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### **P5.06: NATURAL TIME COURSE OF AORTIC STIFFNESS AND WAVE REFLECTIONS IN NORMAL PREGNANCY AND IN GESTATIONAL DIABETES: A LONGITUDINAL STUDY**

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demonstrating that pre-load and after-load contributed approximately equally to the reduction of LV wall stress.

**Conclusions:** NTG reduces myocardial stress and increases myocardial contraction efficiency as a result of similar contributions from reductions in pre- and after-load.

#### P5.03 Withdrawn by author

#### P5.04

#### ARTERIAL STIFFNESS AND WAVE REFLECTIONS DECREASE DURING PREGNANCY

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**Objective:** Studies on changes in arterial stiffness and wave reflections during pregnancy are limited to cross-sectional studies. Our aim was to investigate maternal hemodynamic and cardiovascular adaptations at each trimester of pregnancy in a prospective longitudinal case-control study.

**Methods:** Cardiovascular measurements were performed at 12, 20 and 35 weeks of gestation, and included peripheral (Omron M6) and central (Sphygmocor) blood pressures, wave reflection and arterial stiffness measures (Sphygmocor and Esaote AU5 Wall track system).

**Results:** 109 healthy women with a normal pregnancy (mean age 29.3y, range 21-42) and 26 healthy non-pregnant control subjects (mean age 28.4y, range 21-40) were included. Except for peripheral and central systolic blood pressure, all cardiovascular parameters showed significant ( $p < 0.05$ ) changes during pregnancy. Heart rate increased linearly during pregnancy. In contrast, diastolic blood pressure (DBP), mean arterial pressure (MAP), augmentation index (Alx@75) and aortic stiffness (PWV) showed a typical V-shaped pattern, characterized by a significant drop from 12 to 20 weeks of gestation (DBP: -2.6 mm Hg; MAP: -1.6 mm Hg; Alx@75: -10.0%; PWV: -0.6 m/s), followed by a rise (DBP: +4.2 mm Hg; MAP +4.0 mm Hg) or smaller drop (Alx@75: - 7.8 %; PWV: -0.4 m/s) at 35 weeks compared to 12 weeks of gestation.

**Conclusions:** The present longitudinal case-control study confirms the results of previous cross-sectional studies on peripheral and central hemodynamics. In addition, it shows a drop in wave reflection and arterial stiffness which may be due to vasodilation in the second and third trimester of pregnancy.

#### P5.05

#### EXERCISE- INDUCED ALBUMINURIA IS A MANIFESTATION OF EXERCISE AORTIC RESERVOIR FUNCTION IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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**Objectives:** Patients with type 2 diabetes (T2DM) are susceptible to exercise-induced albuminuria even at submaximal exercise, but the mechanisms are unknown. Recent data indicates that T2DM patients have raised central blood pressure (BP) during submaximal exercise and this could contribute to renal dysfunction independent of upper arm BP. This study sought to determine the relationship between exercise central haemodynamics and exercise-induced albuminuria in T2DM.

**Methods:** Forty T2DM patients (62±9 years; 50% male) and 40 healthy controls (53±9 years; 50% male) were examined at rest and during a 20-minute bout of light cycle exercise (40W; 50RPM). Haemodynamics recorded included, aortic reservoir function (excess pressure integral [xSP] and aortic reservoir pressure), aortic stiffness, augmented pressure (AP), brachial and central BP. Albuminuria was assessed by albumin/creatinine ratio (ACR) at rest and within 20 minutes after exercise.

**Results:** There was no difference between groups in resting ACR ( $p > 0.05$ ). Exercise induced a significant ACR rise in T2DM patients but not controls (0.39±0.89 vs 1.05±1.38 mg/mol,  $p = 0.017$ ). All central haemodynamic variables indicative of systolic stress were significantly higher during exercise in T2DM participants (i.e. xSP, systolic BP and AP;  $p < 0.01$  all). For T2DM patients, exercise xSP was independently associated with increased ACR ( $\beta = 0.003$ ,  $p = 0.001$ ), independent of age, sex, body mass index, and 24-hour ambulatory SBP.

**Conclusions:** Aortic reservoir function, as determined by excess pressure during submaximal exercise, is independently associated with exercise-induced albuminuria in T2DM patients. These novel findings suggest that aortic reservoir function could be important for appropriate renal function in patients with T2DM.

#### P5.06

#### NATURAL TIME COURSE OF AORTIC STIFFNESS AND WAVE REFLECTIONS IN NORMAL PREGNANCY AND IN GESTATIONAL DIABETES: A LONGITUDINAL STUDY

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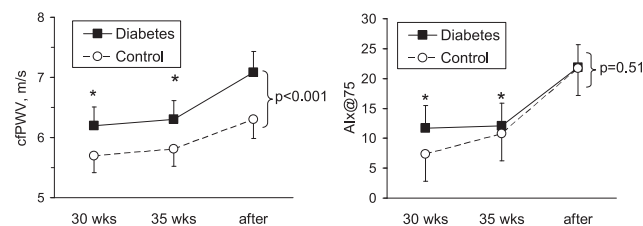
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Pregnancy is associated with profound vascular adaptive changes. Cross-sectional studies show greater arterial stiffness in gestational diabetes than in normal pregnancy. However, the time course of maternal cardiovascular hemodynamics in normal and diabetic pregnancy can only be appreciated in longitudinal studies.

Thirty-six women with gestational diabetes (34±5 years, BP 111/69±13/8 mmHg) and 36 with normal pregnancy (33±3 years, BP 111/68±10/8 mmHg) were examined 3 times, at a gestational age of 30 and 35 weeks, and 12 weeks after delivery. On each occasion, tonometry-based carotid-femoral pulse wave velocity (cfPWV) and heart-rate corrected aortic augmentation index (Alx@75) were obtained (SphygmoCor).

Compared to women with normal pregnancies, women with gestational diabetes had a higher age- and mean arterial pressure-adjusted cfPWV ( $p < 0.001$ , Figure), both during pregnancy (6.2±0.9 vs 5.7±0.8 m/s at week 30, 6.3±0.9 vs 5.8±0.9 at week 35) and after delivery ( $p = 7.1±1.0$  vs 6.3±1.1 m/s). Alx did not differ between the two groups ( $p = 0.51$ ). In both groups, cfPWV was significantly lower at 30 and 35 weeks than after delivery (Figure, both  $p < 0.001$ ). Alx@75 and central SBP were markedly lower during pregnancy than after delivery (both  $p < 0.001$ ), despite unchanged brachial SBP.

**Conclusions:** (1) compared with normal pregnancy, gestational diabetes is associated with a higher aortic stiffness, which remains elevated 3 months after delivery; (2) no significant differences in wave reflection are present in normal and diabetic pregnancies; and (3) aortic stiffness and augmentation are lower during the third trimester of gestation than after delivery, both in normal pregnancies and in gestational diabetes.



#### P5.07

#### DIFFERENT EFFECTS OF AGEING AND BP ON SEVERAL AORTIC AND CAROTID SEGMENTS

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**Objective:** Carotid-femoral PWV (cfPWV) is a regional marker of vascular ageing: our aim was to take advantage of Magnetic Resonance (MRI) and High resolution Echotracking (HRE) in order to non-invasively investigate the effect of age and blood pressure (BP) on different segments of large arteries.

**Methods:** Regional stiffness was measured as cfPWV using Sphygmocor and as aortic arch PWV using MRI (ArchPWV). Local stiffness was measured at the carotid artery site using HRE (carPWV), and at the ascending and