Pre-Existing Diabetes Mellitus – Type 1

PP13
THE EFFECT OF CONTINUOUS GLUCOSE MONITORING IN PREGNANCY COMPLICATED BY DIABETES – A RANDOMIZED CONTROLLED TRIAL - BASELINE CHARACTERISTICS

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Background and aim: To present baseline characteristics of participants in a randomized controlled study on the effect of intermittent use of Real-Time Continuous Glucose Monitoring (CGM) in pregnancy on glycaemic control and pregnancy outcome in women with pregestational diabetes mellitus (DM).

Methods: During a two-year period starting on February 15th 2009, 154 Danish-speaking women with diabetes with a single living intrauterine pregnancy before 14 completed gestational weeks, were consecutively randomized to intermittent use of CGM in pregnancy in addition to routine antenatal care, or routine care only. Exclusion criteria were mental or psychological barriers, known diabetic nephropathy, pre-pregnancy CGM-use, concurrent medical conditions, and previous inclusion. 123 participants had type 1 DM and 31 had type DM and inclusion rates were 79 and 67% respectively. Duration of diabetes, BMI, gestational age, HbA1c and insulin doses were registered and fundus photography and urine albumin excretion measurements were performed. Patients were asked into the incidence of severe hypoglycaemic events in the year preceding pregnancy, number of daily self-monitored plasma glucose (SMPG) measurements, professional educational level, smoking status and ethnicity.

Results: Women randomized to CGM had comparable BMI (25.9 (19-53) vs. 25.2 (19-47) kg/m², p=NS), diabetes duration (10 (0.5-37) vs. 12 (0.5-38) years, p=NS) and HbA1c (6.6 (5.3-10.0) vs. 6.8 (5.3-10.7) %, p=NS) compared to women receiving routine care only. No differences were found in other baseline characteristics. When stratifying for diabetes type, similar baseline characteristics were found in women allocated to CGM compared to controls in women with type 1 as well as type 2 DM.

Conclusion: Baseline data show that women randomized to CGM did not differ from women allocated to routine care. This study will hopefully elucidate the efficacy of Real-Time CGM use in pregnancy on glycaemic control and pregnancy outcome in women with pregestational DM. The results are expected in January 2012.

PP14
CLOSED LOOP INSULIN DELIVERY PROTECTS AGAINST NOCTURNAL HYPOGLYCAEMIA AFTER MODERATE PHYSICAL ACTIVITY IN PREGNANT WOMEN WITH TYPE 1 DIABETES (T1D)

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Aim: To examine the safety and efficacy of closed loop insulin delivery after physical activity in women with T1D during pregnancy.

Methods: Six women with T1D between 16 to 34 weeks gestation were admitted for 24 hours to a clinical research facility. The time spent with plasma glucose levels within the target range (3.5-7.8 mmol/l) was determined following afternoon exercise (50min treadmill walking at 15:00), overnight fast and morning exercise (50min treadmill walking at 09:30). Prandial insulin boluses were self-adjusted according to patients’ usual algorithms and pre-meal capillary glucose concentration, for lunch (50g CHO at 12:30), evening meal (60g CHO at 18:00) and breakfast (50g CHO at 07:30). Continuous subcutaneous insulin infusion basal rates were adjusted at 15min intervals using a model predictive control-based computer algorithm and real time CGM glucose levels.

Results: Mean plasma glucose was 6.3 ± 1.0 mmol/l (5.3 ± 2.0 mmol/l after afternoon exercise, 6.1 ± 0.6 mmol/l overnight and 6.6 ± 2.0 mmol/l after morning exercise). Overall time spent with plasma
glucose in target was 69.5 ± 13.5% (61.1 ± 30.8% after afternoon exercise, 92.4 ± 8.8% overnight, 53.1 ± 26.2% after morning exercise). Time spent hypoglycaemic (plasma glucose < 2.8 mmol/l) was 1.3 ± 1.5% overall (2.9 ± 5.5% after afternoon exercise, 0% overnight, 3.0 ± 3.8% after morning exercise).

**Conclusion:** While further modification of prandial insulin doses and/or replacement carbohydrates is required for optimal glycaemic control during and immediately after exercise, closed loop insulin delivery can deliver near-optimal overnight glucose control with no nocturnal hypoglycaemia following moderate physical activity.

**PP15**

**SUCCESSFUL PREGNANCY AFTER SIMULTANEOUS PANCREAS-KIDNEY TRANSPLANTATION: A CASE REPORT**

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The effect of pregnancy on simultaneous kidney pancreas transplant recipients has previously been described, but experience is limited. Compared to kidney transplant recipients, these patients experience higher rates of preterm delivery, low birth weight, hypertension, infection, pre-eclampsia, acute rejection and graft loss in later years. Risks are reduced by planning pregnancy with functional grafts and stable immunosuppression doses. We describe the case of a thirty-five year old female who six years previously underwent simultaneous kidney pancreas transplant. She had preceding type 1 diabetes mellitus for nineteen years, complicated by retinopathy and nephropathy that required haemodialysis. She also had polycystic ovarian syndrome and required hormonal support to achieve pregnancy. Immunosuppression included tacrolimus, prednisolone and mycophenolate mofetil which was changed to azathioprine prior to pregnancy. An integrated multidisciplinary team closely followed progress during pregnancy. She developed pregnancy-induced hypertension requiring labelolol. Tacrolimus doses were adjusted based on trough levels and blood glucose levels and HbA1c remained within normal limits. She did not require insulin treatment at any point and there was no deterioration in retinopathy despite progressive hypertension. She experienced deterioration in renal indices at twenty-six weeks gestation. Intramuscular betamethasone was administered. Due to further deterioration in renal indices delivery was planned and she underwent an uncomplicated, elective Caesarian section at thirty weeks gestation, performed by her obstetrician with assistance from her transplant surgeon. She delivered a male infant of 1.18kg, appropriate for gestational age, who had hypothermia and respiratory distress, which required intubation and ventilation and an eleven week stay in the special care baby unit. At eighteen month follow the infant shows normal development and there has been no deterioration in either graft’s function.

**PP16**

**AWARENESS LEVELS REGARDING PREGNANCY AND DIABETES IN DIABETIC WOMEN CONTEMPLATING A PREGNANCY**

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Preconception counseling is very important for diabetic women to avoid maternal or fetal complications. For more effective preconception counseling, we investigated the actual levels of awareness regarding pregnancy and diabetes in diabetic women contemplating a pregnancy. We conducted a qualitative open-ended interview of 22 diabetic women (mean [SD] age, 32.4 [5.8] years; duration of diabetes, 10.6 [9.9] years) contemplating a pregnancy in 2009–2010. Eleven subjects had type 1 diabetes, 8 had type 2 diabetes and 3 had other type diabetes. The interview comprised 2 major parts; the knowledge of pregnancy and diabetes and the source of knowledge. We divided the first part, knowledge about pregnancy and diabetes, into 8 categories and investigated the relationship between the awareness and clinical characteristics.
With regard to the knowledge of pregnancy and diabetes, 90% subjects were aware of planning a pregnancy; 73%, of possible maternal complications; and 86%, of possible fetal complications. We observed that 50% subjects had no knowledge regarding dietary treatments or insulin treatments during pregnancy. We found that their major sources of knowledge of pregnancy and diabetes were books (45%), internet (29%), and physicians (18%). The lack of awareness regarding pregnancy and diabetes had a significantly relationship with higher HbA1c level (p = 0.002), but had no significant relationship with the type of diabetes, age, duration of diabetes, or treatment interventions.

In conclusion, the awareness regarding pregnancy and diabetes was found to affect good metabolic control. Preconception counseling for diabetic women is therefore necessary to decrease the risk of adverse pregnancy outcomes.

**PP17**

**AN ANALYSIS OF GLUCOSE VARIABILITY IN PREGNANCY**

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New methods of continuous glucose monitoring (CGM) provide many daily measurements (288-480 by different devices) and detailed data on the magnitude and duration of glucose fluctuations, that give unique insights into daily glycemic control. GCM was used in pregnancy to evaluate pick time, pick value, and hypoglycaemic episodes, no data are available on glucose variability parameters during pregnancy. Aim of this study was to evaluate glycemic variability during pregnancy in normal pregnant women and in women affected by type 1 diabetes mellitus or gestational diabetes. In 114 women (59 type 1, 45 GDM and 10 normal pregnant women) GCM was performed with Gluco-day system (Menarini) in the 3 trimester of pregnancy. As parameters of glycemic variability Standard Deviation, Inter Quartile Range, CONGA, LBGI, HBGI. ADRR were calculated. All indices of glucose variability evaluated were significant higher in type 1 diabetic mothers, GDM ones showed only a slight increase of parameters with respect of normal pregnant women (table 1 evaluated during pregnancy). Interestingly LBGI was higher in the first and third trimester in normal pregnant women with respect to the other two groups even if it doesn’t reach statistical significance. Our data confirm a high glycemic variability in type 1 diabetic mothers that seems reduced with the progression of pregnancy due to improved glucose control but also to increased physiological insulin resistance during gestation. As for GDM women they showed a slight increase of glucose variability parameters with respect to normal ones that also in these patients was reduced at the end of gestation. Glucose variability during pregnancy reflect not only metabolic control but also the physiological change in insulin sensitivity and glucose profile.

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<tr>
<td>CONGA 1</td>
<td>37.2(32.1-48.3)</td>
<td>18.3(16.6-25.7)</td>
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<td>36.8(29.7-47.1)</td>
<td>20.7(16.3-23.8)</td>
<td>21.0(19.0-24.5)</td>
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<td>1.3(0.7-2.4)</td>
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PP18  
AUDIT OF PREGNANCY OUTCOMES IN WOMEN TREATED WITH INSULIN DETEMIR

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Published data on pregnancy outcomes in women receiving insulin detemir in pregnancy remains sparse, with the largest published cohort report to date including 10 women¹. We performed a 3 year retrospective audit of all women with pre pregnancy diabetes (n = 13 – Type 1 DM 9/13 – 7/13 treated pre conception, others 2nd trimester) attending our tertiary diabetes in pregnancy clinic. Continuous variables are reported below as Mean (95%CI); categorical variables as proportions. Maternal characteristics were: Caucasian 11/13; Age 31.5 (27.8-35.1) years; Duration diabetes 14.0(8.7-19.3) years; Booking BMI 26.2 (22.6-29.9) kg/m²; Pre pregnancy HbA1c 8.0(6.7-9.4) %; Known retinopathy 2/13; Known nephropathy 2/13. One woman with very poor diabetes control (HbA1c 9.3% in early pregnancy, treated with Detemir pre pregnancy) was referred from an outlying hospital due to ultrasonographic detection of a severe complex fetal cardiac anomaly. This baby suffered perinatal asphyxia, required prolonged NICU care and died at Age 20 days. There were no other congenital anomalies or perinatal deaths. Maternal outcomes included: HbA1c 2nd trimester 7.1(6.2-8.0) %; HbA1c 3rd trimester 7.2(6.2-8.3) %; Hypertensive disorders in pregnancy (HDP) 3/13; Cesarean section 6/13; Shoulder dystocia 2/13. Neonatal outcomes included; Gestation at delivery 35.8(34.0-37.6) weeks, 5 minute APGAR 8.9(8.5-9.3); LGA (Birthweight > 90th centile for gender and gestation) 7/13; Hypoglycemia (noted in file) 10/13; IV dextrose treatment 6/13; Jaundice requiring phototherapy 6/14. Overall, this group of women treated with insulin detemir showed high rates of pregnancy / neonatal complications, but they also appear to be a high risk group. In particular, their glycemic control before and during pregnancy was often poor and detemir was generally commenced in an attempt to improve control. Recent RCT results for insulin detemir are far more encouraging. Broader, unselected cohort studies will help to more clearly define potential risks and benefits relating to its use in pregnancy.¹

¹Lapolla, A et al. Diabetic Medicine;26;2009;1181-2

PP19  
LONGITUDINAL CHANGES IN GLUCOSE TURNOVER, INSULIN KINETICS AND C-PEPTIDE DURING PREGNANCY IN WOMEN WITH TYPE 1 DIABETES

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There are suggestions of B-cell regeneration manifested by late gestation increases in C-peptide, in T1D pregnancy. This could be a consequence of pregnancy induced growth promoting factors, immune suppression and/or improved glycaemic control. The aim of this study was to investigate the longitudinal changes in the rate of appearance (Ra) and rate of disposal (Rd) of glucose and C-peptide concentration under stable glycaemic conditions during T1D pregnancy. We quantified fasting and meal stimulated glucose turnover and plasma C-peptide in 10 women with T1D in early (12-16 weeks) and late gestation (28-32 weeks). Ra and Rd was measured using dual tracer approach with stable-label glucose tracers. C-peptide was measured using the Invitron immunometric assay (Invitron Ltd, Monmouth, UK); with analytical sensitivity 5pmol/L and mean CV 5.2%. Closed-loop delivery of rapid acting insulin analogue (Aspart) maintained glycaemic control between meals (80g carbohydrate dinner, 60g carbohydrate breakfast) with prandial insulin boluses according to usual treatment algorithms. There were no gestational changes in fasting Ra (10±2 vs. 11±2µmol/kg/min; p=0.32) or fasting Rd (11±2 vs11±1µmol/kg/min; p=0.77). There was no difference in fasting or in stimulated C-peptide levels from early to late gestation; 0.004 (95% CI, -0.006 to 0.007; p=0.9). Glucose Rd was delayed after breakfast (T50% 103±17 vs. 125±21min) and after dinner (T50% 112±22 vs. 142±34min) in late gestation (p=0.003). Peripheral insulin sensitivity was reduced after breakfast (0.11±0.05 vs. 0.07±0.03µmol/kg/min per
pmol/l) and after dinner (0.09±0.04 vs. 0.05±0.02umol/kg/min per pmol/l) in late gestation (p=0.002). Prandial insulin absorption was delayed (time-to-peak 46±10 vs. 78±34min after breakfast; 53±13 vs. 79±33min after dinner) in late gestation (p=0.0002). In conclusion, postprandial glucose disposal is slowed down due to delayed insulin absorption and decreased peripheral insulin sensitivity. Using standardized fasting and meal-stimulated C-peptide levels, we found no evidence of B-cell rejuvenation during T1D pregnancy.

PP20
A CASE OF MOTHER AND CHILD BOTH WHO HAD TYPE 1 DIABETES IN THEIR EARLY INFANTILE PERIOD

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Japan has one of the lowest incidences of type 1 diabetes in the world. Therefore, few cases of familial type 1 diabetic patients have been reported. Neonatal and infantile type 1 diabetes cases are also rare. We had a case of mother and child both who had type 1 diabetes in their early infantile period.

The mother had been diagnosed with type 1 diabetes at 8 months after birth, and started insulin therapy. At age 26, she became pregnant, her HbA1c level was 7.3% due to anemia, her glycated albumin (GA) level was 30.0%. She had no diabetic complications despite a long history of poor diabetic control. In the third trimester her HbA1c level was 6.7% and GA level was still 22.0%. In the 39 gestational week, she delivered a baby, which weighed 3125g at birth, appropriate for date (AFD) nor any neonatal complications.

At 50 days after birth, the mother noticed her son showed polyuria and polydipsia, his blood glucose level was high when she checked with her self-glucose monitoring. At admission, his blood glucose level: 664mg/dl, and HbA1c level: 3.7%. He was treated at the Department of Pediatrics, Kitasato University School of Medicine. Both mother and child had no islet cell antibodies, and had DRB1*0802 and DQB1*0402 alleles. The son had no Kir6.2, SUR1 mutation.

Conclusion: This is the first report of a familial case in which both have type 1 diabetes in early infantile period in Japan.

PP21
RISING PREVALENCE OF PREGNANCY COMPLICATED BY TYPE 2 DIABETES IN SCOTLAND

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²ISD Scotland, Edinburgh, Scotland, UK
³Institute of Health and Wellbeing, University of Glasgow, Scotland, UK
⁴Aberdeen Royal Infirmary, Aberdeen, Scotland, UK

Secular increases in type 2 diabetes (T2DM) are well described in the general population and causing concern in the obstetric population. We used comprehensive national clinical databases of diabetes (Scottish Care Information- diabetes collaboration- SCI-DC) and centrally held obstetric discharge information (Information Services Division NHS Scotland) to assess the number of deliveries to women with diabetes in Scotland. Discharge information alone recorded only 70% of diabetes cases. There were 2338 live births to women with pre-existing diabetes in Scotland between 1st April 1998 and 31st March 2008, representing 1 in 239 births. Numbers of women with type 1 diabetes (T1DM) were very similar to existing national paper audits in 1998/9 and 2003/4 with on average 195 live births to women with T1DM per annum across the 10 years. Deliveries of women with T2DM rose from 20 live births in 1998/9 to 51 in 2007/8– increasing from 10% of deliveries to women with diabetes to 17-24% by 2005-8. Considering liveborn singletons alone, unadjusted birthweight (mean±SD: T1DM 3457g ±805g vs. T2DM 3413g ±817g; P=0.34) and rates of macrosomia (>4.5kg: T1DM 8.1% vs. T2DM 7.9%; P=0.50), were similar, although mothers with T1DM were delivered earlier (gestational age at delivery: T1DM 36.8±2.3weeks vs. T2DM 37.4±2.3weeks; P=<0.05) with increased rates of preterm birth (under 37 weeks: T1DM 32.8% vs. T2DM 21.9%; P=<0.05). Mothers with T1DM were more likely to be delivered by caesarean section (T1DM 67% of singleton births vs.
T2DM 56%; P<0.05) and particularly by emergency section (T1DM 39% vs. T2DM 28%; P<0.05). There were a total of 51 stillbirths and 10 early neonatal deaths (in first week of life) in the 10 year-period with rates of stillbirth of 21.3 per 1000 births and perinatal mortality 25.5 per 1000 births- both approximately 3 to 4 fold that of the background population and appearing stable with time. Rates of stillbirth were similar in T1DM and T2DM (19.6 and 30.3 per 1000 births respectively; P=0.18). Discharge information alone is not reliable for detecting diabetes in pregnancy. Record linkage reveals a marked secular increase in pregnancy complicated by T2DM over 10 years. Stillbirth and perinatal mortality continue to be increased in offspring of mothers with diabetes, while preterm and operative delivery appear particularly high in women with T1DM.

**PP22**

**BENEFITS OF CSII OVER MDI TO PREGNANT WOMEN WITH TYPE 1 DIABETES AND THEIR OFFSPRING: 12 YEAR EXPERIENCE IN ONE CENTRE**

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We have managed a total of 91 pregnancies (1 twin) in women with type 1 diabetes between 1999 and 2010, during which time all women were offered CSII as an alternative to MDI in pregnancy. We have collected data on HbA1c preconceptionally, in each trimester and post-partum; intra-partum maternal glucose; subjective reporting of hypoglycaemia severity; fetal growth and birth weight; neonatal morbidity; maternal weight gain and insulin requirements.

48 women used CSII, 14 switching from MDI in early pregnancy, with 42 live births; 43 used MDI alone, with 37 live births. HbA1c was significantly better in CSII users preconceptionally (7.4 ± 1.3 vs 8.3 ± 2.0%) and in the first trimester (6.8 ± 1.1 vs 7.7 ± 1.7%). However there were no significant differences through the remainder of the pregnancy, although third trimester HbA1c was lower in those women who switched to CSII during pregnancy than those who used either CSII or MDI alone (6.5 ± 0.9 vs 6.8 ± 0.8 vs 6.7 ± 1.0%). Reported hypoglycaemia severity was significantly reduced in CSII users. There was no impact of CSII use on fetal growth or birth weight, although intriguingly there was a positive correlation between third trimester HbA1c and both fetal growth and birth weight ($r^2 = 0.13$ and 0.06 respectively) when mothers had used MDI, but there was no such correlation when mothers had used CSII. Only one CSII user did not continue on CSII during the intrapartum phase, and those who continued CSII had a significantly lower intrapartum glucose than women on MDI who used intravenous insulin infusion (5.7 ± 2.3 vs 7.0 ± 2.8 mmol/l). There was a corresponding reduction in frequency of neonatal hypoglycaemia, with a significantly higher mean neonatal glucose for those born to CSII users (2.5 ± 0.9 vs 1.7 ± 1.0 mmol/l). 32% of neonates born to mothers on CSII had a blood glucose < 2.0 mmol/l, compared to 57% of those born to mothers on MDI. There was a significant reduction in the need for SCBU admission for those neonates whose mothers had used CSII (73 vs 91%) although average length of stay was longer for these neonates; there was no difference in rates of neonatal jaundice or respiratory distress. There were no differences in caesarean section rates overall, but in the last 2 years there were half as many in the women using CSII as those using MDI. There was significantly less weight gain (12.0 ± 4.4 vs 15.0 ± 4.8 kg), lower insulin requirements (ratio of total insulin dose start to end of pregnancy 1.6 ± 0.5 vs 2.6 ± 2.1) and non-significantly better post-partum HbA1c (7.6 ± 1.1 vs 8.3 ± 2.1%) for mothers who used CSII. In conclusion pregnant women with type 1 diabetes using CSII rather than MDI can achieve better glycaemic control, particularly preconceptionally and in early pregnancy, experience less severe hypoglycaemia, with benefits to the mothers in reduced weight gain and to the neonates in reduced hypoglycaemia frequency.

**PP23**

**EVALUATION OF A SIMPLE INTRAPARTUM INSULIN INFUSION PROTOCOL**

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Management of diabetes in pregnancy demands excellent blood glucose control during pregnancy and labour avoiding neonatal and maternal hypoglycaemia. **Objective:** As part of a quality assessment program, we retrospectively evaluated the effectiveness of a labour protocol in use 20 years in our institution for glucose control in women with type 1 and type 2 diabetes. **Methods:** Women were identified who delivered between 2004-2006 and were treated with an insulin dose ≥ 30 units/day prior to labour and managed with an intra-partum protocol. The protocol includes a glucose infusion of 5g/h as 10% dextrose in water and an insulin infusion using ½ of the TDD/24 as the initial hourly rate was begun if CBGM was ≥ 4.5mmol/L and adjusted to maintain glucose between 4.5-5.5mmol/L. At placental delivery, insulin is held and glucose increased to 10g/h until glucose goes above 6mmol/L. **Results:** A total of 80 women were evaluated in 86 pregnancies. Of those, 31 (39%) had DM1 with mean BMI 21.7, 9 with microvascular complications, mean duration of DM 14.6 years, 43% had Caesarian sections. Mean A1C T1 6.3%, T2 5.5%, T3 5.3% and mean FPG T1 7.0, 6.0, 5.6 mmol/L; mean 1hPC T1 7.3 T2 6.2 T3 6.0 mmol/L and insulin was administered in labour in 90% of labours. The 49 (61%) women with DM2 had a mean BMI of 33kg/m², a mean duration of DM of 3.3 years, 2 with microvascular complications, 76% had Caesarian sections, mean FPG T1 7.7, T2 6.3, T3 5.5mmol/L, mean 1hPC T1 9.6 T2 7.0 T3 7.2 mmol/L and insulin infusion was used in 72%. Mean insulin dose in labour was 1.7units/h for DM1, 2.2unit/h in DM2. Maternal hypoglycaemia (CBG <3.3) occurred in 16% of labour occurring equally in DM1 or DM2. There were <5 episodes of maternal hypoglycaemia <2.5mmol/L. Mean glucose achieved overall was 5.9mmol/L (5.9 for DM1, 4.6 for DM2.) Of the 863 CBG readings, there were 31% between 4.5-5.5mmol/L, 24% lower, and 43% higher with 9% ≥7mmol/L. Neonatal hypoglycaemic events (BS ≤2mmol/L occurred in 32 neonates (37% - 46% in DM1 offspring, 40% in DM2 offspring (p=0.047) and 4(12%) in babies whose mother did not receive maternal IV insulin. No significant relationship was seen between glucose control in labour, nor in any trimester in labour and neonatal hypoglycaemia. **Conclusion:** A simple and easy to use insulin infusion protocol safely controlled both DM1 and DM2 women with minimal hypo or hyperglycemic risk for mother or offspring. The degree of glucose control in labour did not appear to relate to the risk of hypoglycaemia in the neonate.

**PP24**

**ASSESSMENT OF PLACENTAL BLOOD FLOW IN DIABETIC PREGNANCIES: ROLE OF MAGNETIC RESONANCE IMAGING**

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2. School of Biomedical Sciences, University of Nottingham, UK.
3. Department of Obstetrics and Gynaecology, Nottingham University Hospitals NHS Trust, Nottingham, UK.
4. Sir. Peter Mansfield Magnetic Resonance Centre, University of Nottingham, UK.

**Introduction** – High volume, low resistance placental blood flow is essential for optimal materno-fetal nutrient exchange. In maternal diabetes the placenta is often large with abnormal vascular development. To date, it has not been possible to study placental blood flow in detail, but magnetic resonance imaging (MRI) potentially provides such a technique.

**Aims** – To compare blood flow within the placenta in diabetic and normal pregnancies using MRI.

**Methods** – 6 women with diabetes and 4 controls had MRI scans at 24-26 weeks. A 1.5 T Philips Achieva MRI scanner was used. The IVIM sequence was respiratory gated, standard diffusion pulsed spin echo sequence acquired with 5 transverse slices encompassing the placenta at 12 b values, repeated 5 times. Analysis was performed to calculate the fractional moving blood volume (f, range 0-1) in each voxel of the entire placenta.

**Results** – The mean value of f in the two groups was similar; normal (0.37) and diabetic (0.34). The women with diabetes had wider distributions of f with a lower mode (0.26 vs. 0.32, P=0.04) and a borderline increased fraction of voxels with very high perfusion (f > 0.8) at 4.1 % vs 2.5 % in controls (p = 0.06).

**Conclusions** – This is the first report demonstrating a difference in the distribution of placental blood flow in women with diabetes compared with controls. It is possible that the high velocity blood flow observed in some intervillous spaces is of pathological significance. MRI provides a potentially valuable tool for the investigation of placental blood flow.
Gestational diabetes mellitus (GDM) is associated with increased maternal and neonatal morbidity and mortality. We investigated the role of healthcare centre accessibility on the decision to attend for screening, employing geographic information systems (GIS), econometric and simulation techniques. In particular, we focus on the extent to which ‘travel distance to screening site’ impacts upon the individual’s screen uptake decision, whether significant geographic inequalities exist in relation to accessibility to screening, and the likely impact on uptake rates of providing screening services at a local level. We also aimed to assess whether Irish women of lower socio-economic status were less likely to attend for screening for Diabetes in Pregnancy than their higher status counterparts.

This study was completed through the Atlantic Diabetes in Pregnancy (DIP) partnership, which offers universal screening for Gestational Diabetes at 24-28 weeks gestation. Data was collected on all women who delivered in 5 antenatal centres along the Irish Atlantic Seaboard between 2007-2009. Patients were ‘geocoded’, in order to provide precise spatial (x,y) coordinates for their residential locations. This facilitates geographic information systems-based route analysis of travel distances for each individual to their nearest screening site. We then model the decision to attend for screening, where control variables include travel distance to screening site, a range of other site accessibility-related variables, as well as a number of individual-level variables relating to personal, socio-economic, clinical and lifestyle characteristics. The socio-economic status is based on the deprivation score derived from the 2006 Census of Population for the Republic of Ireland. The Deprivation Index is constructed from a combination of various indicators; education, employment, percentage skilled/unskilled workers, demographic information, lone parents and number of persons/room.

9,043 pregnant women offered screening, 5,218 (58%) of whom participated in testing. The probability of attending for screening was reduced by 1.8% [95% CI: 1.3% to 2.3%] for every additional 10kms required to travel for screening (p=0.000). We also find significant variation in uptake rates across hospitals after controlling for travel distance and other factors, suggesting that accessibility and quality-of-service are also important determinants of overall uptake rates. Using the deprivation index 60% of those who scored 1 (most affluent) attended for screening, 58% in score 2, 56% in score 3, 53% in score 4 and 46% in the score 5 (most deprived) group attended, p=0.0001. This shows a clear decrease in attendance levels in those who are deemed to be more disadvantaged. The most disadvantaged women overall were 40% less likely to attend than their most affluent counterparts (OR0.6, 95%CI {0.55-0.71},p=0.001).

Accessibility to healthcare centres and socio-economic background both affect the decision to attend for screening for Gestational Diabetes Mellitus in Ireland.
spectrums of medicine. There is little evidence however, suggesting that Diabetes in Pregnancy is more prevalent in women from poorer backgrounds.

This study was completed by the Atlantic Diabetes in Pregnancy partnership, which offered universal screening for Gestational Diabetes at 24-28 weeks gestation. Data was collected on women who delivered in 5 antenatal centres between 2007 and 2009. The calculated socio-economic background is based on a deprivation index derived from area of residence and national census data. The Deprivation Index is scored from 1-5, from least to most deprived, using various indicators; education, employment, percentage of skilled/unskilled workers, demographic information, lone parents and number of persons/room.

Using a 'bivariate probit with sample selection' model we controlled for poor attendance amongst women from disadvantaged areas. We found that incidence of gestational diabetes is significantly higher for women living in the poorest areas, compared to women living in the richest areas. This gradient disappears when diabetes risk factors are controlled for, suggesting personal, clinical and lifestyle factors correlated with socioeconomic status are significant determinants for the development of Gestational Diabetes. These risk factors include; Body Mass Index, family history, smoking, sedentary lifestyle and higher immigrant population.

Gestational Diabetes is more prevalent amongst women from lower socio-economic backgrounds.

PP27
PREDICTORS OF CONGENITAL ANOMALIES IN OFFSPRING OF MOTHERS WITH PRE-GESTATIONAL TYPE1 AND TYPE 2 DIABETES

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Objective: To quantify the risk of major congenital anomalies and to explore factors associated with congenital anomaly occurrence in women with type 1 and type 2 pregestational diabetes.

Methods: Population based cohort study using linked register data from the North of England. The study population comprised singleton deliveries 1996-2008 resulting in live birth, fetal death ≥20 weeks or termination for congenital anomaly (n=401,149 including 1677 pregnancies in women with diabetes). Prevalence rates and rate ratios (RR) with 95% confidence intervals (95% CI) were calculated to compare rates of major structural anomaly in women with and without pre-gestational diabetes. Multiple logistic regression was used to analyse the relationship between potential predictors and congenital anomalies in offspring of women with diabetes.

Results: The rate of major structural congenital anomaly in women with diabetes was 71.6 per 1000 pregnancies (95% CI 59.6-84.9), with a relative risk of 3.8 (95% CI 3.2-4.5) compared to women without diabetes. There was an increased risk across all common anomaly groups, including cardiovascular, nervous system, urinary and digestive anomalies, sequences (including caudal dysplasia sequence), syndromes and multiple anomalies. 18% of affected pregnancies resulted in termination of pregnancy. Lack of folic acid, poor pre-conception glycaemic control, pre-existing nephropathy and socio-economic status were significant univariate predictors of structural congenital anomalies. In multivariate analysis, only pre-conception glycaemic control (aOR 1.20; 1.08-1.35 per 1% increase in HbA1C) and pre-existing nephropathy (aOR 2.25; 95% CI 1.04-4.84) were independent predictors. Type and duration of diabetes, ethnicity, age, early pregnancy BMI, smoking and fetal sex were not associated with congenital anomaly.

Conclusions. Novel approaches to optimising glycaemic control before pregnancy are required. The increased risk among women with nephropathy requires further investigation.

PP 28
PERSONAL EXPERIENCES OF AUSTRALIAN ABORIGINAL WOMEN WITH DIABETES

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We have previously documented extremely adverse outcomes (still birth rate 53/1000) for Australian Aboriginal women with pre-existing diabetes and poor outcomes for women with gestational diabetes.
(still birth rate 24/100). Therefore this study sought to understand the way that Australian Aboriginal women with diabetes experience pregnancy and obstetric care.

Australian Aboriginal women with diabetes, from two communities in the Mid West of Western Australia were recruited from contacts through the local medical services. Women were interviewed in person or over the phone, during and after their delivery using a semi-structured interview. Interviews were transcribed and were analyzed using interpretative phenomenological analysis. Australian Aboriginal women seem to develop gestational diabetes from their third pregnancy on. They perceive and accept that complications of pregnancy and birth as normal. These women are reluctant to announce their pregnancy early, due to the anticipated pressures to terminate their wanted pregnancy. The demands of motherhood; caring for previous children; community commitments, and the challenges of accessing specialist care are the precursors to poor outcomes. Australian Aboriginal women with diabetes are experienced mothers, are reluctant to engage early with health services, and find it difficult to access the quality of care that is required for good pregnancy outcomes.

PP29
DIABETES IN PREGNANCY: A COMPARATIVE STUDY OF STRESS AND WELL-BEING IN WOMEN WITH ESTABLISHED DIABETES, GESTATIONAL DIABETES, AND THOSE WITHOUT DIABETES

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Background and aims: Diabetes in pregnancy increases the risk of maternal and perinatal morbidity and mortality. The experience of diabetes during pregnancy may be a significant source of stress, both because of the impact of the illness and associated treatments on the expectant mother and because of concern about the impact on the unborn child. In order to examine stress associated with diabetes during pregnancy, we carried out a prospective study in women with pre-existing (Type 1 or Type 2) Diabetes (PDM), Gestational Diabetes Mellitus (GDM), and non-diabetic pregnant controls (NDM).

Materials and methods: The participants were 211 pregnant women - 26 with pre-existing diabetes (PDM), 77 with GDM and 108 healthy controls (NDM). All were attending antenatal services in six health care centres in Ireland. We measured stress and wellbeing with several standardised psychological questionnaires including The Pregnancy Experience Scale; The Depression Anxiety Stress Scale; the Multidimensional Perceived Social Support Scale; the Illness Perception Questionnaire-Diabetes; the Diabetes Self-Efficacy Scale; the SF-8 and the Problem Areas in Diabetes Scale. We hypothesized that diabetic women would report higher levels of stress than healthy controls and we also hypothesized that social support may confer a protective role. Results: We found a non-significant trend of increased stress and lower quality of life among diabetic women compared to non-diabetic controls. Women with PDM perceived their illness as having a higher impact on their lives than those with GDM (p<0.0001). However, women with pre-existing diabetes also reported significantly greater self-efficacy in relation to their diabetes management compared to their gestational diabetes counterparts (p<0.05). The results of the remaining questionnaires demonstrate a general trend towards higher distress in diabetic women compared to controls. The healthy controls reported higher perceived social support which may confer a protective role against psychological stress.

Conclusion: These preliminary results suggest that pregnant diabetic women perceive themselves as having a lower quality of life and higher levels of stress in pregnancy, especially women with pre-existing diabetes. This may indicate a need for psychological support in these patients. However, further research is required.
SERUM AMINO ACID CONCENTRATIONS IN PREGNANT DIABETIC RATS – ASSOCIATION WITH FETAL DYSMORPHOGENESIS

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The aim was to compare maternal amino acid levels in diabetic rat pregnancy between two rat strains with low and high malformation susceptibility. Crossing normal (N) and manifestly diabetic (MD) Wi star Furth (W) and Sprague-Dawley (L) females with W or L males yielded 2 x 4 types of pregnancy (normal or diabetic WW, LL, WL, LW). The serum concentrations of free amino acids were determined chromatographically in day-10 blood samples. Increased levels of asparagine, glutamine, proline, alanine, valine, isoleucine, leucine, and decreased lysine were found in all MD rats, whereas the MDW rats (malformation-resistant) had increased levels of taurine, glutamic acid and decreased cysteine and tryptophan, and the MDL rats (malformation-prone) had increased citrulline and ornithine. MDL rats, furthermore, had lower taurine and glutamic acid, as well as higher glutamine, citrulline, valine, cysteine, methionine, leucine, ornithine and lysine compared to the MDW rats. MD+W (enhanced teratogenicity) compared to MDW had decreased levels of taurine, aspartic acid, asparagine, glutamic acid and arginine as well as increased levels of threonine, glutamine, proline, valine, cysteine, methionine, isoleucine, leucine, histidine and tryptophan. MD-L (decreased teratogenicity) compared to MDL had decreased levels of threonine, serine, asparagine, proline, glycine, alanine, citrulline, valine, isoleucine, leucine and ornithine and an increase in tryptophan.

Branched-chain amino acids, citrulline and ornithine levels were increased in malformation-prone MDL rats compared with malformation-resistant MDW rats. These data reflect a more severe diabetic state, as well as an enhanced urea cycle activity, in the MDL rats, these alterations may be associated with the teratogenic process in the MDL rats. In addition, there was a selective decrease in serum levels of taurine in the MDL rats, supporting a specific role for this non-essential amino acid in diabetic teratogenesis.

AN OBESITY-RELATED FTO VARIANT AND THE RISK OF PREECLAMPSIA IN A FINNISH STUDY POPULATION

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Background: Genome-wide association studies worldwide have demonstrated a common variant of the obesity and fat mass-related FTO gene, rs9939609, to be associated with obesity and type 2 diabetes. The A-allele of rs9939609 has also been linked to elevated blood pressure. As obesity is a major risk factor for gestational diabetes and hypertensive disorders of pregnancy, we investigated the impact of short nucleotide polymorphism (SNP) rs9939609 on the risk of preeclampsia (PE) in a Finnish study population.

Methods: We genotyped 476 Finnish women with prior PE and 446 women who had given birth after a normotensive pregnancy for the FTO SNP rs9939609, using a pre-designed TaqMan allele discrimination assay and PCR amplification. Overall, 17.9% of all study subjects were overweight (body mass index (BMI) ≥25 kg/m²) and 7.5% were obese (BMI≥30 kg/m²). No difference in the frequency of overweight or obesity was found between subjects homozygous for the A-allele of rs9939609 and those homozygous for the T-allele (p=0.406 and p=0.134, respectively). Each additional A-allele corresponded to an increase in BMI of 0.082 kg/m² (p=0.791) among the cases and 0.025 kg/m² (p=0.923) among the controls. There was no association between the rs9939609 of FTO and PE. The prevalences of genotypes AA, AT and TT were 15%, 53% and 32%, respectively, among the PE cases, and 16%, 47% and 37%, respectively, among the controls (p=0.199).

Conclusions: Although overweight is a major risk factor of pregnancy-induced hypertension and PE, we found no evidence of an association between the FTO SNP rs9939609 and PE. Risk factors other
than obesity may dominate among the patients manifesting severe, early-onset PE compared to those with a milder, later-onset form of the disease. Our cases were dominated by the more severe end of the disease spectrum, which may explain the lack of association observed in this study. Further studies with larger sample sizes and with possibilities of stratifying the sample according to the degree of severity and the gestation weeks at the onset of PE should be carried out to exclude an association in particular with the less severe, later-onset forms of the disease.

PP32
IN UMBILICAL CORD VESSELS FROM GESTATIONAL DIABETES MOTHERS
HYPERGLYCAEMIA MAY REDUCE NITRIC OXIDE AVAILABILITY BY INCREASING
NITROXIDANT STRESS

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Impaired endothelium-mediated vasodilation has been described in diabetic patients, suggesting decreased Nitric Oxide (NO) availability. However, a hyperglycaemia induced decrease in endothelial Nitric Oxide Synthase (eNOS) expression and activity is far from have being firmly demonstrated. Indeed, hyperglycaemia increases superoxide anion (O2-) production: this might actually increase eNOS expression and activity, but divert NO to the formation of peroxynitrite (ONOO-) and then nitrotyrosine (NT) within the vascular wall, thus inducing vascular damage and reducing NO bioavailability. Aim of our study was to determine whether in the umbilical cord vessels and endothelial cells obtained from women with Gestational Diabetes (GD) (and thus with chronically elevated blood glucose levels) increased NT and eNOS levels were present and to investigate whether eNOS uncoupling and changes in NO bioavailability occur in these conditions. Tissue specimens and cultured human umbilical vein endothelial cells (HUVEC) were obtained from umbilical cords of 10 healthy women (Control, C) and 10 women with GD. Vascular NT and eNOS protein levels were evaluated in cord tissues (immunohistochemistry); NT and O2- levels (immunofluorescence), eNOS mRNA and protein (eNOS monomers/dimers) levels (Real-Time PCR and Western Blot), eNOS activity (conversion of [3H]-L-arginine in [3H]-L-citrulline) and cGMP production (ELISA) were measured in C and GD-HUVEC. As compared to the controls, NT levels were significantly increased both in GD umbilical cords and in GD-HUVEC. As expected, GD cells showed also markedly increased O2- production. eNOS expression resulted two-fold increased both in GD tissue specimens and in GD-HUVEC but with a comparable ratio eNOS monomers/dimers in C and GD samples. Increased NO activity was observed in GD-HUVEC which however was not paralleled by an increase in cGMP production, a natural target of NO activity. Our data indicate that in presence of chronic hyperglycaemia endothelium from GD umbilical cords is characterized by increased NT production driven by increased O2- and NO generation. These data further indicate that hyperglycaemia, by increasing O2- levels, decreases vascular NO availability via NO consumption rather than through eNOS uncoupling, thus contributing to endothelial dysfunction in diabetes.

PP33
SOCIOECONOMIC DEPRIVATION AND PREGNANCY. IS THERE AN ASSOCIATION WITH GESTATIONAL DIABETES AND ITS RISK FACTORS?

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Background: In the general population, socioeconomic deprivation is adversely associated with different diseases and risk factors, including obesity and diabetes mellitus. Data in pregnancy are scarce.
Objectives: To analyze the association between socioeconomic deprivation and gestational diabetes mellitus (GDM) and its risk factors (RF).

Subjects and methods: Pregnant women of a singleton pregnancy who delivered at the center during the period 1/07/2008 to 31/12/2008. Main independent variables: index of socioeconomic deprivation and its components (low educational level, low educational level in youngs, manual workers, temporary workers, unemployment) estimated after census data and grouped into tertiles. Explored dependent variables: Glucose tolerance (NDDG criteria), maternal age, anthropometrics, weight gain during pregnancy and ethnicity. Multivariate logistic regression models have been adjusted.

Results: In the aforementioned period, 810 pregnant women gave birth in the center, and the deprivation index was available for those living in the urban area (684, 84.4%). The population characteristics were: mean age 32 years, mean body mass index 23.4 kg/m$^2$, non-Caucasian ethnicity 41.5%, gestational diabetes 6.8%, average weight gain 12 kg. The global deprivation index was not associated to GDM or its RF. Unemployment was negatively associated with prepregnancy obesity (OR 0.613 and 0.186 for the 2nd and 3rd tertiles) and GDM (OR 0.437 and 0.560 for the 2nd and 3rd tertiles).

Conclusions: In this obstetric population, the deprivation index is not associated with GDM or its RF but unemployment displays a negative (protective) association with both obesity and GDM.

**PP34**

**EFFECTS OF PIOGLITAZONE ON MATERNAL INSULIN RESISTANCE AT LATE PREGNANCY**

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Insulin resistance is a hallmark of late pregnancy both in human and in the rat, and adipose fat is one of the tissues that most actively contributes to this reduced insulin sensitivity. We have previously shown that lumbar adipose tissue (AT) exhibits a low grade inflammation (1), during pregnancy that correlates with insulin resistance in the mother (2). We have also observed that when this maternal-IR is diminished by treatment of pregnant rats with englitazone, a tiazolidinedione (TZD), newborn are smaller and their insulin-glucose relationship is altered (3). The aim of the present study was characterizing if the TDZ are able to reverse insulin resistance during pregnancy by modulation of the inflammatory response of the mother. For that, we treated a group of pregnant rats daily from day 16 to 20 of gestation with 15 mg/day of pioglitazone (TZD). Other group of pregnant rats was treated with the vehicle (control). At 20 days of gestation biochemical parameters and circulating and tissular (visceral adipose tissue) inflammatory markers and macrophage infiltration were analyzed. We observed that, at 20d of pregnancy, TZD-mothers have lower levels of plasma triglycerides, higher of adiponectin and higher insulin sensitivity than controls. We also observed that the TNF-α/IL-6 ratio, an index of Th1/Th2 response, was higher in control than in TDZ-mothers, suggesting that the treated mothers have a lower inflammatory condition. Furthermore, tissular PGE$_2$ and phosphorylation of p38MAPK were lower in adipose tissue in TZD-treated mothers than in control pregnant rats. Finally, immunohistochemical analysis reveals a polarization of macrophages to a more anti-inflammatory phenotype.

In conclusion, our results confirm that IR at late pregnancy is a low-grade inflammatory condition, mediated by stress-kinase activation, and that reversion of insulin resistance by tiazolidinediones is mediated by modulation of the inflammatory state of the adipose tissue. Supported by grants from the Ministry of Science and Innovative Technology of Spain (SAF2007-64881) and SAF2010-19603) and from University CEU San Pablo (CEU10-01).

SEX RATIO IN NEWBORNS OF WOMEN WITH PREGESTATIONAL DIABETES; INFLUENCE OF FIRST TRIMESTER GLYCATED HEMOGLOBIN

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Background and aims: The proportion of live males at birth (sex ratio) in the general population has been established as 51.5. Many conditions can have an impact on it, endocrinologic diseases such as congenital adrenal hyperplasia among them. Few studies have addressed the influence of maternal diabetes with results in pregestational diabetes depicting significant heterogeneity. No study has addressed the potential influence of first trimester glycemic control. We aimed to analyze sex ratio of pregnancies of women with pregestational diabetes both overall and according to mean glycated hemoglobin (GHb) in the first trimester of pregnancy.

Methods: All neonates born alive of women with pregestational diabetes attending the diabetes and pregnancy clinic and with information on fetal sex and first trimester GHb were included. GHb was expressed in SD around the mean and 10 categories were considered (-2 to 0 SD, 0 to 2 SD, ...>14SD). A second analysis combined these categories in 5 (4SD in each one). A Chi-square test was used both to compare sex ratio to the expected figure and among categories. A logistic regression analysis was performed with newborn sex as the dependent variable and GHb, maternal weight height and BMI as some of potential predictors. Significance was set at p<0.05

Results: 410 offspring of women with pregestational diabetes were born alive in the study period (361 from mothers with Type 1 diabetes and 49 from mothers with Type 2 diabetes). 209 offspring were male (51%), the overall rate being not different of the expected one. The sex ratio was lowest for the >4 to 8 SD category (corresponding to HbA1c of >6.4 to 7.6%). Taking this category as reference, the OR of a live male newborn was significantly higher in the >0 to 4 SD (OR 1.73) and =<0 SD (OR 3.0) categories.

Conclusions: In this cohort of women of pregestational diabetes, the overall sex ratio in the offspring was not significantly different from the expected, but it was significantly associated with first trimester GHb (higher in the lower GHb categories).

PP36
INFLUENCE OF TYPE 1 DIABETES MELLITUS ON GLUCOSE, ADIPOKINES, AND ESSENTIAL FATTY ACIDS

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Objective. The goal of this study was to define the influence of type 1 DM on levels of glucose, insulin, c-peptide, leptin, adiponectin, total free fatty acids (FFA), and essential fatty acids (EFA) in maternal and umbilical vein blood. Methods. Research included (58) pregnant women divided into two groups as follows: 28 healthy pregnant women (CTRL) and 30 pregnant women with type 1 DM. Maternal vein blood samples and umbilical vein and artery blood samples during delivery were taken and glucose concentration along with insulin, C-peptide, leptin, adiponectin, and FFA were measured. Extraction of total lipids was performed according Folch method. For extraction of the fatty acids, gas chromatography was used. Results. Mean values in maternal blood of the CTRL were: glucose 4.1 ±1.6 mmol/L, insulin 12.8±1.7U/mL, C-peptide 315.2±201.1 ng/mL, leptin 1003.9±621.8 ng/mL, adiponectin 17.3±4.55 µg/mL. Values measured from umbilical vein blood of CTRL group were: glucose 3.3±1.3 mmol/L, insulin 3.47 U/L, C-peptide 105.7±87.9 ng/mL, leptin 400.3±354.6 ng/mL, adiponectin 4.8±3.5 µg/mL. In maternal blood of type 1 DM values were: glucose 5.4±4.8, insulin 21.1±8.7 U/mL, C-peptide 319±230 ng/mL, leptin 720.4 ± 952.0 ng/mL, adiponectin 9.3±7.9 µg/mL. In umbilical vein of mothers with type 1 DM we measured: glucose 3.1±2.1mmol/L, insulin 11.0±4.2 U/mL, C-peptide 257.0±234.8 ng/mL, leptin 1240.8±989.7 ng/mL, adiponectin 40.6±55.2 µg/mL. Fetal macrosomia is associated with higher concentration of leptin. C peptide correlates very well with birthweight of the newborns and shows increased values among newborns of diabetic mothers even when they are eutrophic compared to the eutrophic newborns of the controls. The statistical significant difference was found in total lipid content in pregnant women between the studied groups.
In the umbilical vein the concentration of the total lipid contents was lower in both groups 1899±862.6 vs. 2636.1±904.8 mg/L compared to the respective artery 2588.9±892.6 compared to the respective artery 2588.9±892.6 vs. 2728.7±1327.4 mg/L what suggests that fetus of the diabetic mother synthesizes additional lipids. We did not find any statistical significant difference between maternal and umbilical vein plasma concentration of EFA between two groups. The concentration of docosahexaenoic (DHA) acid in umbilical artery plasma was higher in CTRL group compared to type 1 DM group (3.17% : 2.43%). The relative concentrations of arachidonic acid (AA) and DHA in umbilical vein plasma in both groups were higher when compared with maternal venous plasma in both groups. There were found statistically significant higher relative concentrations of AA in umbilical vein plasma in CTRL and in type 1 DM groups (11.7%; 13.6%) when compared with maternal vein plasma in both groups (CTRL=1.6%; type 1 DM =1.9%).

PP37
GROUP THERAPY IS A USEFUL METHOD TO HELP REDUCE WEIGHT IN CHILDREN AND ADOLESCENTS, ALTHOUGH NOT ALL CHILDREN ARE EQUALS.

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Obesity is a strong predictor factor for both type 2 and gestational diabetes, being weight reduction one of the best strategies to prevent these alterations. Obese children tend to become obese adults; therefore any strategy leading to a decrease in children obesity may have a major impact in the prevention of type 2 and gestational diabetes. Group therapy is a save and cost effective way to help children to lose weight (Bonet et al, An Pediatria 65:51-6; 2007). Objective: to determine in obese children if in the middle term (up to 18 months) group therapy is an effective way to induce weight reduction. We also wanted to analyze if factors like sex, family history of obesity, diabetes (FHx O D) or the presence of acanthosis nigricans (AN) have any effect the weight reduction. Methods. 101 children from our paediatric endocrine clinic were recruited: 40 pre-adolescents and 61 adolescents, (17 males and 44 females). Differences in the BMI z-score between the value at the beginning of the study and the different follow up periods (6, 12 and 18 months) were analyzed. Only patients that complete the study period were analyzed at different points of time. The differences between times were analyzed using a paired t-test and the differences between groups with a t-test. Results are presented as the mean (standard deviation). Results. When all the children were analyzed together a reduction in the z-score was observed along the study 4.58 (1.6) at the beginning v.s 4.4(1.7) (p=0.001); 4.17(1.9) (p=0.05) and 4.16 (1.7) (p=0.05) respectively at 6, 12 and 18 months. When the patients were divided in groups according to sex, presence of AN or FHx O or D, we found that either female children or those with AN or with a positive FHx O or D did not show a reduction of the BMI z-score when compare with the same group of children without these characteristics. Conclusions. Group therapy is an effective way to induce weight reduction. Female sex or the presence of AN or a positive FHx O or D make it more difficult to lose weight. Speculation. The group of children and adolescents with a higher risk of developing gestational diabetes is more resistant to weight reduction. There is a need for new strategies to help children and adolescents to lose weight.

PP38
THE METABOLIC STATUS OF OBESE ADOLESCENTS IS RELATED TO THEIR BIRTH WEIGHT

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Both small and large birth size for gestational age represent risk factors for insulin resistance, metabolic syndrome and type 2 diabetes. The relationship between body mass index (BMI), blood lipids, glycemia, insulin resistance, adipokines, blood pressure and endothelial function, and birth weight was evaluated in a cohort of obese adolescents. The REACH study (ClinicalTrials.gov number NCT00934570) will assess the effects of structured lifestyle intervention and long acting metformin (or placebo) on BMI and other risk factors for type 2 diabetes and cardiovascular disease in obese adolescents (age 10-16 years, BMI > 95th centile). Study entry data were analyzed prior to any lifestyle or pharmacologic interventions for 96 subjects (mean age 14 years, 49 F, mean BMI 33.1)
with a mean birth weight of 3529 gm (1899-4990 gm); and gestational age 38-42 weeks. BMI z-score was positively correlated with birth weight ($r^2=0.045$, $p=0.04$) and insulin resistance, as measured by HOMA (Homeostasis Model Assessment) at study entry ($r^2=0.144$, $p<0.001$), but not with waist circumference. HOMA was negatively correlated with birth weight ($r^2=0.040$, $p=0.04$), as was fasting plasma insulin ($r^2=0.043$, $p=0.04$), but not fasting glucose values. A positive correlation existed between birth weight and A1C ($r^2=0.086$, $p=0.01$). Adiponectin, but not leptin values, were positively correlated with birth weight ($r^2=0.103$, $p=0.01$), although leptin was positively related to BMI z-score at study entry ($r^2=0.194$, $p<0.001$). Blood pressure was positively correlated with BMI at study entry, but not with birth weight. Blood lipid levels and endothelial function as measured by endoPAT showed no significant association with birth weight. Results show that BMI in obese adolescents was positively related to size at birth. However insulin resistance was worse in those who were relatively small at birth, despite their lower BMI. For obese adolescents the difference in risk factors associated with a birth weight of <2.5 kg vs >4.5 kg was approximately -0.2 BMI z-score, -0.2% A1C and a HOMA of +2.0. Low birth weight in obese adolescents confers additional risk for insulin resistance and progression to type 2 diabetes.

PP39
EARLY FETAL GROWTH DELAY IN OFFSPRING OF WOMEN WITH TYPE 1 DIABETES IS ASSOCIATED WITH COGNITIVE IMPAIRMENT IN ADULTHOOD

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Background: Fetal growth is determined by both genes and the intrauterine environment, and disturbances in fetal growth may lead to adverse long-term outcome. Prior studies found that offspring of women with type 1 diabetes had increased risk of early fetal growth delay (EFGD) compared with offspring from the background population, furthermore offspring with EFGD had developmental impairment in early childhood.

Objectives: To evaluate the impact of EFGD on cognitive function in adult offspring of women with type 1 diabetes.

Research design and methods: We included 62 adult offspring (18 to 27 years) of women with type 1 diabetes and a documented regular menstrual cycle (28 to 30 days). Sonographic gestational age was based on crown-rump length ≤14 weeks of gestation. EFGD was defined as ≥6 days delay between the sonographic and menstrual gestational age. Outcome measure was global cognitive score derived from Raven’s progressive matrices and 3 verbal WAIS subtests. Multiple linear regression analysis was applied including the following covariates:

Maternal: age at delivery, parity, smoking during pregnancy, mean glucose in 1st and 3rd trimester, severe hypoglycaemia during pregnancy.

Neonatal: gestational age, birth weight, neonatal hypoglycaemia, perinatal complications

At follow-up: offspring age, sex, family occupational social class, parental educational level.

Results: Offspring with EFGD (N=20) had significantly lower global cognitive scores than offspring with normal early fetal growth (86.8 vs. 95.8, $P=0.03$). This difference remained statistically significant after adjusting for: maternal age at delivery, parity, smoking during pregnancy, gender, birth weight, gestational age, perinatal complications, offspring age at follow-up, family occupational social class and parental educational level. There was a tendency, that mothers of offspring with EFGD had higher mean glucose levels in 1st (10.0 vs. 9.5mmol/l, $P=0.15$) and 3rd (7.1 vs. 6.8mmol/l, $P=0.06$) trimester and that fewer of the offspring with EFGD were born large for gestational age (15% vs. 36%, $P=0.09$). Neither birth weight (3122 vs. 3340g, $P=0.83$) nor the rate of maternal hypoglycaemia during pregnancy (30% vs. 24%, $P=0.60$), neonatal hypoglycaemia (65% vs. 52%, $P=0.35$) or preterm delivery <37 weeks (5% vs. 12 %, $P=0.39$) differed between the two groups.

Conclusion: Early fetal growth delay in offspring of women type 1 diabetes was associated with impaired cognitive function in adulthood.
**Gestational Diabetes Mellitus**

**PP40**

**CHANGES IN THE GDM DIAGNOSIS IN THE MALTESE POPULATION AS ANALYSED BY THE IADPSG CRITERIA**

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The IADPSG Consesus Panel has suggested new criteria for gestational diabetes (GDM) diagnosis [fasting >5.1 mmol/l or 1-hour >10.1 mmol/l or 2-hour >8.5 mmol/l]. The aim of this study was to evaluate the influence these new criteria will have on the number of women diagnosed with GDM when compared to previously used diagnostic standards for the 75-gram glucose load in: [1] the clinical setting using clinical high risk assessment, and [2] on the diagnosed prevalence of GDM in the Maltese community.

A total of 1278 Maltese women with a clinical high risk assessment for developing GDM underwent a 75-gram load oGTTs in the third trimester. The results were interpreted using the different criteria and were related to the mean BMI and infant body weight values. The IADPSG diagnostic criteria were used and compared to the previously used WHO criteria [Fasting >7.0 mmol/l or 2-hour >7.8 mmol/l] and the ADA-modified WHO diagnostic criteria [2-hour >8.6 mmol/l]. A further 200 women were in 2010 randomly selected from the total pregnant population irrespective of their clinical risk assessment to undergo oGTT testing at 24-32 weeks of gestation. This allowed for the estimation of the prevalence of GDM in the Maltese population and comparison to previously reported figures [1985].

It would appear [Table 1] therefore that, when performed in high risk individuals, both the ADA-modified WHO and IADPSG criteria increase the GDM diagnosis rate by an added 12.5%; the new IADPSG criteria only increases the proportion of women diagnosed as suffering from GDM by 0.5% over the modified-ADA criteria. The cases identified by the ADA-modified WHO were statistically of higher BMI than those identified solely by the WHO criteria (p=0.03). There were no statistical differences in the infant mean birth weights. The newly proposed IADPSG criteria would identify a total of 735 (57.5%) individuals as suffering from GDM. There were no statistically differences in the BMI and infant birth weights between this group and the ADA-modified WHO GDM-identified group.

<table>
<thead>
<tr>
<th>Diagnostic criteria</th>
<th>Number of GDM cases identified</th>
<th>Mean BMI Kg/m²</th>
<th>Mean infant birth weight - grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO criteria (2-hr &gt;7.8 mmol/l)</td>
<td>569 [44.5%]</td>
<td>30.4 ± 7.0</td>
<td>3447.7 ± 484.6</td>
</tr>
<tr>
<td>ADA modified WHO (2-hr &gt;8.6 mmol/l)</td>
<td>728 [57.0%]</td>
<td>31.3 ± 7.4</td>
<td>3471.9 ± 490.2</td>
</tr>
<tr>
<td>IADPSG criteria (Fasting &gt;5.1 mmol/l; 1-hr &gt;10.1 mmol/l; 2-hr &gt;8.5 mmol/l)</td>
<td>735 [57.5%]</td>
<td>30.9 ± 7.3</td>
<td>3465.2 ± 486.7</td>
</tr>
</tbody>
</table>

Table 1: Diagnostic criteria differences in clinical high risk population

The prevalence rate in the Maltese population in 2010 using the IADPSG criteria was 16.5%, markedly different from the 7.0% figure noted by the ADA-modified WHO criteria but similar to the 15.5% identified by the WHO-criteria [Table 2]. Using the previously used diagnostic criteria, it appears that while a slight increase in the GDM prevalence rate may have occurred in the last quarter-century, this increase is not sufficiently marked to be statistically significant.

<table>
<thead>
<tr>
<th>Diagnostic criteria</th>
<th>1985</th>
<th>2010</th>
<th>statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHO criteria (2-hr &gt;7.8 mmol/l)</td>
<td>31 [n = 269] → 11.5%</td>
<td>31 [n = 200] → 15.5%</td>
<td>P = 0.16 ns</td>
</tr>
<tr>
<td>ADA modified WHO (2-hr &gt;8.6 mmol/l)</td>
<td>16 [n = 269] → 5.9%</td>
<td>14 [n = 200] → 7.0%</td>
<td>P = 0.79 ns</td>
</tr>
</tbody>
</table>
Adoption of the recently proposed IADPSG criteria will have a statistically significant increase on the number of women who are diagnosed with GDM; an increase that will require an augmentation in the available clinical resources especially if whole population rather than high risk assessment screening is adopted.

PP41
GESTATIONAL DIABETES MELLITUS IN THE MEDITERRANEAN REGION

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32nd Medical Department, Diabetes Centre, Athens University, Athens, Greece,
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Background and Aims: There is little available data on the prevalence and phenotype of GDM in populations in the Mediterranean region. The aim of this study was to characterise the phenotype of Mediterranean women at 24-32 weeks of pregnancy at risk of developing Gestational Diabetes Mellitus(GDM) or suffering from GDM as diagnosed by a 75 g Oral Glucose Tolerance Test (OGTT).

Methodology: Participating centres in the Mediterranean region recruited 75-200 women per centre in the 24th-32nd week of pregnancy. The study protocol was approved by the relevant Research Ethics Committee in each participating country and informed consent was obtained from all study subjects. These women were assessed for the presence of risk factors such as elevated body weight, BMI, age, history of recurrent miscarriage, unexplained past stillbirth and macrosomia, irregular menses, need for assisted reproductive technology, hypertension (pre-existing, gestational or pre-eclampsia) and a family history of diabetes mellitus. The subjects subsequently underwent a physical examination including height and blood pressure estimation, a 75 gram OGTT with a baseline fasting insulin level and HbA1c estimation. Insulin resistance was assessed using Homeostatic Model Assessment (HOMA-IR). Patients diagnosed with GDM were managed according to locally set protocols. Results are presented as mean ± standard deviation. Comparisons of continuous variables between groups were made using independent-samples t-test and regression coefficients calculated. Categorical variables were compared using the Chi-squared test.

Results: 1210 patients from thirteen different Mediterranean countries were recruited to the study. 115 patients (9.5%) were identified as developing GDM using the ADA criteria, 256 (21.2%) according to WHO criteria and 341 (28.1%) using IADPSG criteria. Significant risk factors in this population for developing GDM were maternal age >35 years (p=0.005), pre-pregnancy BMI > 25 (p=0.006), diastolic BP> 90 mmHg (p<0.0001), PH of macrosomia (p=0.006) and FH of DM in first degree relatives (mother: p<0.0001; father: p=0.02; siblings: p<0.0001). These risk factors all had a high specificity but low sensitivity. Only pre-pregnancy BMI showed a moderate specificity (63.3%) and sensitivity (50.4%). Only fasting blood glucose showed any significant correlation with oGTT-AUC estimation (r = 0.8). There were no significant correlations established between BMI and the biochemical parameters (FBG, oGTT-AUC, HbA1c and HOMA-IR). Similarly no significant correlations were noted between the various biochemical parameters (HbA1C to insulin, HOMA-IR, oGTT-AUC; and FBG to HbA1c and HOMA IR).

Discussion: The significant discrepancy in the prevalence of GDM depending on the diagnostic criteria used highlights the need for a consensus to be reached as to which GDM diagnostic criteria should be adopted in order to ensure best practice and best obstetric and neonatal outcomes without unnecessarily increasing the cost-benefit ratio.

PP42
DIFFERENCES IN OBSTETRICAL AND NEONATAL OUTCOMES FOR WOMEN WITH GDM IN DIFFERENT SUBGROUPS OF IMMIGRANTS IN SWEDEN
Preliminary results showing more favorable outcomes for Non Nordic women has been presented earlier (DPSG 2010). The Non Nordic group is heterogenic and therefore a more specific analysis of subgroups of immigrants was performed. Questions about equal care has been raised in Sweden and therefore it has been of interest to see if there are differences in outcomes for women with GDM depending on country of birth.

**Method:** Population-based cohort study using the Swedish Medical Birth Register (MBR) from 1998-2007. Diabetes type 1 and 2 were excluded. Of 914154 registered singleton births 8560 were diagnosed with GDM (0.9%). 5515 women (64.4%) were categorized as Nordic (born in Sweden, Finland, Norway, Denmark or Iceland) and 35.6% had Non Nordic origin (n= 3046). The Non Nordic group was divided in 5 subgroups according to size: 1: Iraque, Iran, Libanon (n= 980) 2: China, Vietnam, Thailand, India, South-Korea (n=373), 3: Somalia, Ethiopia (n=303), 4: Yugoslavia, Bosnia-Herzegovina (281), 5: Other countries (1109).

**Results:** The prevalence varied between 0.7% (Sweden) to 3.6 % (India). The largest group (35.3%) was from the Middle East and Arabic countries. European countries (mainly eastern Europe) were 18.5%, Asian countries represented 17.7%, African countries 17.7% and South America 4.7%. In the Nordic group 96.8% were from Sweden. The proportion of insulin treated GDM in the Non Nordic group was (31.2%) vs Nordic group (29.0%); the difference just reached significance with an OR of 1.1 (1.01-1.2). In maternal outcomes the main difference was seen in preeclampsia and chronic hypertensive disease (CHD), where the Arabic countries had lower incidence compared with Nordic, Asian or African women.

When analyzing the whole population (GDM excluded) regarding differences in perinatal mortality and stillbirth, there was a significant higher risk of mortality (adjusted OR perinatal mortality 1.3 (1.2-1.4) and stillbirth OR 1.4 (1.2-1.5)) in the Non Nordic group, a difference not found in the group of GDM women. However in women with GDM there was a markedly higher rate of stillbirth and perinatal mortality in the subgroup of women from Yugoslavia and Bosnia-Herzegovina compared with all other subgroups.

**Conclusions:** There are differences in outcomes between immigrant groups but compared with Nordic women the maternal and neonatal outcomes are better for non Nordic women, suggesting that health care is not unequal for this group.

**PP43**

**IS THERE A SEASONAL VARIATION IN THE INCIDENCE OF GESTATIONAL DIABETES MELLITUS (GDM)?**

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**Background and Aims:** GDM seasonability has been rarely addressed in literature, with conflicting results. The aim of the study is to evaluate monthly GDM incidence in a large group of Greek women examined during the past decade.

**Materials and methods:** 7618 pregnant women underwent a 3-hour, 100g OGTT during the 3rd trimester. For GDM diagnosis the ADA 2000 criteria were used. Seasonal and monthly GDM incidences as well as mean seasonal glucose levels during OGTT were calculated. Data for mean month temperature during the decade were obtained from the Hellenic National Meteorological Service. For the statistical analysis the following tests were used: \( \chi^2 \), odds ratio and MANOVA.

**Results:** GDM incidence, relative prevalence (RP) and odds ratio (OR-95%CI) per month, using January as a reference point, as well as mean monthly temperatures are shown in the Table.

<table>
<thead>
<tr>
<th>Month</th>
<th>GDM%</th>
<th>RP</th>
<th>OR(95%CI)</th>
<th>Mean temperature C°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>32.7%</td>
<td>1</td>
<td>relative to January</td>
<td>9.5</td>
</tr>
<tr>
<td>Febr</td>
<td>36.4%</td>
<td>1.11</td>
<td>1.21(0.94-1.56)</td>
<td>10.5</td>
</tr>
<tr>
<td>March</td>
<td>36.9%</td>
<td>1.13</td>
<td>1.24(0.97-1.58)</td>
<td>12</td>
</tr>
<tr>
<td>April</td>
<td>41.2%</td>
<td>1.26</td>
<td>1.42(1.11-1.82)</td>
<td>16</td>
</tr>
</tbody>
</table>
Seasonal GDM incidence was significantly different: Winter(W) = 28.1%, Summer(S) = 39.2%, Spring (Spr) = 32.4% and Autumn(A) = 32.4% ($x^2=51.0$, $p<0.0001$). The odds ratio for GDM incidence during summer was 1.65 (95%CI:1.43-1.90), during spring and autumn 1.23 (95%CI:1.08-1.39) in relation to winter. Glucose levels (Glu) during OGTT were calculated. There was no statistical difference in fasting glucose blood levels. On the contrary, significantly increased blood glucose values were observed at 60’, 120’ and 180’ in S vs W, while Spr and A values were intermediate (ANOVA: $p<0.0001$). Glu 60’(mg/dl): W = 162.8 ±41.9, Spr = 165.8 ±41.9, A = 166.9 ±39.4, S = 172.9 ±39.8, Glu 120’(mg/dl): W = 136.6 ±41.4, Spr = 137.9 ±40.6, A = 139.2 ±38.5, S = 146 ±40.3, Glu 180’(mg/dl): W = 108.6 ±33.2, Spr = 109.8 ±33.2, A = 111.1 ±32, S = 115.9 ±33.8.

The effect of glucose on blood levels at 60’, 120’ and 180’ remained an independent significant factor after adjustment for age, gestational age, BMI, weight gain during pregnancy, systolic and diastolic blood pressure (MANOVA model, $p<0.0001$).

Conclusions: GDM incidence in Greece presents seasonal variation. The risk for GDM diagnosis during summer is significantly increased (~70%) compared to winter. The differences in seasonal incidence are due to post glucose load levels variation, while no differences were found in fasting glucose levels. Whether the observed variations could be attributed to differences in ambient temperature (despite steady room temperature during the OGTT procedure), or other environmental and nutritional factors, remains to be clarified.

PP44
WOMEN BORN PRETERM OR SMALL-FOR-GESTATIONAL AGE (SGA) ARE AT RISK OF SUBSEQUENT GESTATIONAL DIABETES MELLITUS (GDM) AND PRE-ECLAMPSIA.

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Low birthweight is associated with development of GDM, pre-eclampsia as well as type 2 diabetes (T2D) later in life. For T2D the increased risk has been shown to be associated with preterm birth and poor fetal growth, but the mechanisms for GDM and pre-eclampsia remain uncertain. We identified all Danish women who gave birth to at least one child in the years 1985-2007. Two cohorts of all Danish women born 1974-1977 (n = 84,219) and 1978-1981 (n = 32,376) were created, due to different methods of registering birth weight and gestational age in the two periods. Data was linked with information on gestational diabetes, pre-eclampsia and maternal educational level.

Mothers born SGA (BW < -2 SD of expected) had an increased risk of developing GDM (RR = 1.20 [0.94-1.52] for the first cohort, RR = 1.84 [1.21-2.81] for the second cohort), and pre-eclampsia (RR = 1.60 [1.35-1.87] and RR = 1.72 [1.26-2.33]).

In a multivariate logistic regression model the risk of developing gestational diabetes was associated with being born SGA (p = 0.19 for 1974-1977, p = 0.044 for 1978-1981) and low gestational age (p = 0.036 and p = 0.31). The risk of developing pre-eclampsia was associated with being born SGA (p < 0.0001 and p = 0.0001) and low gestational age (p = 0.041 and p = 0.10).

In this cohort of young Danish mothers, prematurity as well as SGA was associated with increased risks of gestational diabetes and pre-eclampsia.

PP45
A STUDY ON PLASMA PHOSPHOLIPID FATTY ACID COMPOSITION AND DESATURASES INDICES IN WOMEN WITH GESTATIONAL DIABETES MELLITUS BEFORE AND AFTER
DELIVERY

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Plasma phospholipid fatty acid (PPFA) composition is affected not only by dietary fat intake, but also by endogenous fatty acid metabolism, which is regulated by enzymes such as elongases and desaturases. Desaturating enzymes, stearoyl-CoA desaturase (SCD, also known as Delta-9 desaturase), and Delta-5 desaturase (D5D) modulate fatty acid composition and are associated with insulin resistance. During pregnancy there is increased demand for the polyunsaturated fatty acids, and in type 1 and 2 diabetes, the activity of D5D is impaired. Therefore, we investigated the possibility that, in gestational diabetes mellitus (GDM), fatty acid composition in plasma phospholipids and desaturases indices may be altered before or after delivery. Furthermore, we measured some parameters of inflammation, such as C-reactive protein (CRP), and interleukin-6 (IL-6), and investigated their relationship with desaturase indices in GDM and control women. PPFA composition was analysed by gas chromatography. In 22 women with GDM and from 23 controls, during the third trimester of pregnancy and 6 months after delivery. We used a valid food questionnaire to determine the intakes during and after pregnancy. Dietary assessment of the GDM and control women were no different in the two groups. During pregnancy also no differences in PPFA composition were observed between the two groups, while 6 months after delivery only a significant increase in stearic acid (18:0) was found in the GDM women compared with the control subjects (12.83±0.96 vs 13.98±1.37; p=0.005). The D5D activity increased 6 months after delivery in controls (2.66±0.79 vs 3.15±0.70; p=0.040), while remained unchanged in GDM. Conversely, SCD index appears significantly decreased after pregnancy in GDM in comparison with the third trimester (p=0.001) and also with controls (p=0.024). In the last ones SCD index remained unchanged after delivery. As regards the relationship between inflammatory markers and desaturases, only SCD index was found significantly correlated to PCR and IL-6, both during the third trimester and after pregnancy in GDM women. In our study, the PPFA composition during the third trimester of pregnancy does not appear different between control and GDM women, while after delivery there are only minimal changes. In contrast to other reports, the data from the current study do not provide evidence of the impairment of D5D in GDM. An other important finding of the present study is that SCD activity seems regulated not only by dietary, hormonal and environmental factors, as well known, but also by GDM. In addition, our results suggest a relationship between fatty acid metabolism and inflammatory markers modulation in GDM.

PP46
POSTOCCLUSIVE REACTIVE HYPEREMIA IN WOMEN WITH A HISTORY OF GESTATIONAL DIABETES

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Postocclusive reactive hyperemia (PORH) is a complex microvascular reaction that thought to be a marker of endothelial function. In the present analysis we aimed to investigate correlates of endothelial function represented by the PORH-index among women with a history of gestational diabetes mellitus (GDM) 3.3±0.5 (mean±SD) years after delivery. This is a case-control study of 40 prior GDM cases and 28 controls that had normal glucose tolerance during their pregnancy (age: 36.9±4.0 vs. 34.8±2.9 yrs, P=0.013, BMI: 27.2±6.5 vs. 24.7±5.0 kg/m², P NS). Participants filled in a questionnaire regarding lifestyle measures, followed by a clinical examination including anthropometrics, blood pressure, and blood draws for fasting lipids, and glucose measures during a 75g OGTT. Endothel-dependent vasodilatation was measured using a laser-Doppler flowmeter. The main outcome was the PORH-index defined as the percentage increase in cutaneous blood flow from resting conditions to peak dilatation following a 2 min upper arm occlusion. The PORH-index was lower in prior GDM cases than in controls (3.23±0.97 vs. 3.80±1.18; P=0.032). The prior GDM group had a higher waist to hip ratio (0.82±0.07 vs. 0.78±0.06), blood pressure (BP, 125±17/79±11 vs. 116±14/72±12 mmHg), HbA1c (5.6±0.3% vs. 5.4±0.3), fasting (5.7±0.9 vs. 5.2±0.5 mmol/l) and 2-hour
glucose (7.2±2.4 vs. 5.6±1.2 mmol/l), and 2-hour insulin (82±62 vs. 43±28 µE/ml, all P<0.05). A negative correlation (all P<0.05) was found between the PORH-index and prior GDM status (r=-0.253), white blood cell count (WBC, r=-0.278), lipoprotein(a) (lp(a), r=-0.248), 2h insulin (r=-0.252), and diastolic BP (r=-0.259); while the PORH-index was positively related to serum total cholesterol (r=0.278; P=0.022). According to a multiple linear regression model (r²=23%) the PORH-index was independently related to prior GDM status, WBC, lp(a), and serum total cholesterol. Our finding that a lower (pathological) PORH-index is related to a higher white blood cell count and lipoprotein(a) might suggest that subclinical inflammation and the coagulation system are both involved in the development of microvascular endothel dysfunction.

PP47
Atlantic DIP: NEW INTERNATIONAL ASSOCIATION OF DIABETES IN PREGNANCY STUDY GROUP (IADPSG) CRITERIA DIAGNOSE MORE WOMEN WITH GESTATIONAL DIABETES MELLITUS AND DETECTS MORE ADVERSE MATERNAL AND NEONATAL OUTCOMES

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Background and aims: New criteria for the diagnosis of gestational diabetes mellitus (GDM) have been published by the International Association for Diabetes in Pregnancy Sub Group (IADPSG). We aimed to assess what effect adoption of these new criteria would have on the number of women being diagnosed with GDM and the degree of associated adverse maternal and foetal outcomes by comparing American Diabetes Association (ADA), WHO and IADPSG criteria.

Materials and methods: Atlantic DIP (Diabetes In Pregnancy) was a prospective study carried out between 2005 and 2008 in five antenatal centres on the Irish Atlantic coast, offering universal screening for GDM using a 75g oral glucose tolerance test at 24-28 weeks. GDM was defined as any of fasting glucose (FG) >5.3mmol/l, 1 hour glucose (1 hr G) >10mmol/l or 2 hour glucose (2 hr G) >8.6mmol/l using IADPSG criteria; any 2 of FG >5.3mmol/l, 1 hr G >10mmol/l or 2 hr G >8.6mmol/l using ADA criteria; FG >6.1mmol/l or 2 hr G >7.8mmol/l using WHO criteria. Statistical analysis was performed using SPSS.

Results: A total of 5,500 women participated. The prevalence of GDM was 680 (12.4%) 225 (4.1%) and 487 (8.9%) using IADPSG, ADA and WHO criteria respectively. The table below shows a selection of number of adverse maternal and neonatal outcomes associated with a diagnosis of GDM using each of the three criteria.

<table>
<thead>
<tr>
<th>Maternal Outcome</th>
<th>Criteria</th>
<th>NGT</th>
<th>GDM</th>
<th>p value</th>
<th>Neonatal Outcomes</th>
<th>Criteria</th>
<th>NGT</th>
<th>GDM</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational hypertension</td>
<td>WHO</td>
<td>363 (7.9%)</td>
<td>55 (12.2%)</td>
<td>0.001</td>
<td>Macrosomia</td>
<td>WHO</td>
<td>170 (17.4%)</td>
<td>19 (24.7%)</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>ADA</td>
<td>386 (7.9%)</td>
<td>32 (15.3%)</td>
<td>&lt;0.0001</td>
<td>ADA</td>
<td>178 (17.5%)</td>
<td>11 (29.7%)</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IADPSG</td>
<td>332 (7.5%)</td>
<td>86 (13.8%)</td>
<td>&lt;0.0001</td>
<td>IADPSG</td>
<td>156 (17%)</td>
<td>33 (23.9%)</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Polyhydramnios</td>
<td>WHO</td>
<td>41 (0.9%)</td>
<td>17 (3.8%)</td>
<td>&lt;0.0001</td>
<td>Neonatal hypoglycaemia</td>
<td>WHO</td>
<td>28 (0.6%)</td>
<td>16 (3.3%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>ADA</td>
<td>51 (1.1%)</td>
<td>7 (3.4%)</td>
<td>0.002</td>
<td>ADA</td>
<td>37 (0.7%)</td>
<td>7 (3.1%)</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IADPSG</td>
<td>37 (0.8%)</td>
<td>21 (3.4%)</td>
<td>&lt;0.0001</td>
<td>IADPSG</td>
<td>28 (0.6%)</td>
<td>16 (2.4%)</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td>Cesarean section</td>
<td>WHO</td>
<td>1234 (25.4%)</td>
<td>177 (37.1%)</td>
<td>&lt;0.0001</td>
<td>Neonatal respiratory distress</td>
<td>WHO</td>
<td>96 (2.0%)</td>
<td>14 (2.9%)</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>ADA</td>
<td>1320 (25.8%)</td>
<td>91 (40.8%)</td>
<td>0.001</td>
<td>ADA</td>
<td>98 (1.9%)</td>
<td>12 (5.4%)</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IADPSG</td>
<td>1165 (24.9%)</td>
<td>246 (37.2%)</td>
<td>&lt;0.0001</td>
<td>IADPSG</td>
<td>86 (1.8%)</td>
<td>24 (3.6%)</td>
<td>0.002</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion: GDM as defined by IADPSG criteria identifies a group of women with similar adverse maternal outcomes to previous criteria, but the absolute number of women with adverse pregnancy outcomes is increased. GDM as defined by IADPSG criteria misses less cases of neonatal adverse outcomes compared to WHO and ADA criteria. These findings support the use of IADPSG criteria for the identification of adverse neonatal outcomes in GDM.

PP48
SCREENING FOR GESTATIONAL DIABETES IN TWIN PREGNANCY

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Objective: Management of gestational diabetes mellitus (GDM) reduces maternal as well as perinatal complications. This support, at least in part, the current practice for screening of GDM during pregnancy. An increased risk of gestational diabetes has been suggested in multiple pregnancies. However, there is little information about the benefits of GDM screening for twin pregnancies. To study this question, we reported the results of a two-step approach (the 50g Glucose Challenge Test, GCT, followed by 100g-oral glucose tolerance test, OGTT) in twin pregnancies.

Methods: We examined a cohort of patients with twin who delivered after 32 weeks of gestation between 2007 and 2010. 50g-GCT was performed at 24-28 weeks. A 1-h venous plasma glucose concentration between 1.3 and 2.0 g/L was considered as a positive screening result. Patients with an abnormal 50g-GCT underwent a 100g 3-h OGTT. When at least two glucose concentrations in OGTT were above threshold (Carpenter & Coustan criteria), the patient was considered as having GDM. Management followed the French guidelines with diet, self-monitoring of blood glucose and/or insulinotherapy. Pregnancy and neonatal outcomes were analyzed according to the results of both tests.

Results: 253 patients were screened for GDM during the study period. 96 patients had an abnormal 50g-GCT and 20 an abnormal OGTT. 50g-GCT had a specificity of 67% and a positive predictive value of 21%. Patients with an abnormal 50g-GCT had a higher BMI than patients with a normal test (24.50 ± 5.79 kg/m² vs. 22.59 ± 5.79 kg/m², p<0.05). There was no difference in the course of pregnancy and delivery, nor neonatal outcome based on test results of 50g-CGT or OGTT. Furthermore, the birthweights were similar between groups (2368.6 ± 467.3 g and 2382.7 ± 504.9 g normal vs. abnormal 50g-CGT; 2365.9 ± 504.4 and 2460.0 ± 505.5 normal vs. abnormal OGTT).

Conclusion: 50g-GCT had a low predictive value for screening GDM in twin pregnancies. We did not find any increase of the maternal and neonatal morbidity when the results of the tests were abnormal. Further studies should assess the value of screening GDM in twin pregnancies to select a population at risk of type II diabetes.

PP49
GDM SCREENING WHICH GUIDELINES?

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Aim. To evaluate the impact of the IADPSG recommendations for the diagnosis of GDM using data collected in the city of Ferrara in the Italian region of Emilia Romagna.

Methods. Within the city of Ferrara pregnant women are referred for GDM screening with a 75 g OGTT to a single NHS Hospital (Arcispedale Sant’Anna). Self-reported height, pre-pregnancy weight, weight gain during pregnancy, parity, history of macrosomia and family history of diabetes were collected at the time of screening for GDM. Results. From May 1 to Dec 31, 2010 complete data on 470 women (99%) were available for analysis. At the time of screening median age was 33 years (IQR 28-36) with 87% of the women aged ≥25 years. Sixty percent were nulliparae and 7.5% were not Caucasians. Screening for GDM was performed at a median gestational age of 25 weeks (IQR 24-27). Before the index pregnancy median BMI was 22.3 (IQR 20.2-25.0) with 15.7% of the women being overweight (BMI 25-29.9) and 8.9% obese (BMI ≥30). Median weight gain at the time of
screening was 7 kg (IQR 7-9). GDM was diagnosed in 11.9% (56/470) according to IADPSG recommendations. (Prevalence of type 2 diabetes above the age of 35 in the Emilia Romagna region is 7%). Among patients diagnosed with GDM, the proportions of patients with either 1, 2 and 3 glucose values above the IADPSG thresholds were 61%, 25% and 4%, respectively. The proportions of patients who were diagnosed with GDM based on the glucose level measured at 0’, 60’ and 120’ were 25%, 43%, 79%, respectively. Risk factors analyzed were age≥25, BMI≥25, family history of diabetes and, for multiparous women, babies with a birth weight ≥4000 grams. All women diagnosed with GDM in this study had at least one of the considered risk factors.

Conclusion. In the population screened, approximately 50% of deliveries, most women were diagnosed on the value at 120 minutes. Decreasing the threshold from 8.5 mmol/l (IADPSG criteria) to 7.8 mmol/l (WHO criteria) would increase the prevalence of GDM from 11.9% to 18%. Strategies for screening and disseminating policies and their implications should be carefully evaluated.

**PP50**

**RATE OF GESTATIONAL DIABETES IN SPONTANEOUSLY CONCEIVED MULTIPLE PREGNANCIES**

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**Introduction:** Data are conflicting regarding whether twin pregnancy is associated with an increased risk of gestational diabetes mellitus (GDM). We aimed to investigate any differences in oral glucose tolerance test (OGTT) results between singleton and multiple pregnancies.

**Methods:** In our unit, standard OGTTs, with measurement of plasma glucose in the fasting state (FPG) and at 2 hours after a 75g oral glucose load, are performed routinely at 28 weeks in all pregnancies considered to be at risk of GDM using conventional risk factors, and also all multiple pregnancies. We obtained results from all OGTTs performed in spontaneously conceived multiple pregnancies in 2009 – 2010. Results were compared with our background rate of GDM, and published data from the large unselected cohort of singleton pregnancies in the HAPO study.

**Results:** Data were available for 76 spontaneously conceived multiple pregnancies. Mean FPG was 4.2 mmol/L, and mean 2 hour glucose was 5.1 mmol/L, compared to 4.5 mmol/L and 6.3 mmol/L respectively in the published HAPO cohort. Both mean glucose values from our data fell within the first septiles for FPG and 2 hour glucose defined by the HAPO dataset. The rate of GDM (WHO criteria) was 1.3% in our study population, compared to our background antenatal clinic rate of 2.4% (p<0.001).

**Conclusion:** The prevalence of GDM in women with spontaneously conceived multiple pregnancies in our unit was lower than that expected for our antenatal population. In addition, our study population had fasting and 2 hour glucose values which fell within the first septile of those defined in the HAPO OGTT dataset. This suggests fetal glucose uptake in these pregnancies is a greater determinant of maternal glycaemia than increased insulin resistance secondary to higher placental mass.

**PP51**

**IS FPG (FASTING PLASMA GLUCOSE) BETWEEN 92-100 mg/dl WITHIN 10TH WEEK OF PREGNANCY ABLE TO PREDICT LATER GLUCOSE INTOLERANCE?**

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IADPSG consensus guidelines for diagnosis of gestational diabetes (GDM) recommend a FPG level ≥ 92 mg/dl in the first trimester be classified as GDM.

**AIM.** To evaluate prevalence and relationship between early 1st trimester FPG ≥ 92mg/dl and abnormal glucose tolerance tests.

**METHODS.** We analyzed retrospectively 4727 pregnant women attended at the Perinatal Medicine Unit of Careggi University Hospital of Florence from January 2009 to September 2010. They performed universal screening and diagnosis in accordance with Carpenter and Coustan’s criteria. Women with FPG > 126 mg/dl were excluded and those with FPG > 110mg/dl were treated without perform GCT and considered as having GDM. All women with GDM followed a standard nutritional therapy and performed daily self monitoring blood glucose with 6 determinations for day and insulin
therapy when necessary. 208 women (4.4%) had FPG in the early 1st trimester ≥ 92 mg/dl, 185 performed provocative tests and 58 (31.3%) had a abnormal FPG (>92 mg/dl) at the time of GCT. Of these women, 48 (25.9%) had GDM, 85 (45.9%) had minor degrees of glucose intolerance (IGT) (positive GCT and negative or 1 abnormal value OGT T) and 52 (28.1%) had normal glucose tolerance (NGT). NGT women were younger and had higher ponderal increment respect to GDM and IGT women. No difference in pre-pregnancy BMI was found. No significant differences were found in gestational age at delivery (38±6 vs 39 weeks), mean birthweight (3314±721 vs 3450±127 gr), mean PI (ponderal index) (2,68±0,3 vs 2,53±0,1), prevalence of macrosomia and PI > 90° percentile between NGT and IGT-GDM women.

CONCLUSION. Only a small number of pregnant women with FPG ≥ 92 mg/dl in the 1st trimester maintain this value at 24-26 weeks, however it seems to be able to identify a population with an high incidence of glucose intolerance documented by an abnormal result in 71% of provocative tests. Probably moving FPG determination later during gestation, it could be less sensitive but more specific method for GDM diagnosis according with new IADPSG criteria. In addition, our results shows a trend toward a higher PI in NGT women with FPG >92 mg/dl in early 1st trimester although without statistical significance.

PP52
EARLY METABOLIC ASSESSMENT OF CAUCASIAN WOMEN WITH PRIOR GDM: PREDICTORS OF POSTPARTUM ABNORMAL GLUCOSE TOLERANCE (pAGT)

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Objective: The purpose of this study was to assess the frequency and potential risk factors of pAGT in a Caucasian population.

Study Design: Among 3607 women who delivered at St. Margaret Hospital, Budapest between 01.01.2005 and 31.03.2007, all women without known diabetes had a 75g OGTT (WHO 1999) at 8-18 and subsequently at 26-28 weeks of gestation. From 278 women with GDM (early-onset GDM diagnosed between 8-18 weeks of gestation, n=159; late-onset GDM diagnosed between 24-28 weeks of gestation, n=119), 171 (61.5%) were reclassified 1.5-6 months postpartum.

Results: Participants and non-participants had similar age, BMI, OGTT glucose values, similar frequency of insulin treatment, early GDM diagnosis during pregnancy, and family history of diabetes. Eleven women (6.4%) had pAGT (impaired fasting glucose, n=2, impaired glucose tolerance, n=6, diabetes, n=3). Women with pAGT were similar regarding their age, BMI, parity, family history of diabetes, previous GDM, previous macrosomia, and insulin treatment during pregnancy. Women in the pAGT group had higher glucose values during the diagnostic OGTT, were more frequently diagnosed during the early OGTT, and received more often insulin treatment during pregnancy. According to logistic regression analysis, insulin treatment (OR: 12.25, 95%CI: 3.3-45.6) and the 2-hour glucose value of the early OGTT (OR: 1.06 / 1 mg/dl, 95%CI: 1.02-1.098) were independent predictors of pAGT. Similarly, independent predictors for the reclassification of 2-hour glucose were insulin treatment during pregnancy and the 2-hour glucose value of the early OGTT.

Conclusions: We found a relatively low prevalence of pAGT in our Caucasian population. Two-hour glucose values during the early OGTT (and thus, the early diagnosis of GDM) predicted pAGT independently of known traditional diabetes risk factors in our population. The risk of pAGT was increased in women with a more severe GDM, reflected by the early onset and the need for more frequent insulin treatment during pregnancy.

PP53
FIRST TRIMESTER LEUKOCYTE COUNT (LC) – AN INDEPENDENT PREDICTOR OF GESTATIONAL DIABETES (GDM)

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Objective: Chronic subclinical inflammation is sought to be involved in the etiology of insulin resistance and type 2 diabetes. Less is known about the link between first trimester LC and the development of GDM.

Study Design: During a population-based screening of GDM in St Margit Hospital, Budapest between 01.01.2005-31.03.2008, 4903 women had fasting blood glucose (fBG) and LC measured between 10-12 weeks of gestation and were subsequently screened for GDM (WHO 1999, 75 g OGTT). Using a nested case-control design all GDM women (n=396) and a convenience sample of all women with normal OGTT delivered between 01.01.2006-31.03.2006 (n=319) were investigated. After exclusions the final sample included n= 283 cases and n=254 controls. Using logistic regression we investi-gated the prospective association between LC, other potential predictors, and the development of GDM.

Results: GDM women were older (31.8±4.3 [mean±SD] vs. 30.1±4.3 yrs; p<0.0001), shorter (165.1±6 vs. 166.5±5.8 cm; p=0.006), heavier (66.3±14.0 vs. 63.9±11.1 kg; p=0.031) had a higher BMI (24.3±4.8 vs. 23.1±4.2 kg/m²; p=0.003), fBG (4.5±0.6 vs. 4.3±0.6 mmol/l; p<0.0001), and LC (9.1±2.0 vs. 8.5±1.9 G/l; p<0.0001) compared to controls. They reported more frequently prior GDM (pGDM 17% vs. 2%; p<0.0001) and a positive family history of diabetes (FH DM 29.1% vs. 8.5%; p<0.0001). Parity and the frequency of previous macrosomia (≥4000g) were similar in the groups. Independent predictors of GDM were LC (OR=1.2/1 G/l; 95%CI:1.08 -1.34), height (OR=0.96 /1 cm; 95CI:0.93-0.998), fBG (OR=1.58/1 mmol/l; 95%CI:1.08-1.34), age (OR=1.08/1 y; 95%CI:1.03-1.13), pGDM (OR=7.81; 95%CI: 2.95-20.68), and FH DM (OR=4.06; 95%CI:2.26-7.31). Analysis, after excluding pGDM cases, resulted in the same independent predictors.

Conclusions: LC was an independent predictor of GDM in our population while traditional risk factors like BMI or previous macrosomia were not. According to our results subclinical inflammation may play an important role in the pathogenesis of GDM.

PP54
ETHNIC DIFFERENCES IN GESTATIONAL DIABETES DIAGNOSTIC RESULTS, PREVALENCE AND PERINATAL OUTCOME

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We evaluated how ethnicity affects normative values of the glucose tolerance test (GTT), prevalence of gestational diabetes and impaired glucose tolerance (GDM) and perinatal outcomes.

Over a four year period 5415 consenting women were randomized to 1 of 3 groups: glucose screen +/- 100g 3h GTT, GS +/- 75g 2h GTT, or 75g 2h GTT alone. Data from this randomized control trial was used to achieve study objectives. Normative data was calculated for women who did the 75g GTT alone and had normal results, as mean fasting, 1h and 2h PG in mmol/L. GTT criteria were derived for each ethnic group using normative mean PG plus 2 standard deviations (O'Sullivan/Mahan method).

Ethnic distribution was 59.7% Caucasian women, 12.3% Middle Eastern, 11.7% Oriental, 6.8% Black, 5.4% East Indian, 3.3% Hispanic, and 1.0% other. Derived GTT values based on normative data (n=1816) for Middle Eastern (4.7/10.2/8.3), East Indian (5.0/10.5/8.7), and Oriental (4.7/10.5/8.6) descent were similar to CDA criteria (5.3/10.6/8.9), but significantly higher for Caucasians (4.6/9.9/8.2), which were closer to newly proposed HAPO criteria (5.1/10.0/8.5). GDM prevalence was higher for East Indian (22.2%), Oriental (15.3) and Middle Eastern women (8.1%) compared to 6.2% for Caucasians (p<0.001), similar to Black (5.4%) and Hispanic (5.5%) women. Perinatal outcomes differed for Black women with and without GDM, who had more preterm labour and smaller babies than Caucasian women. This study supports lowering Canadian 75g GTT criteria to adequately detect GDM in lower risk groups, such as Caucasian who comprise ~60% of this urban population.

Early GDM screening may be advantageous for East Indian and Oriental women, given their high prevalence rates. Despite varying risks of GDM, ethnic groups other than Blacks had perinatal outcomes comparable to Caucasians, perhaps related to our intensive management of GDM. [Study funded by the Canadian Diabetes Assoc.]

PP55
PREDICTORS OF PRETERM BIRTH IN GESTATIONAL DIABETES MELLITUS
Background: In the general population preterm birth is associated with maternal anthropometrics, ethnicity and smoking habit among other predictors. Pregestational and gestational diabetes mellitus (GDM) are associated with increased preterm birth.

Objectives: To analyze the predictors of preterm birth in women with GDM.

Subjects and methods: Women with a singleton pregnancy who delivered at the center between 1/1/1981 and 31/12/2007. Outcome variables: Preterm birth (overall, spontaneous and non-spontaneous). Independent variables: maternal anthropometrics, age, fetal sex, hypertension (chronic + pregnancy-induced), smoking habit, GDM diagnosis characteristics, insulin treatment, mean capillary blood glucose (CBG3T) and glycated hemoglobin in the third trimester among others. Multivariate logistic regression models (enter method) have been used.

Results: In the aforementioned period, 2302 women with GDM delivered in the center and the overall rate of preterm birth was 5.7%. Predictors of overall preterm birth were: pregestational BMI, gestational age and N of abnormal values at diagnosis, CBG3T and insulin treatment (OR 0.441). The negative association of insulin treatment with preterm birth was due to the subgroup with spontaneous preterm birth (OR 0.313). Dose-response analyses disclosed that the effect was more pronounced in women with early initiation of insulin treatment (OR 0.298 for overall preterm birth, 0.166 for spontaneous) or receiving higher insulin doses (OR 0.263 for overall preterm birth, 0.224 for spontaneous).

Conclusions: In this cohort of women with GDM, predictors of preterm birth include variables operating in the general population (i.e. BMI) and GDM-related. Among the last ones, insulin treatment displays a negative association attributable to the spontaneous preterm.

TRIMESTER-SPECIFIC REFERENCE RANGES FOR GLYCATED HAEMOGLOBIN (HbA1c) IN PREGNANCY

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Background and Aims:
Diabetes in Pregnancy imposes additional risks to both mother and infant. These poor outcomes are considered to be primarily related to glycaemic control which is monitored longitudinally through pregnancy by means of HbA1c. The correlation between HbA1c levels with clinical outcomes emphasises the need to measure HbA1c accurately, precisely and for data interpretation comparison to appropriately defined reference intervals. From July 1st 2010, the HbA1c assay in Irish laboratories became fully metrologically traceable to the IFCC standard, permitting HbA1c to be reported in IFCC units (mmol/mol) and derived DCCT/NGSP units (%) using the IFCC-DCCT/NGSP master equation (DCCT = Diabetes Control and Complications Trial, NGSP = National Glycohemoglobin standardisation program).

The aim of this project is to establish trimester-specific reference ranges in pregnancy for IFCC standardised HbA1c in non-diabetic Caucasian women. This will allow us to define the goal for HbA1c during pregnancy complicated by diabetes.

Materials and methods:
Following informed consent blood was collected from 234 pregnant and 36 age-matched controls into EDTA and Fluoride oxalate tubes for HbA1c, haemoglobin and glucose measurement. Pregnancy trimester was defined as follows: T1 (up to 12 weeks), T2 (13 to 27 weeks), T3 (>28 weeks to term). The Menarini HA8160 automated haemoglobin (Hb) analyser was used to assay HbA1c.

Results:
Non-parametric analysis of the data was performed. The 95% IFCC HbA1c (DCCT) reference interval for Controls (n=59) 29-37 mmol/mol (4.8-5.5%), Trimester 1 (n=26) 36 mmol/mol (4.6-5.4%), Trimester 2 (n=107) 25-35 mmol/mol (4.4-5.4%) and Trimester 3 (n=107) 28-39 mmol/mol (4.7-5.7%).
statistically significant difference between the median HbA1c concentration of the control and Trimester 2 subjects, p <0.0001 was determined (Mann-Whitney test).

Conclusion: Trimester-specific HbA1c reference intervals are required to manage diabetes in pregnancy as HbA1c changes throughout pregnancy.

PP57
STATUS OF DIABETIC PREGNANT WOMEN AFTER KIDNEY TRANSPLANTATION (WHITE’S CLASSIFICATION T) IN JAPAN - Comparison with pregnant women receiving renal hemodialysis

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In 1975, Tagatz et al published a sensational account of “the pregnancy in a juvenile diabetic after renal transplantation “. In 1980, class T, was added to White’s classification, based on their work. Recently, the number of pregnant women with diabetic nephropathy is increasing in Japan. Therefore, it is appropriate to report the status of diabetic pregnant women after kidney transplantation (class T), compared with pregnant women receiving renal dialysis, through references. According to Toma’s survey of pregnancy after kidney transplantation in 1999, pregnant women accounted for 194 cases (22.7%) in 852 female renal transplantation recipients, throughout Japan. Their original diseases, due to renal failure, were mainly chronic nephritis syndrome, nephritic syndrome, and SLE syndrome etc. There were no diabetic pregnancies after renal transplantation in this survey. Afterwards, the outcomes of just two diabetic pregnancies with renal transplantation were reported. One, in 2005, from Tokyo Women’s Medical University hospital, at 38 gestational weeks, (2554 g); the other, from Niigata University Hospital, at 37 gestational weeks, (3168 g). In both cases, the pregnancy outcomes were successful.

As only two class-T patients, have been reported, it is difficult to draw a conclusion. However, from early indications, it appears that the results of pregnancy after renal transplantation are better than those receiving renal hemodialysis.

Obesity

PP58
DANISH EXPERIENCE WITH PREGNANCY AMONG WOMEN WITH GASTRIC BYPASS

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Background: With the increasing incidence of severe obesity, bariatric surgery is increasing. Several studies have reported that especially the Roux-en-Y Gastric Bypass (RYGB) is associated with obstetrical and neonatal complications. First choice operation in Denmark is RYGB and fertile women are advised to avoid pregnancy for 18-24 months after operation. However, no national consensus regarding handling pregnant women with RYGB exists.

Aim: The objective of the study is to describe the cases of pregnancies in women with RYGB from two Danish obstetric departments with 10.000 deliveries a year and to present a guideline based on existing studies and the pregnancy outcome from the two departments.

Methods: Subject were all known cases of pregnancies from 2009 to 2010 in women with RYGB (n=21) from the two University Hospitals, Odense and Hvidovre. Data collected from medical records.

Variables: prepregnancy, obstetrical and neonatal data.

Results: There has been no systematic registration of pregnant women with RYGB so the cohort may be inadequate. Thirteen women (62%) became pregnant within 18 months after RYGB. Median
age/pregestational BMI/birth weight: 33.0 years/29.8 kg/m²/3,370 g. Eight of 16 women (50%) delivered by caesarean section. The women were seen more often than normal pregnancies due to ultrasound, screening for diabetes and pregnancy complications. The weight gain for the mother and the birth weight was overall acceptable.

**Conclusion:** The handling of this group is unstructured with the risk of maternal and foetal complications. There is a need for centralisation of the care and for national guidelines concerning pregnant women with a RYGB.

**PP59**

**INTERVENTION DURING PREGNANCY IN ORDER TO LIMIT EXCESSIVE GESTATIONAL WEIGHT GAIN – A RANDOMIZED CONTROLLED TRIAL**

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**Background** Excessive weight gain during pregnancy is common in developed countries and increases the risk of complications during pregnancy, delivery and postpartum period, affecting both maternal and fetal outcome. Previously presented results of intervention have not been sufficient for evidence-based recommendations in clinical practice in antenatal care.

**Objective** The primary objective of the study was to evaluate if a feasible, low-cost intervention could decrease the percentage of women gaining above the IOM recommendations for gestational weight gain compared with standard maternity care. Secondary objective was to evaluate if the intervention affect postpartum weight retention in the women and/or childhood weight development in the offspring.

**Method** Healthy women with a BMI > 19, age > 18 and ≤ 16 weeks gestation were recruited consecutively after informed consent from maternity clinics in the county of Örebro Sweden. The women were randomly assigned to the standard care control group or to the intervention which consisted of education on recommended weight gain according to IOM recommendations, personalized weight graph, prescription of exercise and regular monitoring of weight gain. Growth markers sampled in the umbilical cord such as Leptin, IGF-1, C-peptide, will be analyzed in a subgroup of study patients.

**Results** A total of 445 women were randomised (221 women allocated to intervention and 224 to standard care) to the study and 374 women remained for analysis after completing their pregnancy (192 in intervention group and 182 in control group). The intervention did decrease the proportion of women who exceeded the IOM recommendations (41.1% vs. 50.0%) the decrease was however not statistically significant (p=0.086). The risk estimate (OR) for exceeding IOM recommendations in the control group was 1.2 (95% CI 0.97-1.5).

**PP60**

**GESTATIONAL WEIGHT GAIN IN SEVERE OBESE WOMEN WITH ADVERSE OBSTETRIC OUTCOME**

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**Background:** Obesity, especially severe obesity increases the risk of fetal, neonatal and maternal complications. Gestational weight gain (GWG) has also been thoroughly studied as a predictor of adverse pregnancy outcomes. In 2009, the Institute of Medicine (IOM) recommended gestational weight gain (GWG) of 5-9 kg for all obese women. Recommendations by severity of obesity were not specified because of a lack of available data. We aimed to study the impact of GWG on obstetric complications in patients with severe obesity.

**Methods:** We studied the association between GWG and peripartum outcomes in patients with BMI≥40 kg/m² who delivered term singletons between January 1999 and November 2009. Self-reported total GWG was categorized as weight loss, GWG below, within and over IOM recommendations, respectively 0 to 4 kg, 5 to 9 kg and ≥ 10 kg.
Results: 228 patients were included. 54 of the patients (23.7%) had GWG between 5 and 9 kg. GWG over recommendations increased maternal as well as neonatal complications. The birthweight increased with each class of GWG. GWG below IOM recommendations did not increase significantly the rate of growth restriction. A GWG between 5 and 9 kg was associated with the minimal combined risk of large for gestational age and growth restriction.

Conclusion: We found that patients with severe obesity had a high rate of complications during pregnancy. GWG within the guidelines was associated with the best obstetric outcome. However, limited weight gain and weight loss in severe obese pregnant women seem to be acceptable. We need to determine the optimal gestational weight gain associated with the lower risk of complications.

PP61
DIAGNOSIS AND THERAPY OF POSTPRANDIAL HYPERGLYCEMIA IN A PREGNANT WOMAN WITH GASTRIC BYPASS- A CASE REPORT

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Introduction: The number of cases of pregnancy in women with gastric bypass is increasing, given the prevalence of obesity in young women. Under these conditions, the diagnosis of GDM is not recommended by glucose overload because results are not interpretable.

Clinical case: 29 year old woman, with spontaneous pregnancy, followed in 2010 in endocrinology-obstetric outpatient clinic. She was submitted to gastric bypass in 2009, with 50 Kg weight loss. BMI was 36.25 Kg/m2. Fasting glycemia of first trimester was 67 mg/dL. At the 26th week, and upon request of her medical assistant she underwent a Sullivan test (156 mg/dL). At this time, plasmatic fasting glycemia was 57 mg/dL and HbA1c was 5.3%. Given the impossibility of imposing an OGTT, CGMS was performed, revealing very oscillatory glycemia values, ranging from 51 mg/dL to 283 mg/dL, with permanent postprandial peaks. Assuming a clinically relevant hyperglycemia, she initiated measurements of capillary glycemia during fasting and one hour after meals. She was prompted to increase physical exercise. At the 31st week insulin Humalog® was initiated before the three main meals, for elevated postprandial glycemias. Delivery occurred at the 38th week, cesarean section, yielding a male newborn weighting 2585g, Apgar score 9/10.

Discussion: In spite of the normal fasting glycemia and HbAc1, the glycemic curve in CGMS, as well as SBGM suggested gestational diabetes. In women with prior gastric bypass, dumping syndromes yield elevation of posprandial glycemias, with fast normalization, which may have impact on maternal and fetal outcome. Thus diagnostic criteria of GDM in this context remain a challenge, given the limitations of current tests.