

**Objective** This prospective study examined the prevalence of dyslipidaemia in postpartum women diagnosed with gestational diabetes mellitus (GDM).

**Methods** Women with GDM were reviewed 6–8 weeks postpartum. A fasting lipid profile was performed. Clinical details were recorded from the medical records, including the woman's weight and body mass index (BMI) measured at her first antenatal visit.

**Results** Of the 98 women studied, the mean age was 33.0 years (range 23–45 years) and 30.6% (n = 31) were primigravid. The mean BMI was 30.6 kg/m<sup>2</sup> and 52% (n = 51) were obese. The overall prevalence of dyslipidaemia was 52% (n = 51). Total cholesterol was raised in 44% (n = 43), low-density lipoprotein was raised in 33% (n = 32) and triglycerides were raised in 16% (n = 16). Of the 51 women with dyslipidaemia, 73% (n = 37) had more than one abnormality in their lipid profile. The prevalence of dyslipidaemia was 78% (n = 14) in women with moderate to severe obesity (BMI > 34.5 kg/m<sup>2</sup>) compared with 50% (n = 22) in non-obese women (p < 0.0001). Of the 5 women with an abnormal GTT postpartum, 80% (n = 4) had an abnormal lipid profile.

**Conclusion** Women with an abnormal GTT in pregnancy should be screened for dyslipidaemia postpartum at the time of their repeat GTT, and if the lipids are abnormal they should be offered cardio-protective interventions and ongoing monitoring of their lipid profile.

#### PM.06 LOW MOLECULAR HEPARIN WITHIN THE UTEROPLACENTAL UNIT

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**Background** Perturbation of the uteroplacental haemostasis has been implicated in placenta mediated pregnancy complications in thrombophilic women. LMWH may be effective in altering local thrombin production in the uteroplacental compartment.

**Aim** We determined the effects of LMWH (tinzaparin) on the peripheral, uteroplacental and fetal circulation and on haemostatic gene and antigen expression in placental tissue.

**Method** Eight women on antenatal LMWH prophylaxis (tinzaparin 75 IU/kg) due to moderate risk of VTE undergoing caesarean section (CS) and a control group of 15 healthy pregnant women undergoing CS had venous blood taken from the peripheral and uterine vein before delivery of placenta. Simultaneously, cord venous blood and placental biopsy was collected. Tissue factor pathway inhibitor (TFPI), thrombin antithrombin (TAT) and endogenous thrombin potential (ETP) were measured. Real-time PCR and ELISA were used to quantify mRNA and protein expression of TFPI and TF in placental tissue.

**Results** TAT levels within uterine vein are significantly higher compared to maternal peripheral circulation in both the control group (P < 0.0001) and LMWH group (P < 0.02). In the LMWH group, TAT is reduced compared with controls in the uterine vein (P < 0.001). ETP and TFPI within uterine circulation is reduced significantly in the LMWH group (P < 0.05) and (P < 0.02) respectively. Down-regulation of placental TFPI and TFPI<sub>2</sub> mRNA expression was also found (p < 0.05). Placental TF mRNA expression in LMWH group showed a non significant increase compared to control and this is replicated in placental TF antigen expression.

**Conclusion** TAT is reduced in uteroplacental circulation in thrombophilic women on LMWH prophylaxis and this is mirrored by decreased ETP in uteroplacental circulation. LMWH may be effective in reducing *in-vivo* thrombin production in the uteroplacental circulation of thrombophilic women.

#### PM.07 A PROSPECTIVE STUDY OF CHANGES IN MATERNAL CARDIOVASCULAR AND METABOLIC FUNCTION FROM PRIOR TO PREGNANCY TO POSTPARTUM

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Cardiovascular adaptation in normal pregnancy is the key to understanding cardiovascular function in pregnancy complications. The objective of this study was to investigate changes in maternal cardiovascular function during pregnancy, from a pre-pregnancy baseline to the postpartum period.

In this prospective study, 54 women had normal pregnancy outcome; 5 had preeclampsia (PE) and/or intrauterine growth insufficiency (IUGR). Detailed haemodynamics were assessed pre-pregnancy, at median gestation of 6, 23 and 33 weeks and 16 weeks postpartum. Lipid profile and renal function were assessed pre-pregnancy, in first trimester and postpartum.

While heart rate (HR) increased throughout pregnancy (P = 0.001), brachial and central BP, together with peripheral vascular resistance (PVR) and wave reflections were reduced very early in pregnancy (P < 0.001), followed by an increase in third trimester. Cardiac output (CO) increased to a peak by second trimester (P = 0.001). The HR, CO and PVR returned to pre-pregnancy values in the postpartum period. However, the reduction in BP was sustained postpartum. The MAP increased in second trimester rather than a decrease in women with PE/IUGR (P = 0.02). Lipids and creatinine decreased in first trimester (P < 0.001).

This is the first study to investigate longitudinal changes in central BP and wave reflections from pre-pregnancy to postpartum. We demonstrated profound changes in BP and arterial wave reflections very early in pregnancy; however CO peaks in the second trimester. The reduction in BP below pre-pregnancy values was sustained postpartum. Prospective studies of cardiovascular adaptation, beginning from pre-pregnancy are more likely to provide reliable estimates of pregnancy related maternal cardiovascular changes.

#### PM.08 METFORMIN, GLYCAEMIC CONTROL AND POSTNATAL GLUCOSE-TOLERANCE-TESTING IN WOMEN WITH GESTATIONAL DIABETES

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**Background** Metformin has been shown to be safe, effective and acceptable to women with gestational diabetes (GDM), and is recommended as the first-line pharmacological treatment for women who meet the usual criteria for insulin.

**Methods** We retrospectively reviewed case notes of women with GDM in the Royal Infirmary of Edinburgh (RIE) from January 2009–March 2011. Audit standards derived from local guidelines included: metformin as the first-line glucose-lowering medication in at least 90% of cases; average blood glucose readings <8.0 mmol/L over two weeks in at least 90% of cases (≥8.0 mmol/L was considered 'poor' glycaemic control); and postnatal glucose-tolerance-test (GTT) in all cases. Neonatal outcomes were observed.

**Results** Of the 113 pregnancies reviewed, 82.3% (93/113) of women required glucose-lowering medication. Metformin was used first-line in 94.6% of women requiring medication (88/93), and 99.6% of these continued treatment until delivery. Supplemental insulin was required in 44.3% of cases (39/88). Average blood glucose readings of <8.0 mmol/L were achieved in 93.6%, and 91.2% of cases during the second and third trimesters respectively. 70.8% of

women (80/113) attended for postnatal GTT, and 25% of these (20/80) were abnormal. Macrosomia (defined as birth-weight  $\geq 4000$  g) affected 20.3% of babies. One baby required admission to the neonatal unit due to hypoglycaemia.

**Conclusion** In RIE, women with GDM receive appropriate medication. The quality of glycaemic control has been maintained since metformin became the first-line medication. Suboptimal attendance for postnatal GTT must be addressed to optimise the health of these women who are at risk of developing Type 2 diabetes.

**PM.09 THE EFFECT OF GLUCOCORTICOIDS ON ANGIOGENESIS IN THE HUMAN PLACENTA**

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**Background** Fetal growth restriction (FGR) is associated with glucocorticoid (GC) excess in human pregnancies and animal models. In mice and rats, GC treatment reduces placental angiogenesis and dysregulates the expression of angiogenic factors. It is not known whether GCs reduce angiogenesis in the human placenta.

**Hypothesis** Glucocorticoid excess in the human placenta inhibits angiogenesis by dysregulating angiogenic factors.

**Methods** Human umbilical vein endothelial cells (HUVECs) and human placental artery endothelial cells (HPAECs) were treated with hydrocortisone (HC), prednisolone (PRED) and dexamethasone (DEX) for 24–48 hours. Tube-like structure (TLS) formation on matrigel, cell migration, proliferation and apoptosis were assessed. Chorionic plate arteries (CPAs) from normal placentas ( $n = 10$ ) were cultured for 48 hours with HC or DEX. mRNA expression of six angiogenic factors were quantified using real-time Q-PCR with normalisation to TBP.

**Results** Pilot studies in HUVECs ( $n = 3$ ,  $p < 0.05$ ) and subsequent experiments in HPAECs ( $n = 7$ ,  $p < 0.05$ – $0.01$ ) treated with 10–1,000 nM HC, PRED and DEX showed reduced TLS formation and cell migration compared to vehicle control cells. GCs had no effect on cell proliferation, apoptosis or viability. HC and DEX treatment reduced the expression of fibroblast growth factor-2 (FGF-2) ( $p < 0.001$ ), interleukin-8 ( $p < 0.001$ ), VEGF-A ( $p < 0.01$ ), VEGF-C ( $p < 0.01$ ), matrix metalloproteinase-16 ( $p < 0.01$ ), matrix metalloproteinase-1 ( $p < 0.05$ ) and CCL-2 ( $p < 0.05$ ).

**Discussion** GCs reduced tube formation and cell migration, key facets of angiogenesis, in HUVEC and HPAEC models. These findings indicate that GCs inhibit human placental angiogenesis, which could contribute to the pathogenesis of FGR. The downregulation of specific angiogenic factors by GCs identifies putative mechanistic pathways involved.

**PM.10 ARE LOW PAPP-A CONCENTRATIONS ASSOCIATED WITH PLACENTALLY-MEDIATED COMPLICATIONS IN WOMEN WITH ANTIPHOSPHOLIPID SYNDROME (APS)?**

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Women with antiphospholipid syndrome (APS) have pregnancies complicated by placently-mediated events whereas women with antiphospholipid antibodies (aPL) have similar pregnancy outcomes to the normal population. Low PAPP-A concentrations are useful in predicting adverse pregnancy outcomes in the general population. We aimed to determine whether PAPP-A concentrations could identify women with APS at risk of adverse outcomes.

**Methods** This retrospective case control study included all women with singleton pregnancies (without fetal anomalies) with persistent aPL and PAPP-A concentrations between 2008 and 2012. The women were grouped as those fulfilling the classification criteria for

APS and those who had persistent aPL without a history of thrombosis or adverse pregnancy outcomes. Data obtained included demographic details, medical comorbidities, aPL subtypes, nicotine use. Pregnancy outcomes included live birth, miscarriages  $> 10$  weeks, pre-eclampsia, abruption, birthweight.

**Results** Sixty-one cases were identified. There were no significant differences in maternal baseline characteristics. Live birth rates were similar between both groups. There were significant differences ( $p < 0.05$ ) between all placently-mediated complications, birthweight and customised birthweight centiles. However, despite these complications, PAPP-A concentrations were similar. There was no trend towards adverse outcomes with lower PAPP-A concentrations.

**Abstract PM.10 Table**

Variable	aPL n = 37	APS n = 24
PAPP-A, median (IQR)	1.01 (0.75 – 1.56)	0.91 (0.66 – 1.15)
Live birth, n (%)	33 (89.2)	20 (83.3)
All placently-mediated complications, n (%)	5 (13.5)	9 (37.5)
SGA, n (%)	1 (2.7)	5 (20.8)
Odds ratio	1.0	14.8

**Conclusion** Despite the high rate of placently-mediated complications in women with APS, a low PAPP-A was not useful in predicting these complications.

**PM.11 A LABEL-FREE SRM WORKFLOW IDENTIFIES A SUBSET OF PREGNANCY SPECIFIC GLYCOPROTEINS AS NOVEL PREDICTIVE MARKERS OF EARLY-ONSET PRE-ECLAMPSIA**

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**Objective** The aim of this study was to identify and verify plasma protein markers which may add to predictive algorithms for pre-eclampsia (PE) in asymptomatic nulliparous women.

**Methods** We used a quantitative mass spectrometry (MS) approach to identify proteins with abundance changes in plasma (15 weeks) taken from women who subsequently develop PE recruited to the international SCOPE study. We developed a novel, targeted, label-free MS method, selective reaction monitoring (SRM) which enabled robust and reproducible verification of these proteins in a further 100 samples (16 early-onset PE, 42 late-onset PE, 42 controls).

**Results** We identified and quantified  $>500$  plasma proteins, and prioritised a set of candidate predictive markers. The two most promising, Platelet Basic Protein (PBP/NAP-2) and Pregnancy-specific glycoprotein (PSG)-9 were selected for further verification. The SRM method was validated extensively using dilution experiments for PSG proteins and by comparison to a commercial ELISA for NAP-2. NAP-2 was only elevated in a subset of women with PE, however, peptides unique to PSG-9 and PSG-5 were consistently elevated in women with subsequent early onset PE ( $p < 0.01$ ; AUCs 0.72–0.75). Other PSG peptides were not different between groups.

**Conclusion** This study has identified specific PSG proteins as being predictive of early-onset PE. Importantly, use of a highly specific MS method has enabled measurement of individual PSG family members which has not been possible using antibody-based techniques. Future work is needed to determine whether these proteins will improve current prediction algorithms for the identification of PE in low risk nulliparous women.