XXII Scientific Congress of the Polish Diabetes Society – Abstracts

ORAL SESSIONS OF ORIGINAL PAPERS

SESSION OF ORIGINAL PAPERS I – DIABETES IN CHILDREN AND ADULTS

Chairs: Elektra Szymańska-Garbacz, Agnieszka Szypowska, Bogumił Wolnik

U1
A new trend in CT1 incidence rate among children and adolescents in the Silesian population

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Introduction: The increasing trend of CT1 cases is a worldwide phenomenon and it is expected that this trend will continue in the future. Poland is currently one of the countries with an average incidence rate, with the highest growth rate in recent decades.

Aim of the study: The aim of this study is to summarise a 30-year observation of changes in the epidemiological status in the context of type 1 diabetes in the Upper Silesia region in children under 14 years of age.

Material and methods: A data analysis was conducted concerning the scientific regional registry CT1 of Upper Silesia, the largest and only diabetes centre for children representing EURODIAB in Poland. For detailed analysis of the incidence trend, we used univariate Siso analysis incorporating the R coefficient. We then compared 2 multivariate models including: year-to-year change, age and gender; from 1989–2012 and 1989–2019.

Results: During the 30-year follow-up period, the diagnosis was confirmed in 3222 children (1678 boys) aged 0–14 years. A steadily increasing trend in incidence rates was observed: from 4.68/100 000 (1989) to 23.97/100 000 (2019). In the analyses of the 3 10-year periods, different dynamics were observed in the behaviour of the indicators: in the first 2 decades the trend was constant, in the last one significant year-to-year fluctuations were visible – as follows: R2 = 0.4705, R2 = 0.7180; R2 = 0.2262. The indicators in the age groups on average were: 0–4: 9.41, 5–9: 16.06, 10–14: 18.07; with the highest dynamics found in the 5–9 age group. A comparison of multivariate models showed that the upward trend in incidence has been slowing down in recent years, and the differences previously observed related to age group and gender are becoming less pronounced.

Conclusions: There is a clear long-term upward trend in the incidence of CT1 in Silesian children; however, the dynamics of change in the last decade is quite specific – high year-to-year variability was observed. This probably indicates a significant influence of environmental factors.

U2
Effects of *Lactobacillus rhamnosus* and *Biffidobacterium lactis* on β-cell function in children with newly diagnosed type 1 diabetes – a randomised trial

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Introduction: According to scientific data, changing the bacterial flora of the gastrointestinal tract is important in the development of type 1 diabetes or in preventing the autoimmune process. In animal models, a lower diversity of bacteria from the Lactobacillus and *Biffidobacterium* family has been demonstrated in rats that have developed type 1 diabetes. In contrast, a reduced risk of pancreatic islet immune response was observed in children under 10 years of age with the DR3/4 genotype who received probiotics in the neonatal period.

Aim of the study: Evaluation of the effect of *Lactobacillus rhamnosus* (GG) and *Biffidobacterium lactis* (BB12) therapy on β-cell function in children with newly diagnosed type 1 diabetes.

Material and methods: Children aged 8–17 years with newly diagnosed type 1 diabetes (within 60 days) were included in a multicentre, randomised, double-blind study. For 6 months, patients in the intervention group received Lactobacillus rhamnosus GG and BB12 at a rate of 109 each, while those in the control group received placebo in capsule form once daily. The follow-up period was 12 months. The primary endpoint was the assessment of the area under the curve (AUC) of C-peptide during the 2-hour response to a standard meal (BOOST). Fasting C-peptide levels, inflammatory markers (interleukins), insulin requirements, metabolic compensation, anthropometric parameters, side effects and occurrence of other autoimmune diseases were assessed as secondary endpoints.

Results: The study included 96 patients (48 in the probiotic group and 48 in the placebo group) with a mean age of 12.3 years. 88 (92%) patients completed the 6-month intervention period and 87 (91%) patients remained in the 12-month follow-up period. There were no significant differences in the size of the area under the C-peptide curve between groups at 6 or 12 months of follow-up. Also for the secondary endpoints, no statistical differences were noted between the two groups. No episodes of severe hypoglycaemia or ketoacidosis occurred during the study, and there were no adverse reactions associated with the intake.

Conclusions: The strains of Lactobacillus rhamnosus GG and BB12 administered during the study did not significantly affect the maintenance of residual insulin secretion of pancreatic β-cells in children with newly diagnosed type 1 diabetes. It is still unclear which probiotics, if any, and in what combinations, are potentially most useful in the treatment of type 1 diabetes.

U3
Intestinal fatty acid binding protein as a possible indicator of enterocyte damage in type 1 diabetes in children

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Introduction: A genome-wide association study (GWAS) revealed a role for impaired mucosal barrier function in the aetiopathogenesis of both type 1 diabetes (T1D) and celiac disease (CLD). Increased translocation of food and bacterial antigens from the intestinal lumen into the circulation in individuals with impaired intestinal barrier function is thought to activate the immune response, trigger and/or enhance β-cell destruction preceding the clinical manifestation of T1D.

Aim of the study: The aim of this study was to evaluate intestinal fatty acid binding protein (I-FABP) as a possible serological marker of enterocyte injury in patients diagnosed with T1D and negative serological tests for CLD (anti-tissue transglutaminase antibodies –tTG-IgA and anti-deamidated gliadin antibodies – DGP-IgG).

Material and methods: The study included 156 patients (83 girls and 73 boys) aged 6 to 17 years (mean age: 12 ±4 years). Patients were classified into two groups: with newly diagnosed T1D (n = 30) and T1D lasting a minimum of 3 years (n = 126). The control group consisted of 30 healthy children (14 girls and 16 boys) aged 6 to 17 years (mean age: 9 ±4 years) without diabetes, coeliac disease, evidence of current inflammation and other comorbidities.

Diabetes was diagnosed according to the guidelines of the Polish Diabetes Association. Serum I-FABP concentration was assessed using the Human I-FABP ELISA from HycultBiotech. Data were expressed as mean ±standard deviation (SD). The U Mann-Whitney test was used to compare I-FABP levels between patient and control groups.

Results: Mean I-FABP levels in the T1D patient group were statistically significantly higher than in the control group (respectively: 1153 ±665 pg/ml vs. 623 ±518 pg/ml, $p < 0.05$). Among patients in

the T1D study group, no differences ($p \geq 0.05$) in I-FABP protein levels were observed according to disease duration (new diagnoses: 1159 ±676 pg/ml vs. suffering > 3 years 1151 ±665 pg/ml), gender (girls: 1158 ±777 pg/ml vs. boys: 1146 ±515 pg/ml, $p > 0,05$) and with regard to compliance ($HgA_{1C} \leq 7.5\%$) or non-compliance ($HbA_{1c} > 7.5\%$) to a glycaemic regimen (1167 ±571 pg/ml, 1135 ±752 pg/ml, respectively).

Conclusions: Elevated I-FABP levels may reflect enterocyte damage in patients diagnosed with type 1 diabetes. I-FABP may be a useful serological marker, although its usefulness needs to be confirmed in further studies.

U4
First experience with hybrid closed loop in children with type 1 diabetes

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Introduction: The closed-loop system is designed to maintain glucose levels at a set threshold by combining information from continuous glucose monitoring (CGM) with an algorithm that allows automatic insulin administration. The Medtronic Minimed 780G pump is the first officially available hybrid closed loop (HCL) pump available in Poland.

Aim of the study: Analysis of glycaemic control parameters in children with type 1 diabetes treated with closed-loop hybrid in relation to previous pump therapy.

Material and methods: Eleven children (7 boys) participated in the study, the mean age was 9.82 ±2.4 years and the duration of illness was 2.82 ±2.32 years. All patients were treated with a personal insulin pump and CGM before being connected to the HCL. The study analysed CGM reports and personal insulin pump (OPI) readings from two weeks prior to connection to the HCL and the two weeks under the automatic insulin dose adjustment system (SmartGuard) to current blood glucose levels.

Results: The time spent in target glycaemia 70–180 mg/dl (TIR) before HCL inclusion was 77.94 ±13.40%, and after HCL 82.90% ±9.83 $p < 0.005$. The SmartGuard system utilisation was 90.55% ±21.87.

Conclusions: The use of a hybrid loop significantly increases TIR, while keeping the time spent below 70 mg/dl and the coefficient of variation. Further studies on larger numbers of patients and with longer follow-up times are needed.

U5
Analysis of insulin requirements during pregnancy in type 1 diabetic patients treated with a personal insulin pump

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Introduction: During pregnancy, there is a dynamic change in the daily demand for insulin (DDI). From the second trimester of pregnancy onwards, there is a steady increase in DDI, which is due to the secretion of pregnancy hormones that increase insulin resistance, aimed at ensuring the supply of nutrients necessary for normal fetal development.

Aim of the study: The aim of this study was to assess the change in insulin requirements in women with type 1 diabetes during pregnancy treated with a personal insulin pump.

Material and methods: A single-centre retrospective cohort study was conducted including 93 pregnant women with type 1 diabetes treated with a personal insulin pump, 54% of whom used continuous glucose monitoring.

Patient data from medical history and history of type 1 diabetes and associated diseases were analysed. Insulin requirements, weight gain and HbA_{1c} percentage were analysed.

Results: The mean age of the women was 31.2 ±4.33 years, duration of diabetes 15.9 ±7.43 years, pre-pregnancy BMI 23.8 (23.0–24.6) kg/m^2, pre-pregnancy HbA_{1c} percentage 7.12 ±1.28%, and the percentage of patients meeting pre-pregnancy compensation criteria ($HbA_{1c} < 6.5\%$) was 23%.

The mean DDI before pregnancy was 39.9 ±14.9 units (IU) (0.6 ±0.19 IU per kilogram of current body weight (IU/kg)). The mean DDI on the day of labour was 76.9 ±34.8 IU (0.9 5 ±0.36 IU/kg). The absolute increase in DDI during pregnancy was 28.8 ±15.9 IU (0.27 ±0.19 IU/kg), representing 80.6 ±59.2% (54.2 ±50.2% for IU/kg).

The basal insulin dose before pregnancy was 18.6 ±8.0 IU, which was 47.0 ±13.5% of the DDI. The total increase in basal insulin dose during pregnancy was 10.7 ±8.2 IU, representing 71.4 ±51.9%.

The dose of short-acting insulin before pregnancy was 21.4 ±10.8 IU, which was 52.0 ±15.2% of the DDI. The total increase in short-acting insulin dose during pregnancy was 16.8 ±13.1 IU, representing 96.6 ±36.7%.

The total gestational weight gain was 12.5 ±5.27 kg. The total gestational reduction in HbA_{1c} was 0.35 ±1.02%. The percentage of HbA_{1c} was 6.44 ±1.02% in the 1st trimester, 5.93 ±0.63% in the 2nd trimester and 6.14 ±0.70% in the 3rd trimester. Target HbA_{1c} values (in the first trimester < 6.5%, and in the second and third trimesters < 6.0%) were achieved by 52%, 57% and 38% of patients, respectively.

There was a positive association between percentage gestational increase in short-acting insulin dose and duration of diabetes (r = 0.336; p = 0.0138), total gestational weight gain (r = 0.471; p = 0.0002), and a negative association with total gestational reduction in HbA_{1c} percentage (r = –0.363; p = 0.0104). One case of severe hypoglycaemia was reported.

Conclusions: In women with type 1 diabetes treated with a personal insulin pump, the total increase in daily insulin requirements is just over 50%, including an increase in basal insulin dose of just over 70% and a doubling of short-acting insulin. The total gestational requirement for short-acting insulin correlates positively with the duration of diabetes and gestational weight gain. A higher total percentage increase in short-acting insulin dose was associated with a lower total pregnancy change in HbA_{1c} percentage.

U6
Correlation of short- and long-term metabolic control parameters with characteristics in adults with type 1 diabetes treated with personal insulin pumps

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Introduction: Several studies have assessed the association between personality traits and metabolic control outcomes in children and adolescents with type 1 diabetes mellitus (T1DM), only one was conducted in adult patients treated with insulin pumps. None of them assessed the correlation between personality and parameters from continuous glucose monitoring systems.

Aim of the study: The aim of this observational study was to investigate whether specific personality traits are correlated with the degree of metabolic compensation/duration of diabetes in adult patients with T1DM.

Material and methods: Data were collected from 56 adults (40 men) with treated T1DM (without complications or comorbidities; age 25.1 ±5.8 years; diabetes duration 12.7 ±6.4 years; treated with personal insulin pumps for a mean of 7.5 ±4.5 years). The Big Five personality traits (neuroticism, extraversion, openness, agreeableness and conscientiousness) were assessed using the NEO-Five Factor Inventory questionnaire. The calculated results were related to the standard tens. Groups with high and low sten values for each personality trait were compared. Data on HbA_{1c} percentage, number of glucose measurements per day, basal insulin percentage, daily insulin dose per kg (DDIkg), time spent in range (TIR, 70–180 mg/dl), time spent below range (TBR, < 70 mg/dl and TBR2, < 54 mg/dl), mean CGMS glucose levels were

obtained from personal insulin pumps, glucometers and a blinded continuous glucose monitoring system (Dexcom G4).

Results: The mean levels of the parameters assessed were: HbA_{1c} 6.9 ±0.9% (52 mmol/mol), 24-hour glucose tests 7.3 ±3.0. The mean TIR was 59.4 ±12.5%, mean TBR 12.4 ±8.7%, mean TBR2 5.2 ±5.4%. All personality traits except neuroticism (low trait level) showed medium severity.

Patients with optimal metabolic compensation (HbA_{1c} < 6.5%) exhibited lower severity of neuroticism (p = 0.036). High compliance was the only personality trait correlating with most variables obtained from the CGM system: lower mean (p = 0.0008), lower median glucose (p = 0.0167), lower TAR (p = 0.0056), longer TBR (p = 0.0153), TBR2 (p = 0.0320). Higher levels of conscientiousness measured in stens characterised patients with longer duration of diabetes (above vs. below a median of 14 years; p = 0.0307).

Conclusions: Low neuroticism is more likely to characterise patients achieving HbA_{1c} percentages < 6.5%. Higher agreeableness was the only strong risk factor for metabolic control parameters based on CGM data.

U7
Glucose monitoring by scanning: Polish and worldwide data – analysis of real-world data

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Introduction: Randomised clinical trials and observational studies have shown that the use of continuous scanning monitoring is associated with improved glycaemic control indices and improved quality of life.

Aim of the study: Evaluation of glycaemic control indices in patients using FreeStyleLibre® according to the frequency of measurements – comparison of data from the Polish and global population.

Material and methods: Retrospective real-world data analysis of anonymised data released from FreeStyleLibre® readers from September 2014 (global data)/August 2016 (Polish data) – August 2020.

Results: The Polish data comes from 10,679 readers, 92,627 sensors and covers 113 million recorded blood glucose readings, while the global data comes from 981,876 readers, 11,179,229 sensors and covers 13.1 billion blood glucose readings (60% of the data comes from Europe, countries with the largest share: Germany, France, Italy). The average daily number of scans performed by Polish patients is much higher than the worldwide average: 21.2 ±14.2 vs. 13.2 ±10.7. FreeStyleLibre® users in Poland achieve a lower average $eHbA_{1c}$: 7.0 ±1.2% vs. 7.5 ±1.5%, on average they spend more time in the target range (TIR: 70–180 mg/dl): 64.2 ±17.3% vs. 58.1 ±20.3% and less time in hyperglycaemia (TAR: > 180 mg/dl): 29.7 ±18.0% vs. 36.6 ±21.3%. In Poland, compared to worldwide data, a higher percentage of FreeStyleLibre® users reaches TIR > 70%: 36.3% vs. 28.8%. On the other hand, patients in Poland spend more time in hypoglycaemia (TBR: < 70 mg/dl): 4.7% vs. 3.6%. In addition, for the same number of daily measurements, FreeStyleLibre® users in Poland achieve lower $eHbA_{1c}$, higher TIR, lower TAR but higher TBR. The analyses performed confirm the previously described association of the number of scans performed with improvements in glycaemic indices in the entire group analysed.

Conclusions: The number of scans performed per day is associated with better rates of glycaemic compensation. In Poland, users of continuous glycaemic monitoring by scanning achieve better glycaemic index values than the global average. The reason for the observed relationship is likely to be complex. At the same time, the data obtained show that under everyday conditions a large group of patients performs significantly more scans than is usually recommended.

SESSION OF ORIGINAL PAPERS II – DIABETES PROTEUS (OR NOT). ALL FACES OF DIABETES

Chairs: Edward Franek, Małgorzata Godziejewska-Zawada, Małgorzata Szelachowska

U8
Psychological reactions in patients with T1DM during the pandemic

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Introduction: The pandemic associated with the spread of the SARS-Cov-2 virus has become a global challenge for health services, including in the context of mental well-being. The situation has become particularly challenging for patients with chronic diseases, including patients with T1DM. A crisis intervention team for patients with type 1 diabetes has been established at the University Hospital in Cracow.

Aim of the study: The team aimed to provide psychological support to patients.

Material and methods: An email was sent to 473 patients with T1DM under the care of a diabetes clinic, informing them of the possibility of an online consultation with a psychologist/psychiatrist, with an attached set of psychological tests. The study received approval from the bioethics committee.

Results: Of the 62 patients who responded to the email, 59 patients submitted complete questionnaires (CISS, STAI, PSS-10, GHQ) and 20 patients chose to receive psychological support (intervention group). In this group, both levels of anxiety (Anxiety as a state: M 47.80 vs. M 40.00, $p = 0.042$; Anxiety as a trait: M 47.20 vs. M 40.46, $p = 0.022$) and stress (M 23.60 vs. M 15.44, $p = 0.001$) were statistically significantly higher than in the group of patients who did not need psychological support. In addition, patients in the intervention group were significantly more likely (M 49.30 vs. M 38.23, $p = 0.001$) to use mainly emotion-focused coping strategies. What is also clinically relevant is that patients with T1DM who needed crisis intervention during lock down showed high rates of general psychopathology compared to the group without intervention (Anxiety and depression M 2.58 vs. M 1.85, $p < 0.001$; Difficulties in interpersonal relationships M 2.38 vs. M 1.97, $p = 0.012$; Difficulties in general psychological functioning M 2.76 vs. M 2.30, $p = 0.006$), which may indicate that this is a group with pre-existing psychiatric disorders that manifested in a stressful situation.

Conclusions: Most patients with T1DM cope with the stressor of a pandemic situation similarly to people in the general population – patients use adequate coping mechanisms. However, there is a group of patients who require special clinical attention: these are people with comorbid psychiatric disorders or specific hypersensitivity who require psychological support or psychotherapy in situations of prolonged stress. The presented intervention team can be an example of important and successful cooperation and communication between specialists from different medical fields (diabetology, psychiatry and psychology) at the moment of a crisis situation.

U9
Influenza and COVID-19 vaccination among patients with diabetes

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Introduction: Influenza vaccination is among those recommended in type 1 and type 2 diabetes. In the current times of a raging pandemic, people with chronic illnesses (including diabetes) are also advised to vaccinate against COVID-19. However, there is a lot of contradictory information in public opinion on this subject, which is a legitimate concern.

Aim of the study: In our study, we sought to clarify the attitudes of people with diabetes towards influenza and COVID-19 vaccination, and whether there are factors that modify these attitudes.

Material and methods: Questionnaire-based study among diabetic patients – ongoing. So far 232 responses have been collected, with a predominantly female representation (77.78%), with type 1 diabetes (59.11% of all respondents). Statistical analysis performed using the STATISTICA 13.0 package. Ongoing study.

Results: 54.5% of respondents knew that annual influenza vaccination is recommended for people with diabetes – however, at the same time 20.6% of respondents received the vaccine annually. A statistically significant correlation was found between the attitude towards COVID-19 vaccination and gender of the respondents (men more often declare willingness to be vaccinated – 74% vs. 56%, $p = 0.05$) and type of diabetes (aversion to the vaccine is characteristic of patients with type 1 diabetes – 27.82% vs. 9.78%, $p = 0.05$). Ongoing study – full results will be presented at the Convention.

Conclusions: The population of people with diabetes varies in terms of knowledge and personal attitudes towards influenza and COVID-19 vaccination. Ongoing study – full conclusions will be presented at the Convention.

U10
COVID-19 in diabetic patients – preliminary data on the course of SARS-Cov-2 infection in patients hospitalized in a dedicated COVID-19 hospital

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Introduction: By the end of February 2021, the number of people diagnosed with COVID-19 infection in Poland was approximately 1.8 million. Data from other countries indicate that among those hospitalised for Sars-Cov-2 infection, the proportion of patients with diabetes mellitus (DM) is between 10–20%. DM accompanying COVID-19 infection was a significant risk factor for its severe course, intensive care unit hospitalisation and death. To date, there are no data on the course of COVID-19 in hospitalised patients with DM in our country.

Aim of the study: The aim of this study is to describe the clinical characteristics of hospitalised patients with DM and to look for their association with clinical outcomes and mortality in the course of COVID-19.

Material and methods: A retrospective data analysis was conducted on patients with and without diabetes hospitalised between 6 March and 15 October 2020 for COVID-19 at the Teaching Hospital (TH) in Cracow, operating as a dedicated infectious diseases hospital.

Results: In the TH, 1729 patients were hospitalised for COVID-19 during the study period; diabetes was present in 404 of them (23.3%). Patients with diabetes compared to the group without diabetes were older (median age of 71 years vs. 60 years, $p < 0.001$), there were no differences in the gender structure of the hospitalised groups (men 53.8% vs. 50.5%, $p = 0.24$). The group of patients with DM compared to the group without DM had a higher percentage of patients requiring ICU hospitalisation (16.5% vs. 9.7%, $p < 0.001$), mechanical ventilation (12.1% vs. 8%, $p = 0.011$), higher mortality (19.3% vs. 11.2%, $p < 0.001$), longer duration of hospitalisation (medians: 18 vs. 16 days, $p < 0.001$).

Among patients with DM, the most common comorbidities were hypertension (81.7%), hypercholesterolemia (40%), ischaemic heart disease (32.6%), atrial fibrillation (22.7%), heart failure (17%), and overweight or obesity (85.8%, data available for 141 patients).

During hospitalisation, 151 patients with DM were treated with metformin, 59 with sulphonylurea derivatives and 28 with novel antidiabetic drugs – SGLT2i, DPP4i, GLP-1 analogues (respectively: 44%, 17.2%, 9%, data for 343 patients), in 213 (60.3%, data for 353 patients) insulin.

Conclusions: Patients with DM accounted for about a quarter of those hospitalised for COVID-19 infection. They were characterised by almost double the mortality and ICU stay rates and higher rates of other indicators of severe clinical course. Factors predisposing to significantly poorer clinical outcomes of treatment include multiple comorbidities associated with DM.

U11
Evaluation of the usefulness of determining specific antibodies to pancreatic islet elements in first-degree relatives of patients with type 1 diabetes using the 3 Screen ELISA (pre-diabetes study)

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The preclinical stage (pre-diabetes) precedes the full-blown development of type 1 diabetes (T1D) for many years. Diagnosis during this period is often difficult and is based on the detection of specific antibodies against pancreatic islet elements in the patient's blood. First-degree relatives of T1D patients carrying high-risk HLA genotypes are most susceptible to developing autoimmunity. Genetic testing would potentially be the most advantageous; however, its high cost limits this diagnostic option and selection of individuals with preclinical phase I diabetes is possible after serum analysis of individuals at risk for the presence of antibodies. A 3 Screen ELISA (RSR Ltd) was performed in children from families with type 1 diabetes to simultaneously look for a minimum of one of the autoantibodies against GAD (glutamic acid decarboxylase), ZnT8 (zinc transporter 8) or IA-2 islet antigen. Positive samples in the 3 Screen ELISA were then assessed for the presence of specific antibody types. Potentially about 70% of people with two or more types of antibodies present (including IAA, anti-insulin antibodies), constituting the pre-diabetes group, will develop carbohydrate disorders and require insulin treatment over the next 10 years.

Clinical centres from Bialystok (n = 197), Rzeszow (n = 48), Poznan (n = 51), Warsaw IPCZD (n = 68), Opole (n = 42), Wroclaw (n = 67), Gdansk (n = 25), Lodz (n = 57), Katowice (n = 15), Cracow (n = 14), Szczecin (n = 11), Bydgoszcz (n = 27) participated in the study, with a total of 622 patients aged 7 months to 18 years. Blood was collected at local centres and serum was prepared, coded and sent to the coordinating Clinic and then sent to FIRS Laboratories, RSR Ltd (Cardiff, UK) through international collaboration. All 3 Screen positive samples were then tested with the GAD65 Ab ELISA, IA-2 Ab ELISA, ZnT8 Ab ELISA and Insulin Ab RIA tests. The presence of two or more antibody types identified patients at highest

risk of developing T1D. 51 samples are still being processed.

So far, 622 samples have been assessed. Positive screening test values were observed in 40 patients (6.43%). When analysing individual antibody types, 29 children with multiple (2 or more) antibodies were selected – representing the pre-diabetes group (4.6%). Subsequently, based on the follow-up protocol, positive patients had an Oral Glucose Load Test, glycated haemoglobin and were included in outpatient care.

Early detection of antibodies, made possible by the 3 screen ELISA identifies the preclinical stages of T1D development in the period before the onset of dysglycaemia. Ongoing care, education and follow-up promote longer maintenance of endogenous insulin secretion and provide opportunities for therapeutic interventions in innovative clinical programmes.

U12
hsCRP as a biomarker to aid in the diagnosis of MODY diabetes – a systematic review and network meta-analysis

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Introduction: Maturity-Onset Diabetes of the Young (MODY) includes monogenic forms of diabetes and affects approximately 1–4% of people with diabetes. It is estimated that there may be about 20,000 patients with MODY in Poland, most of whom, however, remain undiagnosed. There are several forms of MODY, the most common of which are HNF-1A-MODY and GCK-MODY. MODY diabetes poses diagnostic difficulties. Genetic testing is expensive, hence the proposals to develop calculators or algorithms to narrow down the group of patients to be further diagnosed. A number of papers have highlighted the lower levels of hsCRP (high specific C reactive protein) in people with a mutation in the HNF1A gene. Numerous authors have attempted to refine or proposed new tools enriched with the determination of this commonly used parameter to assist in the diagnosis of MODY. There is a lack of summary of work published to date assessing hsCRP levels in different types of diabetes and forms of MODY.

Aim of the study: The aim of this study was to perform a systematic review and network meta-analysis of data on hsCRP levels in patients with different types of diabetes – type 1, type 2, type 2 with early onset and clinical features likely to correspond to MODY diabetes and different forms of MODY diabetes – HNF1A-MODY, GCK-MODY and HNF4A-MODY and to attempt to assess the utility of hsCRP as a stand-alone or additional parameter in models differentiating patients with MODY and other types of diabetes.

Material and methods: A systematic review of MEDLINE and EMBASE databases was performed, and all sources were included that compared hsCRP levels in the blood of patients with type 1 diabetes, type 2 diabetes, type 2 diabetes with early onset and clinical features that may correspond to MODY, and forms of HNF1A-MODY, GCK-MODY and HNF-4A-MODY. The included studies were assessed for quality and heterogeneity. The network meta-analysis used a random effects model.

Results: The criteria were met by 8915 (excluding duplicates) studies. 26 full texts were evaluated. 9 papers contained the data required for network meta-analysis. Patients with HNF1A-MODY diabetes had lower hsCRP levels than patients with other types of diabetes (mean difference compared to type 2 diabetes with early onset and clinical features that may correspond to MODY was –1.47 [0.97; 1.97]; to type 1 diabetes –0.71 [0.23; 1.18]; to GCK-MODY –0.76 [0.33; 1.2] mg/l).

Conclusions: HsCRP levels are lower in patients with HNF-1A-MODY compared to other types of diabetes. In most of the papers assessed in this review, the authors point out that hsCRP as a stand-alone parameter is insufficient to distinguish MODY from type 2 diabetes with early onset and clinical features that may correspond to MODY. The inclusion of hsCRP as an additional parameter in models to differentiate between patients with MODY diabetes and other types of diabetes increased their effectiveness in most cases.

U13
Evaluation of reversibility of carbohydrate metabolism disturbances, changes in body composition and adipocytokine concentrations in patients with Cushing's disease treated with surgery

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Introduction: Cushing's disease leads to cardiovascular and metabolic complications that impair quality of life and increase mortality in patients with hypercortisolaemia. The treatment of choice is removal of the pituitary tumour. Prospective studies on the reversibility of metabolic abnormalities after successful surgical treatment are lacking.

Aim of the study: Prospective evaluation of the reversibility of carbohydrate metabolism disturbances, body composition changes and adipocytokine profile in patients with Cushing's disease treated with surgery.

Material and methods: Observational cohort study including 50 patients with Cushing's disease (age: 42.4 ±14.9 years; women 78%) treated with surgery and 52 volunteers with normal carbohydrate metabolism (control group) matched for gender and age (age: 44.1 ±13.3; women 80.8%). Before surgical treatment (visit V0), carbohydrate metabolism (fasting glucose, insulin, C-peptide and OGTT), body composition by densitometry and adipocytokine profile were assessed. This evaluation was repeated 3 and 6 months after surgery in the study group (visits V1 and V2) and compared with the control group.

Results: In V0, obesity and overweight were present in 48% and 36% of patients, diabetes in 26%, pre-diabetes in 42% and hypertension in 78%. Remission of Cushing's disease was confirmed in 38 patients (76%). The dynamics of the studied parameters in the remission group for visits V0, V1 and V2 were as follows: fasting glucose (mg/dl): 90; 80; 82;($p < 0.001$); fasting insulin (IU/l): 14.3; 10.0; 9.5 ($p = 0.001$); mean OGTT glycaemia (mg/dl): 153; 111; 106 ($p < 0.001$); mean insulinaemia (IU/l): 86.5; 65.5; 41.9 ($p < 0.001$); mean C-peptide in OGTT (ng/ml): 4.6; 3.0; 2.8 ($p < 0.001$); proinsulin in OGTT (pmol/l): 26.5; 12; 11.1 ($p < 0.001$); MATSUDA: 2.4; 4.3; 4.9 ($p < 0.001$); waist circumference (cm): 109; 103; 98 ($p < 0.001$); BMI (kg/m^2): 30.4; 28.6; 26.7 ($p < 0.001$); visceral fat (%): 42.2; 40.3; 36.8 ($p < 0.001$); Adiponectin (µg/ml): 3.8; 3.0; 3.3 ($p = 0.341$). The comparison of results in the remission group (V2) with those obtained in the control group were as follows: fasting glucose (mg/dl): 82; 88 ($p = 0.547$); fasting insulin (IU/l): 9.5; 9.05 ($p = 0,416$); mean OGTT glycaemia (mg/dl): 106; 105 ($p = 0.170$); mean insulinaemia (IU/l): 41.9; 42.38 ($p = 0.405$); mean C-peptide in OGTT (ng/ml): 2.8; 1.9 ($p < 0.001$); proinsulin in OGTT (pmol/l): 11.10; 6.49 ($p = 0.005$); MATSUDA: 4.9; 5.4 ($p = 0.332$); waist circumference (cm): 98; 88 ($p < 0.001$); BMI (kg/m^2): 26.7; 23.7 ($p = 0.001$); visceral fat (%): 36.8; 29.8 ($p < 0.001$); adiponectin (µg/ml): 3.3; 5.5 ($p = 0.341$).

Conclusions: After 6 months of successful surgery for Cushing's disease, normalisation of the basic parameters of carbohydrate metabolism is observed: fasting glycaemia and insulinaemia and in the OGTT, as well as indices of insulin resistance, which do not differ from those observed in the control group. Concentrations of C-peptide, proinsulin, adiponectin, as well as BMI, relative visceral fat content and waist circumference, despite improvement, are still significantly different from those observed in the control group, indicating persistence of increased cardiovascular risk despite the normalisation of basic parameters of carbohydrate metabolism.

U14
Differences in the course of diabetes in postmenopausal women

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Introduction: Type 2 diabetes is a growing epidemiological problem worldwide, its risk increases with age, and it primarily affects the female gender.

In addition, postmenopausal women with diabetes have a significantly higher risk of complications, mainly cardiovascular, compared to men with diabetes during this period of life and postmenopausal women but without diabetes.

Aim of the study: The aim of this study was to evaluate the course of type 2 diabetes in postmenopausal women, with particular emphasis on the distinct clinical features, risk factors and cardiovascular complications.

Material and methods: Retrospective analysis of medical records of postmenopausal patients hospitalised at the Department of Endocrinology, Medical University of Lublin, between 2010 and 2014, the study group consisted of 328 patients with type 2 diabetes mellitus and the control group of 140 women without carbohydrate metabolism disorders. Clinical presentation including gynaecological status, diabetes risk factors, prevalence of associated diseases and diabetes complications were assessed.

Results: Women in the study group were characterised by: lower height 157.6 ±9.6 cm vs. control group 159.2 ±6.2 cm ($p < 0.05$), higher body weight 76.1 kg vs. 72.1 kg ($p < 0.05$) and BMI: 30.5 kg/m^2 vs. 28.4 kg/m^2 ($p < 0.001$). Among the recognised risk factors, obesity (51.2% study group vs. 40.7% control group), positive family history of diabetes (26.2% vs. 15.7%), and alcoholism (2.1% vs. 0.0%) predominated in the study group. Similarly, hypercholesterolemia predominated in the study group (61.6% vs. 52.9%); however, this difference was not statistically significant. Nicotinism was more common in the control population 27.9% vs. 18.3% in the study group ($p < 0.05$). The assessment of gynaecological status showed no significant differences in the following: time of first and last menstrual bleeding, miscarriages, abnormalities of the reproductive organs and urinary incontinence, and cancers of the endometrium, ovary or breast. Among the associated diseases, significant differences were observed mainly in the prevalence of cardiovascular disease. Ischaemic heart disease (41.8% vs. 24.3%, $p < 0.001$), myocardial infarction (13.4% vs. 2.9%, $p < 0.01$), heart failure (18.0% vs. 6.4%, $p < 0.01$), stroke (11% vs. 2.9%, $p < 0.01$) and hypertension (89.6% vs. 75%) were significantly more frequent in the study population.

Conclusions: The results presented here confirm the role of previously recognised risk factors for the development of type 2 diabetes, of which obesity appears to be the most significant. In addition, diabetes increased the risk of cardiovascular episodes, the risk of ischaemic heart disease and heart failure was nearly three times higher, the risk of myocardial infarction more than five times higher and stroke more than four times higher compared to postmenopausal patients but without diabetes.

SESSION OF ORIGINAL PAPERS III – DIAGNOSE WELL AND TREAT WELL: EASIER SAID THAN DONE...

Chairs: Katarzyna Cyganek, Piotr Dziemidok, Anna Korzon-Burakowska

U15
Comparison of clinical and metabolic characteristics and obstetric outcomes in patients with gestational diabetes according to the timing of diagnosis of carbohydrate metabolism disorders

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Introduction: Gestational diabetes mellitus (GDM) is associated with a higher rate of obstetric complications. There are now increasing cases of GDM being diagnosed in the first half of pregnancy. To date, however, the cause of this phenomenon has not been established.

Aim of the study: The aim of this study was to compare clinical, metabolic characteristics and obstetric outcomes in women with GDM according to the time of diagnosis.

Material and methods: This was a single-centre retrospective cohort study including 393 pregnant women with GDM treated between 2014 and 2020. In 85 patients, GDM was diagnosed before the 20th week of pregnancy (group A) and in 308 patients after the 20th week of pregnancy (group B). Clinical and metabolic characteristics and obstetric outcomes were analysed.

Results: Women in both groups did not differ in age, mean BMI, frequency of individual BMI categories (≤ 25 kg/m^2, 25–30 kg/m^2, > 30 kg/m^2), glucose concentrations in 75gOGTT, or frequency of insulin therapy use (all $p > 0.05$). There were no differences in duration of pregnancy, proportion of preterm deliveries, mode of delivery, neonatal birth weight, and incidence of excess birth weight. In contrast, newborns of mothers in group A, compared to group B, had a significantly higher rate of SGA (16.47% vs. 8.44%; $p = 0.0302$). Comparative analysis of neonates with SGA with those without SGA (with mean birth weight of 2650g (2250-2800) vs. 3400 g (3150–3650), respectively; $p < 0.00001$) showed that in the group of children with SGA, maternal diagnosis of GDM was made significantly more often before the 20th week of gestation ($p = 0.0302$). No differences were found for the other parameters. Correlation analysis showed a negative association between the presence of SGA and the time of diagnosis of GDM ($p = 0.0258$) and a positive association between the presence of SGA and diagnosis of GDM before the 20th week of pregnancy ($p = 0.0302$). In various regression models including maternal age, pre-pregnancy BMI, timing of GDM diagnosis, 75 g OGTT score, treatment modality and gestational age at delivery, only GDM diagnosed before the 20th week was an independent predictor of neonatal SGA (OR greater than 2 for all models analysed, $p < 0.05$).

Conclusions: Women with GDM, irrespective of the time of diagnosis of the carbohydrate metabolism disorder, do not differ in terms of clinical characteristics, outcome of diagnostic tests or treatment of GDM.

Offspring of mothers with GDM diagnosed before the 20th week of gestation have a higher incidence of SGA compared to women diagnosed in the second half of pregnancy. The timing of the diagnosis of gestational diabetes does not affect other obstetric outcomes. Further research is needed to explain the cause of the observed phenomenon.

U16
Diagnosis of pre-eclampsia in women with diabetic kidney disease

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Introduction: Pre-eclampsia (PE) is one of the most serious complications of pregnancy, affecting approximately 2–3% of women. The diagnosis of PE is particularly difficult in patients with long-standing pre-pregnancy diabetes complicated by nephropathy.

Aim of the study: The primary aim of this study was to assess the frequency of PE diagnosis in

women with diabetic kidney disease (DKD). The second aim was to analyse the influence of various clinical factors and changes in laboratory tests during pregnancy on the occurrence of PE. The clinical analysis considered, among other things, the presence of proliferative retinopathy, chronic hypertension, degree of proteinuria, mode of insulin therapy or use of acetylsalicylic acid.

Material and methods: The study included 79 patients with DKD from the 1st trimester of pregnancy. All patients were hospitalised in the Department of Reproduction, Poznan University of Medical Sciences, between 2016 and 2020. All patients were diagnosed with pre-pregnancy diabetes of at least 20 years' duration and/or diagnosed before 10 years of age with the presence of microalbuminuria or proteinuria in the 1st trimester of pregnancy. Pre-eclampsia was diagnosed after the 20th week of pregnancy based on the International Society for the Study of Hypertension in Pregnancy (ISSHP) criteria including the presence of chronic hypertension.

Results: At the time of inclusion in the study, proliferative retinopathy was found in 16 female subjects (20.2%), overt proteinuria in 10 (12.6%), ischaemic heart disease in 2 (2.5%) and chronic hypertension in 11 (13.9%). PE was diagnosed in 18 pregnant women (22.8%), including 48.1% with retinopathy and/or proteinuria and 9.6% without the above-mentioned complications. The pregnant women diagnosed with PE were significantly older (p = 0.004) and had significantly longer diabetes (p = 0.0001) than patients not diagnosed with PE. The rate of foetal growth restriction (FGR) was significantly higher in the group with diagnosed pre-eclampsia than in the group without PE (27.8% vs. 0.6%, $p < 0.05$). Those patients who used an insulin pump developed PE significantly less often than those pregnant women who used single insulin injections. No reduced incidence of developing PE was observed in women who used aspirin from the 1st trimester of pregnancy compared to pregnant women who did not take the drug.

Conclusions: Long-term pre-pregnancy diabetes is a strong risk factor for developing PE. Patients with overt proteinuria and/or proliferative retinopathy diagnosed in the first trimester of pregnancy are at greatest risk of developing PE. Placental insufficiency expressed by fetal growth restriction is an important clinical feature of PE, also in a diagnostic sense, in women with long-term pre-pregnancy diabetes. The use of insulin therapy with a pump appears to be important in the prevention of PE, as opposed to the use of aspirin.

U17
Echocardiographic assessment of left ventricular structure and epicardial fat thickness in patients with metabolic syndrome

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Introduction: Metabolic syndrome (MS) is a set of cardiovascular risk factors. Transthoracic echocardiography (TTE) with assessment of left ventricular myocardial structure and epicardial adipose tissue (EAT) thickness can be a helpful tool in assessing the severity of cardiac complications. Many years of research have shown that EAT has direct paracrine and endocrine effects on the myocardium and coronary vessels, contributing to the development of atherosclerotic cardiovascular disease.

Aim of the study: The aim of this study was echocardiographic assessment of cardiac morphology in patients diagnosed with MS extended by an EAT measurement.

Material and methods: 42 (median age 50 (20) years, median BMI 32.1 (6.53)) MS patients and 21 (median age 46 [19] years, median BMI 27.3 [4.70]) controls without MS with normal Oral Glucose Tolerance Test (OGTT) results were included in the study. The main exclusion criteria were obesity with BMI ≥ 40 kg/m^2 and significant comorbidities (including advanced heart failure, resistant hypertension, advanced coronary artery disease, active cancer, renal failure with eGFR < 60 ml/min/1.73 m^2, POCHP), use of statins, hypoglycaemic drugs. All subjects underwent a clinical examination, body composition analysis using electrical bioimpednation, OGTT with glucose and insulin determination, and blood lipid concentrations were measured. MS was diagnosed based on the 2009 joint position of the IDF, NHLBI, AHA, WHF, IAS

and IASO. To assess cardiac morphology and function, TTE with a measurement of the EAT thickness was performed in all subjects.

Results: The study groups did not differ in terms of age or gender. Based on TTE, there was a statistically significant increase in the left ventricular mass (LVM) ($p < 0.0001$), an increase in the EAT thickness ($p < 0.0001$) in the MS patients compared to the controls. In the MS group, a positive correlation was observed between LVM and EAT ($r = 0.500$, $p = 0.001$) and between the left ventricular mass index standardised to the power of 2.7 and EAT ($r = 0.606$, $p = 0.0006$), moreover, the EAT layer thickness correlated positively with the left ventricular interventricular septum thickness

($r = 0.403$, $p = 0.033$, as well as with the left ventricular posterior wall thickness ($r = 0.525$, $p = 0.004$). There were also positive correlations between the left ventricular mass index (LVMI) and the fat mass ($r = 0.311$, $p = 0.045$) and between the LVMI and the waist circumference ($r = 0.324$, $p = 0.036$) in the MS patients.

Conclusions: In MS patients, the thickness of the EAT layer may influence left ventricular muscle remodelling. At the same time, the EAT thickness is related to the amount of total body fat and the patient's waist circumference. Echocardiographic measurement of EAT may serve as a potential marker of cardiac complications in MS patients.

U18
Analysis of the bacteriological profile of infected diabetic foot wounds in relation to the method of material collection and selected clinical parameters

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Introduction: Correct microbiological assessment of infected wounds is important in the choice of targeted antibiotic therapy, so it is essential that the material for examination is properly collected.

Aim of the study: The aim of this study was to retrospectively analyse the bacteriological profile of diabetic foot wound infections in relation to the mode of collection and selected clinical parameters.

Material and methods: The analysis included data from 206 patients (141, 68% male) hospitalised in the local Clinical Department between 2016 and 2019 for infected diabetic foot ulceration. According to the procedures in force, in the first two years the material for microbiological examination was taken in the form of a swab, in the following years the procedure was changed and a tissue specimen was taken from the bottom of the ulcer. Only the result of the first culture taken during hospitalisation was analysed. Differences in the prevalence of Gram-positive and Gram-negative flora were assessed according to mode of collection (swab, specimen), presence of critical lower limb ischaemia, gender, e-GFR grade, age, HbA_{1c}, CRP.

Results: In the 206 samples collected, 398 bacterial strains were isolated (average 1.93 strains/patient). 82 cultures (39.8%) were monoculture, 124 (60.2%) multiculture. The most frequently isolated pathogen was Staphylococcus aureus 72 (18.1% of all strains). A total of 193 (48.5%) Gram-positive and 205 (51.5%) Gram-negative bacteria were found. Anaerobes accounted for 55 (13.8%) of the bacterial flora. There were no significant differences in the prevalence of Gram-positive and Gram-negative and anaerobic bacteria across the group depending on the method of culture collection. However, in the patients without critical ischaemia of the lower limbs compared to the patients with ischaemia, the Gram-positive flora was significantly more frequent regardless of the method of material collection (swab: 48 (58.5%), $p = 0.005$; specimen: 73 (57.9%), $p = 0.003$). In the patients with GFR < 60 ml/min, Gram-positive flora was significantly more frequent in wound specimen cultures 56 (59.6%) than in swab cultures 26 (40.0%), $p = 0.015$ and also when compared to specimen studies of the patients with GFR ≥ 60 ml/min 61 (42.1%), $p = 0.008$. In contrast, swabs from those ≥ 65 years of age showed significantly more Gram-negative flora 39 (63.9%) compared to swabs from those < 65 years of age 44 (44.9%). All patients with HbA_{1c} < median (8.4%) compared to those with HbA_{1c} > median had significantly more Gram-negative flora, 54 (63.5%) vs. 45 (45.5%), respectively; $p = 0.014$. This relationship was also observed when comparing against HbA_{1c} the results of swab cultures 22 – (68.7%) vs. 19 (44.2%); $p = 0.035$.

Conclusions: In the analysis performed, significant differences in the prevalence of Gram-positive and Gram-negative bacterial flora were found in some groups of patients with infected diabetic

foot ulcer depending on clinical characteristics and the method of material collection.

U19
Could the use of allogeneic mesenchymal stem cells accelerate ulcer healing in patients with neuropathic diabetic foot syndrome?

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Introduction: Healing of ulcers in diabetic foot syndrome is significantly delayed and is associated with the risk of life-threatening complications, including sepsis, lower limb amputation and even death. Cell therapy based on mesenchymal stem/stromal cells (MSC) is increasingly being considered as a promising tool for wound treatment. It is now known that in addition to bone marrow, where they were first described, other tissues can also be sources of MSCs. In particular, adipose-derived stem cells (ADSC) are of great interest due to their increasingly well documented immunomodulatory properties.

Aim of the study: The aim of this study is to evaluate the safety and efficacy of topical allogeneic ADSC therapy for the treatment of ulcers in patients with neuropathic diabetic foot syndrome (1ABC EudraCT study, number: 201600410915, positive opinion of the Bioethics Committee at the Warsaw Medical University dated 24.06.2019).

Material and methods: A total of 39 patients with neuropathic diabetic foot syndrome in grades IA and IIA according to the University of Texas classification were eligible for the study. During the randomisation period, 9 patients were disqualified due to the presence of exclusion factors. Finally, 10 patients received treatment with standard therapy and tissue adhesive (tissue adhesive group) and 20 received treatment with standard therapy and ADSCs suspended in tissue adhesive (ADSC group). The preparations were made in accordance with specifications approved by the Chief Pharmaceutical Inspectorate. The clinical follow-up included the following parameters: the degree of reduction in size parameters, percentage of epithelializing tissue in the wound, local and systemic tolerability of the therapy, including the occurrence of adverse effects. The assessment was carried out in week: 1, 2, 3, 4, 5 and 9 after administration of the preparation. Statistical analysis was performed using the Wilcoxon test.

Results: The ratio of wound area to initial area was found to be significantly lower in the ADSC group than in the tissue adhesive group in week 1, respectively. (z-score –3.10159, p = 0.00194), 2. (z-score –2.44167, p =0.01468), 3. (z-score –3.0356, p = 0.00236), 4. (z-score –2.08972, p = 0.03662). The percentage of non-epithelializing area in the wound is significantly lower in the MSC group. The tolerability of the administered preparations was very good, with no patients experiencing severe adverse events.

Conclusions: The results of preliminary analyses allow us to conclude that the use of allogeneic ADSCs in the treatment of neuropathic ulcers in the course of diabetic foot syndrome is a safe therapy that allows for improved wound healing outcomes in this group of patients, including influencing a faster reduction in wound size and an increase in the area of epithelializing tissue, which together may contribute to a reduced risk of infection.

U20

Older patients with type 2 diabetes benefit more from switching therapy from NPH insulin to Glargine 300 insulin – a post hoc analysis of a multicentre, prospective observational study

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Introduction: Insulin therapy in older patients with diabetes is particularly challenging because of the higher risk and more severe clinical consequences of hypoglycaemia. An element of therapy that may minimise the risk of hypoglycaemia in older patients with diabetes may be the selection of an appropriate insulin preparation.

Aim of the study: Post-hoc assessment of data from a multicentre, prospective observational study evaluating the change in insulin therapy from NPH insulin to Gla-300 insulin for efficacy and safety in relation to patient age and time since diabetes diagnosis.

Material and methods: The original study completed 469 patients with type 2 diabetes, from 51 centres in Poland, who changed treatment from NPH insulin to Gla-300 insulin at 6-month follow-up. The current analysis of the results was performed according to the age of the patients (224 patients ≤ 65 years of age vs. 245 patients > 65 years of age), and the duration of diabetes (below and above the median, i.e. 13 years of disease duration).

Results: In the age group (GW) ≤ 65 years of age, there was a reduction in mean HbA_{1c} from 9.23% to 8.13% (difference 1.08%, $p < 0.0001$) and in GW > 65 years of age from 9.15% to 8.20% (difference 0.94%, $p < 0.001$), with no significant difference between groups $p = 0.18$. The reduction in hypoglycaemia incident rate in GW ≤ 65 years of age was 5.5% (from 42/224–18.8% to 30/224–13.65%) and in GW > 65 years of age was 14.6% (from 66/245–26.9% to 31/245–13.0%), and the relative reduction in hypoglycaemia incident rate was statistically significantly greater in GW > 65 years of age (14.6% vs. 5.5%, $p = 0.0013$). GW > 65 years of age also had a significantly greater relative reduction in nocturnal symptomatic hypoglycaemic incidents ($p < 0.05$). The time since diagnosis of diabetes (CORC) group ≤ 13 years of age had a reduction in mean HbA_{1c} from 9.20% to 8.04% (a difference of 1.16%) while the CORC group > 13 years of age had a reduction from 9.18% to 8.28% (a difference of 0.87%), $p = 0.007$. In the CORC ≤ 13 years group there was a reduction in all hypoglycaemia episodes from 37/217 (17.1%) to 27/217 (12.7%), in the CORC >13 years group from 71/252 (28.2%) to 34/252 (13.8%), the reduction in hypoglycaemia incidents in the CORC ≤13 years group was 4.7% and in the CORC >13 years group was 15%, the relative reduction was statistically significantly greater in the CORC >13 years group (15% vs. 7%, $p = 0.0003$). There was also a reduction in nocturnal symptomatic ($p = 0.023$) and nocturnal documented ($p = 0.019$) hypoglycaemia in the CORC group >13 years of age.

Conclusions: The change in therapy from NPH insulin to Gla-300 insulin was particularly beneficial in patients > 65 years of age, who achieved a similar reduction in HbA_{1c} compared with younger patients and gained a significantly greater relative reduction in the risk of hypoglycaemia. The patients with longer duration of diabetes achieved a greater relative reduction in the risk of hypoglycaemia, with a slightly smaller reduction in HbA_{1c} compared to the patients with shorter duration of disease.

POSTER SESSIONS OF ORIGINAL PAPERS

POSTER SESSION 1 – SMALL PARTICLES, BIG OPPORTUNITIES

Chairs: Monika Karczewska-Kupczewska, Dariusz Moczulski, Katarzyna Nabrdalik

P1
Klotho protein levels are found to be reduced in children with type 1 diabetes and it correlates with metabolic compensation

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Introduction: Klotho protein levels are recognised as a prognostic factor in the development of chronic complications of diabetes. It is thought that Klotho deficiency may contribute to β-cell apoptosis and the development of type 1 diabetes.

Aim of the study: The aim of this study was to evaluate Klotho protein levels in children with type 1 diabetes (T1D) and its association with classic risk factors for chronic diabetic complications: dysglycaemia and endothelial dysfunction.

Material and methods: The study involved 80 children with T1D (37 boys) and 34 healthy children (control group, 15 boys). Micro- and macroangiopathy was excluded in the patients and renal function was normal for all of them. Serum levels of s-Klotho, sICAM, sVCAM and e-selectin were studied in relation to HbA_{1c}, lipidogram, AVBG and SD glucose.

Results: The concentration of Klotho was lower in T1D than in the control group (2041.9 ±1017.6 pg/ml vs. 2790.3 ±1423.9 pg/ml, $p = 0.0113$). Concentrations of sICAM, sVCAM and e-selectin were comparable in the patients and the control group. In T1D, Klotho and e-selectin were correlated with HbA_{1c} ($r = -0.31$, $p = 0.0066$, ir = 0.25, $p = 0.0351$, respectively), but not with AVBG and blood glucose SD, and with diabetes duration. The concentration of sKlotho correlated with total cholesterol ($r = 0.31$, $p = 0.0129$), HDL cholesterol ($r = 0.43$, $p = 0.0011$) and LDL cholesterol ($r = 0.28$, $p = 0.0412$). The sKlotho level was not correlated with triglyceride, sICAM, sVCAM and e-selectin concentrations.

Conclusions: The study found significantly lower levels of s-Klotho in children with type 1 diabetes correlated with HbA_{1c}, but not with adhesion molecule levels or disease duration.

P2
Association of serum levels of fibroblast growth factor 23 (FGF23) with duration of type 1 diabetes

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Introduction: FGF23 (fibroblast growth factor 23) is a phosphatoury hormone, synthesised and secreted by osteoblasts and osteocytes. The study found elevated levels of circulating FGF23 mainly in people with obesity and type 2 diabetes. FGF23 exacerbates insulin resistance and plays an important role in energy homeostasis. A cofactor essential for the proper function of FGF23 is the Klotho protein. This complex affects glucose metabolism, gene expression of antioxidant enzymes, and cell ageing processes.

Aim of the study: The aim of this project was to evaluate the association of serum FGF23 levels with duration of type 1 diabetes (DMT1).

Material and methods: 58 InLipoDiab project participants [median duration of DMT1 4.2 (3.4–4.8) years, HbA_{1c} 6.6 (5.9–7.3)%] and 67 PoProStu project participants [median duration of DMT1 23 (22–24) years, HbA_{1c} 7.8 (7.2–8.4)%] were eligible for the study. All patients were treated from the diagnosis of diabetes with intensive functional insulin therapy. Serum FGF23 levels were measured by the ELISA test. The reference value for serum FGF23 concentration is ≤ 30 pg/ml. Results below and equal to this value were defined as low (normal) and above as high (abnormal).

Results: The patients of the InLipoDiab project differed significantly from those of the PoProStu project in the following parameters: disease duration 4.2 (3.4–4.8) years vs. 23 (22–24) years; $p <$ 0.001, age 29 (24–33) years vs. 46 (42–52) years;

$p < 0.001$, BMI 23.0 (20.6–25.3) kg/m^2 vs. 25.4 (22.9–28.9) kg/m^2; $p = 0.001$, HbA_{1c} 6.6 (5.9–7.3)% vs. 7.8 (7.2–8.4)%; $p < 0.001$ and were less likely to exceed the 30 pg/ml FGF23 threshold 14% vs. 63%; $p < 0.001$. Multivariate logistic regression showed that as the duration of DMT1 increased by one year, the chance of exceeding FGF23 > 30 pg/ml increased by 22% and this was independent of age, BMI, HbA_{1c} and gender [AOR = 1.25 (95% CI: 1.1050–1.4165), $p = 0.004$].

Conclusions: The duration of DMT1, irrespective of age is associated with higher serum FGF23 concentrations, which may be related to accelerated biological ageing processes in this patient group.

P3
Investigating the association between the expression of proinflammatory markers and the clinical phenotype of patients in the first year after gestational diabetes

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Introduction: Although an important role for subclinical inflammation in the development and progression of gestational diabetes mellitus (GDM) has been demonstrated in recent years, the findings regarding the association of various inflammatory mediators, including TNF-α and IL-6, with gestational diabetes mellitus (GDM) are inconclusive.

Aim of the study: The aim of this study was to evaluate changes in TNFA and IL-6 mRNA expression in leukocytes of women with diagnosed GDM in the third trimester of pregnancy and one year after delivery and to determine the relationship between the expression of these genes as well as clinical and anthropometric parameters of the studied patients.

Material and methods: The study included 28 patients with GDM and 31 pregnant women with normal glucose tolerance (NGT; control group). Patients with a positive family history of type 2 diabetes, a diagnosis of GDM in a previous pregnancy or diabetes before pregnancy, and inflammation were excluded from the study. All patients underwent anthropometric measurements and metabolic parameters and levels of TNFA and IL-6 transcripts in their leukocytes were determined using the qRT-PCR technique.

Results: During pregnancy, women with GDM were hyperglycaemic and had lower HDL fraction cholesterol levels and higher HOMA-IR and higher fasting insulin and IL-6 transcript levels compared to controls ($p < 0.05$). The two groups were not statistically significantly different in terms of age, pre-pregnancy BMI, gestational weight gain and TNFA transcript levels ($p > 0.05$). IL-6 mRNA expression positively correlated with glycaemic concentrations at 0, 1 and 2 h OGTT, while TNFA mRNA expression positively correlated with the patients' pre-pregnancy BMI and fasting glycaemia ($p < 0.05$). ROC curve analysis showed that the IL-6 transcript had a high discriminatory value for both patient groups studied (AUC = 0.848, $p < 0.05$). One year after delivery, levels of IL-6 and TNFA transcripts decreased, but these differences were not statistically significant. Both transcripts positively correlated with plasma CRP levels.

Conclusions: Our results indicate that increased IL-6 mRNA expression in GDM patients is associated with impaired carbohydrate metabolism and that IL-6 and TNFA transcripts are associated with the development and/or course of inflammation in women with a history of GDM during the first year postpartum.

P4
The role of adropin and neopterin in gestational diabetes and the development of associated complications

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The global obesity epidemic is not sparing pregnant women. According to the relevant data, approximately 33–37% of women of childbearing age are obese. These figures are reflected in the increasing number of complications during pregnancy, which include gestational diabetes. The aim of this study is to evaluate the concentrations of two molecules: adropin and neopterin in the course of gestational diabetes and their possible rela-

tionship with the occurrence of obstetric complications characteristic for it. Adropin is a hormone that promotes glucose oxidation relative to fatty acid oxidation in muscle. Neopterin is a non-specific, low molecular weight mediator of the cellular immune response and has been called a marker of inflammation.

The study included 65 obese and overweight pregnant patients (BMI > 27 kg/m^2) with glycaemic disorders diagnosed during pregnancy: gestational diabetes and diabetes first diagnosed during pregnancy – diagnosed according to the criteria of the Polish Diabetological Association. Blood for analysis was collected during two visits: V1– between 28 and 32 weeks of pregnancy, and V2 – between 37 and 39 weeks of pregnancy. Cord blood collected immediately after birth from the umbilical artery of 16 newborns was also secured. Using ELISA, adropin and neopterin concentrations were determined at the above time intervals. The study group was assessed for anthropometric, metabolic compensation and obstetric outcomes.

The patients' mean BMI at visit V1 was 37.96 kg/m^2 and at visit V2 it was 38.75 kg/m^2. The average weight gain of the patients between the two visits was 2.5 kg. In the study group of patients at visit V1, the mean adropin level was 532.32 mmol/ml, the median value for neopterin was 2.54 mmol/ml. For visit V2, the mean value for adropin concentration was 589.67 mmol/ml and the median for neopterin was 3.27 mmol/ml. Comparison of adropin levels between visits V1 and V2 showed a statistically significant increase (p = 0.02). A statistically significant difference was also shown in neopterin concentration values for the V1 and V2 visits (p = 0.002). There was no correlation between the weight gain of the patients and the increase in their serum adropin concentration (Pearson correlation coefficient 0.02 – $p < 0.05$), but there was a positive correlation between the weight gain and the increase in neopterin concentration (Spearman correlation coefficient 0.06 – $p < 0.05$). Adropin and neopterin levels at visits V1 and V2, as well as their change between the visits, were not statistically significantly different between patients whose newborns presented with too high birth weight (LGA, large for gestational age) relative to gestational age and those who were born with normal weight (AGA, appropriate for gestational age).

Overweight and obese pregnant patients with gestational diabetes in the last trimester of pregnancy have significantly increased levels of adropin and neopterin in their serum. The increased neopterin levels correlate with weight gain in the patients.

P5
Expression of miRNA molecules is increased in visceral adipose tissue in women with diabetes and pre-diabetic conditions, which may be linked to inflammation, oxidative stress insulin signalling

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Introduction: MicroRNAs (miRNAs) are well-known epigenetic regulators of gene expression and, at the same time, markers of metabolic disorders, involved, among other things, in inflammation and regulation of glucose metabolism. Carbohydrate metabolism disorders including pre-diabetes and type 2 diabetes (T2DM2) are closely associated with excessive visceral adipose tissue (VAT) growth, which increases inflammation through cytokine production. The hypertrophied VAT also secretes miRNA molecules into the bloodstream that interact with other tissues crucial for regulating glucose metabolism.

Aim of the study: Evaluation of the effect of carbohydrate metabolism disorders on the expression levels of 75 miRNA molecules in visceral adipose tissue.

Material and methods: VAT was collected from 38 patients aged 50–81 years (12 men and 26 women, matched for BMI) allocated to the following groups: normoglycaemic (NG), prediabetes and T2DM based on the 2020 ADA guidelines (FPG level, HbA_{1c}).

The expression level of miRNAs was determined by qPCR against 2 experimentally selected reference genes (Bestkeeper). Statistical analysis included Shapiro-Wilk, Levene and ANOVA with Tukey's post-hoc test, Spearman correlation, FDR correction (applied to expression and correlation analysis), sPL-SDA, ROC curves, and hierarchical clustering. In silico analysis was performed using the miEAA and miRSystem tools.

Results: The expression of selected miRNA molecules in VAT may depend on gender. Hierarchical clustering analysis indicated a significant similarity in the expression profiles of the miRNAs examined in women with diabetes (T2DM) and pre-diabetes. The expression of 15 miRNA molecules was elevated in patients with carbohydrate metabolism disorders (prediabetes and/or T2DM) compared to the normoglycaemic group (miR-10a-5p, let-7d-5p, miR-532-5p, miR-127-3p, miR-125b-5p, let-7a-5p, let-7e-5p, miR-199a-3p, miR-365a-3p, miR-99a-5p, miR-100-5p, miR-342-3p, miR-146b-5p, miR-204-5p, miR-409-3p). The expression of most significantly altered miRNA molecules was positively correlated with FPG and HbA_{1c}. Only miR-146b-5p expression levels were significantly correlated with two IR indices, TG/HDL and HOMA-IR. Furthermore, the expression level of none of the miRNA molecules examined was significantly altered between the pre-diabetes and T2DM patient groups. Based on the results of ROC curves, ANOVA, sPLS-DA modelling, Spearman correlation and hierarchical clustering, the 11 most significantly altered miRNA molecules were selected for functional analysis. The results suggest that changes in the expression of these 11 miRNA molecules may be linked to oxidative stress, inflammation and insulin pathway signalling.

Conclusions: The expression of miRNAs in VAT may depend on gender. The significant changes detected in miRNA expression in VAT in women with carbohydrate metabolism disorders may indicate their role in the development of chronic inflammation and oxidative stress induced by hyperglycaemia*.

**The entire results are presented in a manuscript published in 2021 in the Journal Antioxidants.*

P6
Short-term and chronic hyperglycaemia alter the expression profile of IRS1 I MIR-152-3p in mature human visceral adipocytes

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Introduction: MiRNAs have the ability to silence the expression of many genes in response to environmental factors. Changes in miRNA expression levels have been demonstrated in the adipose tissue of T2DM patients. As one of the insulin-sensitive tissues, adipose tissue is involved in maintaining glucose homeostasis via the insulin signalling pathway. A typical symptom of T2DM is hyperglycaemia (HG), a consequence of disruption of insulin signalling resulting in the development of insulin resistance. However, the effect of HG on individual components of the insulin pathway in adipocytes and what role miRNA molecules play in this is unknown.

Aim of the study: In this study, we set out to investigate (a) how the expression of miRNA 152-3p targeting one of the key components of the insulin signalling pathway, IRS1, changes and (b) how IRS1 expression changes (at the mRNA and protein level) during the differentiation process of visceral adipocytes exposed to chronic and transient HG.

Material and methods: Adipogenesis of human visceral preadipocytes conducted under normoglycaemic (NG) and chronic or transient HG (30mM) conditions, included 3 stages: proliferation (5 days), differentiation (12 days), maturation (6 days) yielding 14 research variants. After each stage, some cells were collected for further analysis, ultimately yielding 14 research variants. Gene and miRNA expression levels were examined by real-time Q-PCR. Protein expression was tested by ELISA. Statistical analysis was performed using ANOVA and Student's *t*-test.

Results: During adipogenesis under normoglycaemic conditions, IRS1 expression at the mRNA level was constant. At the protein level, a significant decrease in expression was observed only

in mature adipocytes. Chronic HG during adipogenesis resulted in a similar expression profile of IRS1,compared to NG cultured cells (at mRNA and protein levels). Only in mature adipocytes did chronic HG induce a significant increase in IRS1 mRNA expression (HHH vs. NNN). Short-term HG induced changes in the expression (mRNA and protein) of IRS1 only in mature cells. A single hyperglycaemic stimulus induced expression changes only when introduced during maturation (decrease at protein level). The dual hyperglycaemic stimulus, on the other hand, resulted in changes only at the mRNA level. The most pronounced change in expression was found when exposure of preadipocytes to HG occurred during their differentiation and maturation period. Expression of mir-152-3p did not change during adipogenesis under constant glycaemic conditions (NG and HG), but was significantly altered under short-term HG. These changes occurred only in mature adipocytes and appear to correlate negatively with mRNA expression, which may explain the lack of changes in IRS1 expression at the protein level.

Conclusions: Hyperglycaemia (short-term and chronic) alters the IRS1 expression profile only in mature adipocytes, but does not affect IRS1 expression during proliferation or differentiation.

The effect of HG on IRS1 expression may be at least partially silenced by the action of mir-152-3p.

P7
Hyperglycaemia reduces adiponectin expression during visceral adipocyte adipogenesis with associated changes in the methylation of the promoter of this gene

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Introduction: Adiponectin is a hormone secreted by mature fat cells and plays an important role in glucose and fatty acid metabolism in the liver and skeletal muscle. This hormone increases insulin sensitivity and has anti-inflammatory and anti-atherosclerotic effects. Hyperglycaemia (HG) – the main biochemical marker of diabetes – can alter the expression of many genes, including those regulating glucose and lipid homeostasis. Exposure of cells to HG, especially long-term, results in epigenetic modifications, including, inter alia, methylation of CpG (Cytosine-phosphate-Guanine) islets. To date, little is known about the effect of HG on the degree of methylation of the ADIPOQ gene and on adiponectin expression.

Aim of the study: To extend our knowledge on the effect of HG on the methylation of the ADIPOQ gene promoter and its transcription and translation in the differentiation and maturation of human preadipocytes.

Material and methods: Human visceral preadipocytes (HPA-v, Innoprot).

Cells of the HPA-v line were differentiated into mature adipocytes under normoglycaemic conditions and HG (30 mM), during three culture stages: preadipocyte proliferation (5 days), differentiation (12 days) and adipocyte maturation (6 days). Variants were determined according to the glycaemic conditions in the culture stages, yielding 6 culture variants (for normoglycaemia– N, NN, NNN, and for HG – H, HH, HHH). ADIPOQ gene expression was determined at the mRNA level using qPCR and TaqMan probes, and at the protein level using ELISA (Cloud-Clone). Methylation analysis of selected CpG sites of the proximal promoter of adiponectin was performed by HRM (QIAGEN). Statistical analysis was performed using ANOVA and Student's *t*-test.

Results: Under normoglycaemic as well as HG conditions, adiponectin mRNA expression increased after the differentiation stage and then decreased in mature adipocytes. However, HG resulted in lower mRNA expression after differentiation. Changes in protein levels produced in adipocytes during adipogenesis corresponded with mRNA levels. However, in mature adipocytes, protein expression only decreased to a certain level. Both after the differentiation and maturation stages, protein levels in HG-treated adipocytes were significantly lower compared to controls. Methylation of the selected adiponectin promoter sequence increased significantly in mature HG-differentiated adipocytes (HHH vs. H), whereas it was not significantly altered in normoglycaemicadipogenesis.

Conclusions: These results suggest that HG may attenuate adiponectin expression in new generations of visceral adipocytes. The concordance of changes in adiponectin expression in

mature adipocytes with an increase in methylation suggests a negative effect of this process on ADIPOQ gene expression. Decreased adiponectin levels following HG exposure may increase insulin resistance and exacerbate the degree of chronic inflammation.

P8
Leptin, adiponectin, omentin-1 and betatrophin in pre-diabetes and type 2 diabetes in relation to selected clinical and biochemical parameters

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Introduction: In the last 30 years, adipose tissue has been seen as an active endocrine organ, due to the discovery of numerous signalling proteins called adipokines. Adipokines are substances secreted by adipocytes with multidirectional effects. Due to the effect of adipokines on insulin resistance, it is thought that they may act as biomarkers in pre-diabetes (PD) and type 2 diabetes (DM2).

Aim of the study: The aim of this study was to determine whether there are significant differences in leptin, adiponectin, omentin-1 and betatrophin levels in relation to PD and DM2 comorbidity and, therefore, whether selected adipokines can act as biomarkers of the above-mentioned conditions. The aim of the study was also to evaluate the concentration of selected adipokines in relation to individual clinical and biochemical parameters in the study groups.

Material and methods: 35 subjects without diabetes or pre-diabetic status aged 44.86 ±12.45 years (control group – CG), 14 subjects with newly diagnosed PD aged 54.29 ±8.24 years and 27 subjects with DM2 lasting 5 ±3.85 years aged 56.35 ±9.34 years were included in the study.

C-peptide, glucose, insulin, CRP concentrations, HbA_{1c} levels, lipid profile by laboratory methods and adiponectin, leptin, omentin-1 and betatrophin concentrations by ELISA were determined among the subjects. Assessment of total (TBF%), subcutaneous (SAT) and visceral adipose tissue (VAT) by DEXA was also performed.

Results: The DM2 group had significantly lower adiponectin levels compared with the CG. Adiponectin concentration in the CG negatively correlated with the concentration of C-peptide, insulin, CRP, index values: BMI, WHR, HOMA IR and VAT area and weight. In the PD group, adiponectin levels negatively correlated with VAT area. In all groups, adiponectin levels correlated negatively with triglyceride levels. Leptin concentration positively correlated with body fatness parameters (BMI, TBF%, VAT weight and area and SAT), regardless of the study group. In the group with PD and DM2, there was a positive correlation between betatrophin levels and VAT weight and leptin concentration. Omentin-1 concentration in CG negatively correlated with HOMA IR index, insulin, leptin and HbA_{1c} levels, as well as body fatness parameters i.e.: VAT, SAT, TBF%, BMI, WHR. The concentrations of adiponectin, leptin and omentin-1 showed significant differences according to gender and study group.

Conclusions: In the study conducted, only adiponectin among the adipokines examined acted as a biomarker for type 2 diabetes. A strong positive relationship between leptin levels and body fatness parameters, especially SAT area, was confirmed. Betatrophin showed properties of an adipokine associated with insulin resistance similar to leptin, and its levels were not gender-dependent.

P9
Histone acetyltransferases and deacetylases are involved in metformin-induced apoptosis in pancreatic cancer cells

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Introduction: Metformin is a drug commonly used to treat type 2 diabetes mellitus (T2DM). In addition, it is also suggested that it exhibits anti-cancer properties as it induces apoptosis, inhibits its growth and proliferation of cancer cells. However, the mechanisms of its anticancer action are not fully understood. It has been suggested that one of these may be an effect on the enzymes respon-

sible for the histone acetylation state, which is maintained by histone acetyltransferases such as: PCAF, p300, CBP and deacetylases such as SIRT-1.

Aim of the study: The aim of this study was to evaluate the effect of metformin on the expression level of histone acetyltransferases: PCAF, p300, CBP and histone deacetylases: SIRT-1 in human pancreatic cancer cells.

Material and methods: The study was performed on pancreatic cancer cell lines 1.2B4 and PANC-1. The 1.2B4 cell line was created by fusing a primary culture of human pancreatic islets with a human pancreatic cancer cell line [HuP-T3]. PANC-1 is a pancreatic ductal epithelial carcinoma cell line.

1.2B4 and PANC-1 cells were treated with 1 mM and 5 mM metformin for 24, 48 and 72 hours. Cell viability was determined by MTT assay, the percentage of cells in early apoptosis was determined by flow cytometry. The mRNA and protein expression of PCAF, p300, CBP and SIRT-1 were analysed by qRT-PCR and Western blot, respectively.

Results: Metformin was observed to induce dose- and exposure-time-dependent apoptosis of 1.2B4 and PANC-1 cells. 1mM metformin increased SIRT-1 mRNA expression at 24 hours ($p < 0.05$) and 72 hours ($p < 0.001$); CBP at 24 hours ($p < 0.05$) and 72 hours ($p < 0.01$), but decreased PCAF mRNA expression at 48 hours ($p < 0.05$) in the PANC-1 cells. 5mM metformin increased SIRT-1 mRNA expression at 24 hours ($p < 0.01$) in the PANC-1 cells and PCAF mRNA expression at 24 hours ($p < 0.01$) in the 1.2B4 cells, but decreased CBP mRNA expression at 72 hours ($p < 0.01$) in the PANC-1 cells. Of the proteins tested, a dose-dependent, statistically significant reduction in PCAF protein expression was observed in both the 1.2B4 and the PANC-1 cells.

Conclusions: The results of our study indicate that the propapototic effect of metformin against pancreatic cancer cells may be related to effects on the expression levels of PCAF, SIRT-1 and CBP.

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POSTER SESSION 2 – DEMONIC PANDEMIC DIABETES

Chairs: Elżbieta Kozek, Beata Matyjaszek-Matuszek, Alicja Milczarczyk

P10
Comparison of the prevalence of ketoacidosis at the time of diagnosis of type 1 diabetes in children during the SARS-CoV-2 virus pandemic and one year earlier

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Introduction: Ketoacidosis (DKA) is a life-threatening acute complication of diabetes, often found at the time of diagnosis. Early detection of type 1 diabetes (DM1) is key to avoiding DKA. During the SARS-CoV-2 virus pandemic, there has been an alarming increase in the incidence of DKA at the time of diagnosis and a higher incidence of severe DKA, sometimes requiring treatment in intensive care units (ICUs).

Aim of the study: The aim of this study was to compare the prevalence of ketoacidosis at the time of diagnosis of DM1 during the pandemic (15.03.2020 – 31.01.2021) and in the corresponding period one year earlier (15.03.2019 – 31.01.2020) in the Pomorskie Province.

Material and methods: All patients with newly diagnosed DM1 hospitalised in the Department of Paediatric Diabetology of the University Clinical Centre in Gdansk from 15.03.2019 to 31.01.2021 were included in the study. Patients were divided into two groups according to the date of diagnosis (before and during the SARS-CoV-2 pandemic). The number of cases and severity of DKA at the time of diagnosis of DM1 were compared. Data were analysed using the Statistica software by Statsoft.

Results: The pandemic period showed 47.56% more cases of DM1 (n = 121) than in the same period a year earlier (n = 82). The average age of patients during the pandemic was 8.9 ±4.4, the year before was 10.2 ±4.83. The majority of patients were from the city (during the pandemic 63.64% (n = 77), before the pandemic 54.88% (n = 45)). During the pandemic, DKA was found significantly more often at the time of DM1 diagnosis (58.68, n = 71) compared to before the pandemic (40.24%, n = 33). Severe ketoacidosis (defined as pH < 7.0) was demonstrated in up to 21.13% of patients (n = 15), one year earlier in 12.12% (n = 4). In addition, up to 29.58% of patients required treatment in the ICU, before the pandemic 15.15% (n = 5). Patients with moderate ketoacidosis (pH 7.0–7.25) were the most numerous group (42.25%, n = 30) during the pandemic period; before the pandemic, patients with mild ketoacidosis (pH 7.25–7.3) predominated (63.64%, n = 21). During the pandemic, patients with mild ketoacidosis represented only 36.62% (n = 26). The mean pH in the group of DKA patients during the pandemic period was lower –7.12 ±0.14 than the year before –7.19 ±0.12, but the difference was not statistically significant (p = 0.06).

Conclusions: During the SARS-CoV-2 virus pandemic, there was a higher incidence of DKA with DM1 and there were significantly more cases of severe DKA. This is probably due to the reduced accessibility to medical care, but also to the more frequent delay in parental reaction and waiting to see a doctor until serious clinical symptoms of the disease appear.

P12
Impact of the lockdown due to the COVID-19 pandemic on glycaemic control in diabetic patients

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Introduction: The lockdown due to the COVID-19 pandemic has affected physical activity and the choices of products bought, to name but a few. This has changed behavioural treatment options for patients with diabetes.

Aim of the study: The aim of this study was to assess the impact of the first months of the lockdown on diabetes control and to look for variables that were in a causal relationship with glycaemic control outcomes during this period.

Material and methods: Retrospective comparisons were made of results before the lockdown (1–4 months before its announcement): V1 with those after 3–5 months of its duration V2 in patients from Nowy Dwór Non-Public Diabetological Centre in Wroclaw.

The following were analysed: absolute value of HbA_{1c} and the direction of its changes (increase/decrease); glycaemic control (good/bad) and other

parameters and information which, in the opinion of the researcher, could have influenced the results: age; gender; duration of diabetes; previous problems with glycaemic control; modification of therapy just before the lockdown; method of hypoglycaemic treatment; change in body weight and physical activity level and occurrence of acute illness and need for unplanned hospitalisation during the lockdown period; patient withdrawal from therapy, previous chronic macrovascular complications. Inclusion criteria: > 18 years of age and availability of the investigator to the HbA_{1c} result before and during the defined lockdown period, a minimum interval of 3 months between analysed HbA_{1c} results. Exclusion criterion: gestational diabetes. The pre-lockdown period (V1) covered December 2019, January, February, March 2020. The lockdown period (V2) included: April, May, June, July, August 2020. For quotient variables the following were determined: means, min/max values, SD, standard error. The Shapiro-Wilk test was used to assess the normality of the distribution. Frequency tables were calculated for variables on nominal scales, including dichotomous ones. Nonparametric tests (Wilcoxon sign and matched pairs) and analysis of variance for repeated measures and Friedman post-hoc test were used to compare HbA_{1c} mean values, which did not show a normal distribution. The statistical significance of correlations between variables on nominal scales was assessed by Pearson's χ^2 and McNemar's χ^2 tests for dependent samples. The correlation between dichotomous and continuous variables was assessed using univariate logistic regression. Principal component analysis (PCA) was used to assess global correlations. A significance level of $\alpha = 0.05$ was adopted.

Results: Information obtained from 65 medical histories (29 from women; T2DM – 96.9%) revealed that during the lockdown: mean HbA_{1c} decreased ($p = 0.0027$); HbA_{1c} normalised in 19 and worsened in 4 individuals ($p = 0.0035$). Furthermore, HbA_{1c} was normal in 60% of patients during V2 and in 40% during V1 ($p = 0.0033$). There was no association of changes in HbA_{1c} during the lockdown with the study variables. Current macrovascular complications were the only variable that affected the increase in HbA_{1c} during the lockdown ($p = 0.0072$), OR = 5.33.

Conclusions: The first months of the lockdown improved glycaemic control in patients with type 2 diabetes. The only group at risk of worsening diabetes compensation were patients with macrovascular complications.

P13
Analysis of carbohydrate metabolism disorders in patients infected with SARS-CoV-2 – own experience

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Introduction: The first SARS-CoV-2 infection was found in December 2019 in Wuhan, China. Since then, the disease known as COVID-19 has spread throughout the world, and on 11 March 2020, the World Health Organisation, observing the scale of the epidemic threat, declared a COVID-19 pandemic. SARS-CoV-2 infection is usually mild, with flu-like symptoms. However, in some cases COVID-19 infection can progress as a severe systemic illness leading to acute respiratory distress syndrome and even death. Patients at high risk of severe COVID-19 have several features in common, including advanced age, male gender and diagnosed comorbidities, including carbohydrate metabolic disorders.

Aim of the study: The aim of this study was to analyse the severity of carbohydrate metabolism disorders in patients with COVID-19 infection.

Material and methods: The study included 58 patients (24-F, 34-M) infected with SARS-CoV-2, in whom carbohydrate metabolism disorders were found during hospitalisation in the Isolation Ward at the Department of Pneumonology, Oncology and Allergology, Medical University of Lublin, between 10.2020 and 01.2021.

Retrospective analysis of available medical records.

Results: The study group included 58 patients, that is 32.4% of all hospitalised patients ($n = 179$), with an age of 67.88 ±12.42 years. Patients with T2DM accounted for 98.3% and T1DM for 1.7%. The mean HbA_{1c} concentration was 7.49% ±2.09. As many as 65.52% of patients with carbohydrate metabolism disorders required passive oxygen therapy, of which 53.45% had Sat. < 90% despite its use, and 12.07% needed mechanical ventilation. Analysis of deaths showed that hyperglycaemic patients accounted for 60% ($n = 20$). Due to increasing symptoms of respiratory failure in hospitalised patients in stage 3 and 4 of the disease according to the "Recommendations for diagnosis

and therapy of SARS-CoV-2 infections of the Polish Society of Epidemiologists and Infectious Disease Physicians" classification, iv corticosteroids were used. They accounted for 60.42% (*n* = 48) of all patients. As many as 50% of patients required insulin therapy delivery (68.97% in the intensive model), of which 75.86% (*n* = 29) had previously been treated with oral drugs or diet alone. The mean daily insulin requirement was 37.59 u/d ±17.01. Statistical analysis showed a correlation between HbA_{1c} levels and the use of insulin therapy ($p < 0.05$) and higher daily insulin requirements were found in patients with higher HbA_{1c} levels ($p < 0.000001$).

Conclusions: One in three patients hospitalised for severe SARS-CoV-2 infection had a history of carbohydrate metabolism disorders.

More than half of the fatal cases found with severe infection had carbohydrate metabolism disorders.

In patients with type 2 diabetes and active SARS-CoV-2 infection, the inclusion of corticosteroid therapy results in the need for insulin therapy in more than 75% of patients.

Chronic metabolic imbalance increases the risk of insulin dependence during COVID-19 infection.

Every patient with diabetes and active SARS-CoV-2 infection requires regular assessment of carbohydrate metabolism.

P14
Therapeutic management and obstetric outcomes in patients with gestational diabetes during the first wave of the COVID-19 pandemic in 2020 – a report from a diabetes reference centre

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Introduction: The COVID-19 pandemic has forced rapid adaptation of healthcare services to ensure continuity of care for many patient groups. Women with gestational diabetes mellitus (GDM) are a special group of patients because they require urgent education and frequent, systematic diabetological control.

Aim of the study: To assess the impact of the first wave of the COVID-19 pandemic on GDM treatment, glycaemic control and obstetric outcomes.

Material and methods: In this retrospective study from the diabetes reference centre (Cracow, Poland), we compared patient data from two different periods: the first wave of the COVID-19 pandemic (March 2020 – June 2020) and the pre-pandemic period (October 2019 – February 2020). Data were collected from medical records and telephone surveys. There were no patients with coexisting COVID-19 in the study groups.

Results: We included 155 women (Group 1 *n* = 73 and Group 2 *n* = 82 from the COVID-19 pandemic and pre-COVID-19 pandemic period, respectively). During the COVID-19 pandemic, almost half of all women with GDM (*n* 1 = 36, 49.3%) used telemedicine as a method of contact with a diabetologist, whereas in the earlier period this tool of contact with a diabetologist was not used. In addition, female patients were more likely to report difficulties in performing self-monitoring of blood glucose (*n* 1 = 20, 27.4% vs. *n* 2 = 7, 8.5% $p \leq 0.01$) and spent less time on average on diabetes education and training than in the control group (*n* 1 = 39, 53.4% vs. *n* 2 = 9, 9.8% less than 2 hours of education; $p \leq 0.01$). Most analysed glycaemic parameters and obstetric outcomes were similar. Referring to obstetric complications, differences were observed in the incidence of prolonged labour (*n* 1 = 12, 16.4% vs. *n* 2 = 3, 3.7% $p \leq 0.01$) and the number of pre-eclampsia episodes (*n* 1 = 0 vs. *n* 2 = 7, 8.5%, $p = 0.01$) .

Conclusions: In this single-centre observation, despite the difficulties encountered in managing diabetes, the period of the first wave of the COVID-19 pandemic did not appear to have a significant negative impact on obstetric outcomes in women with GDM.

P15
Analysis of the reasons for the failure of the measures taken to prevent COVID-19 in the diabetes department between October and December 2020

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Aim of the study: To describe preventive measures for COVID-19 infection in staff and patients of the Department of Diabetology.

Material and methods: Hospital records. Analysis of the activities undertaken in the period October – December 2020 in the Department of Diabetology, based on hospital records.

Results: During the period in question, COVID-19 cases were reported in staff and patients of the Department of Diabetology – an epidemic outbreak was identified. The unfreezing of the economy and the unleashing of population mobility has resulted in uncontrollable behaviour among people. The result was a surge in COVID cases across the country. In the Department of Diabetology, as in the whole hospital, there was an infection with the SARS-CoV-2 virus. Allowing staff to work in different centres led to the disease being imported from another hospital where a COVID-19 outbreak was diagnosed. In October 2020, by decision of the Governor, an observation and infectious diseases sub-division was established in the hospital for patients with suspected or diagnosed COVID-19. The organisation of this ward resulted in the mixing of staff assigned to this ward with others (shared passageways, offices, social rooms) and patients. Patients with an initial negative PCR result, were transferred to the target ward, where after a few days it turned out that the tests taken from the patients were positive again. When analysing the situation, it was difficult to determine the cause of this condition – wrongly taken swab, no viral load period in the patient, false negative result? Due to various aspects (patients' needs, execution of the contract), the Hospital had to return to normal functioning – admissions of scheduled patients. The low number of medical staff (sick leave), resulted in working overtime. The heavy workload exacerbated fatigue, which had an adverse effect on compliance – social distance, sanitisation. In addition, shortages of nursing and support staff forced the hospital management to rotate this staff between wards and merge wards. There was contact between staff involved in the care of COVID-19 patients and others. Also the movement of people from the hospital management (in the same work clothes) and common medical reports involving many people were not negligible in the development of outbreaks (infection vectors).

Conclusions: Human behaviour has the greatest influence on the development of epidemics and new outbreaks. The analysis of documents and the situation shows that organisational errors were the cause of epidemic outbreaks. Simply developing procedures in line with the latest guidelines and legislation does not prevent an increase in the incidence of the disease. Only by strictly adhering to the developed principles will the expected results – the absence of the disease or a reduction in the number of patients – be achieved.

P16
Treatment of obesity in the era of the COVID-19 pandemic – a preliminary report

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Introduction: Obesity and its numerous complications, due to their increasing prevalence, constitute an unresolved public health problem worldwide. Due to the COVID-19 pandemic and its associated restrictions, the number of patients with obesity and its metabolic complications has increased dramatically. The escalating obesity epidemic and the socioeconomic burden of treatment necessitate early detection and effective treatment, ideally before complications occur.

Aim of the study: Evaluation of the effectiveness and comparison of different options for obesity therapy carried out within the framework of same-day hospitalisations in the Department of Endocrinology.

Material and methods: Hospital records of obese patients enrolled in the obesity treatment programme for same-day stays in the Department of Endocrinology.

Retrospective study and statistical evaluation of clinical data collected during the first 3 months of the above programme.

Results: There were 42 patients aged between 16 and 75 years (mean 39.6 ±16.1 years of age), of whom 32 patients (76.19%) came for a second stay. 69% of the patients were female and 31% were male. Based on BMI assessment, WHO grade I obesity was present in 38% of the hospitalised patients, grade II obesity in 41% and 21% of the programme participants suffered from grade III obesity. The median body weight of the participants was 105 kg (range 78–142 kg) and the median BMI was 36.9 kg/m² (range 30.1–50.2 kg/m²). The patients' waist circumference ranged from 92–134 cm (median 109 cm) and median HOMA-IR 3.7 (1.7–10.6).

The patients were offered an individually tailored obesity treatment regimen, with behavioural-only treatment (dietary treatment and regular exercise) being used in 66.7% of the patients. Pharmacological treatment, as an adjunct to lifestyle changes, was undertaken by 33.3% of the study participants, including 23.8% taking a GLP-1 analogue and 9.5% taking a combination preparation of naltrexone and bupropion. In addition, 76.2% of the participants were taking a metformin preparation. In the time between the first and the second hospitalisation (about one month), a decrease in body weight (on average by about 4.4 kg), waist circumference (by about 2.4 cm), BMI (by about 1.31 kg/m²) was achieved in all groups. Pharmacological treatment was intensified; at the end of the second hospitalisation, 10 patients (31%) maintained behavioural treatment as the sole component of therapy.

Conclusions: The threat posed by the pandemic particularly affects obese people, who are at increased risk of hospitalisation and death. This indicates the need for intensive treatment of this civilisation disease. Our experience shows that inpatient treatment of obesity is possible despite the pandemic, and preliminary results allow us to conclude that this treatment is effective. In most patients it is necessary to include pharmacological treatment in addition to behavioural methods and exercise. Further research will optimise treatment methods, ensuring that therapy is effective while keeping patients highly motivated to continue treatment.

P17
Locus of health control, self-efficacy and dispositional optimism in patients with type 2 diabetes during the COVID-19 pandemic

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Introduction: An important factor modifying activity in the process of biopsychosocial health maintenance or prevention of complications of an already existing chronic disease is the locus of health control and self-efficacy, but also a sense of life optimism. It is believed that taking action with regard to physical and mental well-being is largely dependent on expressed opinions about the influence of internal and external factors on health. At a time of the covid19 pandemic and the forced reduction in both movement and accessibility to wider health care, and the fear associated with the possibility of covid19 infecting patients with T2DM diabetes and complications, this seems even more important.

Aim of the study: The aim of this study was to determine the levels of self-efficacy, locus of health control and sense of optimism and the associations between them in patients with type 2 diabetes during the covid19 pandemic.

Material and methods: The study was conducted using a telephone diagnostic survey in a group of 140 T2DM patients with disease of at least 5 years' duration. Three standardised research tools were used: Generalised Self-Efficacy Scale (GSES), Multidimensional Health Locus of Control Scale (MHLC) and The Life Orientation Test (LOT-R). The questionnaires of 106 patients were included in the analysis (the others were rejected due to incomplete responses) with an average age of 62.47 ±7.77 years. The group was predominantly male (55.66%), married (60.38%), not working (33.96%), retired (36.79%), unemployed 9 (8.49%).

Results: 74 of the 106 survey participants (69.81%) showed high self-efficacy, 29 respondents (27.36%) showed medium self-efficacy and 3 respondents (2.83%) showed low self-efficacy. Based on the MHLC questionnaire, the majority of the subjects had an internal locus of health control. Based on the analysis of the LOT-R questionnaire, the majority of respondents (66.98%) have a tendency towards pessimism. In terms of standardised tools, there were low positive correlations, but these are not statistically significant.

Conclusions: The patient's somatic state affects the psychological state and vice versa determining how to deal and cope with difficulties, and the psychological state affects the somatic state. The results obtained on the locus of health control, self-efficacy and dispositional optimism in patients with type 2 diabetes may become very important in planning patient education to improve knowledge, as well as strengthening patient support in caring for their own health and preventing complications.

P18
Psychological aspects of a diabetes diagnosis in the shadow of the pandemic – a case study

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The diagnosis of type 1 diabetes in a child is a shock to the whole family. The COVID19 pandemic, which has been ongoing since 2020, has further exacerbated the psychological difficulties of adapting to a new life situation for patients and their families. To date, support for a parent on the ward with their child has been provided, in addition to staff, by visiting family and friends, and by other parents of children with newly diagnosed diabetes as well as with chronic diabetes. The introduction of sanitary and epidemiological rigours – prohibition of visits and caregivers going outside the ward, seeing other adults only during training – from a psychological point of view significantly increases the quantity and quality of adaptation disorders.

A patient aged 2 years and 6 months was transferred from the intensive care unit (ICU) to the paediatric diabetes unit (PDU) after very severe acidosis – pH 6.86, BE –30, with impaired consciousness. The diagnosis was made at the district hospital, from where the boy was transferred by air transport to the ICU – he required emergency intubation prior to transport, which was witnessed by his mother. Intensive care unit regulations indicate that a parent can see the child after the patient is initially stabilised and secured – the shock experienced during intubation led the mother to consider this as concealing the patient's condition.

In the pre-pandemic setting, it was common for one parent to stay permanently in the Unit and for another parent to come in to look after a child too young to attend training or be left alone.

While in the PDU, the mother's mental state definitely deteriorated, despite the child's good general condition. Communication within the team and decision-making that took into account psychological thinking about the patient and family allowed for a flexible and appropriate response to the dynamic, highly emotional situation of the family system. This approach enabled gradual stabilisation of the patient, diabetes education for the family and therapeutic work with the mother to achieve her ability to care for her son when he returned home.

The first psychological consultation of the patient's mother took place in the Diabetes Outpatient Clinic, allowing her to regain the concrete and mental space to recognise and name the emotional states that were a response to the life-threatening situation of the child and the parallel diagnosis of type 1 diabetes. In addition, having to separate mother and child was an unrehearsed separation for this dyad, the first since birth, made all the more difficult by the fact that breastfeeding was terminated during hospitalisation.

This case shows how important the availability of psychological care is for the patient and their family, especially during an ongoing pandemic. The psychologist is an important member of the therapeutic team; timely intervention allows for proper therapy and prevents the development of sequelae of traumatic events.

POSTER SESSION 3 – APPROACHING DIABETES BY A NANNY AND A TEACHER

Chairs: Piotr Fichna, Beata Mianowska, Agnieszka Szypowska

P19
Care for children with type 1 diabetes in kindergartens and schools

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Introduction: Type 1 diabetes in the paediatric population is becoming a major social problem affecting an increasing number of families with young, dependent children. Polish educational institutions are not prepared to care for diabetics. There are no nurses in them, and they are the ones who, according to the current law, are supposed to take care of students with diabetes. Teachers are not prepared to care for students with diabetes, and there is no system of compulsory, standardised in-service training on the subject.

Aim of the study: To explore parents' views on the quality of care for students with diabetes in kindergartens and schools and to compare the results obtained in 2013 and 2020.

Material and methods: The research in the form of a survey with closed questions and open questions was conducted twice in 2013 (n = 602) and in 2020 (n = 604).

Results: There has been a slight positive change in the care for children with diabetes. In 2013, parents rated the quality of care for children with diabetes as: bad – 13%, insufficient – 68%, sufficient – 14%, good – 5%, and in 2020 as: bad – 11%, insufficient – 54%, sufficient – 25.5%, good – 10.5%. The problem of the lack of legal regulations and the absence of nurses in facilities worsened, staff training was not provided systemically.

Conclusions: It is necessary to solve the problem in a systemic way, to introduce compulsory, standardised training, to clarify the scope of the responsibility of teachers taking on the care of a child with diabetes, to introduce appropriate legislative changes and to extend the regulation to include preschool children, who are currently neglected.

P20
Dietary assessment of adolescents with type 1 diabetes

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Introduction: There are currently between 5 and 10% of teenagers with type 1 diabetes. During this period, the influence of peers and observation of their eating habits plays a significant role. Unfortunately, they very often differ from the principles of proper nutrition which, according to the Polish Diabetes Association, should be introduced as an element of correct metabolic control in patients with type 1 diabetes.

Aim of the study: To assess the nutritional status and diet of adolescents with type 1 diabetes and to compare their dietary habits to generally accepted standards of normal nutrition.

Material and methods: The study participants were 20 boys with a mean age of 14.6 ±1.58 years with type 1 diabetes treated with a personal insulin pump. The mean HbA_{1c} level was 7.55 ±0.84%. The study used anthropometric methods, survey methods (Starzyńska's test) and body composition analysis using the InBody 770 device.

Results: In the majority of subjects, nutritional status assessment indicates a normal distribution of body fat and muscle mass. Unfortunately, there are many dietary mistakes, which include: a lack of regularity of meals; a low intake of fruit and vegetables; a low intake of wholemeal products; an excess of animal products; a low intake of fish, nuts, grains and seeds; the presence of numerous unhealthy snacks such as sweets and crisps; the frequent consumption of sugary drinks; inappropriate portions of meals that are too large; and the choice of inappropriate technological processing such as deep frying. In a significant group of adolescents, the diet is not properly balanced in terms of its macronutrient content. In 50% of the people in the study group, carbohydrates were consumed in excessive amounts, particularly in the form of

simple sugars. 35% of adolescents (7 respondents) consumed protein in higher amounts than recommended. For the amount of fat in the diet, 45% (9 people) consumed it above the daily requirement.

Conclusions: An unbalanced diet, lack of regularity in the meals eaten and the presence of numerous unhealthy snacks can lead to abnormal glycaemic control and the occurrence of metabolic complications in the future.

P21
Increasing prevalence of diabetic ketoacidosis among children with newly diagnosed diabetes – what else don't we know?

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Introduction: Diabetic ketoacidosis (DKA) is a life- and health-threatening condition and continues to be an important diagnostic and therapeutic problem. According to the available literature, younger children are at higher risk of developing this acute complication.

Aim of the study: To assess the frequency and severity of DKA in a group of children with newly diagnosed type 1 diabetes (CT1) hospitalised at our centre between 2015 and 2020.

Material and methods: The population included patients referred directly to our centre for suspected diabetes, as well as those transferred from local centres. Data analysed included: age, gender, pH and severity of DKA at the time of CT1 diagnosis. DKA was diagnosed at pH < 7.3. DKA severity was determined based on the ISPAD definition (severe at pH < 7.1, moderate pH < 7.2 and mild pH < 7.3).

Results: Data from 1058 children (54.4% boys) with a mean age of 9.3 ±4.3 years were analysed. Younger children (≤ 5 years) accounted for 19.7% of the group. DKA was diagnosed in 32.2% of patients, including in the subgroup of children with DKA: mild acidosis in 40.8%, moderate in 28.7% and severe in 30.5%. Between 2015 and 2018, the frequency of DKA was 24.7–34.2%, while between 2019 and 2020 it exceeded 40% ($p < 0.0001$). The incidence of severe DKA more than doubled compared to previous years (from 6.9% of all new cases to 15%, $p < 0.0001$). In 2019–2020, compared to previous years, in the subgroup of children ≤ 5 years, there was a significant increase in both the prevalence of total DKA (49.4% vs. 30.5%, respectively, $p = 0.008$) and severe DKA (18.2% vs. 7.6% of all new DM1 cases, $p = 0.026$). In contrast, there were no differences in either the age of diabetes diagnosis ($p = 0.595$) or the proportion of the subgroup of ≤ 5-year-olds between the groups in the compared intervals ($p = 0.936$).

Conclusions: Still nearly 2/3 of patients with newly diagnosed CT1 are diagnosed in the DKA state. This problem is most pronounced in the youngest age group. There was an alarming increase in the prevalence of DKA to > 40%, including its severe form, during the 6 years included in the analysis. It is necessary to search for the causes of the observed increase in the frequency of DKA and to take preventive measures.

P22
Evaluation of the bacterial microflora of the urethral region in children with newly diagnosed type 1 diabetes mellitus

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Introduction: Children with type 1 diabetes (T1D) are at greater risk of infection due to dysfunction of the immune system. Glucosuria further increases the risk of infection of the urinary tract and urethral area.

Aim of the study: Evaluation of the bacterial microflora of the urethral region in children with newly diagnosed T1D.

Material and methods: The material for the study consisted of urethral swabs taken on ad-

mission in 37 patients with a fresh diagnosis of T1D (19 girls, 18 boys). The mean age of patients was 9.2 years (0.58–17.5 years). The mean HbA_{1c} value was 12.44% (6.4–20.1%). Mean glycosuria was 4929.91 mg/dl (0–9770 mg/dl). Ketoacidosis was diagnosed in 12 children (32.4%).

Results: The following microbial species were isolated in the collected materials: *Candida albicans* – in 12 children (32.43%), *Enterococcus faecalis* in 8 children (21.62%), *Staphylococcus aureus* in 6 children (16.22%), *Escherichia coli* in 5 children (13.51%), *Streptococcus anginosus* in 5 children (13.51%), *Corynebacterium glucuronolyticum* in 5 children (13.51%), *Streptococcus β-haemolyticus* gr B in 4 children (10.81%), *Aerococcusurinae* in 4 children (10.81%), *Candida dubliniensis* in 3 children (8.1%), *Lactobacillus gasseri* in 3 children (8.1%), *Streptococcus oralis* in 2 children (5.4%), *Candida parapsilosis* in 2 children (5.4%), *Coagulase-negative staphylococci* in 24 children (64.86%). In addition, the following microbial species were isolated in individual cases: *Citrobacterfreundii*, *Candida guilliermondii*, *Streptococcus gallolyticus*, *Cutibacteriumavidum*, *Streptococcus vestibularis*, *Streptococcus salivarius*, *Klebsiellaoxytoca*, *Corynebacterium amycolatum*, *Micrococcus luteus*, *Klebsiella pneumoniae*, *Corynebacterium kroppenstedtii*, *Actinomycesturicensis*, *Actinomycesurogenitalis*, *Lactobacillus crispatus*, *Acinetobacter ursingii*, *Leclerciaadecarboxylata*, *Moraxella osloensis*, *Pantoea eucrina*, *Actinotignum schaalii*. In 1 patient cultures were negative.

On the basis of the above observation, 17 children were colonised with Candida fungi in the urethral region (48.57%), whereas in the remaining patients (51.43%) the urethral region was colonised only with bacterial strains.

Conclusions: When T1D is diagnosed, it is extremely important to examine the urethral region to identify inflammation and to intervene appropriately and effectively.

P23
Analysis of factors influencing the prolongation of glycaemic time in the target range in children with type 1 diabetes using a continuous glycaemic monitoring system

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Introduction: In 2019, Batellino et al. published an international consensus on glycaemic targets for patients using continuous glucose monitoring (CGM) systems, which has been accepted by many international scientific societies, including the Polish Diabetes Association. Of greatest importance is the achievement of a time in range (TIR, time in range) > 70%, which is closely related to the occurrence of complications in the form of microangiopathy and macroangiopathy.

Aim of the study: The aim of this study is to isolate factors influencing the prolongation of glycaemic time within the target range estimated from CGM among children with type 1 diabetes.

Material and methods: A clinical-control study. Patients aged 1–17 years with type 1 diabetes for more than 1 year, treated with intensive insulin therapy using an insulin pump ≥ 3 months, using a continuous glycaemic monitoring system ≥ 1 month, using the system at least 6 days a week were included in the study divided equally into study and control groups. The study group consisted of patients who achieved a TIR > 70%, and the control group consisted of patients who achieved a TIR ≤ 70% based on data obtained from CGM. During the visit to the Diabetes Outpatient Clinic, HbA_{1c} levels were determined, data from the glycaemic monitoring system were read and patients were asked to complete a one-time questionnaire.

Results: Data from 66 patients (33 each in the group with TIR > 70% and ≤ 70%, respectively) were analysed. There were no differences for patient age (p = 0.514), insulin requirement (p = 0.772), body weight (p = 0.216), duration of diabetes (p = 0.461), duration of glycaemic monitoring (p = 0.690) or type of glycaemic monitoring system used. The groups were similar in terms of the type of insulin pump used, the insulin analogue in the

pump, the type of injections used and the frequency of insulin pump replacement. In the group of patients achieving a TIR >70%, a significantly higher proportion of patients reported maintaining the interval from insulin supply to meal consumption (p = 0.048). The percentage of HbA_{1c} was statistically higher in the group of patients with TIR ≤ 70% (7.5% vs. 6.5%; p < 0.0001). Analysis of data from glycaemic monitoring systems showed significant differences for the time above range (> 180 mg/dl 23% vs. 14%, p < 0.0001 and > 250 mg/dl 11% vs. 2%, p < 0.0001), but no differences for the time below range for both < 70 mg/dl (3% vs. 3%; p = 0.830) and < 54 mg/dl (1% vs. 1%; p = 0.156).

Conclusions: The main problem of patients not reaching the therapeutic target of TIR > 70% is hyperglycaemia.

Maintaining an adequate interval between insulin supply and meal consumption may be one of the factors contributing to a prolonged TIR.

Patients using glycaemic monitoring systems achieve acceptable and recommended rates of hypoglycaemia regardless of TIR values.

P24
Immunosuppressive activity of Treg lymphocytes in children with type 1 diabetes after stimulation with CCL5 chemokine under in vitro conditions

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The chemokine receptor type 5 (CCR5) and its main ligand, the pro-inflammatory chemokine CCL5, significantly influence the course of the immune response by allowing leukocytes to migrate into inflamed tissues. The CCR5/CCL5 system and its relationship with Treg cells in type 1 diabetes mellitus (DM1) have not been studied to date. One allelic variant of the CCR5 gene contains a 32pz deletion (CCR5-Δ32), which results in abnormal expression of the receptor and reduced amounts of the receptor on the cell surface. Studies suggest that expression of CCR5 on the surface of regulatory T cells (Treg) is necessary to maintain their normal immunosuppressive activity. Preliminary studies by our team have shown an association of the CCR5-Δ32 polymorphism with the occurrence of diabetic retinopathy and increased inflammatory response in DM1 patients. The increased inflammatory response seen in carriers of the Δ32 allele may be due to the fact that impaired expression of the CCR5 receptor attenuates the immunosuppressive effects of CCR5-dependent regulatory T cells.

The aim of the present study was to evaluate the effect of the CCL5 chemokine on the immunosuppressive properties of Tregs. Cells with a CD4+ CD25+ CD127low phenotype were isolated from the whole blood of 18 chronic type 1 diabetes patients using an immunomagnetic method. The cells prepared in this way were subjected to 48 h of stimulation with chemokine CCL5. The percentage of CD4+ CD25+ CD127lowFOXP3 cells expressing the CCR5 receptor was then determined by flow cytometry in both stimulated and unstimulated cultures. To investigate the immunosuppressive properties of Tregs isolated from diabetic patients, an assay was performed to evaluate the production of IFN-γ by effector cells, in co-culture with regulatory lymphocytes. After 5 h stimulation in the presence of PMA with ionomycin and monensin, CD3+CD4+IFNγ+ cells were determined by flow cytometry.

The chemokine CCL5 was shown to positively influence the immunosuppressive properties of regulatory T cells relative to effector T cells, resulting in a significant reduction in the percentage of IFNγ-producing cells compared with non-CCL5-treated cells. It was observed that stimulation of Treg cells with CCL5 chemokine resulted in increased FOXP3 expression on CCR5+ Treg cells which correlated with their increased suppressor activity.

The results obtained suggest that the CCR5/CCL5 axis is significantly involved in the Treg cell-dependent regulation of the inflammatory response. However, further functional studies are needed to better understand this relationship.

P25
Insulin therapy in a child with neonatal diabetes using new technology – Medtronic 640G pumps with SmartGuard system

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Introduction: Neonatal diabetes is a rare cause of hyperglycaemia in infancy. Until the result of genetic testing is available, insulin therapy is the treatment of choice. Due to significant insulin sensitivity, variable insulin requirements, unpredictable length and timing of feeding, lack of clinical trials and recommendations, insulin therapy in this age group is challenging.

Methods: We present the case of a child with transient neonatal diabetes (TND) with a mutation in the BLK gene treated with a Medtronic 640G insulin pump with the SmartGuard hypoglycaemia prediction system.

Material and methods: A female neonate born by caesarean section in 34Hbd with hypotrophy (1240g), macroglossia, limb defects (syndactyly of the first and second fingers of the right hand, lobster claw type defect of the right foot) was observed from 7 hours of life with hyperglycaemia > 300 mg/dl, without metabolic acidosis. Infectious causes of hyperglycaemia were excluded. Neonatal diabetes mellitus was diagnosed. IV insulin therapy was administered (initial flow 0.05 units/kg/h). The flow rate was modified in the range of 0.002–0.1 IU/kg/h due to fluctuations in glycaemia 23–402 mg/dl) and increasing food intake. The baby was partially fed parenterally until 2 weeks of age, then fed from a bottle. Intravenous insulin therapy was continued for the first 3 weeks of life, then a Medtronic 640G insulin pump with SmartGuard hypoglycaemia prediction system was connected. The pump uses a fast-acting analogue at 10-fold dilution. From the 31st day of life the baby was exclusively breastfed (meal boluses given in divided doses before and after feeding).

Results: The insulin requirement after pump connection was 0.18 units/kg/day. During CSII therapy, mean blood glucose levels were maintained at 138 ±38 mg/dl (glucometer) and 141 ±45 mg/dl (CGM), without ketoacidosis or severe hypoglycaemia, and only 2 episodes of hypoglycaemia were reported. Good tolerance of Silhouette-type Teflon insertions and sensors was observed, and no occlusion of the infusion set was observed. In the 45th day of life it was diagnosed with bronchitis requiring steroid therapy. Mean insulin requirements before, during and after infection were 0.22 units/kg/day, 0.56 units/kg/day and 0.59 units/kg/day, respectively, including 47%, 72% and 74% of the dose in the basal infusion. From day 63, only the basal infusion (0.24 units/kg/day) was administered. From day 77 until now, the child has not required insulin. The HbA_{1c} value at the end of treatment was 5.4%.

Conclusions: The use of CPWI with SmartGuard in an infant with TND is safe, provides good metabolic control of diabetes with a reduced risk of hypoglycaemia, facilitates dose adaptation during breastfeeding and during infection. This therapy improves the comfort of the carers' lives.

P26
Familial occurrence of type 1 diabetes mellitus, celiac disease and eosinophilic esophagitis – a case report

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Introduction: Genetic and environmental predispositions play an important role in the aetiopathogenesis of type 1 diabetes (DM1), coeliac disease and eosinophilic oesophagitis (EoE). EoE is a rare disease, but is described to be more common in both children with coeliac disease compared to the general population (5.6% vs. 0.9%) and children with DM1 (1.2% vs. 0.3%). However, the data available in the literature are inconsistent. It is not clear whether the co-occurrence of these diseases is due to their common background or merely coincidence. There is little work showing familial comorbidity of these diseases. The available treatments for EoE (Proton Pump Inhibitors (PPI), steroid therapy or elimination diet) have proven efficacy, the choice of therapy is individualised.

Case description: A 9-year-old boy with type 1 diabetes mellitus treated with continuous subcutaneous insulin infusion for 4 years was admitted

to hospital because of abdominal pain and pain on swallowing food since 2 months. The boy had a history of cow's milk protein allergy at 1 year of age and since the diagnosis of DM1, persistently elevated levels of anti-tissue transglutaminase (anti-tTG) antibodies were observed. In a gastroscopy performed for this reason 2 years earlier, EoE was incidentally diagnosed (no symptoms at the time), treated with PPI. In follow-up endoscopic examinations, no abnormalities were described, anti-tTG levels remained high. During hospitalisation, the gastroscopy performed for the complaint described a recurrence of EoE. Then, after 3 months, it was found that PPI treatment was ineffective, and it was decided to include a cow's milk protein and gluten exclusion diet. The patient's 7-year-old brother was found to be hyperglycaemic (205 mg/dl) on one occasion. In addition, a slower growth rate over the preceding 2 years and periodic abdominal pains were observed. The parents denied the allergy. Screening for DM1-specific autoantibodies is still being processed, OGTT performed was normal, very high (> 300 U/ml) anti-tTg levels were found. On diagnostic gastroscopy with biopsy, both celiac disease and EoE were diagnosed. Treatment with proton pump inhibitors and an elimination diet excluding gluten and cow's milk protein was started. Both brothers are scheduled for a follow-up gastroscopy after 12 weeks of treatment, currently the parents report a decrease in complaints, good tolerance of the diet.

Conclusions: To the best of our knowledge, this is the first case report of familial coexistence of DM1, celiac disease and EoE. By presenting this case, we would like to raise awareness and diagnostic vigilance regarding the possibility of DM1 co-occurring with diseases of non-autoimmune aetiopathogenesis, in particular EoE. Consideration should be given to placing the patient's close family under increased monitoring for these diseases. It is also important to adapt the treatment method in terms of effectiveness and patient capacity. In the case described, an important element was the inclusion of the family in the dietetic care.

POSTER SESSION 4 – DIABETES AS A NERVOUS DISEASE

Chairs: Maciej Pawłowski, Aleksandra Uruska

P27
Carbohydratemetabolismdisorders in patients with ischemicstroke – preliminary report

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Introduction: Diabetes is a strong risk factor for stroke, regardless of other causes. Hyperglycaemia is observed in approximately 60% of patients hospitalised for acute stroke and is an unfavourable prognostic factor, both in patients with diabetes and those without known carbohydrate metabolism disorders. Diabetes management should be adapted to the patient's dynamically changing health situation.

Aim of the study: Assessment of the prevalence of carbohydrate metabolism disorders in patients with fresh ischaemic stroke in the context of current Polish Diabetes Association diagnostic and therapeutic recommendations for 2021.

Material and methods: The study included 50 randomly selected patients with acute ischaemic stroke, aged 37 to 95 years (71.1 ±12.6 years), including 34 women (68%) and 16 men (32%), hospitalised at the Stroke Ward in Lublin from September 2019 to December 2020, who were divided into 3 subgroups: with history of type 2 diabetes, without history of diabetes with HbA_{1c} ≥ 6.5% and without history of diabetes with HbA_{1c} < 6.5%.

Retrospective analysis of medical records, with particular emphasis on anthropometric data, laboratory and imaging examinations.

Results: Prior to the stroke episode, type 2 diabetes was diagnosed in 13 patients (26%), none of the patients had a new diagnosis of diabetes, but 5 patients (10%) had an HbA_{1c} ≥ 6.5% (with no conditions found that could disrupt the relationship between HbA_{1c} value and mean glycaemia). Hyperglycaemia ≥ 180 mg/dl on admission was found in 5 patients (10%, including 3 diabetics and 2 patients without a history of diabetes with HbA_{1c} < 6.5%, but diabetes diagnosis was not extended in this group). The mean glycaemia immediately after the stroke episode in patients with diabetes was 173 ±49 mg/dl and the HbA_{1c} value was 7.5 ±1.6% and only in 4 patients was it higher than the recommended general criterion for diabetes compensation. Among comorbidities in the study group, hypertension was found in 88% of patients and lipid disorders in 44%. There were no significant correlations between carbohydrate, lipid or inflammatory parameters and the thickness of the infima-media complex in the common carotid arteries, the presence of atherosclerotic plaque or haemodynamic parameters of intracranial arteries.

Conclusions: One in four patients hospitalised with acute ischaemic stroke had coexisting type 2 diabetes.

Potentially, one in 10 patients hospitalised for stroke may have an unrecognised carbohydrate metabolism disorder.

An HbA_{1c} value ≥ 6.5% should be a useful parameter to diagnose diabetes in the acute stroke period.

Preliminary analyses do not confirm the association of the presence of metabolic disorders with anatomical and haemodynamic parameters of the carotid and intracranial arteries.

Satisfactory metabolic compensation does not prevent the occurrence of CNS ischaemia.

Prospective observational studies should continue, as increasing the size of the study group will allow more reliable conclusions to be drawn.

P28
Management of acute stroke in a patient with hyperglycaemia – a proposal for a diabetes-neurology algorithm

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Introduction: Diabetes is a recognised risk factor for macro- and microangiopathic com-

plications, including stroke, both ischaemic and haemorrhagic. Additionally, in the acute phase of stroke, hyperglycaemia is an independent factor for poor prognosis and higher mortality, both in patients with and without a prior diagnosis of diabetes. There is a lack of scientific evidence in the available interventional studies supporting a beneficial role of normoglycaemia after insulin therapy in improving prognosis in this group of patients, and current guidelines for the treatment of hyperglycaemia in stroke are mainly based on expert opinion.

Aim of the study: The aim of this paper is to propose an evidence-based diabetes-neurology algorithm for acute stroke in a patient with hyperglycaemia.

Material and methods: A review of the available literature including the results of cardiovascular safety studies of new hypoglycaemic therapies.

Results: In all cases of stroke, blood glucose levels should be laboratory determined. If the glycaemic value exceeds 180 mg/dl (10 mm/dl), intensive antihyperglycaemic treatment should be administered. Although the results of randomised clinical trials do not support the fact that normoglycaemia by intravenous insulin therapy reduces mortality or neurological prognosis, in the acute phase of stroke, infusion pump insulin therapy should be implemented for glycaemia > 180 mg/dl and glucose levels should be maintained in the range of 140–180 mg/dl, avoiding hypoglycaemia. In patients treated for diabetes, in the acute phase of stroke, it is recommended to temporarily discontinue current oral antidiabetic drugs and implement an intensive model of insulin therapy. Blood glucose levels should be closely monitored on an empty stomach and 2 hours after main meals and during the evening and night hours in all stroke patients within the first 72 hours of treatment. In patients who are unconscious and/or have swallowing disorders, gastrointestinal nutrition should be provided as soon as possible through the placement of an intragastric tube and regular enteral feeding. In stroke patients without known diabetes, once the patient is stabilised, a diagnosis of diabetes should be made before discharge from hospital, including the determination of the indication for a glucose load test and HbA_{1c} determination. Considering the results of CVOT studies confirming beneficial cardiovascular effects of certain GLP-1 receptor agonists (liraglutide, semaglutide, dulaglutide) and neutral effects of flosins, after taking into account individual contraindications, they should be recommended for further treatment of diabetes.

Conclusions: Hyperglycaemia in the course of stroke requires intensive treatment, according to a management algorithm accepted by diabetologists and neurologists. In patients without known diabetes, once the clinical condition is stabilised, a diagnosis of diabetes should be made as soon as possible. In the treatment of diabetes, the inclusion of new hypoglycaemic therapies with proven cardiovascular benefits (GLP-1 receptor agonists, SGLT2 inhibitors) should not be delayed with an emphasis on GLP-1 agonists.

P29
Diabetic striatopathy: a rare manifestation of diabetes and a diagnostic dilemma

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Introduction: Diabetic striatopathy is a specific type of neuropathy as it affects the central nervous system, whereas the most commonly observed complication of diabetes in clinical practice is peripheral polyneuropathy. It is characterised by involuntary, arrhythmic, rapid movements of high amplitude (chorea and ballismus) and the presence of hyperintense lesions in the striatum on T1-weighted magnetic resonance images. A feature pointing to diabetic microangiopathy as the cause of the observed abnormalities in the subcortical nuclei is the presence of ischaemic lesions without mass effect or disruption of the internal capsule continuity.

Aim of the study: The aim of this study was to present the current knowledge on the impact of chronic hyperglycaemia on the development of diabetic striatopathy in people with type 2 diabetes.

Material and methods: Analysis of PubMed, Scopus, Polish Medical Bibliography and Web of Science databases in which keywords related to diabetic striatopathy were searched.

Retrospective analysis of available medical records.

Results: In 1 in 100,000 cases, haemichorea/haemiballismus syndrome is the first manifestation of diabetes. The clinical picture, for reasons that are not fully understood, in these patients usually

does not show ketone bodies in the urine or blood (non-ketotic hyperglycaemia) and therefore they do not have acidosis at the time of diagnosis of diabetes. Brain MRI shows hyperintense signal of the caudate nucleus and shell in T1-weighted images, probably reflecting manganese accumulation in gemistocytes (protein-rich astrocytes found in acute brain injury). These lesions may be located either opposite to the clinical manifestations or, less commonly, bilaterally. The prognosis for the resolution of abnormal involuntary movements in these cases is usually good and in general most symptoms resolve completely after a few days, weeks or, less commonly, months following normalisation of blood glucose levels. However, it is not uncommon for symptoms to be so persistent that additional pharmacological treatment is required. Changes in the brain in radiological images may persist for a long time, even after the clinical symptoms have disappeared, from several weeks to 6 years. The most commonly accepted hypothesis for the pathophysiology of diabetic striatopathy is local cerebral hypoperfusion due to excessive blood viscosity following chronic hyperglycaemia. This ischaemia in the central nervous system leads to an increase in anaerobic metabolism, a decrease in γ-aminobutyric acid levels and the triggering of thalamocortical hyperactivity, manifested by abnormal involuntary movements.

Conclusions: Due to the rarity of this complication of diabetes, to date there is insufficient knowledge about it, including its incidence, demographic determinants, correlation of clinical symptoms and location of abnormalities in the striatum. Further multifaceted understanding of diabetic striatopathy, including mechanisms leading to basal ganglia damage, effectiveness of different treatment strategies, frequency of recurrence of clinical symptoms, seems to be necessary to formulate recommendations for its diagnosis and treatment, and preferably prevention.

P30
Hypoglycaemia in a patient with autoimmune encephalitis

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Introduction: Hypoglycaemia is one of the reasons why a patient without diabetes visits a diabetologist. The most common cause of symptomatic hypoglycaemia is functional, usually postprandial hypoglycaemia. Less commonly, it is hypoglycaemia caused by a pancreatic tumour – insulinoma. Hypoglycaemia caused by immunological disorders – the presence of antibodies against insulin or insulin receptors – is even rarer.

Case description: A 59-year-old man was admitted to the Department in January 2020 for a diagnosis of hypoglycaemia. History of 2-time glycaemic drops to about 30 mg/dl confirmed by laboratory tests. The reduction in glucose levels was not associated with meals, exercise or fasting. The glucose drops occurred 2 times, the first time being in July and the second time in November 2019.

Autoimmune encephalitis diagnosed in August 2019, based on positive antibodies reacting with recombinant tretinoin antigen and focal epilepsy in the course of encephalitis. Hypothyroidism in autoimmune disease (10.2019.). Bronchial asthma. Deaf-mutism.

July/August 2019 muscle stiffness making it very difficult to move and perform daily activities and gradually increasing symptoms such as confusion, hallucinations, epileptic seizures. He currently has retrograde amnesia relating to July and August, as well as increased pain in his right shoulder and stiffness in his fingers. 2× confirmed hypoglycaemia.

Fasting trial negative – insulinoma ruled out.

Fasting trial results:

- glucose mg/dl start = 86.99; end = 71.79;
- insulin μIU/ml start = 6.2; end = 3.4;
- C-peptide ng/ml start = 1.94; end = 1.06;
- glycated haemoglobin (HbA_{1c}) = 4.9% (30 mmol/mol).

Anti-GAD antibodies = 150.6 IU/ml (normal < 10).

Pituitary-adrenal axis diagnosis was performed and it was normal. Secondary adrenal insufficiency was excluded as a cause of hypoglycaemia. Possible causes of hypoglycaemia in the patient Given the patient's history and examination findings, it should be assumed that the cause of hypoglycaemia was an autoimmune disorder. Possible causes are:

- hypoglycaemia due to anti-insulin antibodies;
- hypoglycaemia due to anti-insulin receptor antibodies;
- β-cell destruction caused by an autoimmune process.

The most likely cause of hypoglycaemia is the presence of antibodies against insulin receptors.

However, hypoglycaemia related to β-cell destruction by an autoimmune process cannot be excluded, as demonstrated by anti-GAD antibodies, although their presence may also be related to the underlying disease (autoimmune encephalitis) – the patient requires further observation of glucose concentrations.

Conclusions: During the one-year follow-up, the patient did not have recurrent hypoglycaemic events or glycaemic elevations. During the one-year follow-up, the patient did not have recurrent hypoglycaemic events or blood glucose elevations. The neurological and motor condition improved significantly.

P31
Determination of morphological and neurochemical changes in nerve endings of dermis sections in diabetic neuropathy

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Introduction: Peripheral nerve neuropathy is one of the most common complications of diabetes affecting 60% of patients. It is the most common cause of foot ulcers and amputations and contributes to severe sensorimotor disorders, affecting the health of patients and causing significant economic losses to both the patient and the healthcare system. To date, the exact causes of peripheral neuropathy remain unknown; several factors are thought to contribute to the onset of neuropathy such as lack of or poor glycaemic control, impaired perineural circulation or impaired axonal transport.

Aim of the study: The aim of this project was to determine changes in the expression of key proteins associated with axonal transport in the nerve endings of superficial peripheral nerves located in the dermis layer of the distal lower limbs.

Material and methods: Ten healthy subjects and 10 patients with diagnosed diabetes (> 5 years after diagnosis) were enrolled in the study. After obtaining approval from the Local Ethical Committee for the proposed study and after receiving individual consent from each person qualified to participate in the study, dermis sections were taken from the control group and patients for analysis.

After obtaining approval from the Local Ethical Committee for the proposed study and after receiving individual consent from each person qualified to participate in the study, dermis sections were taken from the control group and the patients for analysis. After collection, sections were fixed and prepared for immunofluorescence staining for PGP 9.5 (panneuronal marker), DIAPH1, actin, liprin and proliferin (axonal transport, cytoskeleton). Immunofluorescence analysis was performed using a fluorescence microscope and ImageJ software according to a previously developed method.

Results: Preliminary results indicate that there are differences in the expression of cytoskeletal proteins associated with axonal transport between the control group and diabetic patients. Immunofluorescence analysis showed statistical differences in the number of fibres stained as PGP 9.5 (mean 4.35 vs. 3.07 fibres, control vs. diabetes), furthermore for DIAPH1, liprin and profilin visible, but not reaching statistical significance, differences in the intensity of immunostaining were observed between the control and diabetes groups.

Conclusions: From the preliminary data obtained, noticeable differences in the immunoexpression of key axonal transport proteins emerge between the control and diabetic groups, confirming the role of disturbances of this transport in the development of diabetic neuropathies. These results are a prelude to further studies on the role of axonal transport in neuropathy formation and confirm the role of cytoskeletal proteins in diabetes-related neurological complications in the peripheral nervous system.

P32
The Urinary Incontinence in People with Diabetes Report – an interdisciplinary perspective

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Introduction: Urinary incontinence is considered by the WHO to be one of the most important health problems of the 21st century and has the status of a social disease. In 2008, the estimated number of people with urinary incontinence worldwide was 346 million and in 2013 it was 383 million. It is estimated that in Poland the problem of urinary incontinence may concern about 2.5 million people. Diabetes is the silent pandemic of the 21st century. In Poland, over 2 million people (i.e. 9.1%) currently suffer from diabetes, and by 2025 over 2.7 million (11.0%) will be affected. The "Urinary Incontinence in People with Diabetes Report" confronts these two challenges of our time, which require a multidisciplinary approach.

Aim of the study: The aim of this study was to find out the frequency of urinary incontinence in people with diabetes mellitus, with an assessment of their level of knowledge about urinary incontinence, the impact of this condition on the patients' quality of life, as well as getting to know the sources of knowledge from which they seek help.

Study group and methods: The study group consisted of 400 people with type 1 (n = 150) and type 2 (n = 250) diabetes. There were 65% women and 35% men in the study group. The mean age of the subjects was 55.9 ±10.2, the mean duration of disease was 11.09 ±6.34. The subjects completed the questionnaires independently or with the support of a diabetes educator. The survey questionnaire contained 15 questions.

Results: Significant among the many data are the results that 82% of people with type 2 diabetes (n = 250) and 26% of people with type 1 diabetes (n = 150) suffer from urinary incontinence, with the remainder being at risk. None of the respondents knew any methods of treatment for urinary incontinence. Quality of life is more frequently affected by urinary incontinence in people with type 2 diabetes (p = 0.004). It was verified that accompanying depression (p < 0.001), obesity (p = 0.004) in people with urinary incontinence have a significant impact on quality of life indicating most often limitations in undertaking physical activity. Despite the complaints, as many as 67% of this group had never discussed the issue with a medical professional. The younger the persons the more often they do not talk about urinary incontinence complaints (p = 0.01). In the female group, the lack of talk about urinary incontinence complaints decreases with age (p = 0.004). People with type 2 diabetes are more likely to talk about urinary incontinence complaints (p = 0.008). Most often, respondents chose a urologist from the entire treatment team to talk to (p = 0.01).

Conclusions: The study shows a significant incidence of urinary incontinence in people with diabetes. The subjects have no knowledge of treatment methods for urinary incontinence. Urinary incontinence significantly affects the quality of life of people with diabetes. People with diabetes do not discuss urinary incontinence with medical staff.

P33
DIAPH1, RAGE, CML and HMGB1 proteins expression in sciatic nerve – influence of type i diabetes on neuropathy development

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Introduction: Neuropathy is one of the most commonly diagnosed complications among patients affected by diabetes. This problem has been recognised and is currently being intensively researched in order to establish the pathomechanism of this disease and mitigate its consequences. DIAPH1 belongs to the formin family of Rho-GTPases and is one of the ligands of the RAGE (receptor for advanced glycation end products). The best known final glycation product is Nε-carboxymethyllysine (CML). It has recently been speculated that a key protein that detects high glucose levels as a cellular stressor and danger signal is HMGB1 (high mobility group box). There are indications that the environmental stress of high glucose levels in the cell, as well as increased glycation and the presence of harmful end products of advanced glycation, may contribute to diabetic neuropathy.

Aim of the study: The main aim of the experiment was to investigate whether type 1 diabetes affects the protein expression levels of DIAPH1, RAGE, CML and HMGB1, as well as the number of myelinated nerve fibres in the mouse sciatic nerve.

Materialand methods: OVE26 mice (strain FVB(Cg)-Tg(Ins2-CALM1)26Ove Tg(Cryaa-TAg)1Ove/PneJ] and FVB mice (strain FVB/NJ) from the Jackson laboratory (Bar Harbor, USA) were used for the study. The sciatic nerve was collected from OVE26 (n = 4, study group) and FVB (n = 4, control group) males aged seven months.

The expression level and protein localisation of DIAPH1, RAGE, CML and HMGB1 were determined using an immunohistochemical staining method based on an indirect immunoenzymatic reaction using a substrate for the enzyme (DAB). In turn, the number of myelinated nerve fibres was calculated by staining with toluidine blue.

Results: The expression of the DIAPH1, RAGE, CML and HMGB1 proteins in the mouse sciatic nerve was demonstrated. An increase was observed ($p \leq 0.05$) in the protein expression levels of RAGE and HMGB1 in the sciatic nerve taken from mice with type 1 diabetes (OVE26) compared to the control group (FVB). There were no differences ($p \geq 0.05$) in the expression levels of DIAPH1 and CML between the study groups. There was a trend towards a decreased ($p = 0.057$) number of myelinated nerve fibres in the sciatic nerve in mice with type 1 diabetes.

Conclusions: The results show that in mice with type 1 diabetes, as the number of myelinated nerve fibres decreases, the expression levels of the RAGE as well as HMGB1 proteins increase in the sciatic nerve. High glucose levels can activate signal transduction pathways dependent on these proteins and contribute to the development of diabetic neuropathy. The glycation and oxidative stress marker (CML), the receptor for glycation end-products and its ligands DIAPH1 and HMGB1 were shown to be involved in the development of neuropathy in the type I diabetic mouse. Inhibition of the expression of these proteins, in diabetic patients, may be a future therapeutic target in preventing the development of neuropathy.

P34
Diabetic neuropathy in type 1 and type 2 diabetes in mice

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Introduction: Diabetic neuropathy is the most common neurological complication of type 1 and 2 diabetes (T1D and T2D), affecting the peripher-

al nervous system, leading to sensory impairment and pain.

Aim of the study: The aim of this study was to assess the severity of diabetic neuropathy in the two types of diabetes, taking into account functional, structural and biochemical changes in the sciatic nerve.

Material and methods: The experiment included three groups of mice, including a control group (fed a low-calorie diet), a T1D group (streptozotocin injection – STZ) and a T2D group (fed a high-fat diet – HFD). The experiment lasted 4 months.

The mice were characterised in terms of experimentally induced phenotypic (body weight) and metabolic (blood glucose) changes. To assess the status of diabetic neuropathy of the sciatic nerve, nerve conduction study (ENG), morphometric and morphological analysis and Western Blot analysis of proteins associated with inflammation and oxidative stress were performed.

Results: Of the experimental groups, HFD mice had the statistically highest, and STZ the lowest, body weights ($p < 0.001$). Only mice in the STZ group developed diabetes, as indicated by elevated blood sugar levels compared to the other groups ($p < 0.001$). Compared to healthy control mice, fewer nerve fibres were observed in the STZ and HFD groups ($p < 0.01$), which translated into impaired motor and sensory nerve conduction in these animals, with statistically significant decreases in ENG measurements observed only in the STZ group ($p < 0.01$). The Western blot analysis revealed increased expression levels of the pro-oxidant protein nNOS in sciatic nerves isolated from the STZ and HFD mice ($p < 0.05$). At the same time, the expression levels of the antioxidant protein SOD1 were significantly reduced in these groups compared to the control group ($p < 0.05$). Of the proinflammatory proteins tested, only the expression level of S100b protein was elevated in the HFD group, compared to the STZ group ($p < 0.01$) and the control group ($p < 0.05$).

Conclusions: In the study presented here, the use of experimental treatments consisting of STZ injection and HFD feeding, led to the development of a similar degree of peripheral nerve damage, including a number of morphological and electrophysiological changes in the sciatic nerve. Our study indicates that HFD-fed mice, before developing full-blown diabetes, have neuropathic changes in thick nerve fibres, and that glycaemic status is not a major factor influencing the development and progression of neuropathy in T2D. Noteworthy is the significant disturbance in oxidant-antioxidant balance accompanying neuropathic nerve lesions observed in both early pre-diabetic (HFD) and prolonged diabetic (STZ) mouse groups. Excessive formation of reactive oxygen species and insufficient antioxidant protection play an important role in the development of neuropathy in both types of diabetes.

POSTER SESSION 5 – TYPE 1 DIABETES AFTER HIGH SCHOOL GRADUATION

Chairs: Andrzej Gawrecki, Tomasz Klupa, Adam Krętowski

P35
Coincidence of type 1 diabetes and autoimmune pancreatitis – a case report

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A patient less than 18 years old presented to the ED for severe abdominal pain. A suspicion of "acute abdomen" was raised and the patient consulted a surgeon who ruled out a surgical basis for the pain. When taking a more detailed history, in addition to severe abdominal pain for several days, the patient reported having symptoms of polyuria, polydipsia and a loss of approximately 4 kg of body weight over the past week. In the ED, capillary blood glucose measurement (700 mg/dl) and gasometry (pH 7.16, BE – 20.9 mmol/l, HCO3 9.1 mmol/l) were performed, which revealed moderate ketoacidosis. Due to his severe general condition, inadequate in terms of gasometric parameters, the patient was hospitalised in the ICU for 2 days. He was then transferred to the Paediatric Diabetes Ward, where the autoimmune background of the disease was confirmed (positive ZnT8 and GAD antibodies) and type 1 diabetes (DM1) was diagnosed.

Screening abdominal ultrasound showed Wirsung's duct dilated to 4 mm – extended diagnosis was recommended. The MRI showed a segmentally dilated main pancreatic duct with uneven outlines, discrete 2ndorder ducts and infiltrating diffusion restriction in the pancreas. A suspicion of an inflammatory process, most likely autoimmune in origin, was raised. Once a malignant lesion was excluded, including by biopsy and tumour antigen testing, a diagnosis of autoimmune pancreatitis was made, currently requiring no treatment. The patient is currently under the care of a diabetes and gastroenterology outpatient clinic.

Autoimmune pancreatitis (AIP) is a chronic disease, considered part of a generalised autoimmune disease. It usually occurs late, around the 7th decade of life, more often in men. The progression, as in DM1, may be asymptomatic for a long time. At the time of diagnosis, the most common symptoms are jaundice, weight loss, diabetes (unspecified type), abdominal pain and acute pancreatitis. In the case described, the patient's age made the diagnosing physicians think of DM1, but in older people it is easy to overlook the autoimmune background of diabetes (LADA diabetes), and focus on more common AIP in this population.

Type 1 diabetes is very often accompanied by other autoimmune diseases. The screening includes celiac disease and autoimmune thyroiditis. However, it should be remembered that in a patient already diagnosed with DM1, other rarer autoimmune diseases are also possible, even if the patient's age, as in the case described, is not typical.

P36
Type 1 diabetes mellitus diagnosed in a patient over 80 years of age with associated autoimmune diseases – a case report

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Introduction: Type 1 diabetes is most often diagnosed at a young age and is characterised by absolute insulin deficiency. According to the classification of the Polish Diabetes Association, the definition of type 1 diabetes of autoimmune aetiology includes slow-progressing diabetes (LADA). This type of diabetes, in the early stages of the disease, is characterised by insulin independence. In such patients, especially if they are elderly, type 2 diabetes is often misdiagnosed.

Aim of the study: The aim of this study is to present the description of a patient with vitiligo, alopecia areata and autoimmune diabetes mellitus diagnosed at 84 years of age.

Material and methods: Retrospective analysis of available medical records.

Case description: The patient was diagnosed with diabetes in March 2020, in her 84th year. Medical records show that venous blood glucose at the time of presentation to hospital was 967 mg/dl, pH 7.4, effective plasma osmolality 317 mOsm/kg H_2O. A diagnosis of type 2 diabetes was then made. Intermediate-acting human insulin was prescribed as a single injection before

breakfast. Due to persistent hyperglycaemia, polyuria and polydipsia, the patient was readmitted to hospital in November 2020. On admission, venous blood glucose was 578 mg/dl, HbA_{1c} 12.7%, C-peptide 0.26 nmol/l, body weight 68 kg, height 168 cm, BMI 24.1 kg/m^2. Intravenous insulin infusion was administered, followed by intensive insulin therapy. Due to concurrent autoimmune diseases and atypical onset of the disease, a suspicion of autoimmune diabetes was raised. The antibody results confirmed this assumption – ICA 160 units, anti-GAD 3473 U/ml, ZnT8 884.29 U/ml.

Conclusions: The above case report shows that autoimmune diabetes with acute onset can occur at any age, even in late adulthood. The initial misdiagnosis was probably due to being suggestive of the patient's age and the absence of metabolic acidosis. It delayed the implementation of intensive insulin therapy and exposed the patient to persistent hyperglycaemia for several months. Co-occurrence of autoimmune diseases should always prompt the diagnosis of type 1 diabetes.

P37
Type 1 diabetes during oral retinoid therapy – coincidence or induction? Case reports

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Oral retinoids (ORs) are effective and widely used drugs for the treatment of acne. Increased blood glucose levels and new cases of diabetes are also among the many side effects of ORs mentioned. The literature has so far reported a case of type 1 diabetes mellitus (DM1) with diabetic ketoacidosis (DKA), LADA diabetes and cases of autoimmune thyroiditis (AITD) during or just after the OR treatment course. It has been suggested that OR therapy may be an environmental trigger for autoimmunity. Last year there were 3 cases of newly diagnosed DM1 in OR users at our centre.

Patient 1: A 13-year-old boy admitted for vomiting and weakness with typical symptoms of diabetes (polydipsia, polyuria, weight loss) for one month. Nine months of OR therapy for nodular acne was continued until the date of DM1 diagnosis. Abnormal fasting blood glucose observed during therapy was considered a side effect of treatment. Family history indicated a burden of Crohn's disease in the father. On admission, there was moderate DKA (pH 7.0; HCO3– 4.8 mmol/L; BE –24.9 mmol/l), hyperglycaemia 409 mg/dl, HbA_{1c} 11.9%, positive GADA antibody titer 375.22 U/ml and low C-peptide concentration 0.7 ng/ml.

Patient 2: A 15-year-old girl admitted because of typical diabetic symptoms that had been present for a month. The patient completed one year of OR therapy 2 months prior to hospitalisation. Glycaemia was not monitored during therapy. Family history showed a burden of AITD in the mother and DM1 in the patient's brother and father. On admission, mild DKA (pH 7.29; HCO3– 12.7; BE –13.8), HbA_{1c} 13.9% and positive antibody titres of ICA(+++), IA2 (44.6 U/ml) and GADA 42.9 u/ml were found. In addition, AITD was diagnosed during hospitalisation.

Patient 3: A 15-year-old boy admitted due to typical symptoms of diabetes that had been present for a month. OR treatment was started 3 months earlier for nodular acne. Glycaemia was not controlled during therapy. Family history was not affected by autoimmune diseases. On admission there was moderate DKA with a pH of 7.0, hyperglycaemia of 570 mg/dl, HbA_{1c} of 16.9%. Autoantibodies for DM1 and C-peptide levels are still being processed. During hospitalisation, the patient was also diagnosed with AITD. After stabilisation of glycaemia and dermatological consultation, the patient was continued on OR therapy.

Both before and during OR treatment, it is important to remember to monitor blood glucose regularly according to general recommendations. If abnormal glycaemia is present, it is imperative that the diagnosis for DM1 (including immunological diagnosis) is deepened, especially in adolescents and young adults. Increased vigilance should be exercised in patients with a positive personal and/or family history of autoimmune disease, and more frequent blood glucose monitoring may be required. The relationship between type 1 diabetes and oral retinoids is unclear and requires further study.

P38
Results of growth hormone treatment of a patient with somatotropin hypopituitarism and type 1 diabetes mellitus

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Introduction: Currently, the incidence of diabetes is increasing especially in younger age groups (under 5 years of age). Growth hormone deficiency has a prevalence of 1 : 3500–1 : 8700, so the coexistence of these conditions may be increasing. In diabetic patients, there are multiple mechanisms that impair the growth process, affecting the GH – insulin-like growth factor (IGF-1) axis. However, with properly controlled diabetes, patients achieve a normal body height and should be diagnosed for causes of short stature other than diabetes. There are few reports on the safety and effects of recombinant human growth hormone (rhGH) in patients with somatotropin hypopituitarism (SNP) and type 1 diabetes. Of greatest concern is the increase in IGF-1 levels during rhGH treatment, which may promote the progression of diabetic retinopathy.

Aim of the study: The aim of this presentation is to present the effects of rhGH treatment of a patient with SNP and type 1 diabetes.

Case description: The child was diagnosed with diabetes at the age of 15 months. The patient was treated with intensive insulin pen therapy for 7 months after diagnosis, but large glycaemic fluctuations were observed. At 22 months of age, insulin therapy with a personal insulin pump was started, with good compensation. From the age of 2 the child's growth curve was below the 3rd centile. At 7 years of age, the girl was diagnosed with SNP in the course of the diagnosis of short stature. The child's father had a history of being treated with rhGH for SNP. At the age of 7 years and 2 months the girl started rhGH therapy.

Results: An acceleration of the growth rate was observed after the start of treatment. At the start of rhGH administration, the girl's body height was 113.2 cm (< 3rd centile, –2.13 SDS), after one year of treatment 121.1 cm (3rd–10th centile, –1.71 SDS). The child's current body height at 13 years and 3 months is 152.5 cm (10th–25th centile; –1.35 SDS). IGF-1 levels were continuously monitored and maintained around the lower range of normal values. After the inclusion of rhGH, the need for insulin increased. Before starting rhGH it was about 0.6 units/kg of body weight/day, after starting rhGH it increased to about 1 unit/kg of body weight/day, now 0.9 units/kg of body weight/day. No worsening of metabolic control of diabetes was observed. The percentage of glycated haemoglobin did not change significantly. It was 6.70% at the start of treatment, 6.70% after one year of treatment and 6.41% at the last visit.

No features of diabetic retinopathy were observed.

Conclusions: In diabetic patients, it is also advisable to search for causes of short stature other than metabolic imbalance, since children with well-controlled diabetes do not present growth disturbances. Based on the literature and our own observations, it appears that rhGH treatment of children with diabetes is safe and beneficial. There is a need for larger group studies to assess the safety and effects of rhGH therapy in children with type 1 diabetes.

P39
Levels of biomarkers of muscle and bowel damage after exercise with predominantly eccentric contractions in men with type 1 diabetes

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Introduction: Eccentric exercise plays an important role in building overall fitness, but compared to concentric or isometric contractions, it leads to more muscle damage from micro-injuries. Furthermore, the redistribution of blood flow during this type of intense exercise can lead to reduced blood supply to the gut and oxidative stress.

Aim of the study: The aim of this study was to compare the levels of biomarkers of muscle and

Table 1. Levels of muscle and intestinal biomarkers of damage after exercise with a predominance of eccentric contractions in the study groups

Variable	T1DM	Control group	*p*
Pre-test myoglobin [ng/ml]	25.4 ±11.1	26.3 ±10.9	0.790
Pre-test LDH [U/l]	198.9 ±54	152.4 ±41.1	0.004
Pre-test zonulin [ng/ml]	20.9 ±7.3	18.3 ±7.3	0.361
Myoglobin 60 minutes after the test [ng/ml]	194.9 ±62.6	78.2 ±24.8	< 0.001
LDH 60 min after the test [U/l]	298.5 ±46.4	206 ±43.4	< 0.001
Zonulin 60 min after the test [ng/ml]	36.1 ± .5	27.5 ±9.7	0.008
Myoglobin 24 hours after the test [ng/ml]	84.4 ±24.0	27.7 ±9.1	< 0.001
LDH 24 hours after the test [U/l]	230.8 ±73.9	151 ±27.4	0.002
Zonulin 24 hours after the test [ng/ml]	40.4 ±9.7	20.5 ±8.5	< 0.001

bowel damage after exercise with predominantly eccentric contractions (SE) in men with type 1 diabetes mellitus (T1DM) and healthy subjects.

Material and methods: Selected biomarkers were assessed after a 30-minute run on an incline treadmill (10% incline) with a load of 5% of the patient's body weight at a maximum intensity of 60% of maximal oxygen uptake.

Results: Nineteen men with T1DM with a mean disease duration of 12.2 ±6.0 years, characterised by very good glycaemic control (mean HbA_{1c} percentage 6.9 ±0.7%, 52 mmol/mol) and 20 healthy men were enrolled in the study. There was no difference in age (25.3 ±5.4 vs. 24.3 ±2.5, $p = 0.91$) and BMI (23.9 ±2.3 vs. 22.8 ±2.0, $p = 0.15$) between groups. Initially, patients with T1DM displayed elevated lactate dehydrogenase (LDH) activity. At 60 minutes and 24 hours after the test, the patients with T1DM had higher levels of myoglobin, LDH and zonulin compared to healthy men (Table 1).

Conclusions: Male patients with T1DM appear to be more susceptible to muscle and bowel damage after SE-majority exercise compared to those without diabetes.

P40
Assessment of coagulation parameters in patients with type 1 diabetes by rotational thromboelastometry – a preliminary study

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Introduction: Rotational thromboelastometry (ROTEM) is a method used to assess the dynamics of whole blood clot formation, quality and lysis. Coagulation disorders observed in people with type 1 diabetes mellitus (T1DM) are one of the causes of the development of vascular complications in this group of patients.

Aim of the study: The aim of this study was to evaluate coagulation parameters in patients with type 1 diabetes by rotational thromboelastometry (ROTEM).

Material and methods: The pilot study included 16 subjects with T1DM (9 women/7 men) aged 26–58 years with a median duration of diabetes of 11 (Q25–Q75: 30.75–43.50) years and 18 age- and gender-matched controls (8 women/10 men). Anthropometric parameters, HbA_{1c} value (in the T1DM group), platelet count (PLT), prothrombin time (PT), activated partial thromboplastin time (aPTT) and fibrinogen concentration were assessed in all subjects. The viscoelastic properties of the blood clot were investigated using ROTEM: clotting time (CT), clot formation time (CFT) and angle α, maxi-

mum clot firmness (MCF), clot strength parameter (G), clot lysis index in 30/45/60 min (LI 30/45/60), lysis onset time (LOT) and lysis time (LT).

Results: In the T1DM group, the median HbA_{1c} was 9.35 (7.825–9.750)%, diabetic nephropathy was present in 3 (18.75%), retinopathy in 7 (43.75%) and polyneuropathy in 7 (43.75%) patients. The PLT count, PT, aPTT, and the fibrinogen levels were comparable between the diabetic patients and the control group. The T1DM patient population showed significantly higher MCF (p = 0.01), G (p = 0.006), LI45 (p = 0.02), LOT (p = 0.002) and LT (p = 0.002) values.

Conclusions: Despite comparable values of routinely measured basic coagulation parameters in both groups, qualitative clot analysis using the ROTEM technique revealed differences in the time to clot formation and fibrinolysis as well as in the elasticity of the clot formed in the patients with T1DM. The results indicate a hypercoagulable state in patients with T1DM. Further studies on a larger group of patients with type 1 diabetes are needed to confirm the results.

P41
Hematopoietic stem cells and stem cells with embryonic characteristics – new potential predictors of β-cell function in patients with newly diagnosed type 1 diabetes

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Introduction: There is wide variation in the progression of loss of pancreatic β-cell function among patients with type 1 diabetes. While some patients already present with only trace residual endogenous insulin secretion at the time of diagnosis, in others a phenomenon of partial remission can be observed, during which normoglycaemia and good metabolic control are achievable with low daily insulin requirements. However, predicting which of these groups a particular patient will belong to still poses many difficulties. One possible explanation for this phenomenon may be the regenerative processes taking place in the pancreas parallel to the destruction of the pancreatic islets.

Aim of the study: The aim of this study was to evaluate circulating haematopoietic stem cells (HSCs) and very-small embryonic like stem cells (VS.ELs) in peripheral blood, to determine their importance in maintaining pancreatic β-cell function and their impact on the subsequent occurrence of partial remission in children and adolescents with newly diagnosed type 1 diabetes.

Material and methods: The study involved 59 patients aged 6–18 years with newly diagnosed type 1 diabetes, followed up for a further 2 years. The control group consisted of 31 healthy children matched for gender and age.

HSC and VS.EL cells were isolated from the whole blood collected from the patients at the time of diabetes diagnosis, and identified by four-colour flow cytometry. Pancreatic β-cell function was assessed indirectly by determining C-peptide secretion at diagnosis and after 2 years. Partial remission of diabetes was defined as insulin requirement < 0.5 units/kg/24 h with maintenance of HbA_{1c} < 7%. The study group was divided into subgroups on the basis of median VS.EL, HSC and C-peptide levels with respect to their relationship to each other and to the occurrence of partial remission.

Results: Among patients with higher stimulated C-peptide levels at the time of diabetes diagnosis, lower HSC levels (p < 0.05) and higher VS.EL levels (p < 0.05) and higher VS.EL/HSC ratios (p < 0.05) were observed. Accordingly, patients maintaining higher C-peptide secretion 2 years after diagnosis appeared to present lower HSC levels and a higher VS.EL/HSC ratio at diagnosis than the other patients (p < 0.05). There was also a negative correlation between HSC levels and stimulated C-peptide levels at diagnosis (p < 0.05). In addition, patients with lower HSC levels at diagnosis presented a trend towards a higher rate of partial remission at a later stage, especially in the first 3–6 months after disease onset.

Conclusions: The results indicate a significant role of HSC and VS.EL cells in pancreatic β-cell regeneration processes, and assessment of their mobilisation into peripheral blood at the time of diagnosis of type 1 diabetes may be an important predictor of β-cell function and the occurrence of partial remission of the disease in the future.

POSTER SESSION 6 – NO MORE DIABETIC FOOT

Chairs: Piotr Liszkowski, Beata Mrozikiewicz-Rakowska, Przemysław Witek

P42
Care of patients with diabetic foot syndrome during the first lockdown during the COVID-19 pandemic in Poland – a report from a university diabetic foot syndrome treatment centre

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Introduction: Patients with Diabetic Foot Syndrome (DFS) require multidisciplinary treatment. The first lockdown during the COVID-19 pandemic resulted in reduced access to medical care worldwide. Data from a number of countries on DFS show a decrease in the number of inpatient services provided with an increase in online doctor consultations, a change in the characteristics of the patients presenting and an increase in amputations. So far, no such data have been analysed in Poland.

Aim of the study: To assess the impact of the COVID-19 pandemic on the characteristics of newly presenting patients, the number of amputations and the way patients contact the outpatient DFS treatment centre in real clinical practice during the first lockdown in Poland.

Material and methods: Electronic medical records of patients with DFS were searched to identify: number of inpatient visits, online doctor consultations, newly admitted patients, including those with more severe forms of DFS (defined by Texas Classification System 2; 3; B; C; D), patients with active Charcot neuropathic osteoarthropathy (CN), revascularisations, small and large amputations during the periods of the first 12 weeks of the COVID-19 pandemic in Poland (13.03.2020–05.06.2020), the 12 weeks preceding that time (19.12.2019-12.03.2020) and the 12 weeks analogous to the lockdown period, one year earlier (13 March, Mai, July 2019).

Results: The review confirmed a significant decrease in the number of total services and inpatient visits during the lockdown with the implementation of online doctor consultations, respectively: inpatient visits vs. online consultation (236 vs. 49); (464 vs. 0); (564 vs. 0). Among newly admitted patients with no significant difference in baseline clinical characteristics during the lockdown, there was a higher proportion of patients with more severe forms of DFS relative to control periods: 15/33(45.5%); 9/31(29%); 15/50 (30%) $p < 0.05$ and active CN, 4/33 (12.1%); 2/31 (6.4%); 3/50 (6%) $p < 0.05$ respectively. In contrast, there was no increase in major and minor amputations, respectively: 2/33 (6.1%); 2/31 (6.4%); 2/50 (4%) and 3/33 (9.1%), 4/31 (12.9%), 17/50 (14%).

Conclusions: The results of the review confirm a decrease in the number of services provided to DFS patients during the first lock-down with the implementation of previously unused online doctor consultation. Newly admitted patients during the lockdown were characterised by more severe forms of DFS. During the study period, despite the unfavourable characteristics associated with more severe forms of DFS, no significantly higher number of major or minor amputations was recorded in newly admitted patients.

P43
Results of microbiological analysis of material collected from infected wounds of patients with diabetic foot syndrome

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Introduction: Diabetic foot syndrome accounted for 60% of lower limb amputations in 2018 in Poland (excluding those related to cancer, trauma and external factors). The risk of surgical treatment increases significantly if there is an infection of the soft tissues of the foot. Early initiation of appropriate antibiotic therapy can significantly reduce the risk of losing a lower limb. Assessment of the antibiotic susceptibility of pathogens causing infection in the course of diabetic foot syndrome is crucial for appropriate treatment.

Aim of the study: The aim of this study was to identify the most common microorganisms in tissue infections in diabetic foot syndrome along with their antibiotic susceptibility.

Material and methods: The results of 92 microbiological tests of material obtained from infected wounds of patients hospitalised for diabetic foot syndrome between January 2018 and December 2020 were used for the analysis.

Results: The majority of the study population was male (69%). The mean age of the patients was 59.9 years (35 to 87), duration of diabetes more than 19 years (1 month –50 years), BMI 29.45 kg/m^2 (19–43). The glycated haemoglobin (HbA_{1c}) value was 9.4% (5.3–18%). The most common patients were those with type 2 diabetes (72.5%). Type 1 diabetes was present in 19.8% and secondary diabetes in 7.7%. The mean duration of hospitalisation was 10.9 days (1–27). More than 40% of patients received an antibiotic before admission to hospital, 53% of infections were caused by more than 1 microorganism. Staphylococcus aureus (33%), Enterococcus faecalis (26%), Escherichia coli (22%), Enterobacter Cloacae (18%), Proteus mirabilis (15%) were most frequently detected. Pathogens sensitive to amoxicillin with clavulanic acid were 59%, clindamycin 46%, ciprofloxacin 61%, levofloxacin 56%, piperacillin with tazobactam 89%, metronidazole 67%, vancomycin 100%. The percentage of MRSA strains was 20% and alarm pathogens were detected in 12.4% of patients.

Conclusions: The percentage of MRSA strains was 20% and alarm pathogens were detected in 12.4% of patients. Only more than 40% of patients admitted to hospital used antibiotics despite obvious features of foot infection. 46–61% of the pathogens were sensitive to PTD-recommended empirical antibiotics, i.e. amoxicillin with clavulanic acid, clindamycin and fluoroquinolones. This points to the need to educate doctors and patients about early treatment of infection in diabetic foot syndrome and to perform microbiological tests to use appropriate antibiotics.

P44
More than half of diabetic foot ulcers do not heal (centre's experience)

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Introduction: Diabetic foot syndrome (DFS) is one of the most severe for the patient and most difficult to treat complications of diabetes. In 2018, 3436 patients in Poland, including 482 in the Mazowieckie province, were hospitalised for DFS.

Aim of the study: The aim of this study was to determine the characteristics of patients with diabetic foot and their ulcers and to summarise the results of six-month treatment in the patient population of our Centre.

Material and methods: The study included 174 patients with 212 diabetic feet hospitalised over a thirteen-month period: from February 2018 to March 2019. The final analysis of treatment outcomes included 160 patients (195 feet).

Data from the medical history, physical examination, and additional laboratory and imaging studies were collated. Information was collected including: age, nicotinism, symptoms of neuropathy and infection. The following were taken into account: ESR, CRP, HbA_{1c}, Fe, ferritin, Ca, P, mean glycaemia, ankle-brachial indices, oxygen partial pressure, assessment of abnormalities of touch, vibration, temperature and probe-to-bone tests, measurements of ulcer area and duration. Ulcerations were assessed at three and six months. Statistica 13.1 software was used for statistical analysis.

Results: The survey covered less than a third of the patients in the area (there were 3890 hospitalisations in the country and 555 in the province during the same period). Patients were mainly male (74%), with a mean age of 61.8 years, mainly with type 2 diabetes (87%), with varying diabetes compensation (mean HbA_{1c} 8.14+/–2%), with a duration of DFU ranging from a few weeks to 20 years, and a highly variable ulceration area. 48% of patients had undergone previous amputations. Charcot joint was found in 30%.

After three months, 68 (34.7%) ulcers (DFU) were healed. After a further three months, 18 cases experienced a recurrence of DFU. At six-month follow-up, 91 (47%) ulcers were healed and a further 27% reduced in size. During the first three months, 21 DFS patients required amputation and during the following three months, 7 amputations were performed. These were mainly small operations. Only one patient required amputation at knee level. With 13 ulcers healed after previous resection within the foot.

Conclusions: The population of patients with DFS represents a heterogeneous group in terms of both metabolic compensation and ulcer morphology. A significant proportion of the ulcers decreased and almost half healed during the six-month follow-up.

P45
Shape of feet in patients hospitalised in the Department of Diabetology of the Institute of Rural Medicine in Lublin

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Introduction: Peripheral neuropathy is a major risk factor for ulceration. Neuropathy results in changes in the structure of the foot, which is often manifested by plantarflexion of the phalanges. In turn, foot types are a hereditary trait. They do not change throughout a person's life. Depending on the anatomical relationships of the individual elements of the foot and its morphology, three types of foot are distinguished: Egyptian (70%), Greek (20%) and Roman (Polynesian) (10%). In the Egyptian foot, the big toe is clearly longer than the other toes or is equal to the 2nd toe. It is a strong foot, in the literature not very prone to degenerative changes. The Greek foot is characterised by the fact that the second and sometimes also the third toe are longer than the big toe. In this type of foot there is often a tendency to develop deformities. In the Roman foot, the toes are of similar length and the metatarsophalangeal joints lie at the same height, making the foot wide.

Aim of the study: to determine the foot type in people without and with diabetic foot syndrome to guide prevention.

Material and methods: The method that was used to carry out our own research was a questionnaire survey of our own design. The questionnaire included questions on: gender, age, height, weight and number of years living with the disease. A physical examination was carried out, involving close inspection of the feet to determine the type of foot in people without or with diabetic foot syndrome. A group of 280 patients treated in the Department of Diabetology between October 2020 and February 2021 were included in the study. The Excel computer programme was used to analyse the study. Approval was obtained from the ethics committee at the Institute of Rural Medicine.

Results: The study involved 280 participants (120 women, 160 men). Mean age 59 years, duration of diabetes 16 years, and BMI: 31. The Egyptian foot was present in 154 patients (55.0%). The Greek foot was formed in 120 people (42.9%). The Roman foot was diagnosed in only 6 men (2.1%).

Conclusions: During a foot check, the type of foot prone to diabetic foot formation can be identified and rapid prevention can be implemented. The most common type of foot in patients admitted to the Department is the Egyptian foot. The foot is the least frequently found.

P46
The number of ulcers among patients hospitalised in the Department of Diabetology of the Institute of Rural Medicine in Lublin depending on the shape of the foot

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Introduction: Neuropathic ulcers are the leading cause of non-traumatic foot amputation. As a result of neuropathy, there are changes in the structure of the foot, which increases the risk of ulceration. Foot type is a hereditary trait that does not change throughout a person's life. Arthritic changes are related to the shape of the foot. Depending on the anatomical relationships of the individual elements of the foot and its morphology, three types of foot are distinguished: Egyptian, Greek and Roman (Polynesian). The prevalence of foot shapes in hospitalised patients in the Department of Diabetology was successively 55–42.9–2.1%. The number of ulcers on the feet, in patients hospitalised in the Department of Diabetology during 5 months October 2020 – February 2021, was analysed. The paper was approved by the ethics committee at the Institute of Rural Medicine.

Aim of the study: To determine the incidence of ulcers according to foot shape among patients hospitalised in the Department.

Material and methods: The method that was used to carry out our own research was a questionnaire survey of our own design. The questionnaire included questions on: gender, age, height, weight and number of years living with the disease.

A physical examination was carried out, involving close inspection of the feet to determine the type of foot in people without or with diabetic foot syndrome. A group of 280 patients treated in the Department of Diabetology between October 2020 and February 2021 were included in the study. The Excel computer programme was used to analyse the study.

Results: The study involved 280 participants (120 women, 160 men). Mean age 59 years, duration of diabetes 16 years, and BMI: 31.

Type of foot – number of patients with ulceration –percent of patients hospitalised with that type of foot – total p χ^2 test:

Greek	40 (33.31%) 20 42.9%	p = 0.002231 vs. others
Egyptian	25 (16.2%)	p = 0.000513 vs. others
Roman	3 (50.0%)	p = 0.137577 vs. others
Total	68 (24.3% of all patients hospitalised at that time).	

Conclusions: The foot most prone to developing a wound on the foot is the Greek foot. During a foot check, the type of foot prone to diabetic foot formation can be identified and rapid prevention can be implemented.

P47
Effects of diabetic foot syndrome treatment with low energy laser therapy compared to standard therapy

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Introduction: Laser therapy is a type of physical therapy during which selected body surfaces are irradiated in order to stimulate cells with the energy of laser radiation. As a result of the therapy, cell multiplication, increased collagen synthesis, improved blood supply and nutrition of tissues, accelerated cell metabolism take place. This form of therapy can also be used to treat diabetic foot syndrome.

Aim of the study: Comparison of the efficacy and tolerability of low-energy laser therapy as adjunctive therapy compared to standard therapy in wound healing in diabetic foot syndrome.

Material and methods: A total of 20 neuropathic ulcers in diabetic foot syndrome were evaluated. Superficial wounds without signs of infection and without contraindications to laser therapy were included in the study – 10 wounds each in two treatment groups: standard therapy and a combination of standard therapy and biostimulation laser.

The study was a prospective randomised controlled clinical trial. Randomised therapies included the use of low-level laser therapy (LLLT) as an add-on therapy to standard treatment (SOC, meaning standard of care) alone.

SOC therapy included glycaemic optimisation, mechanical wound preparation, use of specialised healing dressings depending on wound characteristics, and antibiotic therapy if indicated. LLLT was based on 10 daily 15-minute non-contact applications with the following parameters: p = 400 mW, E = 360 J, wavelength 820 nm. The effects of the measures taken were assessed by manual planimetric comparative wound surface area (WSA) assessment at the start of the study and after 10 days of treatment. The primary endpoint will be the relative wound area reduction (WAR) calculated from the formula%WAR = (arealast–areat0)/areat0) × 100. Patients completed quality of life questionnaires regarding the treatment administered and a questionnaire to assess overall improvement or clinical change. Clinical data from the patients' history and medical records were also assessed.

Results: In the group of ulcers treated with low-energy laser, a greater reduction in wound area was achieved than in the group of wounds treated with standard therapy alone. Treatment-related quality of life did not change significantly in both study groups. The patients in both treatment groups rated the outcome of treatment as varying degrees of improvement.

Conclusions: The use of low energy laser accelerates the healing of neuropathic ulcers in diabetic foot syndrome compared to standard therapy alone. Laser treatment was not associated with treatment-related quality of life impairment.

P49
Lower limb amputations in patients with diabetes – trends, causes and 30-day mortality

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Introduction: Diabetic foot is one of the leading causes of disability worldwide. The resulting lower extremity amputations (LEAs) significantly reduce the quality of life and functioning of patients and result in significant health care costs.

Aim of the study: The aim of this study was to evaluate the trend in the number of LEA procedures performed over 10 years, to assess the diagnoses made at hospital discharge after these procedures and the associated mortality in the population of people with and without diabetes in Poland.

Material and methods: Data from patients who were hospitalised for LEA nationwide between 2010 and 2019 were analysed. Data on hospitalisations came from the National Health Fund database and data on deaths from the Ministry of Digitalisation database.

A patient was considered to have diabetes when ICD-10 code E10-E14 was the main reason for the public health service. Diagnoses at discharge after LEA were categorised according to the ICD-10 codes that were reported as the main diagnosis for the hospitalisation in the study years.

Diabetic amputations were defined as those performed in patients with diabetes, but no more than 30 days before diagnosis. Non-diabetic amputations, on the other hand, were defined as those occurring in patients who had never been diagnosed with diabetes.

Results: The annual number of LEA procedures in patients with diabetes between 2010 and 2019 increased from 5,049 to 7,759, while in patients without diabetes it remained constant (Figure 1 illustrates the above data per 100,000 population). LEAs in patients with diabetes accounted for an average of 68.6% of all amputations performed. This value has gradually increased from 61.1% in 2010 to 71.4% in 2019. The number of LEAs per 100,000 diabetic patients remained relatively stable over the same period (mean value ±SD was 242.2 ±9.85). The most common diagnosis made at discharge after LEA in diabetic patients was diabetes, ahead of vascular pathology, soft tissue/bone/joint infections and ulcers (Figure 2). The 30-day mortality rate after LEA procedures remained quite high in both patients with and without diabetes (3.46–34% and 2.24–28.99%, respectively, depending on the cause of amputation). In both groups, mortality was highest in patients with coexisting sepsis and other emergency conditions.

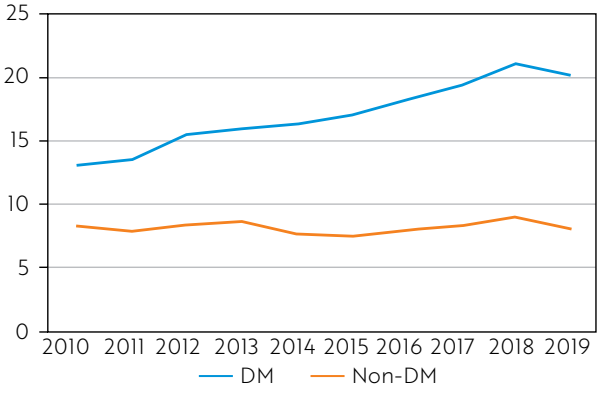

Figure 1. Number of amputations in patients with diabetes mellitus (DM) and without diabetes mellitus (Non-DM) per 100,000 population between 2010 and 2019

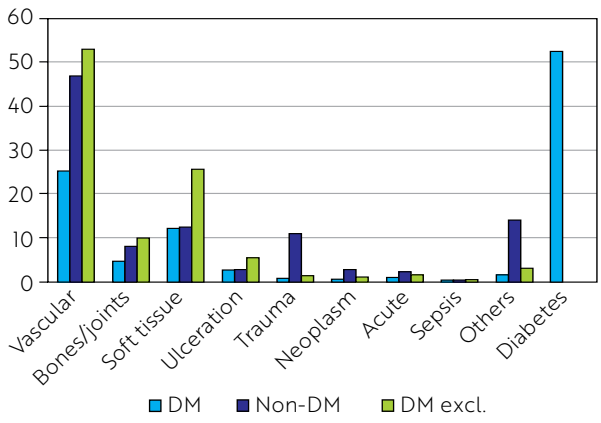

Figure 2. Categories of diagnoses made as principal at hospital discharge after amputation surgery and their percentages. Patients with diabetes – light blue bars (DM), patients without diabetes – dark blue bars (Non-DM), patients with diabetes but without ICD codes E10-E14 as principal diagnosis - grey bars (DM excl.)

In the remaining cases, the 30-day mortality rate was less than 10%.

Conclusions: The number of LEAs in patients with diabetes in Poland increased significantly between 2010 and 2019 – the increasing number of patients with diabetes is responsible for this. The most common causes of LEA were vascular pathologies, infections and ulcerations. The 30-day mortality rate after surgery was quite high and varied according to the principal diagnosis.

POSTER SESSION 7 – A SOUND MIND IN A SOUND BODY OR VICE VERSA?

Chairs: Andrzej Kokoszka, Agnieszka Szadkowska, Mariusz Tracz

P50
Professional burnout among physicians caring for patients with diabetes

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Introduction: Professional burnout is a chronic state of progressive exhaustion, weakness and distancing from work. Among other things, it is associated with an increased risk of developing anxiety disorders, depression, addiction, hypertension and a higher incidence of cardiovascular events. Burned-out doctors are less productive, more inclined to practice so-called "defensive medicine", have poorer contact with patients and are more likely to make medical errors. It has been estimated that, depending on their speciality and place of work, 25–60% of physicians exhibit characteristics of professional burnout.

Aim of the study: To determine the prevalence and assess the severity of burnout among physicians caring for patients with diabetes in relation to gender, work environment and work experience.

Material and methods: The study included 285 physicians caring for patients with diabetes. The participants were informed about the study by email and by audio-visual means during the 22st Congress of the Polish Diabetes Association. Physicians invited to the study were asked to participate in an online survey consisting of two questionnaires – the Oldenburg Burnout Inventory (OLBI) questionnaire examining two components of burnout (distancing from work and exhaustion) and a questionnaire on gender, work environment (number and characteristics of jobs) and work experience (specialisations acquired, length of service).

Results: The Cronbach's α coefficient for the OLBI questionnaire was 0.89. 17.45% of the participants had a high and 61.75% a moderate level of distancing from work. The level of exhaustion was identified as high in 44.91% of the participants and as moderate in 48.07%. High levels of distancing from work were more common among men (p = 0.10), employees of teaching hospitals (p = 0.00), doctors working exclusively in one workplace (p = 0.0000) and participants with 10–15 years of work experience (p = 0.03). In univariate analysis, the strongest predictor of a high score on the distancing subscale was working in a teaching hospital (OR = 9.96; 95% CI: 3.12–31.76, p = 0.00). In a regression model for distancing from work taking into account gender, years working with diabetic patients, working in a teaching hospital and number of jobs, the R2 was 0.22 (p = 0.00).

Men (p = 0.63), employees of teaching hospitals (p = 0.34) and primary care units (p = 0.10), physicians in private medical practice (p = 0.86), participants working in one or two jobs (p = 0.00) and young physicians (p = 0.13) were more likely to report high levels of exhaustion. Working in a non-teaching hospital appeared to be the strongest protective factor against exhaustion in the study population (OR = 0.08; 95% CI: 0.03–0.23; p = 0.0000).

Conclusions: Most participants in the study had at least moderate levels of both components of professional burnout. The percentage of physicians with professional burnout is already high among young physicians with little work experience. In the study population, physicians working in more than two jobs, including a non-teaching hospital, were the least professionally burned out. There was no relationship between gender and levels of job burnout.

P51
Psychotherapy of patients with type 1 insulin-dependent diabetes mellitus and psychiatric disorders – challenge and opportunity

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Introduction: The co-occurrence of psychiatric disorders and type 1 insulin-dependent diabetes mellitus creates a specific combination of symptoms that require special clinical attention. The literature describes specific disorders specific only to this group of patients – e.g. diabulimia, hypoglycaemia phobia, specific fear of complications, self-harm by neglecting diabetes treatment in the

course of bodrerline or other personality disorders, diabetes burnout. Treatment of these disorders requires specialist skills and collaboration between the diabetes team and psychiatrists, psychologists and psychotherapists.

Aim of the study: The aim of this study was to analyse the challenges and difficulties associated with the treatment of patients with T1DM and psychiatric disorders in the context of the psychodiabetes outpatient clinic team functioning within the University Hospital in Cracow.

Material and methods: Patients with a diagnosis of T1DM and symptoms of psychiatric disorders were referred to the clinic – some patients were referred by a diabetologist (35% of the group), the remaining patients reported having received information about the possibility of using the clinic's offer via email or Internet information. Diagnosis of patients was made by psychiatrists and clinical psychologists. Each patient underwent a diagnostic interview.

Results: Since June 2020, 57 patients have benefited from the services of the outpatient clinic, 10 of whom have been referred to group psychotherapy in the outpatient clinic, 14 have received pharmacological treatment, all patients have undergone a diagnostic process and have been advised on further treatment options. Among the patients attending the counselling centre, 32% were diagnosed with a personality disorder (F60) (including 39% with emotionally unstable borderline personality), 23% with an anxiety disorder (F40), 14% with an eating disorder (F50), 18% with an affective disorder (F30), and 4% with a mental disorder related to alcohol abuse (F10). Some patients had dual diagnoses of mental disorders.

Conclusions: Patients with insulin-dependent diabetes mellitus type 1 and psychiatric disorders should receive specialist psychodiabetes care, and psychotherapeutic and pharmacological treatment should take into account comorbidity and interdependence associated with symptoms of both diseases.

P52
Use of dietary applications in the management of type 1 diabetes

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Introduction: Despite significant progress in the management of diabetes, inadequate control of postprandial blood glucose is still a common and serious problem. The current basic treatment model for type 1 diabetes is intensive functional insulin therapy (FIT). One of the most difficult parts of this model is to skillfully estimate the dose of insulin to be given for a particular meal. Online calculators of carbohydrate exchanges (CE) and protein-fat exchanges (PFE) for a whole meal, as well as mobile apps, can be helpful for patients.

Aim of the study: The aim of this study was to investigate the interest of patients with type 1 diabetes in using dietary mobile apps.

Material and methods: An original questionnaire was used for the study, which consisted of 40 questions, including 35 close-ended questions and 5 open-ended questions. A total of 100 people (22 men and 78 women) with type 1 diabetes participated in the anonymous online survey, which was conducted between July and October 2020; 51 people were on personal insulin pump therapy and 49 people were using PEN injectors.

Results: More than half of respondents (53%) said they use mobile apps daily and several times a week. The leading application function was the carbohydrate exchanger (CE) and protein-fat exchanger (PFE) calculator with 71.6% of responses. Among mobile app users, 80.8% of respondents always or often agreed with the estimation of exchangers by mobile apps. 73% of patients felt that the use of mobile apps improved their blood glucose values. However, there was no difference in the assessment of metabolic control of diabetes between the group of respondents using and not using mobile apps at the time of the survey. Both groups achieved similar HbA_{1c} (6.87 ±1.37 vs. 7.00 ±1.12; $p > 0.05$). Also, no significant association was seen between age and time with diabetes and interest in dietary mobile apps. The obstacles indicated by the users of the applications available on the Polish market include the lack of compatibility of the application with other devices (glucometer,

sports watches, personal insulin pump) and health monitoring applications, the lack of information on physical activity management, and the lack of inclusion of the glycaemic index of products in the databases or the single features desired by users in individual applications. Among diet mobile app users, 90.5% of those surveyed would recommend such an app to others with type 1 diabetes.

Conclusions: There is a desire and interest in dietary mobile apps among the type 1 diabetes patient population. In the age of smartphones, such mobile apps can be a tool to support patient education and self-treatment at various stages of illness. They can have a positive impact on changing health habits. The availability of mobile applications on the market is large, but many of them do not yet fully meet patients' expectations.

P53
Evaluation of selected aspects of quality of life of children with type 1 diabetes in Poland

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Introduction: Type 1 diabetes is, next to obesity and asthma, the most common chronic disease in children in Poland. It is not only a medical challenge, but significantly affects all areas of a sick child's life and the functioning of their family. New forms of therapy facilitate the day-to-day management of the disease, but their availability is limited and partly dependent on socioeconomic status.

Aim of the study: The study aimed to assess the prevalence and interrelationship between the child's health status and the pattern of therapy used. Selected aspects of the child's family functioning and access to health and care services were also assessed.

Material and methods: The research material consisted of data collected through questionnaires addressed to carers of children diagnosed with type 1 diabetes. The survey questions were divided into four modules addressing the following issues respectively:

- demographics of the child and carer;
- information about the child's health and therapy;
- information about the impact of the illness on family life and the life of the child;
- information on the care of the child by other persons or institutions.

The study involved 206 carers of children and young people with type 1 diabetes.

The collected data were subjected to statistical analysis. Descriptive statistical tools were used to determine the characteristics of the study population, whereas Pearson's $\chi 2$ test and Cramer's V coefficient were used to assess relationships between variables. Statistical analysis was performed using IBM SPSS Statistics, with a statistical significance level of $p < 0.05$.

Results: The analysis of the obtained results showed the existence of links between the level of family income and the type of therapy used and the use of modern technologies. Children from better-off families also benefited from additional medical consultations. Families with higher income levels were less likely to restrict children's activities due to illness. Living outside urban centres was associated with poorer access to educational facilities and poorer childcare in educational institutions. No statistically significant correlations were observed between demographic and economic factors and child health status as expressed by the occurrence of complications. However, the incidence of the latter affected the child's family situation.

Conclusions: Research shows that there are strong links between income levels and access to modern therapies (insulin pumps, CGM systems) and access to specialist consultations for children and young people with type 1 diabetes. Unequal access to modern forms of therapy and the suboptimal nature of the care regimen actually implemented can have a negative impact on the health of the population of children and young people with type 1 diabetes. Further in-depth analysis on a larger sample is advisable. The results of such a study can make an important contribution to public policy-making in the field of health care and social policy, as well as helping in everyday clinical practice.

P54
Significant improvement in quality of life and metabolic control parameters after the use of a non-puncture scanning blood glucose measurement system (Freestyle Libre) in a patient with type 1 diabetes

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Introduction: Type 1 diabetes mellitus with an unstable, long-standing course expressed by numerous unconscious hypoglycaemic episodes, also at night, with subsequent "rebound" hyperglycaemia, with a marked dawn effect requiring the patient to take multiple daily measurements. The use of a non-puncture scanning blood glucose measurement system (FreeStyleLibre) allows for a significant improvement in the quality of life, the acquisition of good eating habits, a better understanding of the mechanisms of one's body in diabetes and the control of the glycaemic balance of diabetes at a more satisfactory level compared to the traditional method of monitoring blood glucose.

Aim of the study: To present the case of a patient with type 1 diabetes mellitus in whom the use of a puncture-free scanning glycaemic measurement system improved glycaemic control of the disease and quality of life.

Material and methods: Retrospective analysis of available medical records.

Case description: A 60-year-old man with a 41-year history of uncompensated type 1 diabetes mellitus, complicated by micro- and macroangiopathy in the form of polyneuropathy, retinopathy, ischemic heart disease, treated with insulin therapy in the intensive model based on analogue insulins (insulin aspart + degludec), under the care of the Department of Endocrinology and the outpatient diabetes clinic. Before using FreeStyle Libra over the course of May and July 2016, only 34% of blood glucose determinations (out of 500) remained within the target range (70–140 mg/dl), 53% remained above and 13% of measurements below the recommended values. HbA_{1c} was 6.1–6.4% due to the large variation in glycaemic values, this was an adulterated result. The patient used FreeStyleLibre intermittently from September 2016 to January 2020. In October 2016 blood glucose measurements, 52% remained within the target range, 38% above, 10% below the recommended values. The patient is not currently using the FreeStyleLibre system, but learning about good eating habits and the dynamics of glucose trend changes results in glycaemic values being maintained in December 2020 and January 2021: 59% within the target range, 30% above and 11% below the recommended values, HbA_{1c} in January 2021 was 6.6% and enabled the sustained complete elimination of severe hypoglycaemia.

Conclusions: The use of the intensive glycaemic monitoring system significantly improved the patient's quality of life and significantly improved the glycaemic control of diabetes.

P55
Assessment of self-care levels in patients with T2 diabetes using the Self-care of Diabetes Inventory (SCODI) Questionnaire

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Introduction: Self-care supports the control of normal health behaviours that are necessary to maintain normal glucose levels and minimise the risk of complications. In this disease, it is the patient who decides their future, and their daily choices, self-observation and self-control directly affect their health.

Aim of the study: The aim of this study was to assess the level of self-care among patients with T2 diabetes.

Material and methods: The study was conducted in a group of 100 (42 women, 58 men) with a mean age of 56.86 years, diagnosed with T2 diabetes. A diagnostic survey method was used using the Self-care of Diabetes Inventory Questionnaire and a self-administered questionnaire to collect sociodemographic and clinical data.

Results: Health behaviours and self-confidence in relation to self-care had significantly higher values in the female group, among patients who were in a relationship, and among white-collar workers ($p < 0.05$). There are statistically significant positive correlations between all parts of the SCODI questionnaire. The greater the self-efficacy for good health behaviours, the greater the self-efficacy for health control; the greater the self-efficacy for health control, the greater the self-efficacy for glucose control; the greater the self-efficacy for good

health behaviours, the greater the self-efficacy for self-care; the greater the self-efficacy for health control, the greater the self-efficacy for glucose control; the greater the self-efficacy for health control, the greater the self-efficacy for self-care. With the duration of the disease, self-efficacy in terms of correct health behaviour, health control and self-confidence increases. Self-efficacy for normal health behaviours, health control, glucose control and self-confidence in self-care were significantly higher in those who actually followed treatment recommendations.

Conclusions:The surveyed patients are best at adhering to recommendations for good health behaviours and find it most difficult to control their glucose levels themselves.

Health behaviours, self-confidence and health control are higher among women, people in relationships and white-collar workers.

Duration of illness affects levels of self-care in diabetes.

Self-efficacy for good health behaviours correlates positively with self-efficacy for health control, glycaemic control and self-care confidence.

P56
Effect of level of self-care on treatment adherence in patients diagnosed with type 2 diabetes

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Introduction: Self-care is an important part of managing type 2 diabetes. Low self-care may contribute to non-adherence to treatment recommendations. Measures taken to increase self-efficacy in patients with type 2 diabetes help to improve their outcomes.

Aim of the study: To assess the impact of self-care on treatment adherence in patients diagnosed with type 2 diabetes and the influence of selected sociodemographic and clinical variables on self-care levels.

Materia and methods: A questionnaire survey was conducted in a group of 324 patients (162 women, 162 men) with type 2 diabetes. More than half of the respondents were aged over 60 years (54.01%).

The Self-Care of Diabetes Index (SCODI) questionnaire was used to measure the level of self-care. Adherence to treatment was assessed using the Adherence in Chronic Diseases Scale (ACDS).

Results: Health behaviour scores were highest on the adherence subscale with a mean of 68.37 (SD = 18.14, Me = 68.75) and lowest on the blood sugar self-monitoring subscale with a mean of 56.05 (SD = 22.45, Me = 55.56). We found that low adherence to treatment recommendations occurred in 52.47% of the subjects, medium in 39.20% and high in only 8.33%. There were significant positive correlations between ACDS scores and SCODI subscales ($p < 0.05$): maintaining self-care (correlation coefficient: 0.436), self-care (correlation coefficient: 0.413), monitoring self-care (correlation coefficient: 0.384) and self-confidence (correlation coefficient: 0.453).

Conclusions: The study suggests that self-care can have a significant impact on adherence to treatment by patients with type 2 diabetes. The higher the level of self-care in each area of functioning, the higher the level of adherence to treatment recommendations. It was found that demographic variables such as female gender, education and employment status could influence self-care in the management of chronic diseases such as type 2 diabetes.

P57
The role of the "educational clock" in the management of patients with type 2 diabetes

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Introduction: Diabetes is the silent pandemic of the 21st century. Media reports on the SARS-CoV-2 coronavirus pandemic provide statistics on a daily basis. Type 2 diabetes affects 5–7% of the world's population. Diabetes education is fundamental to diabetes management and should be tailored to the needs of people with type 2 diabetes and their loved ones using effective educational methods and tools.

Aim of the study: The aim of this study was to investigate the role of the "Education Clock" in the management of people with type 2 diabetes and the impact on metabolic alignment and the achievement of set therapeutic goals depending on gender, age and duration of disease together with observation of renal function.

Material and methods: The study group consisted of 400 people including 232 women (58%) and 168 men (42%). The mean age of the subjects was 55.91 ±10.24, with a mean disease duration of 8.10 ±3.08 years. HbA_{1c} level, body weight, BMI and eGFR were determined twice in the subjects before and after the study. Inclusion criteria for the study were: person with type 2 diabetes, age > 18 years, BMI > = 25 kg/m^2, not meeting criteria for carbohydrate balance in terms of HbA_{1c}, prescribed combination therapy: oral medication and insulin, and scoring at least 6 on the Clock-Drawing Test. An educational tool called the "educational clock" was used for the study. The study using the "Education Clock" lasted 3 months (October 2018 – January 2019) in 5 stages.

Results: The use of an educational tool such as the "educational clock" significantly improved the metabolic control of diabetes in the subjects: There was a reduction in HbA_{1c} from an average baseline of 8.11 ±0.53% to 7.21 ±0.44%, with a mean difference in change of –0.9 ±0.48%. At the same time, the subjects experienced a mean weight reduction from an initial 82.65 ±8.14 kg to 78.53 ±7.98 kg, with a mean change difference of –4.12 ±3.50 kg. The subjects had a mean reduction in BMI from baseline 29.25 ±1.67 kg/m^2 to 27.82 ±1.71 kg/m^2, with a mean difference in change of –1.43 ±1.17 kg/m^2. In the study group, eGFR increased on average from baseline 73.82 ±7.83 ml/min/1.73 m^2 to 74.80 ±9.00 ml/min/1.73 m^2, with a mean change difference of 0.98 ±2.23 ml/min/1.73 m^2. The study shows that age differentiates the intensity of the studied variables except for the HbA_{1c} index before education. The subdivision of the study group according to the duration of the disease indicated differences in the intensity of the studied variables except for the mean difference in the change in BMI, HbA_{1c} after education and the mean difference in the change in body weight.

Conclusions: Use of the original educational tool "educational clock" for 3 months The diabetes education process had a significant effect on improving metabolic control regardless of age and in all age groups. Strict adherence in both men and women was important in achieving therapeutic goals without worsening renal function.

P58
Education of patients with elevated fasting blood glucose levels

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Introduction: The main causes of abnormal fasting glycaemia or pre-diabetes include overweight, abdominal obesity, insulin resistance, a sedentary lifestyle, physical inactivity and an excessively caloric diet rich in highly processed foods, mainly simple carbohydrates and saturated fats.

Aim of the study: Education of patients with elevated fasting blood glucose to prevent the development of diabetes.

Material and methods: The method used to conduct the study was a self-constructed questionnaire survey and the Pre-Diabetes and Undiagnosed Diabetes Risk Factor Test developed by the National Health Service. The questionnaire included questions about gender, height, weight, stimulants, place of residence, type of treatment, number of meals consumed per day, frequency of consumption of vegetables, fruit, wholemeal and highly processed products. The survey was conducted between 2019 and 2021 with 100 people at the Diabetes Outpatient Clinic and the Diabetes School attended by people with type 2 diabetes for 11 years to complete their knowledge of pre-diabetes and diabetes.

Results: The study evaluated 100 questionnaires obtained from 42 women and 58 men. The mean age of the subjects was 65 years and BMI: 31.0. Most of the people (60%) lived in the city. Secondary education prevailed in 40% of the individuals. All patients presenting for education had an abnormal fasting blood glucose diagnosed by a diabetologist after an Oral Glucose Tolerance Test and were prescribed a self-monitoring diet without pharmacological treatment. The Risk Factor Test showed that out of the 15 questions asked, 90% of the patients were at increased risk of pre-diabetes. Half had hypertension and were taking cholesterol-lowering statins. They reported drowsiness (80%), fatigue (70%), hunger and increased thirst (30%). They had a sedentary lifestyle and physical activity was low or sporadic (75%). The diet was dominated by highly processed foods (60%), and vegetables and fruit were consumed less than 3 times a day (70%). The patients underwent education on nutrition, physical activity and self-monitoring. Re-education took place once a month with

weight measurement. Within a year, 60% of the patients reduced their body weight by 6–10 kg and the remainder by 5 kg. Only 30 people required pharmacotherapy after several months of dietary treatment.

Conclusions: Behavioural measures, i.e.: dietary change, physical activity, continuous education of the patient and their family to change living and eating habits, reduced the incidence of diabetes by 50% without pharmacotherapy. The basic recommendation is to check your blood sugar levels regularly and make changes to your diet so that you can prevent the development of diabetes and subsequent complications.

POSTER SESSION 8 – THE MULTI-PRONGED NATURE OF DIABETES

Chairs: Mariusz Dąbrowski, Janusz Gumprecht

P59
Predictors of rehospitalisation and mortality in patients hospitalised for diabetes

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Introduction: The multimorbidity of patients with diabetes increases the frequency of their hospitalisation. These hospitalisations are longer and patients have higher overall and in-hospital mortality compared to non-diabetic patients. Diabetic patients also have a higher frequency of rehospitalisation. However, data on factors affecting hospital readmissions and mortality after discharge in this group of patients are limited.

Aim of the study: to assess factors influencing hospital readmission and mortality at 90 days after hospital discharge in patients hospitalised for diabetes.

Material and methods: Data from patients who were hospitalised nationwide for diabetes between January 2017 and December 2017 were analysed. Data on hospitalisations came from the National Health Fund database and data on deaths from the Ministry of Digitalisation database.

Hospitalisations for diabetes were identified by the following ICD-10 codes: E10 – insulin-dependent diabetes mellitus; E11 – insulin-independent diabetes mellitus; E12 – diabetes associated with malnutrition; E13 – other specified forms of diabetes mellitus; E14 – diabetes unspecified. Statistical analysis consisted of the construction of logistic regression models in which the explanatory variables were rehospitalisation for diabetes and death within 90 days after hospital discharge. The three main groups of explanatory variables included demographic profile, patient medical history and factors related to hospitalisation.

Results: 11.3% of the 74,248 hospitalisations resulted in readmission to hospital. Variables that significantly increased the risk of re-hospitalisation were: age less than 35 years, male sex, previous hospitalisation for acute diabetic complications, weight loss, peripheral artery disease, deficiency anaemia, renal failure, alcohol abuse, heart failure, emergency admission and weekend admission, same-day hospitalisation and hospitalisation of 8–14 days or more, hospitalisation in a teaching hospital with an endocrinology or diabetology ward.

Of the 74,111 people admitted to hospital, 7.3% died within 90 days of discharge (Figure 3). Variables that significantly increased the risk of death were age, malignancy (with and without metastases), weight loss, coagulation disorders, alcohol abuse, acute complications of diabetes, heart failure, renal failure, deficiency anaemia, peripheral arterial disease, water-electrolyte and acid-base imbalance, emergency and weekend hospital admission, hospitalisation of 8–14 days and longer than 14 days. However, same-day hospitalisation and hospitalisation in a more experienced centre were associated with a lower risk of death (Figure 4).

Conclusions: most factors that increase the risk of hospital readmission and death after hospital discharge are unmodifiable, although hospitalisation in an experienced centre may result in a reduction in the frequency of these events.

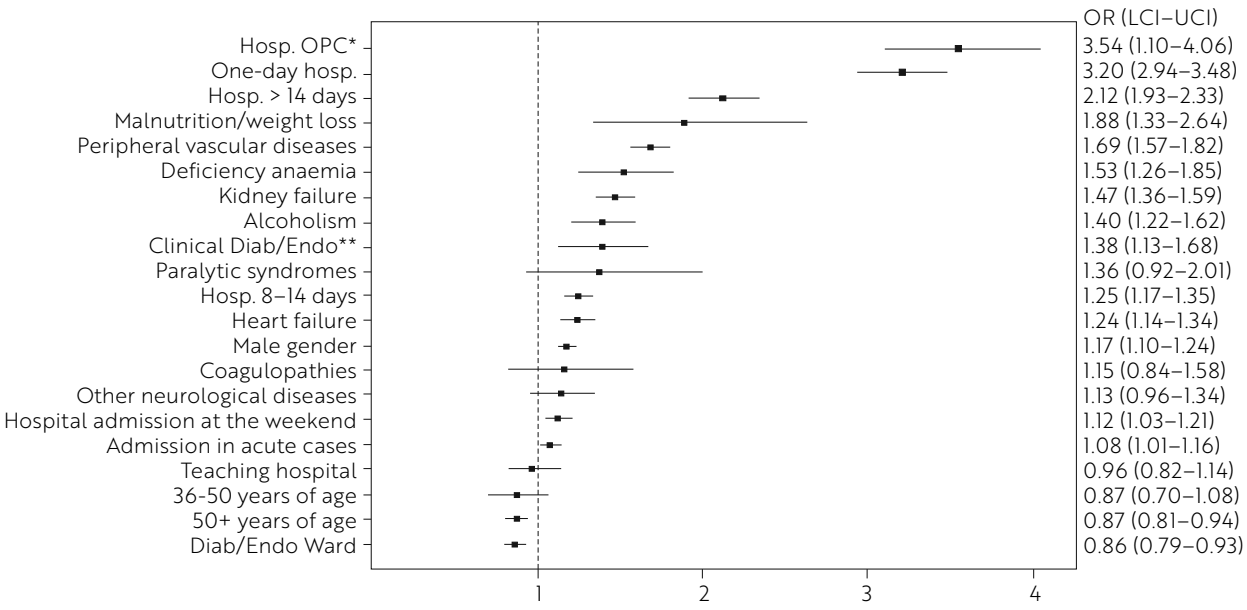

Figure 3. Predictors of rehospitalisation within 90 days of hospital discharge – odds ratios 95% confidence intervals

**Hospitalisation due to acute complications in the year before the hospitalisation analysed, ** hospitalisation in a teaching hospital with a diabetology/endocrinology ward.*

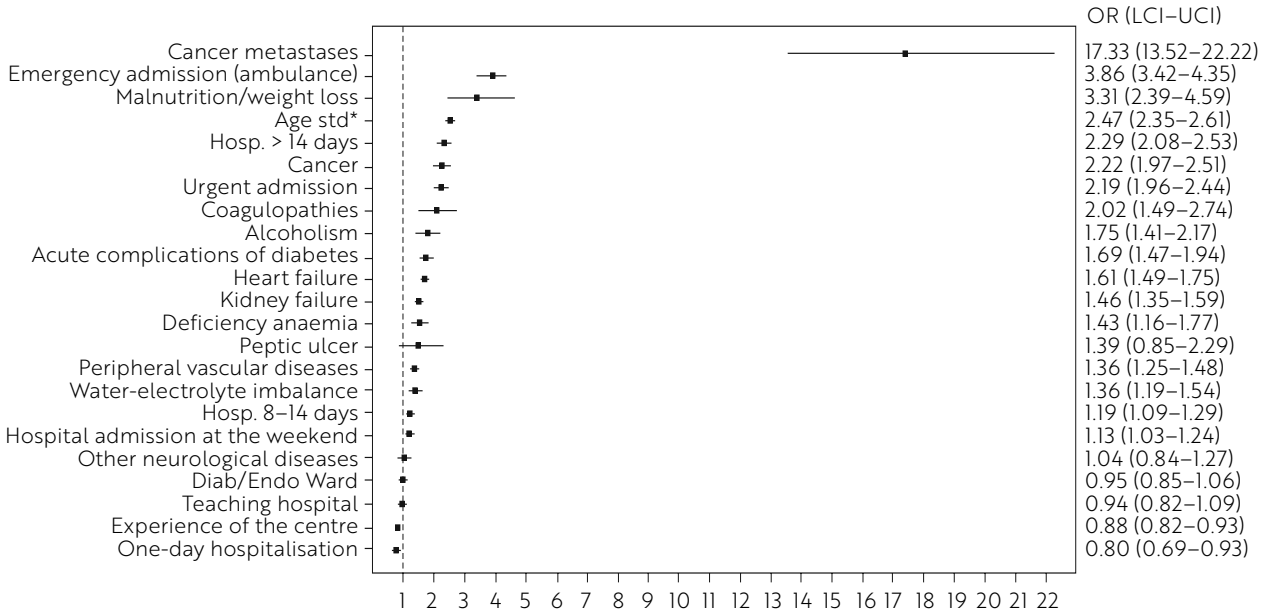

Figure 4. Predictors of mortality within 90 days of hospital discharge – odds ratios of 95% confidence intervals

**Age standardised by mean and standard deviation.*

P60
Effect of insulin-like growth factors on survival of patients with chronic heart failure

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Introduction: Heart failure (HF) develops against a background of ischaemic heart disease for which obesity is an important risk factor. In recent years, there have been reports that the presence of obesity may be protective in patients with HF. This phenomenon has been termed the obesity paradox representing an inverted epidemiology of known HF risk factors. To date, its aetiology has not been established. One hypothesis under discussion is the involvement of insulin growth factors (IGF-1 and IGF-2). Available studies have mainly documented the effects of IGF-1 on myocardial cells, while there are no reports evaluating IGF-2 in the occurrence of the obesity paradox in patients with HF.

Aim of the study: The aim of this study was to evaluate the effect of IGF-1 and IGF-2 on survival in patients with HF in relation to body mass (BM) and the presence of carbohydrate metabolism disorders (CGD).

Material and methods: Seventy-five patients (64% male) in NYHA class II–IV hospitalised for exacerbation of HF were included in the study. The mean age of the group was 67.11 ±13.56 years, BMI 30.18 ±6.17 kg/m^2. 16% of the patients had a normal BM and 56% suffered from carbohydrate metabolism disorders. Each participant on admission underwent anthropometric measurements (BMI, WR and WHR), RR measurement, echocardiogram, biochemical tests (including HbA_{1c}), IGF-1 and IGF-2 tests. After one year they were contacted for survival data. During the 12-month follow-up, 9 patients (12%) died. Verification of the causes of death was based on medical records.

Results: There were no significant differences in IGF-1 according to NYHA class, BMI, CGD and survival. There were also no significant differences in IGF-2 concentrations according to BMI and CGD. The group with NS in NYHA class III/IV showed significantly lower IGF-2 values compared to patients with NYHA II [583.71 ±162.35 vs. 676.08 ±172.09 ng/ml; $p = 0.020$, respectively]. Also, those who died during the 12-month follow-up had statistically lower IGF-2 values compared to survivors [501.47 ±172.89 vs. 645.31 ±166.17 ng/ml; $p = 0.040$, respectively]. There was a positive correlation of IGF-2 concentrations with lipid parameters (total cholesterol [$r = 0.28$; $p = 0.015$] and LDL [$r = 0.29$; $p = 0.011$]) in the whole group, BMI ≥ 25 kg/m^2, without CGD and NYHA III/IV (in this group also with triglycerides [$r = 0.35$; $p = 0.031$]). Similar correlations were not shown for IGF-1. Logistic regression analysis showed that IGF-2 concentration was one of the risk factors for death during 12-month follow-up [OR 0.99; [95% CI: 0.99–1.00]; $p = 0.0253$].

Conclusions: In the study group, reduced IGF-2 levels characterise patients with more advanced HF and are associated with a higher risk of death at 1-year follow-up.

IGF-2 seems to influence cellular metabolic processes more than IGF-1.

P61
Association of HDL cholesterol levels with the incidence of chronic complications of type 1 diabetes (after 18 years of follow-up: the PoProStu study)

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Introduction: High density lipoprotein cholesterol (HDL): HDL-C) has a protective effect against the development of chronic complications in people with type 1 diabetes (DM 1). It has also been

shown that after the diagnosis of DM 1, the initiation of insulin therapy causes an increase in HDL-C concentration and its qualitative changes. In addition, the relationship of current HDL cholesterol levels with the occurrence of certain chronic complications in diabetes was shown to be U-shaped.

Aim of the study: The aim of this study was to evaluate the association of baseline HDL-C levels, after the initiation of insulin therapy at the beginning of DM 1, with the incidence of chronic diabetic complications assessed in an 18-year follow-up (Poznan Prospective Study – PoProStu).

Material and methods: A group of 92 adults with DM 1 (60 men, 32 women) were included in the study. The following were assessed: baseline data at the beginning of DM 1 including: first serum HDL-C concentration after the introduction of insulin therapy. In the follow-up study after 18 years of observation the endpoint was: the occurrence of chronic complications of diabetes (diabetic kidney disease, peripheral neuropathy, cardiovascular autonomic neuropathy, diabetic retinopathy, macroangiopathy). In addition, parameters of metabolic control of diabetes at baseline and at the end of the observation were assessed.

Results: The median baseline HDL-C concentration was 74 (61.5–84.5) mg/dl. In a follow-up study after 18 years of observation among people with DM 1 aged 43 (39–46) years with diabetes duration of 20 (19–22) years, the median HbA_{1c} was 7.85 (7.2–8.5)%. The occurrence of diabetic kidney disease was found in 22 (24%), peripheral neuropathy in 19 (21%), cardiovascular autonomic neuropathy in 9 (10%), diabetic retinopathy in 31 (34%) and macroangiopathy in 9 (10%) subjects. The association of serum HDL-C levels with the occurrence of chronic complications of diabetes was confirmed in a quadratic logistic regression model among men, for diabetic kidney disease (pM = 0.005, pHDL ^ 2 = 0.016) and for diabetic retinopathy (pM = 0.012, pHDL ^ 2 < 0.05). The logistic regression model for diabetic retinopathy in men was independent of diabetes duration and metabolic control parameters. Statistical significance was found for the logistic regression model for diabetic kidney disease in men independent of HbA_{1c} at the end of follow-up: (pM = 0.0015, significance of extension $\chi 2$ test of differences between models $p = 0.052$).

Conclusions: Among men with DM 1 there is a non-linear U-shaped association between baseline HDL-C concentration, established after the introduction of insulin therapy, and the occurrence after 18 years of observation of diabetic retinopathy and, independently of HbA_{1c} value, the occurrence of diabetic kidney disease, which would suggest the loss of protective properties of high HDL cholesterol concentration.

P62
Quality of life in patients with diabetic eye disease

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Introduction: Diabetic eye disease is a late complication of diabetes that can have a significant impact on patients' overall quality of life (QOL).

Aim of the study: The aim of this study was to assess the quality of life of patients with diabetic eye disease and to determine the influence of sociodemographic factors on QOL.

Material and methods: The study included a group of randomly selected 107 patients, aged 19–84 years, of both genders (including 58.9% women, mean age 41.8, SD = 43.09), diagnosed with diabetes (diabetes t.2 – 81.3%) and diabetic eye disease. Data were collected using an original survey questionnaire, the Beck Depression Test and the Shortened Version of the WHO Questionnaire (WHOQOL-BREF).

Results: The most common vision dysfunctions in the study population were cataract (48.6%), diabetic retinopathy (40.1%) and glaucoma (17.7%). More than three-quarters of respondents described their general health (75.7%) and vision (77.6%) and quality of life (73.8%) as good. Only 2.8% rated their health as very good and 1.9% as very bad. More than one third of the men pointed out the need to receive help from others to perform activities of daily living. Mean Beck Depression Test scores were slightly higher in people living in rural areas (14.7 points) than in urban areas (8.5 points); in older people and those with lower education. Mild (14%), moderate (19%) and severe (14%) depression occurred in people aged 65 years

and over. Depressive features were not found in the group of patients under 40 years of age. According to the patients, QOL is affected by poorer vision (49.5%), high blood pressure (41.1%), poor physical performance (31.8%), rapid fatigue (29.9%) and sleep disturbances (23.4%). The patients' quality of life was at an average level (mean score of 3.4). Urban residents rated the quality of life and health satisfaction significantly higher than rural residents in the psychological (p = 0.001), somatic (p = 0.017), health satisfaction (p = 0.038) and overall quality of life (p = 0.021) domains. The quality of life was rated lower by: people living alone (3 points) and those with low education (3.59 points).

Conclusions:There was no significant effect of vision dysfunction on the subjective assessment of quality of life. The patients with diabetic eye disease rated their overall health, vision and quality of life as good.

More than one third of the patients presented depressive features, and the highest rates were presented by elderly people, with primary education, widowed and single.

The patients' quality of life is at an average level. The subjects rated QOL highest in the environmental, somatic and psychological domains, and lowest in the social domain, satisfaction with their health and overall quality of life.

Monitoring the quality of life of patients with diabetic eye disease is an important element of medical care enabling the planning of comprehensive care: diabetological, psychological and social.

P63
Fenofibrate in the prevention and treatment of diabetic retinopathy: a systematic review

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Introduction: Diabetic retinopathy (DR) is the most common and severe microvascular complication of diabetes, threatening vision loss. The study examined the validity of fenofibrate (off-label) as an add-on therapy to standard of care (SO) for primary and secondary prevention of DR.

Aim of the study: To assess the efficacy and safety of fenofibrate in the prevention and treatment of DR and to add to the evidence base with data from studies conducted in real practice and papers published in a language other than English.

Material and methods: Randomised controlled trials (RCTs), experimental studies without randomisation and observational studies (data from actual clinical practice).

A systematic review of the literature indexed in MEDLINE, EMBASE, Cochrane Library, Web of Science and other databases was conducted in January 2021. Studies were included in the review regardless of the language of publication. Where possible, a meta-analysis was performed using the OpenMeta[Analyst] software. A Mantel-Haenszel fixed-effects model or a DerSimonian-Laird random-effects model (in case of heterogeneity of results) was used for cumulation.

Results: Inclusion criteria were met by 16 experimental studies (including 7 RCTs) and 14 observational studies. The research was characterised by moderate to very high methodological quality. A meta-analysis of experimental results indicates that fenofibrate added to SO compared with placebo or SO reduces the risk of DR progression by more than 50% (RR 0.45; 95% CI: 0.30–0.65). Although experimental studies did not show a beneficial effect of fenofibrate in the primary prevention of DR, studies conducted in real practice indicate that fenofibrate may also be effective in this aspect (RR 0.81; 95% CI: 0.69–0.95). In experimental studies, fenofibrate therapy contributed to a 31% reduction in the risk of needing laser photocoagulation for any reason (RR 0.69; 95% CI: 0.58–0.82), as well as for diabetic macular oedema or DR progression. A similar trend was shown in observational studies, but a meta-analysis was not available. The results of one study indicate that the use of fenofibrate therapy compared with SO may be associated with an improvement in quality of life in patients 3 months after vitrectomy (p = 0.007), likely due to the protective effect of fenofibrate on ocular tissues after ocular surgery – as evidenced by the results of other single scientific reports. Safety profile analysis indicates that fenofibrate is well tolerated by diabetic patients, but cumulative results were not possible.

Conclusions: The results of the review confirm that fenofibrate added to standard therapy may be an effective and safe therapeutic option for the secondary prevention of DR, thus delaying the need for invasive treatment. Data from actual practice indicate that the therapy may also be effective for primary prevention of DR. The place

of fenofibrate in the care pathway for patients with diabetes needs to be reviewed.

P64
Insulin therapy in patients receiving enteral and parenteral nutrition – a summary

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Introduction: Diabetic patients on total enteral or parenteral nutrition present an atypical glycaemic profile with a prolonged rise in glycaemia after the connection of nutrition. In patients who eat meals, the above profile is superimposed by postprandial increases in glycaemia.

Aim of the study: The aim of this paper is to summarise the authors' several years of experience in the management of insulin therapy in these patients.

Material and methods: Glargine was administered as a single injection in patients fed enterally around the clock without prolonged interruptions. In patients on enteral nutrition for 16–20 hours per day, NPH insulin was administered in addition to glargine before connecting the feeding. The dose of NPH insulin was 30–40% of the daily requirement. In patients on parenteral nutrition, when feeding took 16–20 hours per day, glargine was given as a single injection and NPH insulin was given before connecting the feeding. The NPH insulin dose was generally 66–75% of the daily insulin dose. If the patient did not agree to treatment with glargine, they received NPH insulin instead.

Patients eating meals had short-acting insulin or a human insulin analogue administered additionally before meals if necessary. If the daily insulin requirement was less than 10 units, glargine or NPH insulin was used before connecting the feeding in monotherapy. Daily insulin requirements were determined by continuous intravenous insulin infusion, abandoning it when the expected value was low.

Results: Acceptable glycaemic values were achieved in the patients, while hypoglycaemic episodes were completely avoided. The insulin regimen proved convenient for the patients themselves and their caregivers, allowing it to be used in an outpatient setting in patients who were discharged home.

Conclusions: In the patients on enteral nutrition for 24 hours per day, the administration of glargine as a single injection, and in the case of feeding for 16–20 hours per day, the combination of glargine with NPH insulin administered before the connection of the feeding, proved to be effective and safe. NPH insulin accounted for 30–40% of the total daily insulin dose. In patients on parenteral nutrition, the combination of glargine with NPH insulin administered prior to the connection of nutrition proved to be effective and safe. NPH insulin accounted for 66–75% of the total daily insulin dose. The proportion between NPH insulin and glargine may be slightly altered if the patient's general condition is severe or there is a severe infection. When insulin requirements were low, it was effective to administer NPH insulin by single injection to the patients on parenteral nutrition or glargine to the patients on enteral nutrition for less than 24 hours. In the case of patients consuming additional meals, the administration of bolus doses of short-acting insulin was not necessary at low daily insulin requirements.

If a patient on parenteral nutrition does not agree to the use of glargine, it can be replaced by NPH insulin – administered then in the morning (30–40% of the daily dose) and before connecting the feeding (the remaining 60–70%).

P65
Newly diagnosed diabetes as the first sign of acromegaly

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Introduction: Diabetes is one of the complications of certain endocrinopathies. Early diagnosis of the underlying disease offers a chance of permanent cure or improved diabetes control.

Aim of the study: The aim of this study was to analyse the factors determining the diagnosis of acromegaly in a patient with newly diagnosed diabetes and to evaluate the further course of di-

Table 2. Treatment with a first-generation somatostatin analogue

Parameter	Result	Parameter	Result	Parameter	Result
Age	56	HbA_{1c}	10.3%	Creatinine	0.9 mg/dl
Glycaemia on admission	290 mg%	Leukocytosis	5700 µl	TSH	1.08 µIU/ml
Ketones in urine	Absent	Haemoglobin	13.9 g/dl	FT4	14.29 pmpl/l
Sodium concentration	147 mmol/l	Testosterone	1.59 ng/ml	Prolactin	7.8 ng/dl
Potassium concentration	4.1 mmol/l	Urea	41 mg/dl	Cortisol	15.13 µg/dl
Insulin	2.4 µU/ml	IGF-1	301.2 ng/ml	HGH	10.19 ng/ml
Anti-GAD antibodies	Negative	IAA antibodies	Negative		

abetes after surgical treatment of the detected tumour.

Material and methods: The analysis was retrospective and included clinical and laboratory characteristics of the course of hospitalisation and the period after surgical treatment.

Results: A 56-year-old patient was admitted to the Department of Diabetology because of polyuria and polidypsia occurring for 3 months, weight loss of about 10 kg. In addition, for about 3 years the patient had noticed enlargement of the hands and feet, a change in the tone of voice and periodic excessive sweating. On admission, physical examination revealed clinical features of acromegaly, high blood pressure values reaching 200/140 mm Hg. The HbA_{1c} level was 10.3% and glycaemia on admission was 290 mg%.

The patient received insulin therapy in an algorithm of 4 injections, at a total daily dose of 40 units/day. In addition, a standard hypotensive treatment was prescribed, achieving normalisation of blood pressure values. A brain MRI was performed which showed an abnormal mass within the sellaturcica measuring approximately 20 × 23 × 19 mm (ap × db × cc), funnel distortion, with no obvious thickening. The determined GH concentration was 10.19 ng/ml, (n < 5), and IGF-1 –301.2 ng/ml (n < 256). Treatment with a first-generation somatostatin analogue was administered. Selected patient results are shown in the Table 2. Successful surgical removal of a somatotrophic pituitary tumour allowed insulin to be discontinued and diabetes to be treated with an oral drug only – metformin XR at a dose of 1500 mg in the evening. The control glycated haemoglobin level 3 months after surgery was 5.9%.

Conclusions: The coexistence of diabetes and symptoms of endocrine disease should provide a rationale for looking for secondary causes of diabetes, including GH-secreting tumours – acromegaly. In the management of this form of diabetes, attention should be paid to adequately modifying the treatment of diabetes after treatment of the underlying disease, which will reduce the risk of hypoglycaemia.

P66
Frontal lobe abscess as the first manifestation of diabetes mellitus

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Introduction: Diabetes mellitus in adulthood is usually asymptomatic in the early stages and is diagnosed incidentally, but in some cases the first manifestation is symptoms of ketoacidosis. Chronic hyperglycaemia can lead to immune disorders and severe infections.

Case description: A 46-year-old patient with no history of chronic disease was admitted to the neurology ward in November 2019 for sudden onset of headache, vomiting and disturbance of consciousness. He also reported polyuria and polydipsia for several months. Physical examination revealed pyramidal syndrome in the form of mild right hemiparesis and discrete right VII nerve paresis. Laboratory tests showed hyperglycaemia of 343 mg/dl, HbA_{1c} percentage of 13.4%, features of ketoacidosis, elevated inflammatory parameters and glucosuria, ketonuria as well as proteinuria. MRI of the head showed an extensive irregular multifocal lesion in the left frontal region, with peripheral contrast enhancement, partly with features of diffusion restriction, with a morphology consistent with a brain abscess in the late phase of organisation. The lesion caused extensive swelling of the left cerebral hemisphere with displacement

of the central structures for approximately 10 mm. After metabolic disorders were compensated and his general condition improved, the patient was transferred to the neurosurgery ward, where a left frontal craniotomy was used to completely remove the multichamber brain abscess. Culture of the abscess material yielded a growth of Staphylococcus aureus MSSA – targeted therapy with cloxacillin followed by rifampicin was implemented. Diabetes was treated with continuous intravenous insulin infusion followed by insulin analogues in an intensive insulin therapy regimen. In addition, hypotensive treatment was initiated. After completion of antibiotic therapy, the patient was admitted to the diabetes ward in January 2020 for diagnosis and metabolic compensation of diabetes. He reported poor exercise tolerance and weight loss of 12 kg since the diagnosis of diabetes. The physical examination revealed mediocre subcutaneous tissue (BMI – 21.6 kg/m^2), muscular atrophy, high blood pressure, resting tachycardia and features of polyneuropathy. Ophthalmic examination diagnosed proliferative retinopathy, diabetic macular oedema and cataracts in both eyes. Laboratory tests showed a reduction in HbA_{1c} to 6.8%, mild anaemia, atherogenic dyslipidaemia, hypokalaemia and proteinuria. The glucagon test showed a reduced baseline C-peptide concentration (0.76 ng/ml) and an incomplete increase after stimulation (1.44 ng/ml). No anti-GAD antibodies were found. Doppler ultrasound of the carotid arteries showed bilaterally calcified atherosclerotic plaques of the internal carotid artery. During hospitalisation, insulin therapy was modified and metformin was added, with satisfactory glycaemic control observed (insulin requirement 0.7 units/kg/day). Due to hyperlipidaemia, statins were included. Further follow-up (February 2020) showed an increase in body weight (BMI – 23.4 kg/m^2), normal glycaemic values, and further reductions in HbA_{1c} and lipid concentrations.

Conclusions: Long-term significant hyperglycaemia leads to immune dysfunction and can cause severe, life-threatening infections. To prevent the occurrence of acute complications of diabetes, early recognition and treatment are important.

POSTER SESSION OF YOUNG SCIENTISTS I – TYPE 1 DIABETES – THERE IS SOMETHING TO THINK ABOUT

Chairs: Aleksandra Araszkiewicz, Przemysława Jarosz-Chobot, Irina Kowalska

PS0
Assessment of the prevalence and severity of DKA in children with newly diagnosed DM1 from Silesia in the year of the pandemic – 2020 compared to 2019

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Introduction: During the COVID-19 pandemic, access to healthcare services decreased in many countries, including Poland, as a result of many restrictions designed to inhibit the spread of SARS-CoV-2 infections. Diabetic ketoacidosis (DKA) is an acute, life-threatening complication of diabetes that can result from a delayed diagnosis of type 1 diabetes (DM1) and requires urgent medical intervention.

Aim of the study: To assess the prevalence and severity of DKA in children with newly diagnosed DM1 in 2020 compared to 2019.

Material and methods: Retrospective analysis based on 196 medical histories from 2019 and 223 from 2020, of children aged 1 to 18 years hospitalised in the Department of Paediatric Diabetology and Paediatrics of the John Paul II Upper Silesian Child Health Centre in Katowice due to DM1 diagnosis. The analysis used the results of tests performed on the day of admission to hospital.

Results: The number of children with a diagnosis of DM1 in 2020 hospitalised at the Children's Diabetes Ward in Katowice increased by 13.77% compared to the previous year (196 vs. 223). The number of cases with DKA at the diagnosis of DM1 in 2020 increased by 12.5 percentage points (pp) relative to 2019 (47.5% vs. 35%). In addition, the number of cases of severe DKA with a diagnosis of DM1 (pH 7.00, bicarbonate < 10 mmol/l) requiring ICU treatment in 2020 also increased by 2.7 pp in this group.

Conclusions: The absolute number of fresh DM1 diagnoses in children, DKA cases, including those classified as severe increased in 2020 compared to the previous year. Arguably, it was the COVID-19 pandemic that contributed to the delay in the diagnosis of DM1 and the inclusion of appropriate treatment. However, confirmation of this thesis requires a more in-depth analysis.

PS1
Assessment of the prevalence of positive anti-thyroid antibodies: anti-thyroid peroxidase and anti-thyroglobulin in children with newly diagnosed type 1 diabetes in 2016–2019

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Introduction: Type 1 diabetes (T1D) is often accompanied by other conditions in the autoimmune disease family, particularly autoimmune thyroiditis. The prevalence of anti-thyroid antibodies in children with T1D at diagnosis has been shown to be higher than in the general population.

Aim of the study: To assess the presence of antibodies to thyroid peroxidase (ATPO) and thyroglobulin (ATG) and their association with selected clinical parameters in children with newly diagnosed T1D.

Material andmethods: A retrospective study, based on four years of hospital records (2016–2019) including 737 children (401 boys) with newly diagnosed T1D, with a median age of 9.69 (25–75% 6.15–12.92) years. The prevalence of ATPO and ATG in the following age groups was assessed: 0–5; 5–10; 10–18 years. Selected clinical parameters such as anthropometric data, anti-glutamic acid

decarboxylase antibodies (GADA), anti-tyrosine phosphatase antibodies (IA2A), anti-zinc transporter 8 antibodies (ZnT8A), HbA_{1c}, C-peptide, daily insulin dose, thyroid hormones were analysed: TSH, fT4, the presence of diabetic ketoacidosis.

Results: Positive ATPO and/or ATG were found in 10.6% of all children with newly diagnosed T1D; ATPO – 9.4%, ATG – 4.3%, ATPO and ATG (combined) – 3.1%, with no difference in prevalence between years. The distribution across age groups for positive ATPO was as follows: 12.3% –from 10 to 18; 9.1% –from 5 to 10; 4.0% –from 0 to 5 years; and for ATG: 5.7% –from 10 to 18; 4.7% –from 5 to 10; < 1% –from 0 to 5 years. Positive ATPO were significantly more frequent in older children (Me 10.81 vs. Me 9.47 years; $p = 0.005$), as well as positive ATG (Me 11.47 vs. Me 9.59 years; $p = 0.040$). Positive ATPO was observed more frequently in girls (63.8% vs. 36.2%; $p = 0.002$). Moreover, among other selected clinical parameters, the following significant statistical relationships were noted: positive ATPO was significantly more often accompanied by positive and higher GADA values 13.2%; $p = 0.008$; Me 186.93 vs. 48.69 U/ml; $p = 0.001$), and respectively positive ATPO and ATG, higher HbA_{1c} values (Me 12.2 vs. 11.5% $p = 0.039$; Me 12.4 vs. 11.06%; $p = 0.039$) and higher TSH levels (Me 3.43 vs. Me 2.89 mIU/l; $p = 0.008$; Me 3.88 vs. Me 2.92 mIU/l; $p = 0.010$).

Conclusions: Positive antithyroid antibodies are present in about 11% of the Polish population of children with newly diagnosed T1D, especially in older children, of the female gender and with positive GADA.

PS2
The new challenge of the obesity epidemic: type 1.5 diabetes among children – a case report

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Introduction: In the paediatric population, type 1 diabetes is the most common, but due to changing lifestyles and the obesity epidemic, paediatricians are increasingly dealing with type 2 diabetes or double diabetes so-called 1.5. Risk factors for type 2 diabetes in children include obesity, poor eating habits, elevated liver parameters, elevated triglycerides and cholesterol, and maternal gestational diabetes. In patients with type 1.5 diabetes, an autoimmune background is implied. Obese patients may arrive at hospital in a good general condition, without ketoacidosis, and with laboratory results showing both type 1 and type 2 diabetes at the same time.

Case description: A 13-year-old patient in good general condition was admitted with suspected insulin-dependent diabetes mellitus. Fasting blood glucose was 224 mg/dl, with no features of ketoacidosis. He reported weakness, and polyuria and polydipsia that had been present for about 2 weeks. He denied weight loss. He was overweight from the age of 8. On admission he weighed 79 kg, with a history of abnormal eating habits. Diagnosis for diabetes showed a fasting C-peptide of 5.35 ng/ml with a blood glucose of 160 mg/dl, IA2 of 20.8 IU/ml, HbA_{1c} of 8.2% and urine glucose of 5962 mg/dl. He was also diagnosed with autoimmune thyroiditis. Hypertriglyceridaemia (TG 350 mg/dl), elevated GGTP, hypertransaminasaemia and non-alcoholic fatty liver were found. The mother suffered from gestational diabetes. In addition, there is a family history of type 2 diabetes. Treatment with Humalog and Abasaglar insulin was started.

Conclusions: A diagnosis of type 1.5 diabetes was made and the patient was referred for further gastroenterological diagnosis. Proper diet, physical activity will be necessary to achieve clinical improvement. Lifestyle change is a key prognostic factor in obese patients, and early intervention can prevent the development of insulin resistance, a major modifiable risk factor for type 1.5 diabetes.

PS3
Diabetes and new technologies – using the m-health app to convert food by children and young people with type 1 diabetes

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Introduction: Nutrition mobile apps are becoming an increasingly popular tool for meal conversion among people with type 1 diabetes (CT1)

The basic functions, combined with innovative solutions introduced in mobile applications, bring hope that this way of converting food will significantly contribute to improving metabolic compensation and influence a better quality of life for CT1 patients.

Aim of the study: Assessing the prevalence and benefits of mobile nutrition apps as food conversion tools for children and adolescents with CT1.

Material and methods: The study included 100 patients of the Upper Silesian Child Health Centre (43% boys, 58% girls), aged 3–21 years (mean 14 years), with CT1 lasting 1–14 years (mean 5.5 years).

The study used an original questionnaire and medical data from patient records: weight, height, duration of diabetes, insulin therapy model and results of the last 3 HbA_{1c} measurements.

Results: Of all respondents, 47% used mobile apps and/or online calculators regularly (several times a day), 20% chose apps for unfamiliar products, 21% had used them in the past and 12% had never used them. The most popular mobile apps were the dedicated diabetes app Medtronic (25%) and the nutrition app VitaScale (22%). Patients who regularly use mobile apps achieved lower HbA_{1c} levels than those who do not calculate the nutritional value of their meals or do so blindly (median: 7.2% vs. 7.8%). The subjective opinion of 44% of the respondents was that the use of mobile apps had a beneficial effect on improving their blood glucose, 67% said that the use of apps improved their quality of life. The patients treated with an insulin pump achieved better metabolic compensation as measured by HbA_{1c} (7.5% vs. 8.5%), however, no association between treatment modality (pump/multiple injections) and frequency of use of the application was demonstrated. The use of mobile apps correlated positively with younger patient age (where carers are more likely to be involved in treatment) and shorter disease duration. The patients using mobile apps were more likely to have a normal BMI (25–85 pc, 77% vs. 55%).

Conclusions: Regular use of mobile dietary apps can improve metabolic control as measured by HbA_{1c} and maintain normal body weight among children and adolescents with CT1. In addition, food conversion using mobile apps improves the subjective quality of life of CT1 patients and their caregivers.

PS4
Evaluation of the implementation of nutritional standards in adult patients with type 1 diabetes treated with a personal insulin pump

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Introduction: Proper nutrition is one of the most important factors for good human health, it is also an element influencing the metabolic compensation of patients with type 1 diabetes (T1DM). There are few studies evaluating diet, knowledge, and implementation of dietary recommendations in adult patients with type 1 diabetes, and none of them evaluated the implementation of dietary standards in this group of patients.

Aim of the study: The aim of this observational study was to assess nutrition in terms of the implementation of PTD recommendations and nutritional standards (EAR/AI) for selected vitamins and nutrients.

Material and methods: Data on qualitative and quantitative dietary parameters were obtained using structured notes kept by the patient for 7 days (after training in this area). The content of energy and selected nutrients was calculated using the computer program "DietaPRO" version 2020 (the updated 2017 Tables of Nutritional Values, Polish Food and Nutrition Institute, were used). Dietary supplements were not included in the calculations. Both the estimated average requirement level (EAR) and the adequate intake level (AI) were based on the guidelines of the Polish Food and Nutrition Institute (2020). Data were collected from 42 adults (29 men) with treated T1DM (without complications or comorbidities); age 26, 0 ±5.9 years; diabetes duration 12.6 ±6.1 years; treated with personal insulin pumps for a mean of 7.0 ±4.0 years, with a mean BMI of 24.0 ±3.0.

Results: The mean energy value of the patients' total daily ration was 2036.8 kcal (1585.3 kcal among women, 2239.2 kcal among men). The analysed menus provided on average 17.5% of energy from protein, 34.0% from fat and 49.7% from carbohydrates, indicating a macronutrient distribution in line with recommendations.

Saturated fatty acids as well as dietary cholesterol were consumed in excess (13%, 350.9 mg/day). The diet was characterised by a slightly lower than recommended intake of polyunsaturated fatty acids (PUFAs) (5.1%) and a normal intake of monounsaturated acids (12.5%). There was a low risk of calcium (94.6% EAR), magnesium (94.3% EAR) and folate (89.6% EAR) deficiency. Insufficient intakes of potassium (79.8% AI), iodine (34.1% EAR) and vitamin D (16.5% EAR) were observed. Other nutrients analysed (thiamin, riboflavin, niacin, phosphorus, iron, zinc, copper, manganese, vitamin A, vitamin B6, vitamin B12, vitamin C, vitamin E) did not pose a risk of deficiency.

Conclusions: In conclusion, the patient group studied consumes excessive amounts of saturated fatty acids and dietary cholesterol. Intakes of calcium, magnesium, potassium, iodine, vitamin D and folate were at risk of deficiency. The results obtained indicate the need for further dietary education of patients with type 1 diabetes under the care of diabetes clinics in order to prevent lipid disorders and improve the quality of diet.

Source of funding for research work: Scientific grant of the Polish Diabetes Association 2017.

PS5
Glyculator 3.0: updated analytics platform for analysis of glycaemic variability from continuous glycaemic monitoring

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Introduction: In recent years, continuous glycaemic monitoring (CGM) systems have become a key tool in the clinical assessment of diabetes. The increasing trend for published studies, including clinical trials, has created a need to standardise the calculation of glycaemic variability (GV). The joint efforts of the diabetes community have allowed the unification of standards regarding the use of CGM and its interpretation, which has been reflected in international and national clinical standards.

Aim of the study: To produce a free online tool for reproducible GV analysis, including providing ongoing support for standards published by scientific societies, and enabling data transport to other analysis platforms.

Material and methods: To determine the scalability of the analytical systems produced, we collected over 400-patient-years of data collected across 4 CGM technology producers: Abbott, Dexcom, Eversense and Medtronic. The standards published as part of the special editions of Diabetes Care "Standards of Medical Care in Diabetes" from 2018–2021 were implemented.

When creating the software, we relied on a database system suitable for storing time series and on our own implementation of algorithms for loading and pre-processing CGM data files. In addition, to enable access to these data and analysis results, we have developed a user-friendly graphical user interface (GUI), accessible via a web browser, and an application programming interface (API), particularly useful for integrating our tools with other applications. The tool includes a calculation module to analyse parameters of glycaemic variability in a selected time window in one or many patients and tools to design cross-sectional analyses of larger CGM datasets.

Results: The developed online tool "GlyCulator 3.0." is a modular implementation of current CGM data analysis standards. The tool allows importing input data in different formats, overlaying multiple records, assessing their quality with possible correction of data gaps, calculating glycaemic variation parameters and creating comparative reports for further statistical analyses. Data from analyses performed by "GlyCulator" users with a basic description of the particular study in which the data were collected will be able to be imported together with the exact CGM analysis parameters into a permanent repository of CGM data and analysis protocols for subsequent scientific use or reanalysis. In addition, it will allow raw data to be made available to other analytical platforms such

as R and Python, enabling more sophisticated and reproducible analysis in clinical or scientific collaborations.

Conclusions: The developed GlyCulator 3.0 tool, available in Polish and English, allows easy-to-use, reproducible and updated to the latest standards CGM data analysis and management for research and clinical projects.

PS6
Assessment of factors influencing the intensity of fear of hypoglycaemia in women with type 1 diabetes

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Introduction: Hypoglycaemia is a condition in which blood glucose falls below 70 mg/dl, regardless of the presence of clinical symptoms. Severe hypoglycaemia can lead to serious consequences, including death. Most patients with type 1 diabetes (DM1) experience at least one hypoglycaemia per month. Fear of hypoglycaemia (FOH) is a subjective feeling of a DM1 patient that leads to the need to take multiple measures to prevent a drop in glucose levels, compromising the patient's quality of life and suboptimal diabetes compensation.

Aim of the study: To assess factors influencing the severity of fear of hypoglycaemia in women with DM1.

Material and methods: The study group consisted of 98 women with DM1 aged 29.2 ±7.2 years, with diabetes duration of 13.7 ±8.1 years and HbA_{1c} of 6.9 ±1.3%. At the time of the study, 32 women were pregnant (32.7%). 54 women were treated with a personal insulin pump (PIP) (55.1%).

The Hypoglycaemia Fear Survey-II (HFS-II) questionnaire, consisting of a section on actions taken to avoid hypoglycaemia (HFS-behaviour) and a section on fear of hypoglycaemia (HFS-concerns), was used to assess the intensity of FOH. The questionnaire covered behaviours and concerns related to hypoglycaemia in the past 4 weeks, with a higher score indicating greater anxiety. Parameters analysed: presence of pregnancy, duration of disease, type of therapy (PIP vs. pens), metabolic compensation of diabetes (HbA_{1c}), number of hypoglycaemic episodes.

Results: The mean HFS score in the whole study group was 49.94 ±22.86 and the mean hypoglycaemia frequency was 5.61 ±6.14/week. The pregnant and non-pregnant women did not differ significantly in treatment ($\chi 2 = 1.33$, NS) or FOH intensity (40.50 vs. 52.50, NS) with significantly more frequent hypoglycaemic episodes in the pregnant group (7.00/week vs. 3.50/week, $p = 0.001$). In the pregnant women, there was a significant positive correlation between the HFS-behaviour score and the frequency of hypoglycaemia ($rs = 0.467$, $p < 0.05$). The women with DM1 < 10 years had a slightly higher overall HFS score compared to women with DM1 ≥ 10 years (55.00 vs. 43.50, $p = 0.092$), and a significantly higher HFS-concerns score (32.50 vs. 22.50, $p = 0.019$). A significantly lower HFS score was observed in the group of women treated with PIPs compared to pen therapy (42.50 vs. 57.00, $p = 0.018$), with a slightly higher frequency of hypoglycaemia (4.85/week vs. 3.00/week, $p = 0.064$). There was no significant correlation between the HFS score and the degree of metabolic compensation as measured by the HbA_{1c} level ($rs = 0.132$, NS).

Conclusions: FOH in women with DM1 can be modified by various factors, the most relevant of which appear to be the type of therapy used, the duration of the disease and the presence of pregnancy. In the group analysed, pregnant women and women treated with PIP with DM1 were more likely to experience hypoglycaemic episodes.

PS7
Do we always know what we are treating? A case report

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Introduction: Observational studies show that the number of people developing type 1 diabetes over the age of 30 is steadily increasing. Clinical observation and proper diagnosis are essential to administer the right treatment at the right time.

Aim of the study: The aim of this study is to present the diagnostic process in a 34-year-old female patient with diabetes.

Material and methods: The patient had been treated for hypothyroidism in the course of Hashimoto's disease since she was 29 years old. History of five pregnancies (3 unsuccessful). In her last

pregnancy she was diagnosed with gestational diabetes, which was successfully treated with metformin in the UK. The delivery went without complications. Several months after delivery, the patient found fasting blood glucose of ≥ 126 mg/dl on several occasions in self-monitoring. The body weight at the time was 72 kg with a height of 175 cm, BMI 23.5 kg/m^2. Family history of diabetes negative.

Methods: Analysis of the diagnostic process based on the results of self-monitoring, laboratory tests and the clinical course of diabetes.

Results: A fasting blood glucose result of 133 mg/dl was obtained. In a repeat examination 113 mg/dl, in addition C-peptide 1.09 ng/ml (norm 1.1–4.2 ng/ml), HbA_{1c} 5.7% and anti-GAD antibodies were measured – negative. To confirm the diagnosis of diabetes, an Oral Glucose Tolerance Test (OGTT) with insulinaemia determination was performed. Fasting blood glucose was 108 mg/dl and in the 2nd h OGTT was 222 mg/dl. The fasting insulin concentration was 2.70 µIU/ml and after 2 hour's 8.30 µIU/ml. Diabetes was diagnosed and therapy with a DPP-4 inhibitor and metformin was initiated. To differentiate the type of diabetes, anti-IA2 antibodies were determined. A negative result was obtained. The patient followed a strict diet, glycaemic control was very good, HbA_{1c} 5.7%. After about 4 months of therapy, due to the stress induced by the child's illness, self-monitored blood glucose increased rapidly (to > 360 mg/dl). The patient reported further weight loss to 63 kg. This was considered indicative of an endogenous insulin deficit, type 1 diabetes was diagnosed, oral medication was discontinued and insulin therapy with multiple injections using insulin analogues was recommended. Improvements in glycaemia and stabilisation of body weight were achieved.

Conclusions: From the outset, the patient's type 1 diabetes was supported by the presence of another autoimmune disease, the absence of excess weight and a negative family history, as well as low fasting C-peptide and insulin levels and a small increase in insulinaemia during the OGTT. The absence of anti-GAD and anti-IA2 antibodies made the diagnostic process difficult. However, this did not rule out type 1 diabetes, and the subsequent clinical course indicated a worsening endogenous insulin deficit – gradually increasing glycaemia, weight loss and finally a sharp increase in glycaemia as a result of emotional stress enabled the correct diagnosis to be made. The example of this patient indicates that in young adults > 30 years of age, with newly diagnosed diabetes, type 1 diabetes should always be considered at diagnosis.

The paper has been prepared as part of the Student Research Group in Diabetology at the Medical College of Rzeszow University.

POSTER SESSION OF YOUNG SCIENTISTS II – FOR STYLE MATTERS

Chairs: Maciej Małecki, Piotr Molęda, Dariusz Włodarek

PS8
Lifestyle of a student with T1 diabetes during the COVID-19 pandemic

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Introduction: At the beginning of the 20th century, two elements were introduced into the treatment of diabetes, insulin, discovered in 1922, and a model of self-treatment based on diabetes education.

Material and methods: It included exploring knowledge about diabetes and allowing people to monitor their blood glucose levels, weight, diet, need for physical activity and mental wellbeing. Thus, a lifestyle based on personalised diabetes education has become a factor in the prevention and treatment of diabetes, significantly facilitating the self-control of:

- fasting and pre-meal blood glucose: 70–99 mg/dl (3.9–5.5 mmol/l), 2 hours after a meal: < 140 mg/dl (7.8 mmol/l);
- achieving optimal levels of total cholesterol: < 175 mg/dl (< 4.5 mmol/l), LDL fraction cholesterol levels in patients with diabetes and ischaemic heart disease: < 70 mg/dl (< 1.9 mmol/l), HDL fraction cholesterol levels: > 40 mg/dl (> 1.0 mmol/l) [for women, higher by 10 mg/dl (by 0.275 mmol/l)], triglyceride levels: < 150 mg/dl (< 1.7 mmol/l), normalisation of blood pressure: < 130/80 mm and excessive body fat accumulation exceeding 30% of body weight in women and 25% in men.

This article aims to show the lifestyle of a student patient with t1 diabetes during the COVID-19 pandemic treated with an insulin pump, with a particular focus on behaviours that pose additional health risks in the areas of physical, mental and social health. The aim is to clarify which habits and behaviours of a student with t1 diabetes enforced by studying in a changing environment disrupted, and how, a sense of health security? What was effective for prevention?

Results: Lifestyle in the area of physical health was characterised by: reduced physical activity, impaired fitness and efficiency. Increased time spent sitting in front of a computer. Staying tensed and in non-ergonomic positions. Excessive visual-motor and auditory concentration. Eating irregularly, snacking between meals, resulting in feeling sluggish. The mental health lifestyle was characterised by: limited cognitive perception and formative skills. Accumulation of negative feelings and emotions. Increased vigilance in identifying sources of danger, limited predictability caused anxiety. In the style of social life there were: limited communication and relationships: family, collegial, didactic. Lack of constructive academic discussion. Limited family, information, emotional and medical support. Difficult to clarify misunderstandings, changes in established rules, didactic criteria generating psychosocial discomfort.

Conclusions: The rational lifestyle of a student with t1 diabetes during the COVID-19 pandemic was determined by personalised diabetes self-education. The time of the pandemic necessitated an independent search for up-to-date diabetes knowledge, performing follow-up procedures and making decisions. According to the student, systematic and moderate physical activity was a basic prophylactic and therapeutic factor causing health-promoting structural and functional changes in tissues and organs and the psychosocial sphere.

PS9
Health-seeking behaviours of people with type 2 diabetes during the COVID-19 pandemic

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Introduction: The COVID-19 pandemic period is a period of social isolation that can result in abnormal lifestyles. An abnormal lifestyle is the nucleus of a group of metabolic disorders, including hyperglycaemia resulting in a diagnosis of type 2 diabetes.

Aim of the study: Analysis of health-seeking behaviours of patients with type 2 diabetes during the COVID-19 pandemic.

Material and methods: The study group consisted of patients (n = 134, median age) with type 2 diabetes. The study was conducted using an original survey questionnaire consisting of 30 questions, both single-choice and open-ended. In addition to eating habits in terms of health-seeking behaviour, issues concerning physical activity and the use of apps to support a healthy lifestyle were examined. Patients were also asked about engaging in risky behaviours such as drinking high alcoholic beverages and smoking tobacco products.

Results: Older subjects paid more attention to the regularity of their diet p = 0.04: 75 subjects declared regularity of eating (median age 66 years [interquartile range 55–72 years]), 48 subjects declared eating according to perceived hunger (median age 60 years [interquartile range 49-69 years]), 11 subjects pay no attention to the regularity of eating (median age 52 years (interquartile range 47–65 years)). Younger people were more likely to report smoking cigarettes (p = 0.01) and were more likely to undertake physical activity (p < 0.001), with some seniors not doing any physical activity at all due to declared mobility limitations. Those who exercised more frequently also reported more frequent use of apps to support health-promoting behaviours (p < 0.00001).

Conclusions: Age is an important determinant of health-seeking behaviour. Younger people are more likely to use apps to support healthy behaviours and are more likely to be physically active. Older people, on the other hand, are more likely to say they eat regularly compared to younger people. Younger people require dietary support due to reported lower meal regularity, and older people require support to increase physical activity due to reported lower physical activity.

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PS10
Mutual correlates of carbohydrate metabolism disorders and depression

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Introduction: Due to the significant increase in the incidence of the disease, diabetes and depression are among the growing diseases of civilisation – in recent decades, the proportion of people suffering from depression has risen to 4.3% of the world's population and from diabetes to 8.8%. With increasing data on these diseases, it is increasingly postulated that there is a clear, two-way correlation between them – both mood disorders can become risk factors for diabetes and vice versa.

Aim of the study: The aim of this study is to present the current state of knowledge on the co-occurrence of depression and diabetes, as well as the relationship between these diseases.

Material and methods: A literature review was performed using the PubMed, Google Scholar and Cochrane platforms. Articles published after 2015 were analysed.

Results: Mood disorders are twice as common among people with diabetes, regardless of type. In contrast, people with depression have a 1.5 times higher risk of developing type 2 diabetes, compared to the general population. A key element in the mechanism of diabetes in depression is chronic stress. It has been demonstrated that it is the cause of excessive, chronic activation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system, leading to increased secretion of cortisol and catecholamines whose effect on cells may be the cause of the development of insulin resistance and then disorders of carbohydrate metabolism and eventually diabetes. Patients with depressed mood have no motivation to undertake physical activity which, combined with hypercortisolaemia, results in obesity and hyperglycaemia. It is associated with increased mortality and more frequent cardiovascular complications compared to people with diabetes alone. There is also an inverse relationship. Chronic inflammation,

which accompanies diabetes, has been observed to cause changes leading to the development of depression. Adipose tissue and damaged vascular endothelium release pro-inflammatory cytokines that may influence the onset of depressive symptoms by affecting neurotransmitter metabolism and also activating the hypothalamic-pituitary-adrenal axis. Fluctuations in glucose concentrations affect the functioning of areas of the brain responsible for mood and cognitive function.

Conclusions: The results of long-term studies do not clearly indicate whether depression leads to the development of diabetes or whether this chronic metabolic disease contributes to mood disorders. However, it remains undisputed that there is a link between these two diseases. Successful treatment of depression in a person who has not yet developed diabetes can significantly reduce the chance of developing the disease. It has been found that immunological and endocrine disorders can lead to the coexistence of depression and diabetes. The widespread prevalence, severe complications and acute social impact of depression and diabetes, combined with the paucity of information on the exact nature of their correlation, illuminate the need for more research into these relationships.

PS11
Assessment of quality of life and adherence to treatment in patients with type 2 diabetes

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Introduction: Type 2 diabetes is a chronic metabolic disorder. It can be asymptomatic for many years. It requires close cooperation between the patient and the treatment team and adherence to treatment based on diet, exercise and pharmacotherapy. Ultimately, it causes deterioration in both physical and mental functioning, resulting in a reduced quality of life. The effectiveness of the therapy is significantly dependent on the patients' quality of life and adherence to treatment.

Aim of the study: The aim of this study was to assess the quality of life and adherence to treatment recommendations of patients with type 2 diabetes.

Materials and methods: Due to the epidemiological situation related to the COVID-19 pandemic and the constraints involved, the study was conducted by diagnostic survey from November 2020 to January 2021 using remote tools. 110 subjects (60 women and 50 men) were eligible for the study. The Polish version of the Audit of Diabetes-dependent Quality of Life (ADDQoL) questionnaire, The Adherence in Chronic Diseases Scale (ACDS) and Acceptance of Illness Scale (AIS) were used to measure the variables.

Results: The respondents rated their quality of life as good. The respondents' mean rating of quality of life without disease was –1.55 points (SD = 0.69), which rounded up amounts to –2, meaning that they rated their quality of life without disease as much better than their current quality of life. The aspects of daily life most affected by the disease, according to the respondents, are freedom to eat, freedom to drink, physical fitness, travel and holidays. The study found that the higher the adherence the better the quality of life in areas such as current quality of life, quality of life without diabetes, leisure time, work life, travel, physical fitness, family life, social life, sex life, physical appearance, self-confidence, willingness to do things, reactions of the environment, financial situation, housing situation. The least burdened areas of life are family life and independence from others, as well as professional life.

Conclusions: In conclusion, our results show that type 2 diabetes adversely affects the quality of life assessment of patients with type 2 diabetes. The majority of respondents also have low levels of adherence.

PS12
Assessment of public knowledge about vitamin D supplementation

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Introduction: For many years, life has moved largely indoors, in front of computer screens – the COVID-19 pandemic, to the surprise of the whole world, through numerous necessary lockdowns, forced society to restrict being outside even more. Right now, more than ever, it is important to sup-

plement vitamin D, which has proven multidirectional, including immunostimulatory, effects.

Aim of the study: The aim of the study was to test the public's knowledge of vitamin D supplementation, with a particular focus on people with diabetes, and to explore behavioural trends to prevent calcifediol deficiency.

Material and methods: The study was conducted using a questionnaire method, statistical analysis of the results was performed using the STATISTICA package. The survey is ongoing – so far 307 respondents from all over Poland, aged 16–71, have taken part.

Results: 81.4% of respondents take vitamin D supplements, of which 42.3% have done so for more than a year – among respondents with diabetes, the percentage taking vitamin D is 94%. Only 30% of respondents seem to be aware of the correct action of sunlight exposure in vitamin D biosynthesis. The survey is ongoing – full results will be presented at the Convention.

Conclusions: An increasing number of people, also among patients with diabetes, take up vitamin D supplementation. However, the level of knowledge on this subject is still insufficient – gaps are revealed even among the most basic information. Full conclusions will be presented at the Convention.

PS13
Probiotics and diabetes

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Introduction: One of the most dangerous civilisation diseases is diabetes mellitus. It is thought to affect nearly 400 million people on Earth. According to the latest knowledge, it is considered a heterogeneous disease. Patients with either type 1 or type 2 diabetes are most commonly seen. Both these types of disease are characterised by an impairment or loss of insulin production and secretion by the β-cells of pancreatic islets. A dangerous phenomenon in the course of the above disease are complications, defined as microangiopathy (neuropathy, nephropathy and retinopathy) and macroangiopathy (atherosclerotic lesions of, inter alia, the cerebral and coronary arteries). One of the most important causes of these pathological changes is chronic hyperglycaemia, resulting in the formation of excessive amounts of free oxygen radicals. This condition leads to a pro-oxidant-antioxidant imbalance, termed oxidative stress. Therefore, new ways of treatment are constantly being sought to inhibit the development of the above pathological processes.

Aim of the study: The available literature on the potential use of probiotics in modern diabetes pharmacotherapy was reviewed.

Material and methods: Scientific articles from the last few years describing in vivo studies and biological properties, including antioxidant properties of probiotics, were collected and studied.

Results: Based on in vivo experiments, it was hypothesised that administration of probiotics could lead to delayed development of complications by altering the composition of the intestinal flora. Among other things, oxidative stress and inflammation are reduced. In addition, there was an increase in the expression of genes for adhesion molecules in the intestinal lining epithelium, leading to a sealing of the intestinal barrier. An increase in tissue insulin sensitivity and inhibition of autoimmune processes were also observed.

Conclusions: In view of the incomplete knowledge, research should continue to define definitively the role of probiotics in the prevention and treatment of diabetes.

PS14
The effect of manual lymphatic drainage on biochemical parameters in patients with abnormal body weight – a preliminary study

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Introduction: In recent years, more and more new therapies have been sought to help treat overweight and obese patients.

Aim of the study: The aim of our study was to evaluate the mass analysis of body composition and biochemical parameters after manual lymphatic drainage (MDL) in patients with abnormal body weight.

Material and methods: Twenty patients aged 45 ±12 years were included in the study, including 10 normal weight patients (body mass index [BMI] ≤ 24.9 kg/m^2; Group I) and 10 overweight and obese patients (BMI ≥ 25.0 kg/m^2; Group II). Clinical, physiotherapy and biochemical examinations were performed in all the subjects. Body composition was analysed using bioimpedance (TANITA SC-240), BMI and waist-hip ratio (WHR) were calculated. Each patient received 10 MDL therapies 3 times a week for 30 minutes each. Biochemical tests were performed in each patient before and after MDL therapy.

Results: After manual lymphatic drainage in group I, a decrease in mean visceral fat was detected in the body composition analysis, but no differences in mean body fat mass, lean mass, muscle mass or body water content were detected. A decrease in C-peptide levels was detected, 2.3 ng/ml before MDL therapy vs. 1.3 ng/ml after MDL therapy and in mean fasting insulin levels, 11.8 µIU/ml before MDL therapy vs. 5.2 µIU/ml after therapy. A decrease in HOMA-IR was also detected, 2.6 before MDL therapy vs. 1.1 after MDL therapy. In contrast, there were no changes in C-reactive protein (hsCRP), glycated haemoglobin (HbA_{1c}) or fasting glucose levels. In the analysis of body composition in group II after MDL therapy, an increase in mean fat mass, an increase in mean electrical impedance and a decrease in mean fat-free tissue mass, a decrease in muscle tissue mass were detected. A decrease in water content as well as in the level of visceral fat was also demonstrated. In addition, a decrease was detected in C-peptide levels before MDL therapy of 3.2 ng/ml vs. 2.3 ng/ml after MDL therapy, a decrease in fasting insulin levels before MDL therapy of 15.1 µIU/ml vs. 11.4 µIU/ml after MDL therapy and a decrease in hsCRP levels before MDL therapy of 3.3 mg/dl vs. 2.8 mg/dl after MDL therapy. A decrease in HOMA-IR was also detected after MDL therapy in group II, 3.5 before MDL therapy vs. 2.7 after MDL therapy. There were no changes in HbA_{1c} or fasting glucose levels before MDL vs. after MDL therapy.

Conclusions: The preliminary results of our study showed lower levels of the biochemical parameters studied after manual lymphatic drainage. It is possible that MDL may have a positive effect in the prevention of obesity, however, further research is needed to confirm the effectiveness of the proposed method in supporting the treatment of obesity.

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