



# XXIII SCIENTIFIC CONGRESS OF THE POLISH DIABETES SOCIETY 5–7 MAI 2022 | GDANSK – ABSTRACTS

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## ORAL SESSIONS OF ORIGINAL PAPERS

## SESSION OF ORIGINAL PAPERS I

Chairs: Monika Karczewska-Kupczewska, Agnieszka Szypowska

## U1

### ACHIEVING GLYCEMIC TARGETS AMONG PREGNANT WOMEN WITH PRE-EXISTING TYPE 1 DIABETES TREATED WITH MODERN INSULIN PUMPS AUGMENTED WITH CONTINUOUS GLUCOSE MONITORING SENSORS WITH PREDICTIVE LOW GLUCOSE SUSPEND FUNCTION

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**Introduction:** Maintenance of maternal blood glucose concentration at or near normoglycemic levels in the preconception period and throughout the entire pregnancy of women with type 1 diabetes mellitus (T1DM) is associated with a reduced risk of adverse outcomes for mothers and infants. According to the current guidelines, pregnant women with T1DM who use continuous glucose monitoring systems (CGM) should aim to reach the time spent with blood glucose levels in the target range (time in range – TIR) in over 70% of readings.

**Aim of the study:** The objective of this observational study was to assess achieving glycemic targets among pregnant women with pre-existing T1DM treated with modern insulin pumps augmented with CGM sensors with predictive low glucose suspend function (MiniMed 640G).

**Material and methods:** We analyzed records of 60 pregnant women with pre-gestational T1DM using 640G pump, who were registered between the years 2016–2020. All patients used CGM. Glycemic control was assessed by measuring glycated haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) levels and the time spent in the target range between 63–140 mg/dL.

**Results:** The mean age of patients was 29.5 ±4.9 years. The mean T1DM duration was 12.2 ±7.6 years, the mean body mass index: 23.0 ±3.7 kg/m<sup>2</sup>, the mean HbA<sub>1c</sub> level on the first visit: 6.5 ±1.4%. The

first pregnancy visit was registered in 7.4 ±3.5 week of pregnancy. The mean time of initiation of therapy with the 640G system in women who were not planning a pregnancy was 9.5 ±5.1 week of pregnancy. In the study group 41.7% of women were planning to become pregnant. The HbA<sub>1c</sub> levels were observed to decrease throughout the pregnancy: the HbA<sub>1c</sub> was 6.2 ±1.0%, 5.3 ±0.5% and 5.4 ±0.5% in the first, second and third trimester, respectively ( $p = 0.0006$ ). The mean percentage of CGM readings in the target range was at 56.0% in the first trimester, and 53.5% in the second, and 56.8% in the third trimester, respectively ( $p = 0.6$ ). In the first trimester 33.0% of patients achieved the time spent in the target range between 63–140 mg/dL (TIR > 70% of readings), while 35.0% – in the second, and 37.0% in the third trimester. In the study group we recorded 4 cases of a congenital malformation (6.7%), and 10 cases of macrosomia defined as birth weight > 4000 g (16.6% of patients).

**Conclusions:** The study showed that still a low percentage of patients achieved TIR, despite using modern insulin pump therapy augmented with CGM sensors with predictive low glucose suspend function.

## U2

### TRANSITIONING OF PEOPLE WITH TYPE 1 DIABETES FROM MULTIPLE DAILY INJECTIONS AND SELF-MONITORING OF BLOOD GLUCOSE DIRECTLY TO MINIMED™ 780G ADVANCED HYBRID CLOSED LOOP SYSTEM: A TWO-CENTER, RANDOMIZED CONTROLLED STUDY

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**Aim of the study:** To evaluate the outcomes and challenges of transitioning to the MiniMed™

780G advanced hybrid closed-loop (AHCL) system in adult individuals with type 1 diabetes (T1DM) naïve to CSII and continuous glucose monitoring (CGM) technologies.

**Material and methods:** The trial was a two-center, randomized controlled, parallel group study (Clinicaltrials.gov registry: NCT04616391) evaluating individuals with T1DM aged 26–60 years and managed with multiple daily injection (MDI) and self-monitoring of blood glucose (SMBG), and an haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) < 10%. After 2 weeks run-in phase, participants were randomized to the AHCL or the MDI/SMBG group and followed up during 3 months.

**Results:** 41 participants were recruited and 37 were randomized to either the AHCL (20) or the MDI/SMBG (17) group. All 37 participants (age 40.3 ± 8.0 years; duration of diabetes 17.3 ± 12.1 years; body mass index 25.1 ± 3.1 kg/m<sup>2</sup>; HbA<sub>1c</sub> 7.2 ± 1.0%) completed the study. Time spent in target (time in range – TIR) increased from 69.3 ± 12.3% at baseline to 85.0 ± 6.3% at end of study in the AHCL group, while remaining unchanged in the control group: 62.1 ± 11.2% to 61.5 ± 11.2% (treatment effect 21.5% [95% CI: 15.7, 27.3%]; *p* < 0.001). The time below range (< 70 mg/dl) decreased from 8.7% ± 7.3 to 2.1% ± 1.7 in the AHCL group and remained unchanged in the MDI/SMBG group (7.5% ± 7.6 to 8.1% ± 7.1) (treatment effect –4.4% [95% CI: –7.4 to –2.1%]; *p* < 0.001). All secondary glucose outcomes at the end of study favored the intervention group. Participants from the AHCL group also had significant improvements in HbA<sub>1c</sub> levels (treatment effect –0.6% [95% CI: –0.9 to –0.2]; *p* = 0.005) and quality of life in specific subscales, compared to the MDI/SMBG group.

**Conclusions:** People with T1DM naïve to CSII and CGM technologies initiating AHCL significantly and safely improved their glycemic control, as well as their quality of life and psychological well-being, providing reassurance for the successful adaptability of advanced technologies for treatment of T1DM.

### U3

#### DOES THE TOTAL DAILY INSULIN DOSE BELOW 8 UNITS EXCLUDE AUTOMATIC MODE IN THE ADVANCED HYBRID CLOSED LOOP MINIMED™ 780G SYSTEM? CASE REPORT

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**Introduction:** The advanced hybrid closed loop (AHCL) system introduced in Poland in December 2020 represents a new era in the treatment of type 1 diabetes. AHCL system is another step towards better care, improved quality of life and effectiveness and safety of therapy. Unfortunately, the current criterion for implementing the automatic mode of the MiniMed™ 780G – SmartGuard system is the total daily insulin dose (TDI) exceeding 8 units.

**Aim of the study:** Present a case of a patient with type 1 diabetes with less than 8 TDI units treated with the Medtronic AHCL system in automatic mode using diluted insulin lispro in a ratio of 1 : 1.

**Material and methods:** In a 2.5-year-old boy diagnosed with type 1 diabetes in December 2021, treated with the MiniMed™ 780G system in manual mode due to a TDI of 4.8. A 1 : 1 dilution of insulin lispro was used (50 units of insulin in 1 ml 0.9% NaCl), the settings of the bolus calculator were modified – the carbohydrate index g/1 j was divided by 2, the hourly flow in the base was multiplied by 2. After 6 days of manual mode automatic mode was activated. The DPV SWEET program was used to analyze the report from the AHCL system memory.

**Results:** See the Table 1.

**Conclusions:** The AHCL system in the SmartGuard automatic mode enables safe and effective insulin therapy in patients, including the youngest children, with a daily insulin require-

**Table 1.** Patient with type 1 diabetes with less than 8 total daily insulin units treated with the Medtronic advanced hybrid closed loop system

	The period before insulin dilution 27 January–2 February 2022	Insulin dilution 1 : 1 3–9 February 2022	Insulin dilution 1 : 1 10–16 February 2022
Average blood glucose [mg/dl]	131.18	126.38	128.72
CV [%]	38.14	37.07	32.56
GMI [%]	6.45	6.33	6.39
Time percentage of glucose concentrations in range [%]			
> 250 [mg/dl]	3.79	2.62	1.26
180–250 [mg/dl]	10.10	7.60	10.91
70–180 [mg/dl]	79.76	4.41	84.09
54–70 [mg/dl]	5.55	4.53	3.54
< 54 [mg/dl]	0.81	0.86	0.20
The percentage of sensor use [%]	98	98	98
Mode AHCL [%]	0	9	100
Mode manual [%]	100	91	0

AHCL – advanced hybrid closed loop, CV – coefficient of variation, GMI – glucose management indicator

ment of less than 8 units with a dilution of insulin in the ratio of 1 : 1.

#### U4 WHAT DO PRESCHOOL CHILDREN WITH TYPE 1 DIABETES GAIN BY USING ADVANCED HYBRID CLOSED LOOP SYSTEM?

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**Introduction:** The MiniMed 780G is the first advanced hybrid closed loop (AHCL) pump available in Poland, for children with type 1 diabetes (T1D) from 7 yrs of age.

**Aim of the study:** The goal was to analyse glycemic control parameters in T1D children < 7 years of age treated with the AHCL in relation to previous pump therapy.

**Material and methods:** For 11 T1D children, aged 5.66 ± 1.24 yrs, SAP records from two weeks preced-

**Table 2.** Analyse glycemic control parameters in children with type 1 diabetes

	Sensor augmented pump	AHCL (first two weeks)	AHCL (second two weeks)
Avg SG [m/dl]	146.11 ± 18.19	133.36 ± 12.90	133.19 ± 11.30
TDI [u]	15.81 ± 4.41	15.35 ± 4.36	16.13 ± 5.21
GMI [%]	6.80 ± 0.43	6.50 ± 0.30	6.50 ± 0.27
Percent of sensor glucose values in range [%]			
> 250 [mg/dl]	5.54 ± 4.80	3.95 ± 3.03	3.15 ± 2.05
180–250 [mg/dl]	20.36 ± 7.81	14.54 ± 4.17	14.91 ± 4.07
140–180 [mg/dl]	21.42 ± 4.23	19.00 ± 3.03	19.48 ± 3.00
70–140 [mg/dl]	46.35 ± 10.94	54.20 ± 6.85	54.88 ± 5.26
54–70 [mg/dl]	4.29 ± 2.53	6.04 ± 3.52	5.47 ± 3.45
< 54 [mg/dl]	2.03 ± 2.51	2.27 ± 2.38	2.10 ± 2.01

AHCL – advanced hybrid closed loop, Avg SG – average sensor glucose, GMI – glucose management indicator, TDI – total daily insulin  
The sensor glucose profile shifted significantly towards the optimal TIR (70–140 mg/dl) ( $p < 0.05$ ).

ing the AHCL connection were compared to the records of the first four weeks in AHCL – divided into two two-week periods. The initial AHCL training period was excluded from analysis.

**Results:** See the Table 2.

**Conclusions:** In preschool children, AHCL system effectively and safely improves glycemic control by increasing time in range (70–140 mg/dl) compared to SAP.

## U5

### ANALYSIS OF FACTORS DETERMINING NEONATAL BIRTH WEIGHT IN PATIENTS WITH TYPE 1 DIABETES TREATED WITH PERSONAL INSULIN PUMP

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**Introduction:** Diabetes complicating pregnancy increases the risk of fetal growth acceleration (large for gestational age – LGA).

**Aim of the study:** To evaluate the factors influencing birth weight in patients with DM1 treated with an insulin pump (IP).

**Material and methods:** The study included 93 pregnant women with DM1 treated with IP, 54% used continuous glucose monitoring.

Medical history, data on the course of DM1, comorbidities, insulin requirements, weight gain and glycemic outcomes were analyzed.

**Results:** The mean age of women was  $31.2 \pm 4.33$  years, diabetes duration  $15.9 \pm 7.43$  years, pre-pregnancy haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>)  $7.12 \pm 1.28$ , 23% had HbA<sub>1c</sub> below 6.5%. There were 40 LGA and 1 SGA case (excluded from the analysis). The patients were divided into 2 groups – the study group consisted of 40 patients with LGA newborns, the control group included 52 patients. The patients did not differ as concerns anthropometric data, comorbidities or diabetes complications. Patients in the LGA group were less frequently primiparous (45% vs. 67%,  $p = 0.03$ ), and had earlier miscarriages (25% vs. 9.4%,  $p = 0.05$ ). Only in the LGA group, earlier deliveries macrosomic neonates were observed (12.5% vs. 0%,  $p = 0.012$ ). There were no differences in insulin requirements, HbA<sub>1c</sub>, or the percentage of patients achieving the HbA<sub>1c</sub> target in consecutive trimesters (T). Mean glycemia was

slightly higher in the LGA group in individual Ts,  $p > 0.05$ . Only the mean glycemia before pregnancy and the time spent above 140 mg/dl in the III T were higher in the LGA group –  $143 \pm 27$  vs.  $124 \pm 26$  mg/dl, respectively,  $p = 0.05$  and  $37.3 \pm 19.5\%$  vs.  $29.7 \pm 13.6\%$ ,  $p = 0.05$ . In the LGA group, 23 newborns (57.5%) had macrosomia, and in the control group 5 (9.4%) newborns. No other differences in obstetric outcomes were observed. Correlations between the incidence of LGA and the history of miscarriage ( $r = 0.214$ ), macrosomia ( $r = 0.28$ ) and parity ( $r = 0.22$ ) were observed, all  $p < 0.005$ . There were correlations between the occurrence of LGA and mean glycaemia before pregnancy, in II and III T ( $r: 0.396, 0.220, 0.299$ , respectively), time in range (TIR) in II and III T ( $r = 0.214$  and  $0.221$ ), maternal body weight in II and III T ( $r = 0.20$  and  $0.264$ ) and gestational weight gain ( $p = 0.222$ ), all  $p < 0.05$ . There was no correlation between LGA frequency and insulin doses.

**Conclusions:** In women with type 1 diabetes treated with IP, the incidence of LGA is associated with the observed pre-pregnancy glycaemia, in II and III T, and TIR in these trimesters. The burden of obstetric medical history also influences the incidence of LGA.

## SESSION OF ORIGINAL PAPERS 2

Chairs: Edward Franek, Małgorzata Szelachowska

### U6

#### METABOLIC SYNDROME IN CHILDREN AND ADOLESCENTS WITH TYPE 1 DIABETES MELLITUS – IS IT A REAL PROBLEM IN CLINICAL PRACTICE?

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The development of overweight and obesity is a growing problem, among both the healthy population and adolescents with type 1 diabetes (T1D). It significantly influences the course of diabetes, worsening insulin sensitivity and metabolic control. Moreover, it increases the risk of metabolic syndrome (MetS), and development of many cardiometabolic complications.

The main aim of the study was to assess the MetS prevalence in children and adolescents with T1D compared to healthy peers.

In the study 120 participants were enrolled ages 10–17. The diabetic group included sixty T1D patients with at least two years of disease duration. Sixty healthy peers comprised the control group. Blood high density lipoprotein cholesterol, triglycerides, fasting glucose, haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) and Total Antioxidant Status (TAS) were measured. Blood pressure was measured. Metabolic syndrome incidence was determined by the criteria of the International Diabetes Federation, National Cholesterol Education Program Adult Treatment Panel III, World Health Organization and Weiss et al. Respondents with MetS were included if they met at least one of the above-mentioned criteria. Nutritional status assessment included anthropometric measurements and body composition analysis by bioelectroimpedance method. A 3-day food diary and the Dieta6 program were used to evaluate dietary nutrient intake. The bioethics committee written permission was obtained to perform the study. Statistical analysis on results was performed using Statistica program.

Metabolic syndrome was found in every third diabetic and every tenth healthy peer. CTI subjects with MetS diets were characterized by high sucrose and saturated fatty acids consumption (especially palmitic acid) and low dietary fiber-rich products and mono- and polyunsaturated fatty acids (oleic, eicosapentaenoic, docosahexaenoic acids) intake. Body composition analysis showed high total adipose tissue content (diabetics with MetS vs. control: 26.4 vs. 14%,  $p < 0.001$ ) and visceral (77 vs. 35 cm<sup>2</sup>,  $p < 0.001$ ). Statistically significant higher HbA<sub>1c</sub> level was found in subjects with MetS (T1D with MetS vs. T1D without MetS: 9 vs. 7%,  $p < 0.01$ ). Additionally, statistically significantly lower TAS was observed in the diabetics with MetS group, than in the control group (1.261 vs. 1.617 mmol/l,  $p < 0.001$ ).

Demonstrated high young diabetics with MetS percentage confirms it may be a real problem in clinical practice. Subjects with MetS were characterized by high adipose tissue content, especially visceral, and diets low in unsaturated fatty acids and rich in saturated fatty acids. Above factors, combined with identified low antioxidant status, promote oxidative stress development, possibly resulting in difficulty maintaining metabolic control and accelerating cardiometabolic complications development.

### U7

#### HIGH DENSITY LIPOPROTEIN PARTICLES' FUNCTION OF CHOLESTEROL EFFLUX CAPACITY IN NEWLY DIAGNOSED TYPE 1 DIABETES (PROSPECTIVE INLIPODIAB1 STUDY)

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**Introduction:** People with type 1 diabetes are characterized by high serum high density lipoprotein (HDL) concentration, which does not translate into a better prognosis in this group. It

is probably related to the impaired function of HDL particles. One of the main functions of HDL is the anti-atherosclerotic role related to cholesterol reuptake (cholesterol efflux capacity – CEC). The initiation of insulin therapy increases serum HDL-cholesterol levels within the first year of therapy. It is not known whether the quantitative changes are accompanied by an improvement in HDL function.

**Aim of the study:** To evaluate HDL cholesterol reuptake function in adults with newly diagnosed type 1 diabetes

**Material and methods:** The analysis comprised 125 patients (83 men, 66%) with newly diagnosed type 1 diabetes confirmed by the presence of autoantibodies, recruited to the insulin therapy and lipoproteins' profile in type 1 diabetes (InLipoDiab1) study. The median age at onset was 26 (IQR: 22–32) years. Cholesterol efflux capacity was assessed in collaboration with UT Southwestern Medical Center, Dallas, TX, USA by measuring the efflux of specially labeled cholesterol from murine J774 macrophages into the HDL acceptor in patients' serum. The study was performed at two points: before the first administration of exogenous insulin and after one year of using intensive insulin therapy.

**Results:** After one year of observation, a significant increase in serum HDL concentration [46 (36–55) vs. 66 (55–82) mg/dl;  $p < 0.0001$ ] and no change in CEC [1.29 (1.11–1.42) vs. 1.24 (1.14–1.41);  $p = 0.6$ ] were demonstrated.

**Conclusions:** In patients with type 1 diabetes, in the first year of the disease, there is no improvement in the function of HDL particles despite a significant increase in serum HDL concentration.

## U8 EFFICACY AND SAFETY OF VARENICLINE FOR SMOKING CESSATION IN TYPE 2 DIABETES PATIENTS – A DOUBLE-BLIND RANDOMIZED PLACEBO CONTROLLED TRIAL

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**Introduction:** Cardiovascular complications are leading cause of morbidity and mortality in patients with type 2 diabetes mellitus (T2DM). Smoking enhances the combined harmful effects of hyperglycemia and other risk factors thus accelerating vascular damage in patients with diabetes, so counseling on quitting smoking and treatment

of tobacco addiction should be routine components of diabetes care. The evidence for effective cessation interventions in patients with diabetes is limited.

**Aim of the study:** To evaluate the efficacy and safety of varenicline in smokers with T2DM.

**Material and methods:** It was a multicenter, double-blind, placebo-controlled, randomized, clinical trial. Study participants were T2DM patients, who were smoking at least 10 cigarettes a day and intending to quit. 300 patients were randomly-assigned (1 : 1) to varenicline (1 mg BID) or placebo group. The total duration of the study was 52 weeks (a 12-week treatment period followed by a 40-week nontreatment phase).

**Results:** The primary efficacy endpoint of the study was carbon monoxide confirmed continuous abstinence rate (CAR) from week 9 to week 24, which was significantly higher for varenicline vs. placebo (31.3% vs. 7.3%, OR 5.77,  $p < 0.0001$ ). The secondary efficacy endpoints: CAR from week 9 to week 12, CAR from week 9 to week 52, and 7-day point prevalence of abstinence at weeks 12, 24, and 52, were also significantly higher for varenicline vs. placebo. The most frequent adverse events occurring in the varenicline group compared with the placebo group were: nausea (27.3% vs. 11.4%), insomnia (19.4% vs. 12.7%), abnormal dreams (12.7% vs. 3.4%), anxiety (11.4% vs. 7.3%) and irritability (9.4% vs. 5.4%). Serious adverse events were infrequent in both groups and not treatment-related.

**Conclusions:** Varenicline is well-tolerated and effective in achieving long-term abstinence in T2DM patients willing to quit.

## U9 MEASUREMENT OF HAEMOGLOBIN A<sub>1c</sub> IN THE POSTPRANDIAL PERIOD MAY RESULT IN FALSE DIAGNOSIS OF DIABETES

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**Introduction:** Haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) is very useful and convenient parameter for the diagnosis of carbohydrates abnormalities, especially as the assay does not need to be performed under fasting conditions. Some data indicate that lipaemic blood samples could lead to falsely elevated

HbA<sub>1c</sub> values, however data concerning the effect of postprandial state on HbA<sub>1c</sub> are not available. It can be assumed that even small changes in the postprandial period could affect the diagnosis of diabetes mellitus type 2 (DM2), which is very often asymptomatic.

**Aim of the study:** to assess the effects of a meal on HbA<sub>1c</sub> levels in the subjects with DM2 and in non-diabetic subjects with and without obesity.

**Material and methods:** study included 92 subjects aged 18–60 years old, and comprised 20 DM2 patients not well controlled (HbA<sub>1c</sub> > 7%), 20 DM2 patients well controlled (HbA<sub>1c</sub> ≤ 7%), 24 obese subjects without diabetes, and 28 normal body weight subjects without diabetes. All studied subjects underwent three blood samplings: baseline at fast, and at the 4 hr and 6 hr after a standard breakfast containing 1200 kcal, with high fat (60 g) and high carbohydrate content (125 g), with protein content 44 g. All DM2 patients were taking their antidiabetic drugs according to previous prescription. Assays performed at fast and in postprandial state: HbA<sub>1c</sub> (HPLC method), glucose, total, low density lipoprotein and high density lipoprotein cholesterol, triglycerides. At each time point HbA<sub>1c</sub> was assayed twice to eliminate analytical error.

**Results:** Increase of HbA<sub>1c</sub> in the postprandial period was found in 60 subjects of the whole group (65%). The greatest changes of HbA<sub>1c</sub> were observed in DM2 patients – increase of ≥ 0.1% was found in 75% of them, while in the group without diabetes in 44.3% ( $p < 0.03$ ). In all these subjects the highest increase of HbA<sub>1c</sub> was observed at 6 hr after the meal. Maximum increase of HbA<sub>1c</sub> value was found in patients with well controlled diabetes – it was 0.5% and 0.6% at 4 hr and 6 hr. HbA<sub>1c</sub> levels positively correlated with triglycerides levels, both in the whole study group as well as in 60 subjects in whom HbA<sub>1c</sub> levels increased after the meal.

**Conclusions:** Postprandial lipaemia may increase HbA<sub>1c</sub> levels. Measurement of HbA<sub>1c</sub> in the postprandial period may result in false diagnosis of diabetes mellitus.

## U10 MICROORGANISMS ISOLATED FROM INFECTED DIABETIC FOOT ULCERS

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**Introduction:** Soft tissue and bone infections in patient with diabetic foot are growing therapeutic problem, due to increased microorganisms resistance.

**Aim of the study:** Analysis of etiological agents of diabetic foot infections and susceptibility to antibiotics microorganisms isolated in samples taken from patients from Regional Diabetes Centre in Gdansk in 2021.

**Material and methods:** We analysed 229 samples: deep swabs, aspirates and tissue samples from 136 patients of Diabetic Regional Centre in 2021

Samples were inoculated on standard microbiological media. Susceptibility testing of clinically relevant strains was performed by disc diffusion method according to EUCAST guidelines. Coagulase neg. Staphylococci and *Corynebacterium* sp. isolated in single colonies were qualified as colonisation without susceptibility testing. Identification of the strains was done with Vitek system and MALDI TOF system.

**Results:** Among the samples 196 were positive. The dominated pathogens were: *Staphylococcus aureus* – 19.4% isolated strains, anaerobes – 13% (*Prevotella* sp. 3.2%, *Peptostreptococcus* sp. 3.2% i others: *Porphyromonas* spp, *Finnegoldia magna*, *Bacteroides* spp. 6.5%). *Enterococcus faecalis* 9%, *Escherichia coli* 8.9%, *Enterobacter* spp. 8.8%, *Proteus mirabilis* 7.6%, *Pseudomonas aeruginosa* 7.1%, *Klebsiella* spp. 4.3%, *Acinetobacter* spp. 3.6%, *Streptococcus agalactiae* 4.5%, other β-haemolytic streptococci 6%, Susceptibility to antibiotics: amoxicillin clavulanic acid – 56%, cefuroxime – 75%, ceftriaxone – 83.4%, piperacillin tazobactam – 82%, meropenem – 95.9%, ciprofloxacin – 38.7%, clindamycin – 49%, trimetoprim-sulfometaksazole – 76%, gentamycin – 66.7%. All Gram-positive

strains were susceptible to vancomycin and linezolid. 97% of anaerobic bacteria were susceptible to metronidazole.

**Conclusions:** We noted low susceptibility to outpatients antibiotics in diabetic foot infections Especially important is high resistance to clindamycin and ciprofloxacin – antibiotics with good tissue penetration. Choice of right antibiotic should be based on microbiological results. For empirical treatment cefuroxime, cotrimoxazole or parenteral 3<sup>rd</sup> generation cephalosporins, piperacillin/tazobactam and meropenem should be used.

## SESSION OF ORIGINAL PAPERS 3

Chairs: Wojciech Fendler, Roman Junik

### U11 THE IMPACT OF THE COVID-19 PANDEMIC ON THE DIAGNOSIS OF TYPE 1 DIABETES IN POZNAŃ

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**Introduction:** SARS-CoV-2 virus infection due to direct cytotoxicity on pancreatic  $\beta$ -cells and triggering autoimmune reaction may be associated with the increase in diabetes type 1.

**Aim of the study:** To analyze and compare cases of newly diagnosed type 1 diabetes before and during the pandemic.

**Material and methods:** The analysis covered adults hospitalized in the Department of Diabetology and Internal Medicine due to newly diagnosed diabetes with the phenotype of type 1 diabetes (sudden onset with typical symptoms of hyperglycemia, blood glucose exceeding 200 mg/dl, with indications of absolute insulin deficiency, without obesity), the period before (January 2017 – March 2018) and during (January 2020 – March 2021) the pandemic. The following were assessed in all participants of the study: the value of autoantibodies, the degree of metabolic decompensation at diagnosis (glucose concentration in the venous blood plasma, presence of ketonemia and diabetic ketoacidosis).

**Results:** 214 patients were enrolled in the study, including 76 women (35.5%), aged 30 (23–36); 108 in the pre-pandemic period (January 2017 – March 2018) and 106 during the pandemic (January 2020 – March 2021). In the time before the pandemic, negative antibodies were found more frequently despite a phenotype suggesting an autoimmune disease (24% vs. 3%,  $p < 0.001$ ). The comparison of both groups showed that people diagnosed with diabetes during the pandemic were characterized by a higher concentration of anti-GAD antibodies [337 (62–2674) vs. 207 (2.42–919),  $p = 0.001$ ], higher blood glucose level on admission [369 (286–457) vs. 332 (263–394) mg/dl,  $p = 0.01$ ], lower body mass index [22.1 (19.8–24.4) vs. 23.2 (20.2–26.1) kg/m<sup>2</sup>,  $p = 0.04$ ] and lower body weight before diagnosis of diabetes [71.8

(60.4–82.6) vs. 78 (66–88) kg,  $p = 0.03$ ]. In addition, during the pandemic, the diagnosis of autoimmune diabetes was observed more often in women (41.5% vs. 29%,  $p = 0.04$ ) and more frequently in the picture of ketoacidosis (40.5% vs. 17%,  $p = 0.001$ ), including severe ketoacidosis with pH < 7.0 (10% vs. 0%,  $p < 0.001$ ). Haemoglobin A<sub>1c</sub> values and lipid profile did not differ significantly in both groups.

**Conclusions:** The number of adults hospitalized for newly diagnosed type 1 diabetes did not increase during the COVID-19 pandemic. However, diagnosis was delayed during the pandemic, reflecting much deeper metabolic disturbances. More often the diagnosis was made in the picture of diabetic ketoacidosis, including severe one.

### U12 THE IMPACT OF THE COVID-19 PANDEMIC ON THE NUMBER OF HOSPITALIZATIONS, AMPUTATIONS, AND DEATHS IN PATIENTS WITH DIABETIC FOOT IN POLAND

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**Aim of the study:** The healing process of diabetic foot (DF) ulcers is significantly delayed and associated with the risk of life-threatening complications. The analysis aim was to compare the number of hospitalizations, amputations, and mortality of patients with DF before and during the COVID-19 pandemic in Poland.

**Material and methods:** The number of elective and urgent hospitalisations along with amount of amputations and deceased patients collected between 2017–2019 and during COVID-19 pandemic in 2020 were compared and examined with a one- or two-ways ANOVA test analysis of variance. The data containing total number of cases in Poland were obtained from national medical records gathered by National Health Fund. Discharge diagnoses were categorized according to ICD-10 codes. Diabetic amputations were defined as those performed in patients with diabetes, but not earlier than 30 days before its diagnosis.

**Results:** The analysis comparing the data related to the process of healing DF between the years 2017–2019 and 2020 showed statistically significant decrease of elective hospital admissions (from 29.6% to 26.3%,  $p = 0.0095$ ). Among them was decrease of percentage of hospitalizations related with resection of devitalised tissues (from 79.4% to 71.3%,  $p = 0.010$ ). Adversely in the analysed periods, there is an observed tendency of increased urgent hospital admissions (from 70.0% to 73.2%,  $p = 0.0103$ ), which were related to the increase of the percentage of toe amputations (from 23.3% to 24.2%  $p = 0.023$ ) and significant increase of major amputations (from 1776 to 1974,  $p = 0.00097$ ). This rise was parallel with the increase of deaths due to DF (from 3.9% to 4.8%,  $p = 0.031$ ).

**Conclusions:** The results of conducted analyses confirm that the COVID-19 pandemic had a negative impact on the medical care of patients with DF in Poland. Changes in the treatment regimens and greater patient support in terms of the possibility of providing medical services to patients with DFU in their place of residence are necessary in order to avoid not only unnecessary amputations, but also the increasing number of deaths due to this complication of diabetes.

### U13 ASSESSMENT OF THE ASSOCIATION OF BONE MORPHOGENETIC PROTEIN 4 (BMP4) AND ITS RECEPTOR BMPRIA IN SUBCUTANEOUS AND VISCERAL ADIPOSE TISSUE WITH METABOLIC SYNDROME IN OBESE HUMANS

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**Introduction:** Obesity has been linked to the development of metabolic syndrome (MS), which

increases the risk of type 2 diabetes and cardiovascular disease. Both high body mass index (BMI) and body fat distribution are important causes of metabolic disorders. Studies indicate that visceral obesity is a major determinant in the development of MS. Bone morphogenetic protein 4 (BMP4) signaling plays an important role in white adipose tissue formation as well as carbohydrate and lipid metabolism. In contrast, the involvement of BMP4 in the pathogenesis of obesity and its complications in humans is still unclear.

**Aim of the study:** To evaluate the association of BMP4 and BMPRIA expression in subcutaneous (SAT) and visceral adipose tissue (VAT) with MS in obese subjects.

**Material and methods:** The study included 31 subjects (10 men and 21 women, mean age:  $38.9 \pm 10.95$  years; mean BMI:  $42.8 \pm 5.9$  kg/m<sup>2</sup>) who underwent the bariatric surgery. Patients were divided into obese subjects without MS ( $n = 15$ ) and with MS ( $n = 16$ ) diagnosed according to the Harmonizing the Metabolic Syndrome criteria (Circulation 2009). The mRNA expressions of BMP4, BMPRIA, insulin signaling pathway genes (IRS1, IRS2, PIK3CA, AKT2, SLC2A4) and adipogenesis markers (CEBPA, CEBPB, PPARC, ADIPOQ) were measured in the obtained material (SAT, VAT).

**Results:** In obese subjects with MS the expression of BMP4 ( $p = 0.02$ ) and BMPRIA ( $p = 0.02$ ) in VAT was lower compared to obese subjects without diagnosed MS. In the entire group, BMP4 expression in VAT was correlated negatively with BMI ( $r = -0.41$ ,  $p = 0.02$ ), waist circumference ( $r = -0.55$ ,  $p = 0.005$ ), systolic blood pressure ( $r = -0.45$ ,  $p = 0.01$ ), serum triglyceride ( $r = -0.44$ ,  $p = 0.02$ ), fasting insulin ( $r = -0.57$ ,  $p = 0.002$ ), HOMA-IR ( $r = -0.57$ ,  $p = 0.002$ ), and positively with high density lipoprotein cholesterol concentration ( $r = 0.52$ ,  $p = 0.003$ ). BMPRIA expression in VAT was correlated negatively with triglyceride ( $p = -0.40$ ,  $p = 0.03$ ), fasting insulin ( $r = -0.40$ ,  $p = 0.04$ ), HOMA-IR ( $r = -0.42$ ,  $p = 0.03$ ). BMP4 and BMPRIA expression in VAT was correlated positively with IRS1 expression ( $r = 0.40$ ,  $p = 0.03$  and  $r = 0.40$ ,  $p = 0.03$ , respectively) and BMPRIA expression was also correlated with SLC2A4 expression ( $r = 0.54$ ,  $p = 0.002$ ). In SAT, BMP4 expression was correlated positively with ADIPOQ ( $r = 0.49$ ,  $p = 0.006$ ) and IRS1 ( $r = 0.48$ ,  $p = 0.007$ ) expressions, and BMPRIA expression with PPARC ( $r = 0.43$ ,  $p = 0.02$ ), ADIPOQ ( $r = 0.41$ ,  $p = 0.02$ ), IRS2 ( $r = 0.56$ ,  $p = 0.001$ ), PIK3CA ( $r = 0.50$ ,  $p = 0.004$ ) expressions. In multiple regression analysis, all these correlation were independent of BMI.

**Conclusions:** The BMP4/BMPRIA pathway in VAT may play an important role in the induction of metabolic disturbances in obesity. BMP4 may also be an important regulator of white adipose tissue function in humans.

## U14 NEW ONSET DIABETES DURING COVID-19 PANDEMIC

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The COVID-19 pandemic is a source of many long term complications, not only in the patients with severe pneumonia but also in the asymptomatic ones. Cells which present on their surface ACE-2 receptors are in particular jeopardy, as the SARS-CoV-2 virus shows affinity to them. In this group ex lung alveolar epithelial cells, kidneys, heart, brain, gastrointestinal and endocrine organs are in the greatest risk due to the co-expression of the transmembrane serine protease 2 (TMPRSS2). Those particles together seem to be a crucial anchor for the SARS-CoV-2 virus.

Additionally, SARS-CoV-2 infection may also cause cytokines storm, which is likely to damage many organs in the body. This scenario is more common in patients with severe pneumonia and high viremia.

The new onset diabetes in the post-COVID patients is a world-widely seen complication, which causes are currently under scrutiny. In this particular case, the direct damage of B islets induced by viral replication within them is the most highly reported cause. Sometimes it provokes temporal diabetic episode due to pancreatic regenerative potential.

Furthermore, like many other viruses, SARS-CoV-2 is suspected of triggering autoimmune B cells ablation. Nonetheless, the typical autoantibodies are absent in the majority of the post-COVID diabetes patients.

On top of that, the infection with SARS-CoV-2 virus acts as a trigger that could decompensate the prediabetic state and increase probability of developing diabetic ketoacidosis (DKA) in patients with newly diagnosed diabetes or unmask type 1 and 2 diabetes mellitus in patients. From the clin-

ical point of view, the onset of diabetes in post-COVID-19 patients has more fulminant course, with severe hyperglycaemia and DKA at admission.

**Conclusion:** Viral etiology of diabetes mellitus or diabetic episode should be taken into account in the differential diagnosis during COVID-19 pandemic.

## U15 NEFROPROTECTIVE EFFECT OF METFORMIN AMONG PATIENTS WITH DIABETES TYPE 2

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**Introduction:** The SARS-CoV-2 pandemic has had an enormous impact on the metabolic control of diabetes. The percentage of deaths and the number of complications due to it have increased significantly among patients with this condition. Knowledge of the efficacy of antidiabetic drugs during this period may help to improve metabolic control in the analyzed group of patients.

**Aim of the study:** To compare the metabolic control of patients with type 2 diabetes mellitus (DM2) treated with different drugs at the Diabetes Outpatient Clinic of UCK WUM in the period before (15 January– 28 February 2020) and during (05 June 2020 – 22 February 2021) the SARS-CoV-2 pandemic and to evaluate the potential impact of the applied form of antidiabetic therapy on metabolic control of diabetes and renal parameters among patients under observation.

**Material and methods:** Laboratory results of DM2 patients treated with metformin and/or insulin were analyzed; comparisons were made using Pearson correlation and ANOVA tests. Blood levels of metabolic control biomarkers were monitored throughout the first pandemic wave and compared with results obtained before March 4, 2020 (the first confirmed case of SARS-CoV-2 in Poland).

**Results:** We analyzed 598 patients (mean body weight 87.07 kg ( $\pm 19.54$ ), age 68.8 ( $\pm 11.87$ )). In the analyzed group of patients 22.41% ( $n = 134$ ) were treated with insulin, 42.64% ( $n = 255$ ) with metformin and 28.6% ( $n = 171$ ) with a combination of these drugs. Patients' baseline haemoglobin A<sub>1c</sub> and creatinine levels were 7.33% ( $\pm 1.39$ ) and

1.16 mg/dl ( $\pm 0.76$ ) respectively and increased by 0.19% ( $p = 0.02$ ) and 0.07 mg/dl ( $p = 0.004$ ) respectively during follow-up. The frequency of patients presenting for laboratory tests decreased by 42.18% compared to the pre-pandemic period. All patients had an increase in creatinine levels, but metformin treated patients had the lowest increase at 0.01 mg/dl.

**Conclusions:** The observed deterioration of metabolic control among DM2 patients during the pandemic period makes it necessary to introduce systemic changes in the care of the analyzed group of patients. The aim of these changes should be to avoid an exponential increase in the incidence of diabetic complications and their irreversible consequences. Changes of renal parameters in patients treated only with metformin may indicate its nephroprotective effect. These results should confirm its leading place in the algorithm of therapy of patients with type 2 diabetes.

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## POSTER SESSIONS OF ORIGINAL PAPERS

## POSTER SESSION 1

Chairs: Monika Karczewska-Kupczewska, Maciej Pawłowski

P1

## THE ASSESMENT OF NEUROPEPIDE Q IN PATIENTS WITH METABOLIC SYNDROME

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**Introduction:** Neuropeptide Q (NPQ) seems to regulate numerous physiological functions, including feeding and energy homeostasis. Nevertheless, its potential involvement in metabolic disorders is not fully understood.

**Aim of the study:** To evaluate serum concentrations of NPQ and to establish its relationship with metabolic syndrome (MetS) components.

**Material and methods:** 149 Caucasian individuals aged 24–66 years were examined. Subjects were divided into two groups: 66 patients with metabolic syndrome (MetS+, 45.33 ± 9.59 years) and 83 healthy volunteers without MetS (MetS-, 41.29 ± 8.19 years).

Biochemical measurements (fasting blood glucose – FBG, lipid profile) were performed using the enzymatic method with standardized commercial tests. Neuropeptide Q serum concentration was analysed using immunoenzymatic test. Anthropometric measurements (body weight and height, waist and hip circumference) were taken, and anthropometric indexes were calculated. Analysis of body composition was made using bioelectrical impedance technique. Moreover, blood pressure measurements were conducted.

**Results:** Subjects from MetS+ group had statistically higher body weight (by 47.3%;  $p < 0.001$ ), body mass index; by 43.2%;  $p < 0.001$ ) and percentage of body adipose tissue (BAT; by 38.3%;  $p < 0.001$ ), as well as lower total muscle mass

(TMM; by 30.1%;  $p = 0.0001$ ). According to the definition of metabolic syndrome, MetS+ group had significantly higher levels of FBG (5.51 (5.21;6.18) vs. 5.06 (4.70;5.22) mmol/l;  $p < 0.001$ ) and triglycerides (TG; 2.08 ± 1.13 vs. 0.98 ± 0.44 mmol/l;  $p < 0.001$ ), and significantly lower concentrations of high density lipoprotein (HDL; 1.18 ± 0.30 vs. 1.77 ± 0.42 mmol/l;  $p = 0.006$ ), than MetS- group. The medi-ans of concentrations of total cholesterol (TC) and low density lipoprotein were slightly higher in the MetS+ group, although without statistical significance. The concentration of NPQ in MetS+ group was significantly lower (0.47 (0.34;0.54) vs. 0.52 (0.43; 0.60) ng/ml,  $p = 0.015$ ) than in MetS-. In the entire study population, several negative correlations were observed between NPQ concentration and Waist to Hip Ratio ( $r = -0.195$ ,  $p = 0.017$ ), BAT ( $r = -0.248$ ,  $p = 0.003$ ), diastolic blood pressure ( $r = -0.197$ ,  $p = 0.016$ ), TG ( $r = -0.176$ ,  $p = 0.032$ ) along with a positive correlation with HDL ( $r = 0.211$ ,  $p = 0.01$ ) and TMM ( $r = 0.498$ ,  $p < 0.0001$ ). Moreover, a negative correlation between NPQ and FBG ( $r = -0.245$ ,  $p = 0.049$ ) was observed in the MetS+ group. In a multiple regression model, in the entire study population, the total muscle mass turned out to be an independent factor determining NPQ concentration ( $p < 0.0001$ ,  $r^2_{adj} = 24.4\%$ ).

**Conclusions:** NPQ seems to protect against metabolic-related dysfunctions. Thus, NPQ level may be considered as a new potential biomarker of metabolic complications accompanying visceral obesity. Nevertheless, further studies are needed.

P2

## OBESITY AND DIABETES IN WOMEN ARE ASSOCIATED WITH LOWER EXPRESSION OF THE GENE ENCODING ESTROGEN RECEPTOR ALPHA (ESR1) IN SUBCUTANEOUS ADIPOSE TISSUE

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**Introduction:** Proper estradiol levels and action positively influence peripheral insulin sensitivity in vivo. Therefore, a menopause-related decrease in estradiol level may be partially responsible for

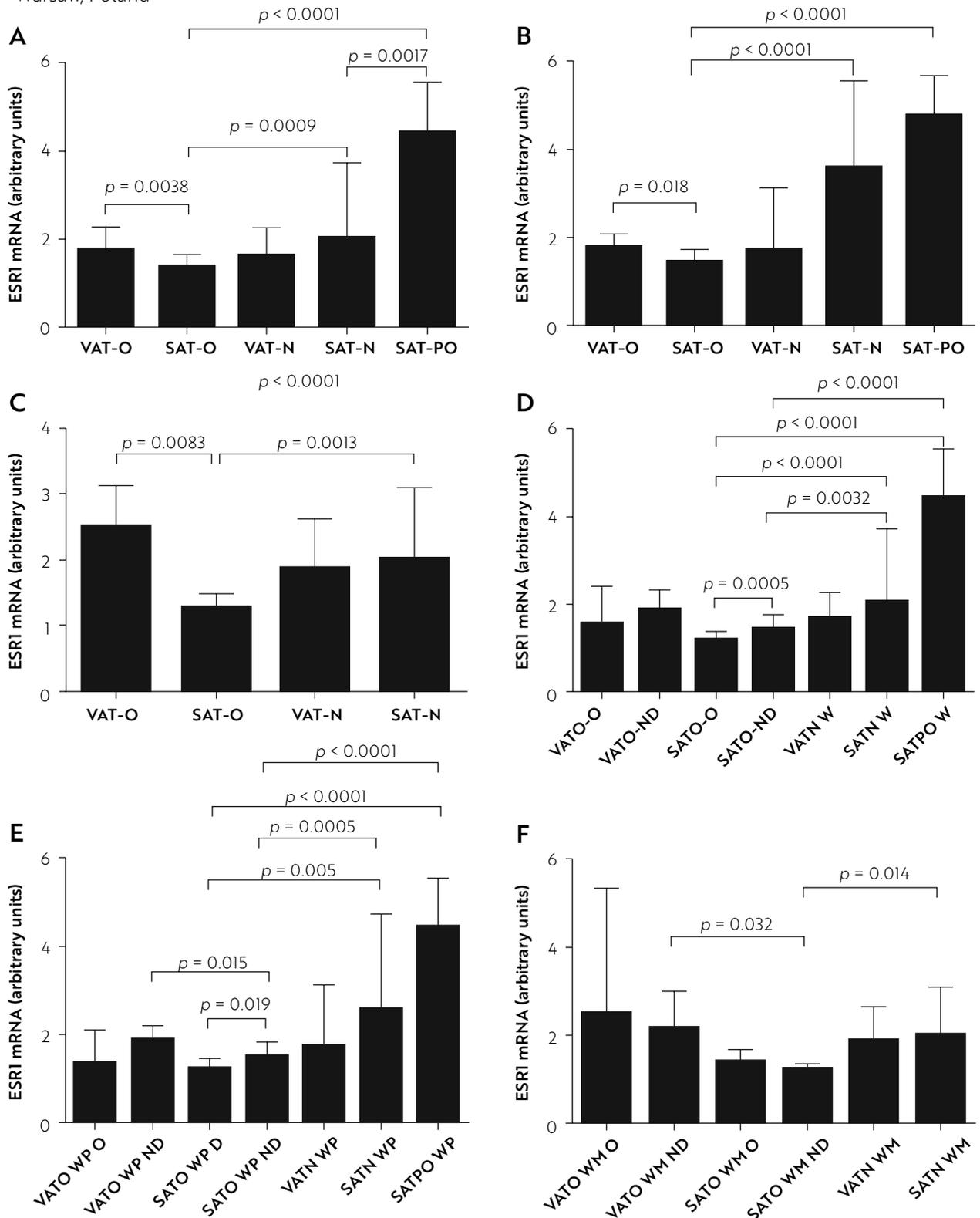


Figure 1. Evaluate an association between estrogen receptor  $\alpha$  mRNA levels

the increased risk of insulin resistance in postmenopausal women and account for their higher susceptibility to type 2 diabetes (T2D). A chief mediator of estradiol action in tissues is estrogen receptor  $\alpha$  encoded by ESR1.

**Aim of the study:** To evaluate an association between ESR1 mRNA levels in adipose tissues and incidence of T2D in pre- and postmenopausal obese before and after bariatric surgery and normal-weight women.

**Material and methods:** ESR1 mRNA levels were measured by real-time PCR in visceral adipose tissue and subcutaneous adipose tissue (SAT) of 63 obese (O, body mass index (BMI) > 40 kg/m<sup>2</sup>) women before bariatric surgery, 18 normal-weight (N, BMI 20–24.9 kg/m<sup>2</sup>) women and in 14 SAT tissues of women one year after bariatric surgery (PO).

**Results:** In the entire study group (Figure 1 A), ESR1 expression on mRNA level was lower in subcutaneous adipose tissue of obese patients (SAT-O) compared to SAT of the normal-weight individuals (SAT-N,  $p < 0.0009$ ). This finding was common for 48 premenopausal ( $p = 0.0001$ , Figure 1 B) and 15 postmenopausal ( $p = 0.0013$ , Figure 1 C) women. The surgically-induced weight loss was associated with a significant increase of ESR1 mRNA level in SAT (SAT-PO) in the whole study group ( $p < 0.0001$ , Figure 1 A) and premenopausal ( $p < 0.0001$ , Figure 1 C) study participants. Since none of the female patients from the weight-loss group had a postmenopausal status, the impact of menopause on this phenomenon could not have been studied. When the entire group of the obese study participants was divided into subgroups according to the presence of T2D it occurred that ESR1 mRNA levels were significantly lower in SAT of 23 obese women with T2D compared to 40 women with normal glucose levels ( $p = 0.0005$ , Figure 1 D). However, stratification of female patients by menopausal status revealed that the association between the ESR1 mRNA levels in SAT and diabetes was present in the premenopausal women only ( $p = 0.019$ , Figure 1 E), while in the postmenopausal group no difference between the diabetic and nondiabetic patients was observed (Figure 1 F).

**Conclusions:** Obesity in women is associated with decreased ESR1 mRNA levels in SAT, regardless of menopausal status. However, decreased ESR1 mRNA levels in SAT increase the incidence of diabetes only in premenopausal obese women.

### P3 EARLY TRANSCRIPTOMIC ORGAN-SPECIFIC CHANGES IN MURINE MODEL OF TYPE 2 DIABETES (DB/DB MICE)

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**Introduction:** The animal models of diabetes, such as db/db mice, are a useful tool to decipher the genetic introduction of molecular changes at the early stages of disease development.

**Aim of the study:** Here we aimed to find the early transcriptomic changes in three tissues involved in the regulation of metabolism – adipose tissue, muscle and liver in db/db mice.

**Material and methods:** Nine animals were included in the study. Tissues were collected at ages: 8, 12 and 16 weeks. Three mice were analyzed per time point.

A transcriptome wide analysis was performed by mRNA-seq. 500 ng of total RNA was used to prepare libraries according to SENSE mRNA-Seq Library Preparation Kit (Lexogen). The libraries were sequenced on NextSeq (Illumina). The bioinformatic analysis consisted of the following steps: trimming the sequences using the Cutadapt tool, mapping them to the mouse reference genome GRCm38 with the STAR aligner, counting the mapped mRNA reads using HT-Seq. Differential expression analysis was performed with the aid of edgeR package in R. The analysis of the Kyoto Encyclopedia of Genes and Genomes (KEGG) and Gene Ontology pathways was also performed.

**Results:** The time-dependent transcriptomic analysis has shown that most pronounced differences could be observed in liver, while muscle and adipose tissue did not undergo statistically significant changes in mRNA expression. In liver, 9 genes were differentially expressed between time points

8 and 12 weeks (Irf7, Ly6a, Ly6g6d, H2-Dma, Pld4, Ly86, Fcer1g, Ly6e, Idil) and 6 genes between ages 8 and 16 weeks (Neb, Cdkn1a, Mup-ps13, Rbml4, Tsku) (adj.  $p$ -value < 0.05). The analysis of mitochondrial transcriptomic profile (MitoExome) in the liver also changed with time. Two differentially expressed genes were found between time points 8 and 12 weeks (Ckmt2, Cox6a2) and 5 genes between ages 8 and 16 weeks (Mavs, Tomm40L, Mtfpl, Ckmt2, Cox6a2) (adj.  $p$ -value < 0.05).

**Conclusions:** The KEGG pathway analysis performed on nominally significant genes has shown a significant enrichment in pathways related to autoimmune response (natural killer cell mediated cytotoxicity, antigen processing and presentation, graft-versus-host disease or autoimmune responses). Very early changes (ages 8–12 weeks) were characterized by NOD-like receptor pathway, cytosolic DNA sensing, cytokine-cytokine receptor interaction and chemokine pathway and pathways characteristic for steroid biosynthesis. Our results suggest an important contribution of immunological response, mainly cytosolic DNA sensing, and mitochondria at the early stages of diabetes and obesity development.

#### P4 INFLUENCE OF BARIATRIC SURGERY-INDUCED CHANGES IN BODY COMPOSITION ON THE GLYCAEMIC CONTROL PARAMETERS IN OBESE WOMEN AND MEN

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**Introduction:** Bariatric surgery is not only the most effective method of excess weight loss but also allows for the improvement or even remission of the majority of obesity-related comorbidities, including type 2 diabetes (T2D). One of the mechanisms underlying the beneficial effect of bariatric procedures on the course of T2D is the surgery-induced change in body composition.

**Aim of the study:** To evaluate the effect of bariatric-induced changes in body composition on the glycaemic control parameters in obese women and men stratified by the diabetic status.

**Material and methods:** 422 obese patients (331 women and 91 men, mean body mass index  $43.6 \pm 5.7$  kg/m<sup>2</sup>, mean age  $42.4 \pm 10.8$  years) qualified for sleeve gastrectomy were included into the study. In the study participants, body composition and the basic parameters of carbohydrate metabolism (fasting glucose and % of glycated haemoglobin – HbA<sub>1c</sub>) were evaluated before and 12 months after the procedure.

**Results:** Initially, 160 (37.9%) study participants [111 (33.5%) women and 49 (53.8%) men] were diagnosed with glucose tolerance disorders (T2D or prediabetes). At baseline, statistically significant differences in body composition between men and women were observed: a higher % of body fat (FBM) in the female group ( $46.2 \pm 3.7$  vs.  $37.6 \pm 5.8$ ;  $p < 0.0001$ ) and a higher % of lean body mass (LBM) in the male group ( $60.5 \pm 5.5$  vs.  $51.6 \pm 3.4$ ;  $p < 0.0001$ ). At 12 months after the bariatric surgery, glucose intolerance persisted in 60 patients (39 women and 21 men). In men, bariatric surgery led to a greater % loss of FBM than in women ( $53.2 \pm 19.6$  vs.  $45.6 \pm 13.5$ ;  $p = 0.0074$ ) and, conversely, a lower % loss of LBM ( $16.9 \pm 5.3$  vs.  $14.2 \pm 4.8$ ;  $p = 0.0023$ ). In women, the higher loss of FBM correlated with a lower fasting glucose ( $r_s = -0.367$ ,  $p < 0.0001$ ), and in women with previously diagnosed glucose intolerance: with lower fasting glucose and a lower % of HbA<sub>1c</sub> ( $r_s = -0.408$ ,  $p = 0.00013$  and  $r_s = -0.385$ ,  $p = 0.0003$ , respectively). In all men and in men with previously diagnosed glucose intolerance, a statistically significant correlation was observed between higher LBM loss and lower fasting glucose ( $r_s = -0.337$ ,  $p = 0.03$  and  $r_s = -0.439$ ,  $p = 0.03$ , respectively).

**Conclusions:** In the studied group, sleeve gastrectomy led to a more significant loss of FBM in men and LBM in women. Regardless of these changes, in women, a better glycaemic control correlated with more significant loss of FBM, and in men – of LBM.

## P5 RELATIONSHIPS OF THE SECRETOME OF ADIPOSE TISSUE-DERIVED MESENCHYMAL STEM CELLS WITH GLUCOSE AND LIPID METABOLISM IN ADULTS

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Adipose tissue is rich in mesenchymal stem cells (MSC) that have multipotent differentiation potential. In addition, the secretome of MSC has been found to improve regeneration of injured tissues and exert immunosuppressive effects. The role of adipose tissue MSC in the pathogenesis of obesity and metabolic syndrome remains, however, unknown.

We aimed to assess the secretion of selected growth factors and cytokines by adipose tissue-derived MSC in relation to body weight and basic glucose and lipid metabolism parameters in adult subjects.

For this preliminary study thirty adult subjects with no inflammatory or cancerous disease

**Table 3.** Coefficients of Spearman rank correlations of the studied proteins by mesenchymal stem cells with basic clinical parameters of the metabolic syndrome

	Mean ±SD (min–max)	VEGF [pg/ml] 2987.5 ±890.1 (1240–4005)	IGF-1 [ng/ml] 1.69 ±1.06 (0.9–6.6)	IL-6 [pg/ml] 2132 ±680.0 (343.2–4001.2)	IL-10 [pg/ml] 1.78 ±0.66 (0.64–3.28)	HSP90 [ng/ml] 61.9 ±12.0 (45.3–91.6)
Age [years]	44.1 ±9.6 (28–66)	–0.13	–0.01	0.12	–0.08	–0.10
BMI [kg/m <sup>2</sup> ]	31.9 ±7.7 (21.3–47.9)	–0.15	0.34	0.12	0.10	0.03
Total fat tissue [body weight %]	36.4 ±8.0 (15.6–48.0)	–0.31	0.16	0.17	0.11	–0.14
Visceral fat indicator	9.2 ±3.9 (3–17)	–0.14	0.32	0.12	0.08	–0.07
HOMA-IR	4.2 ±5.2 (0.5–21.2)	–0.16	0.19	0.21	0.22	0.17
Fasting serum glucose [mg/dl]	101.5 ±35.0 (65–221)	–0.16	–0.01	0.08	<b>0.41</b> <b>p = 0.02</b>	0.23
HbA <sub>1c</sub> [%]	5.9 ±1.1 (4.8–9.3)	–0.01	–0.08	0.17	<b>0.43</b> <b>p = 0.02</b>	0.16
Serum HDL-cholesterol [mg/dl]	58.6 ±13.8 (37–87)	–0.24	–0.14	0.03	–0.17	–0.24
Serum LDL-cholesterol [mg/dl]	109.9 ±31.1 (42–176)	–0.11	–0.25	0.20	–0.24	<b>–0.41</b> <b>p = 0.03</b>
Serum triglycerides [mg/dl]	135.1 ±85.3 (38–385)	–0.14	–0.10	0.10	0.33	0.01

VEGF – vascular endothelial growth factor, IGF-1 – insulin-like growth factor 1, IL – interleukin, HSP90 – heat shock protein 90

were enrolled, including 25 female; 16 obese, 9 overweight and 5 normal weight; 7 type 2 diabetic, 6 pre-diabetic and 17 normoglycemic ones.

Mesenchymal stem cells were harvested from a sample of abdominal subcutaneous adipose tissue, which was collected by liposuction. Mesenchymal stem cells were cultured in standard conditions until confluence was reached and reseeded for a final passage. At ~80% of confluence medium was renewed for the last time and after 72 hours conditioned medium was collected. Concentrations of vascular endothelial growth factor (VEGF), insulin-like growth factor 1 (IGF-1), Interleukin 6 (IL-6), interleukin-10 (IL-10), and heat shock protein 90 (HSP90) were evaluated in the media samples with dedicated ELISA kits. Basic glucose and lipid metabolism parameters were assessed from the fasting venous blood samples. Total and visceral fat mass were estimated with a bioimpedance device.

Mesenchymal stem cells secretion of neither of the two studied growth factors, nor IL-6, correlated with the analyzed clinical parameters (Table 3). On the other hand, MSC expression of IL-10 correlated positively with fasting blood glucose and the fraction of glycated haemoglobin, whereas release of HSP90 was associated inversely with serum low density lipoprotein cholesterol concentration.

In conclusion, secretion of selected cytokines by adipose tissue-derived MSC appears related to the degree of glucose and cholesterol metabolism disturbances in adults. This suggests involvement of the protein secretome of adipose tissue MSC in the pathogenesis of the metabolic syndrome and calls for further study in the field.

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## POSTER SESSION 2

Chairs: Mariusz Dąbrowski, Przemysław Witek

P6

### FULMINANT TYPE 1 DIABETES MELLITUS – A NEW SUBTYPE OF TYPE 1 DIABETES CASE REPORT

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**Introduction:** Fulminant type 1 diabetes mellitus (FT1DM) is a distinct subtype and accounts for 20% of ketosis-onset type 1 diabetes cases in Japan. We present a case of unusually rapid course of type 1 diabetes. A 48-year old woman was admitted to the hospital with ketoacidosis. Four days before admission she had a high fever (38.5°C) and a sore throat, next thirst and polyuria, then weakness and drowsiness. On admission: pH = 6.9; plasma glucose level = 50.8 mmol/l (916 mg/dl). Na = 132 mmol/l; K = 6.42 mmol/l; CRP = 53.82.

**Material and methods:** Body mass index = 21 kg/m<sup>2</sup>; dryness of oral mucosa. Additional laboratory tests: haemoglobin A<sub>1c</sub> = 41 nmol/mol (5.9%); C-peptide = 0.03 ng/ml; autoantibodies anti-GAD < 5.01 U/ml, anti TPO = 7511 U/ml (0–60); amylase = 86.2 (28–100); TSH = 2.35 uIU/ml. In Computed Tomography of abdomen: Nodular thickening at the border of the body and tail of the pancreas without a distinct lesion. The pancreas not enlarged without any focal changes. In MRI of abdomen: pancreas of normal size without focal lesions. Wirsung duct not extended. Extra spleen. On chest X-ray: no change. In the Ultrasound of thyroid: thyroid of normal size, with no obvious focal changes. Echogenicity heterogeneous with hypoechoic areas. Flesh with bands of fibrosis. Lymph nodes unchanged.

**Results:** Ketoacidosis in the course of fulminant type 1 diabetes mellitus. Hashimoto thyroiditis. Euthyroidism.

**Discussion:** Non autoimmune fulminant type 1 diabetes is a distinct subtype of type 1 diabetes.

Diagnostic criteria for FT1DM by the Japan Diabetes Society are: 1. occurrence of diabetic ketosis or ketoacidosis (approximately 7 days) after onset of hyperglycaemic symptoms; 2. plasma glucose level  $\geq 16.0$  mmol/l ( $\geq 288$  mg/dl) and haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) < 8.7% at first visit; 3. fasting serum C-peptide level < 0.3 ng/ml (< 0.10 nmol/l) and < 0.5 ng/ml (< 0.17 nmol/l) after iv glucagon (or after meal) load at onset. Approximately 70% of patients with fulminant type 1 diabetes presented with flu-like or gastroenteritis-like symptoms. Fever is the most common and was observed in 60.0% of patients. Fulminant type 1 diabetes mellitus could also develop after immune checkpoint inhibitors, which have been widely used for the treatment of many types of cancer.

**Conclusions:** Some adult patients develop diabetes with an unusually rapid course – FT1DM. The disease may be related to a viral infection or occur as a side effect of anti-cancer treatment. Careful interviewing allows us to determine the unusually rapid course of diabetes, and the examination of C-peptide and HbA<sub>1c</sub> to make a proper diagnosis.

P7

### HOW TO APPLY THERAPY OPTIONS PRESENTED BY ADVANCED CLOSED LOOP THERAPY (ADVANCED HYBRID CLOSED LOOP MINIMED 780G) IN A DIABETES TYPE 1 PATIENT UNDERGOING MINOR SURGICAL PROCEDURES

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**Introduction:** The preparation of a type 1 diabetes patient for an elective surgical procedure requires prior assessment of metabolic control of the disease and performing basic tests. It is essential to consider new technologies in preparation of the patient for a surgical procedure.

**Aim of the study:** To present a case of a patient treated with advanced closed loop therapy.

py (AHCL MiniMed 780G) while in deep sedation during diagnostic upper gastrointestinal tract endoscopy.

**Material and methods:** In January 2022 our 12 year old, female patient with a 6 years history of type 1 diabetes, managed with AHCL since Jan 2021, was admitted to our department for endoscopy of upper digestive tract performer in deep sedation as part of investigation of coeliac disease. In the AHCL report from the two weeks prior to hospital admission, her mean glycemia was  $113 \pm 33$  mg/dl, glucose management indicator 6.0%, coefficient of variation 29.3%, time in range (TIR) 92%, time below range 4% TAR 4% , sensor use 98% of the time, auto-mode system – 100%.

**Results:** In the perioperative period the patient was hydrated intravenously without glucose and the inuline was delivered exclusively with auto-mode system, with the temporary glycemia target set at 150 mg/dl. The glycemia in that period was within the desired range, mean glycemia  $138 \pm 12$  mg/dl, TIR 100%.

**Conclusions:** The automatic mode with temporary glycemia target at 150 mg/dl enables safe and correct management of a small procedure (below two hours) in a patient treated with hybrid closed loop (AHCL).

## P8 THE IMPACT OF DIET MACRONUTRIENTS (FATS, PROTEINS, CARBOHYDRATES) ON METABOLIC CONTROL IN PATIENTS WITH TYPE 1 DIABETES TREATED WITH A PERSONAL INSULIN PUMP

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**Introduction:** In recent years, there has been an increase in the incidence of type 1 diabetes (DM 1). Nutrition education and proper diet constitute an integral part of the treatment of this disease.

**Aim of the study:** To evaluation of diet macronutrients impact on metabolic control in patients with type 1 diabetes.

**Material and methods:** The study included 32 people with type 1 diabetes, including 16 women and 16 men in age  $26 \pm 5.3$  years with diabetes occurrence  $11.5 \pm 5.7$  years, treated with a personal insulin pump (OPI)  $6 \pm 3.7$ .

Evaluation of the diet was made based on anonymous questionnaires and current listing diaries. The content of macronutrients, vitamins, and minerals in the diet of patients was referred to the norms for the Polish population and the PTD recommendations. Anthropometric measurements were performed using the BIA method. The glyce-mic assessment was made based on data from glyce-mic monitoring (FGM) – FreeStyle Libre, as well as measurements using a glucometer. Laboratory tests included: haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>), total cholesterol, its low density lipoprotein and high density lipoprotein (HDL) fractions, and triglycerides. The AGE-Reader was used to assess glycation through the fluorescence of collagen in the skin (AF).

**Results:** The diet of patients with DM 1 is in large part, was consistent with current recommendations. However, the excess amount of saturated fatty acids consumption were observed. The diet of patients was characterized by an insufficient amount of polyunsaturated fatty acids and plant proteins. The mean HbA<sub>1c</sub> among the subject was  $6.9 \pm 0.6$ . The level of nutrient intake does not affect the HbA<sub>1c</sub> percentage. A positive correlation was found between the consumption of fats ( $p = 0.0468$ ) and monounsaturated fatty acids ( $p = 0.0456$ ) and the concentration of HDL cholesterol. The supply in the carbohydrate ( $p = 0.0069$ ;  $rs = -0.49$ ), protein ( $p = 0.006$ ;  $rs = -0.49$ ). correlates negatively with the values of the AF index.

**Conclusions:** The obtained results suggest that eating habits affect the metabolic control and parameters of diabetes. Properly planned diet may be conducive to achieving therapeutic goals and constitute an essential element of the prevention of diabetic complications.

## P9 HIGHER NDUFS8 SERUM LEVELS AND MITOCHONDRIA TURNOVER CORRELATE WITH BETTER INSULIN SENSITIVITY IN TYPE 1

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**Aim of the study:** Insulin resistance in type 1 diabetes mellitus (T1DM) is a common clinical problem combined with impaired course of the disease and poor prognosis. On the other side T1DM causes adverse changes in the mitochondria. One of the features of proper function of mitochondria is their turnover. The NADH dehydrogenase [ubiquinone] iron-sulfur protein 8 (NDUFS8 protein) is a subunit of Complex I and plays an important role in the mitochondrial function. NDUFS8 serum concentration probably reflects the turnover of mitochondria. The aim of the study was to evaluate the presence NADH dehydrogenase [ubiquinone] iron-sulfur protein 8 serum level as a marker of Complex I and the relationship with insulin resistance in type 1 diabetes.

**Material and methods:** Participants were adults with T1DM, recruited during 1 year (2018–2019). NDUFS8 protein serum concentration was measured using the ELISA test. Insulin resistance was evaluated with indirect marker estimated glucose disposal rate (eGDR). The group was divided on the base of median value of eGDR (higher eGDR – better insulin sensitive).

**Results:** The study group consisted of 12 women and 24 men, aged 39.5 (28.0–46.5) years with the duration of the disease 22 (15–26) years and haemoglobin A<sub>1c</sub> 8.35 (6.92–9.78)%. Medians of eGDR and NDUFS8 protein concentration were 7.6 (5.58–8.99) mg/kg/min and 2.25 (0.72–3.81) ng/ml, respectively. The group with higher insulin sensitivity had higher NDUFS8 protein serum concentration, lower WHR, body mass index and they were younger. A negative correlation was observed between NDUFS8 protein serum concentration and WHR ( $r_s = -0.35$ ,  $p = 0.03$ ), whereas a positive correlation was observed between NDUFS8

protein serum concentration and eGDR ( $r_s = 0.43$ ,  $p = 0.008$ ). Multivariate linear regression confirmed a significant association between insulin sensitivity and better mitochondrial function ( $\beta = 0.54$ ,  $p = 0.003$ ), independent of age, duration of diabetes and smoking.

**Conclusions:** Higher NDUFS8 protein serum concentration, which reflects better mitochondrial turnover, is associated with higher insulin sensitivity among adults with T1DM.

## P10 HYPOTHALAMIC-PITUITARY- ADRENAL AXIS IN PATIENTS WITH TYPE 1 DIABETES AND RECURRENT HYPOGLYCEMIA

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**Aim of the study:** Hypoglycemia is the most common complication of type 1 diabetes treatment. Impaired secretion of counterregulatory hormones (including cortisol) in response to hypoglycemia has been demonstrated in these patients. The aim of our study was to assess whether hypothalamic-pituitary-adrenal axis dysfunction could be related to hypoglycemia in patients with type 1 diabetes.

**Material and methods:** Continuous ambulatory glucose monitoring was conducted for 5 days in 60 patients with type 1 diabetes treated with intensive functional insulin therapy. Two subgroups were identified with episodic and recurrent hypoglycemia, respectively. Basal cortisol and ACTH secretion and ACTH-stimulation test were assessed in all patients.

**Results:** There were no significant differences in the morning ( $13.0 \pm 2.8$  vs.  $13.1 \pm 3.9$   $\mu\text{g/dl}$ ) and evening ( $4.3 \pm 1.8$  vs.  $4.3 \pm 2.7$   $\mu\text{g/dl}$ ) cortisol and ACTH ( $30.8 \pm 18.0$  vs.  $29.3 \pm 13.7$  and  $10.7 \pm 7.5$  vs.  $11.1 \pm 6.1$   $\text{pg/ml}$ , respectively) concentrations, in daily urinary cortisol excretion ( $118.2 \pm 67.9$  vs.  $112.2 \pm 63.7$   $\mu\text{g/24 h}$ ) and in cortisol concentrations 30 and 60 minutes after stimulation with synthetic ACTH ( $21.0 \pm 2.9$  vs.  $22.2 \pm 4.6$  and  $24.4 \pm 3.0$  vs.  $26.0 \pm 5.7$   $\mu\text{g/dl}$ , respectively) between the groups.

**Conclusions:** Recurrent hypoglycemia is not related to impaired ACTH or cortisol secretion. Thus, routine diagnostic for subclinical hypocortisolemia in patients with hypoglycemia seems to be unnecessary, unless there are other reasons like signs or symptoms of adrenal insufficiency.

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## POSTER SESSION 3

Chairs: Piotr Molęda, Katarzyna Nabrdalik

### P11 EXPERIENCES OF THE DIABETES TEAM FROM THE SWEET NETWORK BENCHMARKING (2019–2021)

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**Introduction:** Benchmarking is a low-cost tool that allows a comparative analysis of the strategy presented by a given medical facility with other similar facilities. Its result serves as the basis for improvement. An example of international benchmarking in diabetology is the SWEET Network.

**Aim of the study:** To present the benefits and difficulties of participating in benchmarking based on the experience of the multidisciplinary diabetes team.

**Material and methods:** Description of own experiences of the diabetes team of the Pediatrics Department and the Diabetes Clinic for Children of the University Hospital in Opole – from 2019 the reference center of the SWEET network.

**Results:** Joining the international SWEET project (127 reference centers from around the world, including 6 from Poland) made it possible to formulate and undertake further goals to be achieved, set priorities and focus on action, as well as creating and updating a list of tasks and team activities. Checklists for repetitive activities were developed. Data from comparative analyzes with other centers and own previous results are obtained from the SWEET database every 6 months and allow for real checking of the results of our work and updating the directions of the team's activities; evaluation by reviewing activities and strategies. Entering data into the standardized international SWEET database allows to easily identify patients who, for example, did not come for an appointment in the last year or did not have the required follow-up tests performed. Thanks to the benchmarking, we noticed significantly higher

lipid profile parameters in our patients compared to other centers and we increased the activities of the entire team in this area, achieving gradual improvement of results. The difficulty reported by the team is the hospital's failure to implement the automation of data transfer from the hospital system to the SWEET database.

**Conclusions:** Participation in benchmarking involves assessing the diabetes team with numerous advantages and benefits that outweigh certain difficulties. The work of the team and the quality of diabetes care are reflected in the benchmarking results that allow to compare the obtained results to other reference centers around the world, as well as their evolution over time.

### P12 THE IDENTIFICATION OF PREDICTIVE TRANSCRIPTOMIC BIOMARKERS FOR POSTPARTUM GLUCOSE INTOLERANCE IN PATIENTS WITH GESTATIONAL DIABETES

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**Introduction:** Gestational diabetes (GDM) is associated with a great risk of abnormal glucose tolerance (AGT) in women after delivery. From a clinical perspective, it is therefore important to identify non-invasive biomarkers that could predict postpartum AGT already during diabetic pregnancy, in order to implement prevention programs.

**Aim of the study:** This study aimed to identify the predictive transcriptomic biomarkers for AGT recognized at 1 year following delivery among Caucasian women after GDM, and to determine the optimal cut-off expression values of the studied genes for diagnosing postpartum AGT.

**Material and methods:** The study consisted of 28 patients with diagnosed GDM at 24–28 weeks of gestation at a 1 year follow-up (pGDM). Among the pGDM subjects, 18 sustained normal glucose

tolerance (NGT) and 10 developed AGT, which included 9 prediabetes women (8 IFG + 1 IGT) and 1 T2DM women. The expression of the selected metabolic- and inflammation-related genes (ADORA1, ADORA2A, ADORA2B, ADORA3, INSR, IRS1, IRS2, MAPK8, SIRT1, XBP1, IL-6, IL-8, IL-10, IL-13, IL-18, TNFA, RELA) was examined in leukocytes of pregnant women. The receiver operating characteristic (ROC) curves and the area under the ROC curve (AUC) calculation were applied to estimate the prognostic value of the aforementioned genes. The optimal cut-points were identified using the Youden method.

**Results:** The results of the ROC curve analysis indicated that the expression for INSR, IL8, IL13 and TNFA (AUC = 0.72,  $p = 0.0217$ ; AUC = 0.75,  $p = 0.0260$ ; AUC = 0.73,  $p = 0.0193$ ; and AUC = 0.76,  $p = 0.0089$ ; respectively) separately showed a fair accuracy for predicting AGT at 1 year follow-up among women affected by GDM. However, the AUC of the combination of the expression results for the four genes was 0.87, which was significantly higher than that of each single gene ( $p = 0.0000$ ).

**Conclusions:** Combined expression of INSR, IL8, IL13 and TNFA during pregnancy complicated with GDM could be considered promising novel predictive biomarker for AGT at a 1 year follow-up although its predictive value still needs to be verified by a large sample size.

## P13 A MAXIMAL RESPIRATORY EXCHANGE RATIO IN CHILDREN AND ADOLSCENTS WITH TYPE 1 DIABETES

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**Introduction:** Children with type 1 diabetes require an individual attitude and education related to physical activity [1]. The Cardiopulmonary Exercise Test provides repeatable and measurable data on the cardiorespiratory system and metabolism [2, 3]. The Respiratory Exchange Ratio (RER or R) is

a peak gas exchange factor, which shows the rate of exhaled carbon dioxide ( $VCO_2$ ) to the uptake of oxygen ( $VO_2$ ) [4]. It is assessed on the basis of the analysis respiratory gases, assuming generally on the values of 0.8–1.0 for fats and 1.0 for carbohydrates [5].

**Aim of the study:** To determine the maximum respiratory exchange ratio in children and adolescents with type 1 diabetes and to indicate the moment when cells only use carbohydrates to generate energy.

**Material and methods:** The study included a total of 83 children and adolescents diagnosed with type 1 diabetes from all over Poland, with particular emphasis on the Mazowieckie and Podkarpackie voivodeships. The study group consisted of 50 boys and 33 girls aged 9–18 years (mean  $\pm$ SD = 13.87  $\pm$ 2.6).

The study was performed using portable gas analyzer Cortex MetaMax 3B\_R2 and cycloergometer. Before starting the main study, all participants were required to warm up without load for 4 minutes with a constant speed of 60–80 rpm. After this period, the initial load of 25 W was determined. Successively, the resistance was increased linearly by 15 W/min with the constant maintenance of the peeling cadence, similarly to the warm-up. The test was conducted to the refusal.

**Results:** Statistical analysis showed a significant advantage of children (65.85%) with dominated fat burning (RER < 1) compared to the use of carbohydrates 34.15% (RER > 1). The mean RER in the entire study group was 0.96 (SD =  $\pm$ 0.09). There was a correlation between the respiratory quotient and age ( $r = 0.485$ ), and the content of adipose tissue ( $r = -0.210$ ). On the other hand, no correlation between RER and gender, height, weight or body mass index were observed.

**Conclusions:** Our findings suggest that children and adolescents with type 1 diabetes in the majority are unable to use carbohydrates in high-intensity exercise exceeding the Respiratory Exchange Ratio equal to or above the value of 1. The data suggest that the subjects were largely unable to tolerate exercise, when anaerobic changes were dominated.

**Funding statement:** The study was supported by funds of the Medical College of Rzeszow University.

**P14****A COMPARISON OF THE CLINICAL CHARACTERISTICS, GLYCEMIC CONTROL AND POST-PARTUM FOLLOW-UP RATE OF WOMEN WITH GESTATIONAL DIABETES DURING THE COVID-19 PANDEMIC IN 2020 AND 2021**Magdalena Wilk<sup>1</sup>, Radostaw Dziedzic<sup>2</sup>, Maciej Matecki<sup>1</sup><sup>1</sup>Department of Metabolic Diseases, Jagiellonian University Medical College, Cracow, Poland<sup>2</sup>Student's Scientific Group, Department of Metabolic Diseases, Jagiellonian University Medical College, Cracow, Poland

**Introduction:** Since the beginning of 2020, health care systems worldwide have been struggling with the COVID-19 pandemic. Women with GDM require complex, continuous specialized care from the moment of diagnosis, during pregnancy and after childbirth. Over the past two years the model of care for pregnant women has had to adapt to the prevailing epidemiological conditions while maintaining high diagnostic, treatment and control standards.

**Aim of the study:** To compare the clinical characteristics, glycemic control and post-partum follow-up rate of women with gestational diabetes during the COVID-19 pandemic in 2020 and 2021.

**Material and methods:** Retrospective analysis of medical records of the outpatient clinic at the Department of Metabolic Diseases and Diabetology, University Hospital in Cracow. Comparison was made between the periods of March–May 2020 (wave I) and March–May 2021 (wave III). The postpartum control of these patients until December 2021 was also analyzed.

**Results:** When patients treated during wave I ( $n = 69$ ) vs. wave III ( $n = 107$ ) were compared, there were no differences in patients' age  $32.5 \pm 4.8$  vs.  $31.9 \pm 4.9$  years ( $p = 0.3$ ), week of pregnancy at GDM diagnosis  $21.7 \pm 8.2$  vs.  $20.9 \pm 8.4$  weeks ( $p = 0.5$ ) or in pre-pregnancy body mass index  $25.7 \pm 5.0$  vs.  $26.6 \pm 6.5$  kg/m<sup>2</sup> ( $p = 0.6$ ). Patients treated in 2020 were more likely to use telemedicine consultations 36% vs. 18% of all visits ( $p = 0.001$ ). Patients did not differ in results in the OGTT test (0 min:  $4.9 \pm 0.5$  vs.  $5.1 \pm 0.6$  mmol/l,  $p = 0.1$ ; 60 min:  $9.2 \pm 2.2$  vs.  $9.2 \pm 1.9$  mmol/l,  $p = 0.9$ ; 120 min:  $7.9 \pm 1.9$  vs.  $7.6 \pm 1.8$  mmol/l,  $p = 0.4$ ). The mean fasting self-control glucose did not differ  $4.8 \pm 0.3$  vs.  $4.8 \pm 0.3$  mmol/l ( $p = 0.6$ ) but we ob-

served a worse mean postprandial glycemia result in patients treated in 2020 vs. 2021,  $6.6 \pm 0.8$  vs.  $6.3 \pm 0.7$  mmol/l ( $p = 0.03$ ), respectively. Patients in 2021 were more likely to receive insulin therapy, 73.8% vs. 60.9% in 2020,  $p = 0.07$  (Cramer's V test 0.14), but they did not differ in week of starting the treatment  $22.2 \pm 9.3$  vs.  $20.9 \pm 8.9$  weeks,  $p = 0.5$ . Patients rarely reported for postpartum check-ups, 26% in 2020 and 20.5% in 2021,  $p = 0.4$ .

**Conclusions:** As compared to the COVID-19 wave I period in 2020, the insulin treatment of GDM women during wave III in 2021 was initiated more frequently and lower postprandial glycaemia was observed. Moreover, teleconsultation was used less frequently. The alarming information is that in both 2020 and 2021 patients reported for the recommended postpartum check-ups in a similar low percentage.

**P15****THE RELATIONSHIP BETWEEN SELECTED NEW BIOMARKERS OF CARDIOVASCULAR DISEASE AND INTIMA-MEDIA THICKNESS VALUE IN YOUTHS WITH DIABETES TYPE 1 CO-EXISTING WITH EARLY MICROVASCULAR COMPLICATIONS**Joanna Peczyńska<sup>1</sup>, Bożena Klonowska<sup>2</sup>, Artur Bossowski<sup>1</sup>, Barbara Głowińska-Olszewska<sup>1</sup><sup>1</sup>Department of Paediatrics, Endocrinology, Diabetology with Cardiology Subdepartment, Medical University of Białystok, Poland<sup>2</sup>Department of Clinical Pediatrics, University of Warmia and Mazury in Olsztyn, Poland

**Introduction:** Recent years have confirmed the importance of "new biomarkers", their usefulness in estimating the risk and explaining not fully understood pathogenesis of cardiovascular disease. In type 1 diabetic patients (T1D), vascular complications develop extremely early, resulting in reduced life expectancy. The aim of our study was to assess intima-media thickness (cIMT) of common carotid arteries and the occurrence of classical atherosclerosis risk factors together with selected new biomarkers of cardiovascular diseases (hsCRP, adiponectin, myeloperoxidase, NT-proBNP peptide, vitamin D) in youths with T1D, recognised in screening tests to present early stages of microvascular complications (VC).

**Material and methods:** The study included 50 adolescents and young adults with T1D, mean age  $17.1 \pm 3.3$  years, with diabetes duration of  $10.3 \pm 3.3$  years, including 20 patients with T1D and VC(+), and 30 patients with no additional diseases: T1D and VC(-). The control group consisted of 22 healthy volunteers (C). The study analyzed mean haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) value from all years of disease, body mass index (BMI), blood pressure, lipids, new biomarkers of atherosclerosis, and cIMT of common carotid arteries.

**Results:** In the group with T1D and VC(+) significantly higher BMI was found:  $23.07 \pm 4$  vs.  $21.28 \pm 2.9$  in group with T1D and VC(-) and  $19.65 \pm 2.4$  kg/m<sup>2</sup> in group (C) ( $p=0.003$ ). Waist circumference was highest in the group with T1D and VC(+)  $78.4 \pm 9$  vs.  $75.1 \pm 7.6$  in group T1D and VC(-) vs.  $69.0 \pm 7.4$  cm in group C ( $p < 0.001$ ). The mean value of HbA<sub>1c</sub> was higher in group T1D and VC(+): 9.8% than in group T1D and VC(-): 8.5% ( $p < 0.001$ ). Lipids and blood pressure values were highest in VC(+) group too. Significantly higher concentration of hsCRP, NT-proBNP and lower vitamin D were observed in T1D and VC(+) in comparison to T1D and VC(-) and the control group. The IMT in the T1D and VC(+) group was 0.49 mm and was insignificantly higher to the T1D and VC(-) group (0.46 mm), but higher than in healthy controls: 0.41 mm ( $p < 0.001$ ). Intima-media thickness correlated significantly positively with HbA<sub>1c</sub>, hsCRP, NT-pro-BNP, and negatively with vitamin D level.

**Conclusions:** Youths with T1D coexisting with early recognised microvascular complications present many abnormalities in classical and new cardiovascular risk factors. Among the “new biomarkers” of atherosclerosis, most important for estimating the risk of macroangiopathy seem hsCRP, vitamin D<sub>3</sub>, and NT-proBNP peptide. Greater risk of developing early cardiovascular disease depends primarily on metabolic control.

## POSTER SESSION 4

Chairs: Beata Matyjaszek-Matuszek, Małgorzata Myśliwiec

## P16

## ASSESSMENT OF HYPOGLYCEMIA IN PATIENTS WITH TYPE 1 DIABETES IN CLINICAL PRACTICE: IS MEDICAL ANAMNESIS SUFFICIENT?

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**Aim of the study:** Hypoglycemia is an important limiting factor in the efficacy and the safety of diabetes management. Hypoglycemia, not only severe, has numerous health, psychological and social consequences. Standards of management of a patient with type 1 diabetes include a history of hypoglycemia at each visit to the doctor's office. The aim of this study was to determine whether the assessment of the occurrence of hypoglycemia based on medical anamnesis is sufficiently sensitive and specific in comparison with the assessment of objective data obtained during ambulatory continuous blood glucose monitoring.

**Material and methods:** The study included 60 patients with type 1 diabetes. The subjects completed questionnaires concerning the occurrence of hypoglycemia episodes and awareness of hypoglycemia (auctorial questionnaires – 2 or more hypoglycemia per week was defined as recurrent hypoglycemia). Diabetes control was assessed in all patients by haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) and time in range (TIR) and continuous ambulatory glucose monitoring (CGM) was conducted for 5 days (2 or more hypoglycemia during the monitoring (5 days in an outpatient setting) were considered as recurrent hypoglycemia).

**Results:** Based on the medical anamnesis, 33 people with recurrent and 27 people with episodic hypoglycemia were identified. Patients with severe hypoglycemia accounted for 42.4% of the group with recurrent hypoglycemia. Severe hypoglycemia didn't occur in patients with episodic hypoglycemia. Duration of diabetes was longer in patients reporting recurrent hypoglycemia (17 vs. 8 years,  $p = 0.004$ ). There were no significant dif-

ferences in diabetes control (assessed with HbA<sub>1c</sub> and TIR) between the two groups. The analysis of the CGM records revealed recurrent hypoglycemia in 48 of 60 subjects (80% vs. 55% according to the medical history). Medical anamnesis as a diagnostic test for the incidence of recurrent hypoglycemia, compared to CGM was characterized by the specificity of 91.7% and a sensitivity of 66.7%.

**Conclusions:** The sensitivity of the medical history in detecting hypoglycemia is low. The objective methods, such as ambulatory continuous blood glucose monitoring is needed to evaluate the prevalence of hypoglycemia in patients with type 1 diabetes.

## P17

## FREQUENCY SCANNING CORRELATES NOT ONLY WITH GLYCEMIC INDICES BUT ALSO WITH FEAR OF HYPOGLYCEMIA IN TYPE 1 DIABETES PATIENTS USING IS-CGMS

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**Introduction:** Frequency scanning with intermittently scanned CGMS (is-CGMS) is associated with glycemic indices. No data is available for its association with fear of hypoglycemia (FOH), a well-known factor affecting quality of life and glycemic control in type 1 diabetes (T1DM).

**Aim of the study:** To analyze the association of scanning frequency with glycemic indices and FOH in T1DM patients using is-CGMS.

**Material and methods:** T1DM patients using is-CGMS were eligible. Clinical data, Ambulatory Glucose Profile reports were obtained from medical records. FOH was assessed using Hypoglycemia Fear Survey II (HFS II).

**Results:** 58 female and 19 male patients participated in the study, 38 were treated with insulin pump, 39 with multiple daily injections. Their mean age was  $34.1 \pm 10.2$  years and T1DM duration  $14.7 \pm 12.0$  years. Mean glycemic indices were as follows: mean glucose –  $155.8 \pm 29.8$  mg/dl; glucose management indicator (GMI) –  $53.3 \pm 7.5$  mmol/mol; time in range (TIR) –  $66.4 \pm 17.8\%$ ; TB70 –  $4.5 \pm 4.1\%$ ; TB54 –  $0.6 \pm 1.2\%$ ; TA180 –  $29.2 \pm 17.9\%$ ; TA250 –  $9.6 \pm 10.4\%$ ; % coefficient of variation (CV) –  $36.7 \pm 8.3$ . The average scanning frequency was  $13.8 \pm 7.8$  scans/d. Mean HFS II scores were  $16.1 \pm 7.2$  and  $18.7 \pm 12.2$  in behavior and worry subscale, respectively. Correlation was found between scanning frequency and mean glucose, GMI, TIR, TB70, TA180, TA250, % CV, and for the first time HFS II – B ( $p < 0.05$  for all statistics).

**Conclusions:** In summary, we have confirmed associations between higher scanning frequency and better glycemic indices. Moreover, we have found negative correlation of scanning frequency and FOH. This constitutes a new argument for advising T1DM patients frequent scanning when using is-CGMS.

## P18 DOES NODULAR GOITER INCREASES A RISK OF NEUROVASCULAR COMPLICATIONS IN ADULT PATIENTS WITH TYPE 1 DIABETES?

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**Introduction:** Recently, several studies have been published on the association between impaired glucose metabolism and thyroid volume and the presence of thyroid nodules. To date, the occurrence of thyroid nodules has not been established in type 1 diabetes (T1DM).

**Aim of the study:** To assess the relationship between nodular goiter and the clinical feature and occurrence of chronic T1DM complications.

**Material and methods:** The study population comprised 126 consecutive European Caucasian participants T1DM including 57 (45.2)% men. Median participants' age was 31 (IQR: 26–36) years and T1DM duration was 14 (IQR: 9–18) years. In the study

group, 46 (36.5)% participants were diagnosed with at least one neurovascular complication [retinopathy – 43 (34.4)%, diabetic kidney disease – 11 (8.7)%, autonomic neuropathy – 12 (10)% and peripheral neuropathy 12 (10)%]. Neck ultrasonography (US) was performed. A thyroid nodule was defined as a lesion with a diameter large than 3 mm.

**Results:** Thyroid nodules were found in 18 patients (14)%. We found no statistically significant differences in smoking status, haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>), body mass index (BMI), waist/hip ratio (WHR), thyroid lobes volumes, indicators of insulin sensitivity like the estimated glucose disposal rate, visceral fat index (VFI) in the study group vs. patients without thyroid nodules. Nonetheless, patients with thyroid nodules, as compared with control group were older [43.5 (35–57) vs. 30 (25–35) years;  $p = 0.0002$ ], with women prevalence [78% vs. 51% of women;  $p = 0.03$ ] and had longer T1D duration [19.5 (15–31) vs. 13 (9–17) years;  $p = 0.001$ ], had lower free triiodothyronine (FT3) [2.76 (2.66–2.89) vs. 3.09 (2.82–3.36) pmol/l;  $p = 0.004$ ] and lower estimated glomerular filtration rate [83.39 (75.84–104.72) vs. 99.16 (89.10–111.09) ml/s/1.73 m<sup>2</sup>;  $p = 0.01$ ] Occurrence of neurovascular complications in all [(61.1 vs. 32.4)%,  $p = 0.02$ ], autonomic [(26.7 vs. 7.6)%,  $p = 0.04$ ] and peripheral neuropathy [(33.3 vs. 4.6)%,  $p = 0.001$ ] was higher in group of patients with thyroid nodules. Multivariate linear logistic regression analysis indicated thyroid nodules (odds ratio [OR], 27.73; 95% confidence interval [CI]: 1.68–458.88;  $p = 0.02$ ), diastolic blood pressure (DBP) [OR, 1.20; 95% CI: 1.00–1.44;  $p = 0.04$ ] and T1D duration [OR, 1.17; 95% CI: 1.02–1.32;  $p = 0.02$ ] as predictors of peripheral neuropathy occurrence after adjustment for sex, age, HbA<sub>1c</sub>, BMI, systolic blood pressure (SBP), FT3.

**Conclusions:** Occurrence of thyroid nodules in adults with type 1 diabetes was associated with a higher incidence of neurovascular complications.

## P19 DIABETIC NEUROPATHY – THE DIAGNOSTIC MULTICENTER STUDY USING THE “KARTA BADANIA – 4Z”

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**Introduction:** Diabetic neuropathy is the most significant risk factor in the development of Diabetic Foot Syndrome. Chronic hyperglycaemia causes damage to the peripheral nervous system, that leads to dysfunction of thin nerve fibers (hypoaesthesia, hemihypalgesia hemithermoanaesthesia) and coarse fibres (proprioception disorders, areflexia). In type 2 diabetes neuropathic changes can appear before diagnosing the disease. A patient should be examined for diabetic neuropathy at the time of diabetes diagnosis. In type 1 diabetes patient can be examined for diabetic neuropathy after 5 years from diagnosis, provided that there are no symptoms.

**Aim of the study:** To examine the occurrence of diabetic neuropathy in a group of people with diabetes, learn about their knowledge and habits regarding foot care practices using the “Karta badania – 4Z”.

**Material and methods:** Diagnostic test based on the original project “Karta badania – 4Z” was carried out on the group of 168 with diabetes after obtaining their written consent, in 13 cities in Poland. Diagnostics was done using 4Z rule – Zobacz (see) (footwear, socks, gait), Zbierz wywiad (gather medical history) (course of treatment, type of diabetes, knowledge level, health behaviors), Zrób badanie (conduct a medical examination) (foot clinical examination), Zalecenia (recommendations) (education with handing the results and recommendations over to the attending physician was included in an individual card: “Neuropatia cukrzycowa – Karta badania”). In a specialist medical examinations were used: monofilament, Rydel-Seiffer tuning fork, and a device called THIP-THERM, neurotips.

**Results:** Patients over age of 56 with type 2 diabetes and fasting blood glucose level above

130 mg/dl, with no medical records of disorders related to feet were the most numerous study group (82.6%). 60% has never been educated about prevention of Diabetic Foot Syndrome, the rest has been informed about its prevention mostly by a nurse (63.4%) or a doctor (28%). Respondents claimed that they should i.a.: soak feet in warm water (29.9%), walk barefoot (15.6%), warm up feet using a heating pad (10.2%), use pumice (26.3%). 40% of the respondents was diagnosed with diabetic neuropathy.

**Conclusions:** The diagnostic multicenter study has shown the occurrence of diabetic neuropathy in 40% of the respondents. Low level of knowledge regarding proper foot care is the reason re-education is needed. The “Karta Badania – 4Z” used in the research is a basis for further actions that will eventually lead to the creation of standardized questionnaire.

## P20 CLINICAL COURSE, TREATMENT RESULTS AND THE ROLE OF SELECTED LABORATORY AND CLINICAL PARAMETERS OF INFLAMMATION IN THE DIAGNOSIS OF BONE INFLAMMATION IN PATIENTS WITH DIABETIC FOOT SYNDROME

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**Introduction:** Foot ulcers and associated infections are a common complication of diabetes and can lead to amputation of the limb. The infection that initially develops within soft tissues spreads over time, involving adjacent bones. Early diagnosis of osteitis can be difficult due to an initial lack of radiological changes. To date, it has not been determined which of the laboratory parameters of bone inflammation better correlates with this complication.

**Aim of the study:** To determine the role of selected laboratory parameters of inflammation in the diagnosis of bone inflammation in patients with foot ulceration, to assess the osteitis risk factors in the analyzed group of patients and to evaluate the course and results of treatment.

**Material and methods:** The study included 100 patients with diagnosed type 1 or type 2 dia-

betes and the presence of foot ulcers with clinical and laboratory signs of infection. Patients were divided into two groups, followed by osteomyelitis and no signs of inflammation. In the course of the study, parameters such as gender, patient's age, duration of diabetes, haemoglobin A<sub>1c</sub> level, time span of the wound and its surface and location, type of diabetic foot, presence of bone penetration, level of selected inflammatory parameters in blood serum and microbiological test results. Type and duration of antibiotic therapy were taken into account. The results of the treatment were analyzed. Statistica 13.3 was used for statistical calculations.

**Results:** During the course of the study, there was no effect of diabetes duration, age and gender on the presence of inflammatory features. However, higher CRP and ESR values were noted in the group with osteitis. Bone penetration was more common in the osteitis group. There were no differences in the duration of the wound in the two groups of patients, however, there was a correlation between the duration of the wound and its surface area. Wound healing was more often observed in the group without signs of inflammation. In both groups of patients amputations were observed.

**Conclusions:** Osteomyelitis in patients with diabetic foot syndrome is a significant clinical problem. This aspect is considered to be one of the most difficult and controversial in the widely understood management of infections. The analysis of the study results contributed to the discussion on the role of conservative therapy in comparison to early surgical intervention. Early diagnosis and optimal treatment are essential factors in reducing both morbidity and mortality.

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## POSTER SESSION 5

Chairs: Beata Mianowska, Piotr Fichna

### P21

#### TYPE 1 DIABETES MELLITUS AS A ADVERSE EVENT OF CANCER IMMUNOTHERAPY (ICI)

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Immunotherapy has been integrated as part of routine cancer care. Monoclonal antibodies targeting cytotoxic T-lymphocyte antigen-4 (CTLA-4, Ipilimumab), programmed cell death protein 1 (PD-1, nivolumab, pembrolizumab) or its ligand (PD-L1) are used in melanoma, lung, urethral, head and neck, renal cancer with significant improvement of patients survival. However, a broad spectrum of autoimmune adverse events may occur.

Upon immunotherapy, t-cell reactivation may also affect normal cells causing side events with features similar to autoimmune diseases. If side events of grade  $\geq 3$  acc. Common Toxicity Criteria Adverse Events accrue it is mandatory to stop the therapy. The most common side events are fatigue, rash/vitiligo, pneumonitis, colitis, and those related to endocrine systems (thyroiditis, hypophysitis, adrenalitis) and diabetes. The most commonly reported endocrine events are thyroiditis, which is irreversible, requires hormone supplementation, enable continuing the therapy and is linked with a better outcome.

Immunotherapy-induced type 1 diabetes mellitus (T1DM) is extremely rare ( $< 1\%$ ) and is potentially life-threatening. Oncological patients treated with combination therapy of anti-PD-1 and anti-CTLA-4 can develop a particular pattern of T1DM, with very rapid onset within a few weeks after starting therapy. Type 1 diabetes mellitus is an effect of rapid  $\beta$ -cell destruction, is present usually with ketoacidosis, very high glucose level (400–900 mg/dl),  $A_{1c}$  haemoglobin level between 6.9–10% and C-peptide level is detected, or sometimes is normal with rapid decreased. Anti-glutamic acid decarboxylase, anti-islet cell, and insulin antibodies are rare. The median onset of T1DM is three to six months of therapy.

Collaboration between specialists, as well as patient education, for early diagnosis and supportive care, is necessary. It is suggested that glucose levels should be regularly monitored during ICI treatment. The exact pathophysiologic mechanism and predictive biomarkers have not yet been established.

### P22

#### GLP-1 RECEPTOR AGONISTS AND A RISK OF THYROID CANCER – A REVIEW OF CURRENT KNOWLEDGE

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Glucagon-like peptide-1 receptor agonists (GLP-1RAs) during the last decade have become one of the most important groups of drugs for the treatment of type 2 diabetes, followed by obesity and coexisting metabolic disorders.

Immunohistochemical studies have shown the presence of GLP-1 receptors not only in the pancreas, gastrointestinal tract but also in the heart, kidney, brain, C cells of the thyroid gland suggesting pleiotropic effects of GLP-1. Thanks to reports we know of significant cardioprotective and nephroprotective effects with few side effects. Other reports suggest the possibility of using GLP-1 analogs in the treatment of further disease, e.g. pre-diabetes, NAFLD, but also in neurodegenerative diseases. With so many possibilities of using this group of drugs in long-term and high-dose therapy, it is necessary to conduct research on their safety. Among the mentioned important side effects there was also information regarding the risk of thyroid cancer. During initial preclinical studies in animal models, high expression of GLP-1 receptors in calcitonin-secreting parafollicular C cells was demonstrated in rodents; their activation led to calcitonin synthesis, parafollicular cell hyperplasia, proliferation, formation of hyperplasia, and adenomas with increased risk of medullary carcinoma. In contrast to rodents in monkeys having significantly fewer C cells, there was no significant expression of GLP-1R receptors. An important

question, then, was whether the findings in various animal models could be extrapolated to human treatment? We now know that GLP-1 expression on thyroid cells is species-specific; moreover, the drug doses used in preclinical animal studies were tens of times higher than the maximum doses. The contraindications issued by the FDA for GLP-1 RA are a history of medullary thyroid cancer and a family history of medullary thyroid cancer and MEN-2 syndrome. Consistently, the FDA does not recommend calcitonin monitoring or thyroid ultrasound in patients treated with GLP-1 RA. Data from clinical trials of GLP-1 analogs – CVOTs such as – LEADER and SUSTAIN have not shown an association with an increased risk of thyroid cancer, including medullary cancer. However, the FDA obliges to monitor the incidence of MTC up to 15 years after the introduction of the drugs, so the result will be known around 2035–2037.

The work is a review of the literature from the initial preclinical data to the current publications about the risk of thyroid cancer during the treatment of GLP-1RA.

### P23 COMPARISON OF TWO MODELS OF INSULIN THERAPY USED DURING HOSPITALIZATION IN A PATIENT WITH ORGANIC BRAIN INJURY AND TYPE 1 DIABETES MELLITUS

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**Introduction:** Preferred algorithm regimen for inpatient insulin treatment is the model of intensive insulin therapy. The aim of this model is

to achieve target glucose concentrations below < 180 mg% and to reduce the risk of hypoglycemia.

**Aim of the study:** The analysis was done to compare the effectiveness of basal bolus treatment with treatment with 3 insulin injections of insulin mixtures in the morning and evening and a rapid-acting analogue at lunch during two close in time hospitalizations of the same patient

**Material and methods:** The analysis performed was retrospective and included clinical and laboratory characteristics of the two hospitalizations.

**Results:** A 69-year-old patient with a history of alcohol abuse, organic brain damage, and suspected normotensive hydrocephalus was hospitalized several times in the Department due to hyperglycemia up to 700 mg%, with or without ketoacidosis. The periods of hospitalization lasted up to two weeks, the interval between stays was 6–10 days. Difficulties of insulin therapy at home were mainly due to the patient's noncompliance and refusal to take insulin. During one of the hospitalizations, a 4-injection regimen was used: insulin lispro before main meals and NPH insulin before bedtime, during the second stay 3 injections with mixed insulin preparations aspart 50/70 and 30/70 and insulin aspart for dinner. Daily insulin doses averaged 39 and 31 units for the two regimens compared. Glycemic control in the range of 100–250 mg% was more frequently achieved for the 4-injection regimen compared with the 3-injection regimen 70.5% vs. 45.7%. Hypoglycemia was also significantly less frequent 0% vs. 7.1%, and intravenous glucose administration was necessary for 5.4% of blood glucose determinations for the 3-injection regimen only. A comparison of the two hospitalizations is shown in the Table 4.

**Conclusions:** Inpatient use of a 4-injection regimen compared with a 3-injection algorithm containing insulin mixtures is associated with better glycemic control, lower rates of hypo- and hyperglycemia. Skipping an insulin dose in the 4-injection

**Table 4.** A comparison of the two hospitalizations

	Hospitalizations 1 (4 injections) 76 glucose measurements	Hospitalizations 2 (3 injections) 70 glucose measurements
Daily insulin dose [Ij]	39.3 ±10.1	31.3 ±8.4
Mean glucose [mg%]	207 ±88	213 ±99
Glucose 250–400 [mg%]	20.2	35.7
Glucose > 400 [mg%]	4.05	4.2
Glucose < 70 [mg%]	0	7.1
Glucose 100–250 [mg%]	70.2	45.7
Glucose i.v.	0	7.1
Insuline dose omission	5.4	8.1

regimen caused less adverse metabolic effects, although treated as an error occurred with quite high frequency during both hospitalizations.

## P24 DIFFERENTIATION OF DIABETES ASSOCIATED WITH EXOCRINE PANCREAS DISEASE AND TYPE 2 DIABETES BASED ON ANTHROPOMETRIC AND METABOLIC PARAMETERS

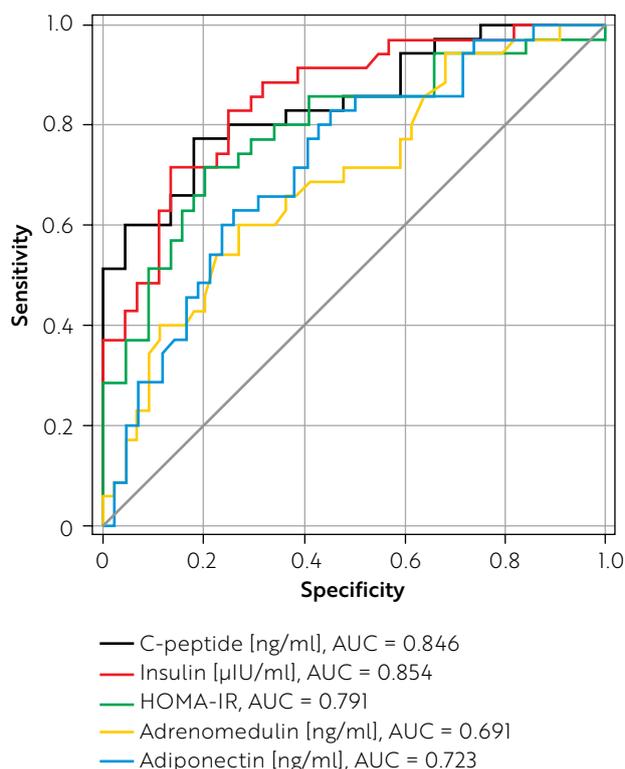
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Mariusz Partyka, Krzysztof Gutkowski,  
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**Introduction:** Pancreatic cancer (PC), despite its low incidence, is a diagnostic challenge due to the lack of typical symptoms and specific biological markers, which delays its diagnosis and hinders radical treatment. Chronic pancreatitis (CP), which is also often mildly symptomatic, predisposes to PC development. In pancreatic diseases impaired carbohydrate metabolism is frequent. In case of PC, it may be its only early manifestation.

**Aim of the study:** To compare anthropometric and metabolic parameters of patients with pancreatic disease associated diabetes and patients with type 2 diabetes (T2DM).

**Material and methods:** The study included 123 patients of the Department of Gastroenterology



**Figure 1.** Receiver operating characteristic curve and area under curve of analyzed variables  
AUC – area under curve

and Diabetic Clinic of the Provincial Clinical Hospital No. 1 in Rzeszow: 55 patients with PC, 33 with CP and 35 with T2DM. 26 patients with PC and 18 with CP had diabetes (24 and 2 had prediabetes, respectively). Gender, age, body mass index (BMI), fasting glucose, insulin, C-peptide (with HOMA-IR calculation), adrenomedulin, adiponectin and creatinine levels were analyzed and estimated glomerular filtration rate (eGFR) was calculated. The

**Table 5.** Characteristic of the studied population

Parameters	T2DM (n = 35)	PC + CP (n = 44)	p-value	PC (n = 26)	CP (n = 18)	p-value PC vs. CP
Sex						
Women (n)	21	16	0.062	14	2	0.010
Men (n)	14	28	0.062	12	16	0.010
Age [years]	60.7 ± 6.9	60.0 ± 9.7	0.828	<b>65.5 ± 4.7</b>	<b>52.1 ± 9.8</b>	<b>&lt; 0.001</b>
BMI [kg/m <sup>2</sup> ]	<b>30.83 ± 5.21</b>	<b>25.11 ± 4.87</b>	<b>&lt; 0.001</b>	25.87 ± 5.43	24.00 ± 3.81	0.214
Fasting glucose [mg/dl]	128.4 ± 35.9	130.0 ± 51.7	0.341	118.9 ± 40.1	145.9 ± 62.7	0.104
C-peptide [ng/dl]	<b>5.16 ± 2.43</b>	<b>2.46 ± 1.26</b>	<b>&lt; 0.001</b>	2.59 ± 1.27	2.26 ± 1.24	0.407
Insulin [µIU/ml]	<b>33.58 ± 23.69</b>	<b>11.06 ± 9.12</b>	<b>&lt; 0.001</b>	8.71 ± 6.73	14.44 ± 11.10	0.061
HOMA-IR	<b>10.70 ± 9.94</b>	<b>3.70 ± 3.25</b>	<b>&lt; 0.001</b>	<b>2.79 ± 2.39</b>	<b>5.00 ± 3.92</b>	<b>0.026</b>
Adrenomedulin [ng/dl]	<b>0.63 ± 0.38</b>	<b>0.41 ± 0.25</b>	<b>0.004</b>	<b>0.33 ± 0.18</b>	<b>0.54 ± 0.28</b>	<b>0.004</b>
Adiponectin [µg/ml]	<b>8.28 ± 4.01</b>	<b>13.08 ± 7.20</b>	<b>&lt; 0.001</b>	14.27 ± 8.06	11.14 ± 5.17	0.294
Creatinine [mg/dl]	0.85 ± 0.27	0.72 ± 0.47	< 0.001	0.68 ± 0.16	0.78 ± 0.72	0.390
eGFR [ml/min/1.73 m <sup>2</sup> ]	<b>85.14 ± 19.24</b>	<b>100.53 ± 21.60</b>	<b>&lt; 0.001</b>	<b>94.18 ± 13.94</b>	<b>109.71 ± 27.27</b>	<b>&lt; 0.001</b>

CP – chronic pancreatitis, PC – pancreatic cancer, T2DM – type 2 diabetes

Results presented as mean ± SD. Significant differences between the groups are highlighted in bold.

obtained results were used to evaluate the usefulness of these parameters in differentiating “classic” T2DM from diabetes in the course of PC and CP.

**Results:** Patients with PC and CP were mainly men, while T2DM patients were mainly women, but the difference was not significant (Table 5). Patients with PC and CP had significantly lower BMI, insulin and C-peptide levels, and lower HOMA-IR with comparable fasting glycemia. Significant differences were also revealed for the adrenomedulin, adiponectin and creatinine levels, and eGFR value. In the receiver operating characteristic curve, the largest area under curve (AUC) was found for insulin and C-peptide (Figure 2) (both  $p < 0.0001$ ). The optimal cut-off points for identifying diabetic patients with pancreatic pathology (the highest sum of sensitivity and specificity) were  $< 12.00 \mu\text{IU/ml}$  for insulin level and  $< 3.45 \text{ ng/ml}$  for C-peptide. Such values were found for 6 people with T2DM, 22 with PC and 11 with CP (insulin), and 8 people with T2DM, 21 with PC and 15 with CP (C-peptide). Inversely, the adiponectin level  $< 11.00 \mu\text{g/ml}$  may indicate T2DM, although this parameter has a lower discriminating power. We found also that 50% of patients with adrenomodulin levels  $< 0.49 \text{ ng/ml}$  had PC (Table 5).

**Conclusions:** The analysis showed the greatest usefulness of fasting insulin or C-peptide concentration for identification of diabetes associated with pancreatic pathology. Older age, low insulin and adrenomodulin levels better identify patients with PC, while low levels of C-peptide identify patients with CP.

## P25 NEWLY DIAGNOSED DIABETES AS THE FIRST SYMPTOM OF ECTOPIC CUSHING’S SYNDROME

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**Introduction:** Pre-diabetes is present in 20–30% and diabetes mellitus in 30–40% of patients with Cushing’s syndrome. Ectopic Cushing’s syndrome accounts for 10–15% of all cases.

**Aim of the study:** We present a case of a patient with newly diagnosed diabetes in the course of ectopic Cushing’s syndrome.

**Material and methods:** Medical data were obtained during multiple outpatient visits and hospitalizations.

**Results:** A 31-year-old female presented to the emergency department with a chief complaint of high blood glucose levels. She reported a 3-week history of fatigue, muscle weakness, headaches, and generalized swelling. Physical examination revealed peripheral edema, high blood pressure (170/100 mm Hg), and tachycardia (170 beats/min). Initial workup showed hyperglycemia (478 mg/dl) and metabolic alkalosis with hypokalaemia (2.5 mmol/l). Treatment with hypokalemia repletion, antihypertensive treatment, and intensive insulin therapy were implemented. Although aggressive treatment was started, with 60–70 units of insulin daily, satisfactory blood glucose levels were not achieved. Given the overall clinical presentation and resistance to initiated treatment, aggressive Cushing’s syndrome was suspected. Based on laboratory and imaging findings, a diagnosis of Cushing’s syndrome was made (Table 6).

Despite the constant modification of insulin doses, target values of blood glucose levels have not been accomplished. After continuous infusion of etomidate followed by left-sided adrenalectomy, rapid improvement of glycemic control has been

**Table 6.** A diagnosis of Cushing’s syndrome

Glucose [mg/dl]	4.78
C-peptide [ng/dl]	2.27
Anti-GAD	–
HbA <sub>1c</sub> [%]	7.9
Cortisol 7:0 a.m. [μg/dl]	72.98
Cortisol 12:00 a.m. [μg/dl]	69.17
ACTH [pg/ml]	963.7
Free urinary cortisol [μg/24 h]	11587.5
Chromogranin A [ng/ml]	1385.0
CT of the chest, abdomen and pelvis	Left adrenal mass measuring 80 × 56 × 39 mm infiltrating the diaphragm
Pituitary MRI	No pathology
<sup>18</sup> F-FDG-PET/CT	Metabolically active lesion of the left adrenal gland and multiple active bone lesions suggestive of metastatic malignancy
HDDST and CRH tests	Negative

CT – computed tomography, GAD – glutamic acid decarboxylase, MRI – magnetic resonance imaging

noted. Overall, treatment was modified and optimal glycemic control was balanced with a diabetic diet. A follow-up (8 weeks) whole-body PET/CT with  $^{18}\text{F}$ -FDG revealed a  $42 \times 33$  mm lesion in the anterior mediastinum. Due to the local invasion, only a partial resection was performed. Histopathology revealed a thymic large cell neuroendocrine carcinoma with an atypical thymic carcinoid component. Thymectomy was followed by mediastinal radiotherapy and chemotherapy with the ADOC regimen. Currently, diabetes is treated with a diabetic diet and metformin.

**Conclusions:** Ectopic Cushing's syndrome presents with severe arterial hypertension, diabetes, and hypokalemic alkalosis. It requires quick diagnosis and appropriate treatment. The patient has been under diabetes, endocrine, and oncological follow-up for almost 3 years. Nevertheless, the prognosis is poor, due to the natural progression of the disease and high incidence of recurrence.

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## POSTER SESSION 6

Chairs: Piotr Liszkowski, Elżbieta Orłowska-Kunikowska

### P26

#### FIVE YEARS HAVE PASSED AS ONE DAY – THE AVAILABILITY OF DIABETES CLINICS NOW AND THEN ...

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**Introduction:** Diabetes mellitus is an incurable disease that requires great discipline on both: the patient and the doctor. In some cases, it is necessary for the patient to be referred from primary care to a diabetes clinic – then the waiting time for a visit to such a clinic becomes important.

**Aim of the study:** To assess the waiting time of adult patients to visit a diabetes clinic and availability of medical services in this area, as well as to compare the obtained results with the results of the study assessing the availability of diabetes clinics in 2017.

**Material and methods:** The study used data taken from the official database of National Health Fund – diabetes clinics were selected from which to treat adult patients on a stable state. The obtained data were subjected to statistical analysis.

**Results:** There are currently 714 diabetes clinics for adult patients in Poland (–26 compared to 2017). Most (118) clinics are located in the Silesian Voivodeship (–12 compared to 2017). The total number of patients waiting for an appointment at a diabetes clinic is 55,000 patients nationwide (+21,000 compared to 2017). The nationwide median waiting time for an appointment at a diabetes clinic is 95 days (+40 days compared to 2017) – the shortest waiting time is in the Lodz Voivodeship (74 days), and the longest in the Kuyavian-Pomeranian Voivodeship. Province (182 days). Data as of February 5, 2022 – complete and updated data will be presented during the Congress.

**Conclusions:** Availability to diabetes clinics in Poland is varied and the average waiting time for an appointment is about 3 months. Unfortunately, compared to the state from 5 years ago, this availability has worsened, hence it is justified to consider actions that could lead to an improvement in this situation.

### P27

#### CITIES CHANGING DIABETES IN POLAND

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International studies show that people living in cities are nearly twice as likely to suffer from diabetes as rural dwellers. The situation is similar in Poland, where over 65% of people affected by diabetes live in the city. Cities influence how people live, eat and spend their free time. The development of the agglomeration, its dynamics and pace contribute to a change in the lifestyle of the inhabitants, which also translates into the development of civilization diseases. School is an important place to promote health, proper eating habits and physical activity. The quality of school activities is influenced by the knowledge, personal behaviour and attitudes of teachers.

To establish the level of knowledge about diabetes among teachers from Cracow and Warsaw. Other motivations were to learn about teachers' opinions on overweight, to get data about their lifestyle (based on their subjective evaluation), as well as information about their experiences with type 1 diabetes among students. The study was carried out in cities because, according to the data, this is where the highest percentage of diabetes cases is.

In order to obtain the above-mentioned information, an online questionnaire was conducted, provided to teachers by City Halls. 3061 people from Cracow and 1190 from Warsaw participated. The highest rate of correct answers to the topic of diabetes was recorded in the 46–55 age group. In general, teachers have the least amount of information on the causes and symptoms of diabetes, as well as on the management of hyperglycemia and hypoglycemia.

With age, the problem of obesity increases (the highest dynamics is observed in the 35–45 age group), as well as regular physical activity and diet (the highest in the age groups 44–55 and over 55). The youngest teachers are the most critical and

the least active in pro-health activities undertaken by schools. Teachers aged 46–55 are the most satisfied with the above-mentioned activities. It is also the group that had the most contact with students with type 1 diabetes. Teachers aged over 55 were most often involved in taking care of them.

The data from the study show that the school is a very important place for health promotion. Teachers' competences should be regularly improved and they should be actively involved. System and local government interventions as well as interventions carried out directly in educational institutions are needed.

## P28 PSYCHOLOGICAL PARAMETERS AND QUALITY OF LIFE IN PATIENTS WITH TYPE 1 DIABETES MELLITUS UNDERGOING TRANSITION FROM MULTIPLE DAILY INJECTION AND SELF- MONITORING OF BLOOD GLUCOSE TREATMENT DIRECTLY TO MiniMed™ 780G ADVANCED HYBRID CLOSED LOOP SYSTEM

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**Introduction:** Evaluation whether transition from multiple daily injections (MDI) and self-monitoring of blood glucose (SMBG) directly to MiniMed™ 780G advanced hybrid closed loop (AHCL) system has an impact on psychological well-being and quality of life of the patients.

**Material and methods:** Two-center, randomized controlled, parallel group study was performed. 41 type 1 diabetes mellitus (T1DM) patients managed with MDI/SMBG at baseline were randomized either to AHCL or MDI/SMBG groups. 37 participants (20 in AHCL and 17 in the MDI/SMBG groups) completed the study (age 40.3 ± 8.0 years; duration of diabetes 17.3 ± 12.1 years; haemoglobin A<sub>1c</sub> 7.2 ± 1.0). Ten standardized psychological questionnaires were used.

**Results:** At baseline, the level of stress in the patients was higher than in general population (g.p.) (M16.62, ±7.50; M22.14, ±4.27;  $p = 0.000$ ). However, their coping strategies were significantly more effective (Active coping, Planning, Positive reframing, Acceptance, Humor etc.). Type 1 diabetes mellitus patients had significantly higher level of self-efficacy than g.p. (M27.32, ±5.32; M31.08 ± 2.99;  $p = 0.000$ ). Only women aged 41–54 had higher level of state anxiety than g.p. (M47.80, ±9.78, M39.50 ± 9.27,  $p = 0.034$ ). Patients in our study significantly more accepted their illness than patients with diabetes from g.p. (M 24.81, ±7.09; M32.17, ±5.96;  $p = 0.000$ ) but they feel that their health does not depend on them as much as it is expressed by people from g.p. (M24.81, ±7.09; M32.17, ±5.96;  $p = 0.000$ ). In the course of the study the AHCL group reported an increase in their QoL in 4 scales: feeling well (2.3; CI: 0.1–4.6;  $p = 0.042$ ); working (2.8; CI: 0.7–4.9;  $p = 0.012$ ); eating (3.1; CI: 0.8–5.4,  $p = 0.011$ ); doing normal things (2.8; CI: 0.2–5.4;  $p = 0.0343$ ). The level of anxiety decreased in AHCL group (–6.8; CI: –11.8 to –1.8  $p = 0.009$ ), (–1.4; CI: –2.5 to –0.3;  $p = 0.013$ ); (–3.5; IC: –6.5 to –0.5;  $p = 0.022$ ). The AHCL group patients became more emotion-oriented in stressful situations (1.1; C: –2.2; –0.0  $p$ ; 0.043) and significantly less self-blaming after 3 months of the study (–0.5; C: –0.9; –0.09;  $p = 0.020$ ).

**Conclusions:** The results indicate that transitioning from MDI/SMBG treatment to AHCL in patients naïve to technology may significantly improve psychological well-being and quality of life of the patients within 3 months. The rapidity of these changes suggests that they may be related to the significant improvement in glycemic outcomes.

## P29 THE PERCEPTION OF BODY WEIGHT BY PERSONS WITH TYPE 2 DIABETES AND DIAGNOSED OVERWEIGHT AND OBESITY

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**Introduction:** The perception of one's own body is determined by both cultural and social factors. Changes taking place in a given society

and culture undergo a specific evolution.

**Aim of the study:** The study was aimed at assessing the perception of weight, body size and body dissatisfaction in adults with type 2 diabetes, normal weight, overweight and obesity.

**Material and methods:** In the diagnosis of the perception of one's own body, the information on weight and height provided in the data sheet was taken into account, and the body mass index (BMI) value for each respondent was calculated in order to compare this index with the figure illustrating the body structure (Stunkard (FRS)) in the questionnaire. In the survey, the respondents indicated a drawing of a figure they identify with and which they would like to be most similar to. This allowed to determine whether the body image of people with type 2 diabetes was consistent with their actual appearance. The survey was conducted at the turn of November and December 2021 at the Diabetes Clinic in Chetm.

**Results:** The study involved 80 people with type 2 diabetes (48 women and 32 men). The patients' average age was 65 years and the BMI was 31.0. Most people (60%) lived in the countryside. The results of the proprietary study indicate that 5% of people with a normal BMI believed that they were underweight, and 15% were overweight. Among people diagnosed with overweight on the basis of BMI, 23% thought that they had a normal body weight, and 2% considered themselves obese. Among the obese (55%), only 3% considered their body weight normal, and 52% indicated that they were overweight. Most often, dissatisfaction with the body shape was expressed by women. The women claimed that they were dissatisfied with their appearance due to the higher BMI indicator evidencing their obesity (56%).

**Conclusions:** Overweight and obese people misjudged their own BMI and body size on Stunkard figure rating scale.

It is recommended for patients with type 2 diabetes to use psychological and educational help in order to gain knowledge on how to reduce their excess weight, maintain proper body weight, accept one's own difference, improve well-being and the ability to cope with stress, frustration and potential failures of the treatment process.

### P30

#### AIMING FOR THE CENTER OF BULLSEYE: THE DIABETIC CONSULTATION CHART. A SIMPLE, USER-FRIENDLY AND EFFECTIVE METHOD TO IMPROVE DIABETIC PATIENT OUTCOMES

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**Introduction:** Evidence from prospective randomized clinical trials in patients with both type 1 and type 2 diabetes indicates that outcomes related to microvascular damage are related to glycemic control. Stress may have negative effects on health and patients with diabetes may be at increased risk. The experience of stress is associated with the release of counter regulatory hormones and energy mobilization, often resulting in elevated glucose levels. In addition, stress can disrupt diabetes control indirectly through effects on diet, exercise, and other self-care behaviors. Dealing with a very diverse diabetic patients' population (across language, literacy, education level, economic status, religion and cultural Introduction) makes achieving therapeutic goals more challenging. Interventions helping to overcome these obstacles are urgently needed.

**Aim of the study:** Measurement of hypoglycemia awareness, stress and glycosylated haemoglobin (HbA<sub>1c</sub>) level and impact of visual representation of results on patient behavior and glycaemia after 6 months intervention

**Material and methods:** Group of type 1 and type 2 diabetics were allocated to intervention vs. standard therapy (ratio 1 : 1) between 8 March 2020 and 9 February 2021. All patients were from single private practice (GP). 113 patients (16 type 1 and 97 type 2) were enrolled to the study but complete dataset was analyzed from 76 patients (9 type 1 and 67 type 2). Methods: diabetes consultations chart, Diabetes Distress scale 2 (DDS2), modified Clark and Gold score (source: King's College Hospital London).

Effect size calculation with tailed t-test and Cohen's effect size.

**Results:** Diabetes Distress scale 2: t-score 2.89, SD 0.25, two-tailed  $p$ -value 0.01, confidence range: mean difference 0.73, confidence range 0.23–1.24. Clark and Gold score: t-score 1.42, SD 0.19, two-tailed  $p$ -value 0.31, confidence range: mean difference 0.27, confidence range 0.11–0.64. HbA<sub>1c</sub>: t-score 2.28, SD 0.13, two-tailed  $p$ -value 0.045, confidence range: confidence difference 0.29, confidence range: confidence range 0.04–0.53 and Cohen's effect 0.14. Control group: t-score 0.47, SD 0.10, two-tailed  $p$ -value 0.64, confidence range: mean difference 0.05, confidence range 0.25–0.16.

**Conclusions:** Measuring stress (DDS2) and HbA<sub>1c</sub> level and graphic representation of results with bullseye for diabetic patient helped to focus the consultation and reduced significantly both stress level (by 1 point) and HbA<sub>1c</sub> level (by 0.3%) after 6 months. There was no significant change in Clark and Gold score (hypoglycemia awareness).

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