmacy cost (-$2,257, $p<0.05$) and lower expenses for glucose-lowering treatments (-$1,045, $p<0.05$) than CGM. Both SMBG and CGM cohorts had similar costs related to inpatient and emergency room admissions.

This analysis shows that SMBG is less costly than CGM in non-intensively treated T2DM patients and is associated with lower pharmacy costs, including glucose-lowering medications. Furthermore, no significant differences in the number of emergency room visits or hospitalizations are seen in SMBG and CGM users.

Mapping Genetic Determinants of Blood Glucose Control in the Action to Control Cardiovascular Risk in Diabetes Study Group (ACCORD)

Saturday, 4th June 2022

This paper was presented by Drs. John S. House, Daniel M. Rotroff, Vivian Fonseca, from RTP, NC, Cleveland, OH, New Orleans, LA; as a part of the Symposium "Precision Diabetes Medicine: A Joint ADA/EASD Initiative" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

The hemoglobin glycation index (HGI) is the difference between observed HbA1c and predicted HbA1c from FPG using linear regression. HGI is an important biomarker of clinical management/drug treatment outcomes and can identify individuals at high risk for multiple adverse events and outcomes before the appearance of clinical symptoms.

"Here, we sought to test if variation in HGI has genetic determinants in the Action to Control Cardiovascular Risk in Diabetes (ACCORD) clinical trial using a genome-wide association approach (N = 7913). We subsequently replicated the top hits (P < 1-5) in the Atherosclerosis Risk in Communities Study (ARIC; N = 3741)."

An intergenic SNP rs73407935 (7q11.22) was associated with HGI (P = 5.8-10) with the locus replicating in ARIC. Further, multiple variants at suggestive genome-wide significance in discovery (P < 5-6) replicated in ARIC including variants near or in ASAH1 (P = 2.4-6), a region previously associated with risk of CAD in T2D, LRRC4C (P = 2.4-6), SHLD1 (P = 3.7-6)

and FAM22B (P = 2.5-6). The top 2 replicated SNPs in FAM22B are characterized eQTLs for expression of multiple genes in cells from pancreas, brain, and the immune system, including TRAF4, PROCA1, and RPL23A.

Many SNPs associated with HGI were distinct from those associated with FPG or HbA1c. In ACCORD, sex-specific HGI associations with SNPs in or near GALNT11 in females (P = 5-9) and HECW2 (P = 1.5-8) in males were observed. Further, analysis of 544 Hispanics revealed associations of a strong eQTL variant near USF1 (rs2516837; P = 1.5-09) and SNPs near NXNL2/SPIN1 (rs141006133; P = 6.9-9) with HGI. This work represents the first evaluation of the genetic etiology of HGI.

"We identified and replicated variants that merit further study in the development of precision medicine for treatment of T2D. The results of the stratified analyses highlight the potential importance of heterogeneity in these efforts."

Lower Peak Glucose and Increased Time in Range (TIR) in a CGM-Wearing T2D Population Not Taking Fast-Acting Insulin Shows Value of Real Time–CGM (rtCGM) as a Behavior Change Tool

Saturday, 4th June 2022

This paper was presented by Drs. Margaret A. Crawford, Daniel R. Cherñavvsky, Katharine Barnard, from San Diego, CA, Charlottesville, VA, as a part of the Symposium "Is Time in Range the Gold Standard in Glucose Management?" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Table 1. Time in Range (TIR), Peak Glucose, Hyperglycemic & Hypoglycemic Events During Meal-Related Time Periods in Weeks 1 & 12 in People with Type 2 Diabetes Not on Fast-Acting Insulin (n=150).[1,2]

	% TIR 70-180 mg/dL		Peak Glucose, mg/dL		Weekly Severe Hyperglycemic Events[3]		Weekly Hyperglycemic Events[4]		Weekly Hypoglycemic Events[5]	
Time Periods	Week 1	Week 12	Week 1	Week 12	Week 1	Week 12	Week 1	Week 12	Week 1	Week 12
T2D NIIT Population with ≥ 5% TIR Increase (n=53)										
Overnight (12am- 5 am)	96.7 (74.4, 99.3)	**98.2 (94.2, 99.6)**	231 (179, 284)	**211 (187, 244)**	0 (0,1)	0 (0,0)	2 (0, 4)	2 (1, 3)	0 (0, 0)	0 (0, 1)
Morning (5am- 12pm)	66.9 (34, 84.2)	**94 (74.5, 99.1)**	260 (233, 312)	**227 (205, 270)**	1 (0,3)	**0 (0,1)**	5 (3, 7)	**3 (2, 5)**	0 (0, 0)	**0 (0, 0)**
Afternoon (12pm- 5pm)	67.6 (47.3, 81.5)	**88.1 (71.6, 98.3)**	268 (238, 295)	**231 (209, 272)**	1 (0,3)	**0 (0,1)**	5 (4, 7)	**4 (2, 5)**	0 (0, 0)	0 (0, 0)
Evening (5pm- 12am)	63.3 (38.6, 85.3)	**83.9 (64.2, 95.8)**	280 (236, 326)	**241 (212, 267)**	2 (0,3)	**0 (0,1)**	7 (5, 10)	**5 (3, 8)**	0 (0, 0)	0 (0, 0)
All Time Periods	72.4 (50.6, 83.4)	**87.6 (77.6, 95.4)**	297 (257, 345)	**263 (240, 300)**	4 (1, 11)	**1 (0, 5)**	20 (15, 26)	**15 (8, 21)**	0 (0, 1)	0 (0, 1)
All T2D NIIT Participants (n=150)										
Overnight (12am- 5 am)	97.5 (81.0, 99.8)	95.9 (78.0, 99.4)	212 (178, 246)	**222 (189, 264)**	0 (0, 0)	**0 (0, 1)**	1.5 (0, 3)	**2 (1, 5)**	0 (0, 0)	0 (0, 0)
Morning (5am- 12pm)	84.7 (68.4, 98.2)	87.7 (71.6, 97.8)	234 (201, 272)	234 (205, 270)	0 (0, 1)	0 (0, 1)	4 (2 ,6)	4 (2, 6)	0 (0, 0)	0 (0, 0)
Afternoon (12pm- 5pm)	83.3 (67.6, 97.5)	83.1 (62.8, 97.5)	243 (207, 270)	231 (209, 270)	0 (0, 1)	0 (0, 1)	4 (2, 6)	4 (2, 6)	0 (0, 0)	0 (0, 0)
Evening (5pm- 12am)	82.1 (58.1, 96.6)	76.2 (56.7, 96.2)	255 (223, 288)	247 (219, 289)	0.5 (0, 2)	0 (0, 2)	6 (2, 8)	6 (4, 9)	0 (0, 0)	0 (0, 0)
All Time Periods	84.2 (73.0, 92.5)	82.5 (67.3, 93.4)	268 (233, 304)	267 (240, 306)	1.5 (0, 4)	2 (0, 5)	17 (10, 22)	17.5 (10, 24)	0 (0, 1)	0 (0, 1)

[1]All values reported as median (IQR). [2]Bold values indicate that Week 12 value is significantly different (p<0.05, paired T-test) than Week 1 value.
[3]Severe Hyperglycemic Events are glucose >250 mg/dL. [4]Hyperglycemic Events are glucose >180 mg/dL. [5]Hypoglycemic Events are glucose <70 mg/dL.

Lifestyle modification is advised for individuals with T2D to improve physical and mental health outcomes.

Glucose data were collected with rtCGMs in an observational 12-week clinical trial in US adults with T2D not taking fast-acting insulin (NIIT). Participants did not receive education beyond standard of care. Paired T-tests were used to evaluate changes in % TIR 70-180 mg/dL, peak glucose, and hyper- and hypoglycemic events during meal-related time periods (morning, afternoon, evening) between the first and last weeks of CGM wear. Results are presented for the full T2D NIIT population and a subgroup of participants whose TIR increased by ≥ 5% over the study period.

Fifty-three (35%) participants improved their TIR by ≥ 5%, in whom TIR and peak glucose were significantly improved and events of severe hyperglycemia were eliminated in meal-related time periods (Table 1).

Lower peak glucose, TIR increasing to target, and elimination of severe hyperglycemic events suggest that participants optimized their glucose during the rtCGM wear period through behavior modification. Longitudinal research that collects contextual behavioral and self-learning information alongside CGM data can provide further insight into how rtCGM operates as a behavior change tool.

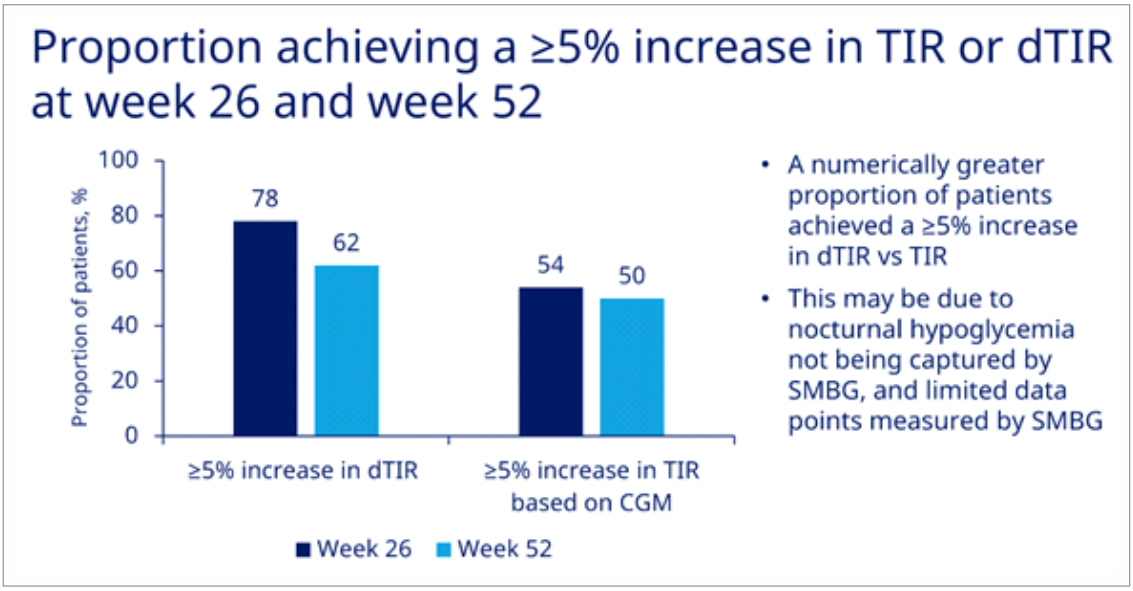
SESSION-7 : Timing of Eating and Exercise in Metabolic Health

Effect of Eight-Hour Time-Restricted Eating vs. Daily Calorie Restriction on Cardiovascular Disease Risk Factors in Adults with Obesity

Saturday, 4th June 2022

This paper was presented by Drs. Shuhao Lin, Sofia Cienfuegos, Kelsey Gabel, from Chicago, IL as a part of the Symposium "Timing of Eating and Exercise in Metabolic Health" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Asso-ciation at New Orleans.

Time restricted eating (TRE) is a form of intermittent fasting that involves confining the period of eating to 8-h and fasting with zero-calorie beverages for 16-h. Short-term studies (2-3 month) suggest that 8-h TRE produces moderate weight loss and improves blood



pressure and plasma lipids. What remains unknown is whether these improvements by TRE would become more pronounced over longer periods of time (6-months), and whether these benefits are comparable to that of daily calorie restriction (CR).

Accordingly, this study compared the effects of 8-h TRE versus CR and a no-intervention control group on body weight and cardiovascular disease risk factors in adults with obesity over 6-months.

Adults with obesity (n = 63) were randomized to 1 of 3 interventions for 6-months: 8-h TRE (ad libitum eating between 12:00 to 8:00 pm, fasting between 8:00 to 12:00 pm); CR (25% energy restriction daily); or control (ad libitum food intake with no meal timing restrictions).

Results: By month 6, body weight decreased (P = 0.02) by CR (-4.9 ± 1.4%) but not TRE (-3.4 ± 0.7%), versus controls (-0.7 ± 1.1%). Diastolic blood pressure was significantly (P = 0.04) reduced by TRE (-4.0 ± 1.4 mm Hg), but not CR (-0.1 ± 1.7 mm Hg), versus controls (1.6 ± 1.5 mm Hg). Changes in systolic blood pressure, fat mass, visceral fat mass, lean mass, LDL cholesterol, HDL cholesterol, triglycerides, and heart rate did not differ between groups at month 6. Adherence to 8-h TRE remained high throughout the trial, i.e. subjects adhered to the 8-h eating window on 6 ± 0.1 days/week.

These preliminary findings suggest CR may produce greater weight loss compared to TRE over 6-months. While TRE did not produce significant weight loss, the diet did lower diastolic blood pressure. This would suggest that this intermittent fasting regimen may produce improvements in cardiovascular parameters in the absence of body weight reductions.

Changes in Body Weight and Glucoregulatory Markers by Eight-Hour Time-Restricted Eating vs. Daily Calorie Restriction: A 6-Month Randomized Controlled Trial

Saturday, 4th June 2022

This paper was presented by Drs. Shuhao Lin, Sofia Cienfuegos, Kelsey Gabel, from Chicago, IL as a part of the Symposium "Timing of Eating and Exercise in Metabolic Health" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Intermittent fasting has gained substantial popularity in the past decade. The most popular form of intermittent fasting is time restricted eating (TRE), which involves eating within a 4-to-10-hour window and water fasting for the rest of the day. Short-term studies (2 months) indicate that TRE produces mild reductions in body weight and markers of glucose regulation. What remains unknown is whether longer durations of TRE (6-months) can lead to even greater improvements in these diabetes risk factors. In addition, whether TRE is more effective than daily calorie restriction (CR) for improving these endpoints, also remains unknown.

The purpose of this study was to compare the effects of 8-h TRE versus daily CR on body weight, body composition, and markers of glucoregulation, in adults with obesity.

Design: Participants were randomized to 1 of 3 groups for 6-months: 8-h TRE (n = 24, 12-8pm eating window, 8pm-12pm fasting window), CR (n = 22, 25% energy restriction daily), or a control (n = 19, no food or meal timing restrictions).

Weight loss was not significantly different between the TRE (-3.4 ± 0.7%) and CR group (-4.9 ± 1.4%) by month 6. Only the CR group experienced significant weight loss (P = 0.02) versus controls (-0.7 ± 1.1%). Changes in fat mass, lean mass, and visceral fat mass were not significantly different between groups post-treatment. Likewise, no significant changes in fasting glucose, fasting insulin, or HbA1c were observed. Changes in insulin resistance (assessed via HOMA-IR) did not differ between TRE (-0.50± 0.35 %), CR (-0.56 ± 0.39 %), or controls (0.37 ± 0.43%).

These findings suggest that TRE does not produce greater weight loss than traditional dieting (CR) over 6-months. Our findings also show that neither diet had any beneficial effect on body composition of markers of gluco-regulation, versus controls, in adults with obesity.

Feasibility of a Remote Clinical Trial in People with Type 2 Diabetes – Findings from the MOTIVATE T2D Trial

Saturday, 4th June 2022

This paper was presented by Drs. Andrew P. Davies, Katie Hesketh, Jonathan Low,from Liverpool, United Kingdom, as a part of the Symposium "Timing of Eating and Exercise in Metabolic Health" on Saturday 4th June 2022 at the 82nd Scientific Sessions of the American Diabetes Association at New Orleans.

Table 1: Availability of outcome data from remote measures

	Baseline		Post-intervention	
	% data available (*n*=110)	Reason for missing data (n)	% data available (*n*=46)	Reason for missing data (n)
Blood Samples	100%	-	89%	Drop out (4) Not completed (1)
HbA1C	99%	Hemolyzed (1)	89%	-
Lipid profile	55%	Awaiting analysis (25) Hemolyzed (18) Insufficient sample (5) Out of date tubes (1)	39%	Awaiting analysis (16) Hemolyzed (4) Insufficient sample (2) Out of date tubes (1)
Flash Glucose	97%	Sensor error (2) Unable to insert (1)	91%	Drop out (4)
14d wear-time	70%	Sensor fell out (37)	67%	Sensor fell out (7)
7d wear-time	90%	Sensor fell out (16)	98%	Sensor fell out (1)
Physical activity	100%	-	91%	Drop out (4)
4d wear-time	100%	-	91%	-
Blood pressure	98%	Not completed (2)	91%	Drop out (4)
Anthropometrics	100%	-	91%	Drop out (4)

Lipid profile includes total cholesterol, HDL, LDL, non-HDL and triglycerides. Flash glucose monitor wear-time criteria includes ≥70% of data. Physical activity monitor wear-time criteria includes ≥16h of wear-time. Anthropometrics include height, weight, BMI and waist circumference.

The execution of clinical trials can be expensive and present logistical challenges regarding recruitment and retention of participants. Innovative research design fostering convenience by eliminating research facility visits may enhance recruitment and retention."

"We examined the feasibility of a remote clinical trial in people living with type 2 diabetes (T2D). People with recently diagnosed T2D were recruited across the UK and Canada to the MOTIVATE T2D trial (NCT04653532); a feasibility randomised controlled trial investigating two exercise and physical activity interventions. Participants received a self-testing kit, via mail, at baseline and post-intervention (6 months).

Measures included, HbA1c, lipid profile, anthropometrics and blood pressure and 14-day flash glucose and physical activity monitoring. Between Jan 2021 and Jan 2022 286 patients were eligible, of whom 110 (UK n=63, Can n=47, male n=58, white n=95) consented. Mean journey time from research facilities was ≤1h in 18%, 1-2h in 50% and >2h in 33% of participants. Availability of outcome data is presented in Table 1.

Remote testing resulted in benefits to recruitment and good participant retention and protocol adherence. As such, remote clinical trials are feasible in people with T2D and future clinical trials should consider a remote clinical trial based approach as an alternative to conventional designs.

ADA 82ND SCIENTIFIC SESSIONS New Orleans, 2022

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