P2.18- Late gestation heat stress impact on placental morphology and fetal development in ewes.

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P2.17.
QUANTITATIVE EVIDENCE OF MICRO-/NANOPLASTICS IN PLACENTAL TISSUE OF HEALTHY CANADIANS REVEALED THROUGH PYROLYSIS GAS CHROMATOGRAPHY-CYCLIC ION MOBILITY MASS SPECTROMETRY

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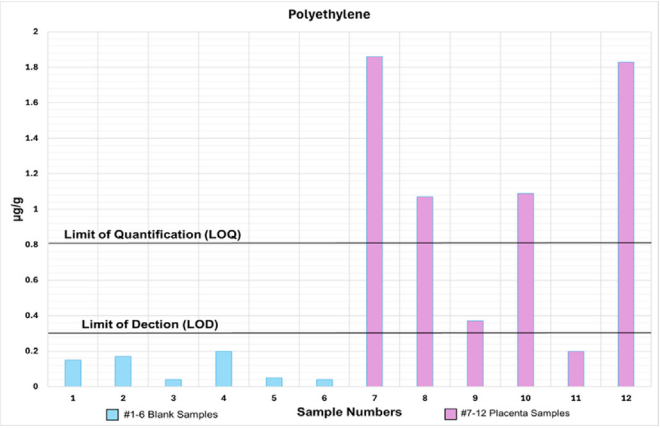
Objectives: Concerns have been raised recently about the potential impacts microplastics (MPs) have on human health including vulnerable populations such as pregnant people and children. Driven by recent reports of MPs in food and drinking water, human tissue and blood, we have conducted the present study aimed at identifying and quantifying MPs in the placental tissue of Canadians.

Methods: Placental tissue samples were collected from participants from the Health Sciences Centre in St. John's, Newfoundland and Labrador (HREB 2021.015) (n=20). The homogenized placental tissue was base digested for 48 hours. The samples were then filtered through a glass fiber filter with a pore size of 0.7μm. This step was performed in a clean room to minimize contamination from indoor dust. The filter paper was directly analyzed by pyrolysis gas chromatography coupled to a cyclic ion mobility mass spectrometer (Py-GCxcIMS, Waters, Wilmslow, UK). Our method targets the most commonly studied polymeric particles such as polyethylene, polypropylene, polystyrene, polymethylmethacrylate, and polyethylene terephthalate.
Results: Preliminary results were obtained from five study participants. In replicate measurements (n=6 placental tissue samples from one individual), the results showed evidence of low concentrations of polyethylene (~0.4 - 1.8 μg/g) (Figure 1), and polypropylene (~2.8 - 3.1 μg/g). In the five participants, polyethylene, polypropylene, and polystyrene (~0.5 μg/g) were detected in 1/5, 2/5 and 1/5 placentas, respectively. The LODs/LOQs and observed MP levels were comparable to a previous study of blood, which formed a large portion of the tissue sample [Leslie et al., Environ. Int., 2022].



Conclusion: Py-GCxcIMS provided first quantitative evidence of MPs in human placenta collected from a Canadian population (n=20).

P2.18.
LATE GESTATION HEAT STRESS IMPACT ON PLACENTAL MORPHOLOGY AND FETAL DEVELOPMENT IN EWES

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Objectives: 1) Evaluate the effects of late gestation heat stress on placental/fetal development in ewes; 2) Evaluate if citrulline supplementation mitigates heat stress impacts.

Methods: 28 pregnant ewes were randomly assigned to each treatment in environmental chambers: control (CON; n = 14, 18ºC) or heat stress (HT; n = 14: 28ºC daytime and 25°C nighttime) during their last month of gestation. Within temperatures, animals received citrulline (0.5% dry matter intake, CT) or not (NO), resulting in a 2x2 factorial design: CONCT, CONNO, HTCT and HTNO (n = 7/trt). Respiration rates (RR) and rectal temperature (RT) were measured once weekly. Gestation length (GL) and lamb birth weight (BW) were recorded. Placentas were collected at spontaneous delivery (3 ± 0.66 h postpartum). Data analysis used the GLIMMIX procedure in SAS with fixed effects of ewe, lamb sex and category, treatments, and their interaction.
Results: HT increased RR ($p < 0.001$), whereas CT decreased RT in both treatments ($p = 0.009$). HT decreased GL ($p = 0.03$) and lamb BW tended to be lower in the HTCT group ($p = 0.03$). Placental morphology did not differ among treatments, but female twins had greater cotyledon numbers ($p = 0.005$) and lower placental efficiency ($p = 0.03$).
Conclusion: Exposure of ewes to HT during late gestation reduced GL and BW, confirming observations in cattle but citrulline had no effect on these outcomes. Lamb growth and placental function are currently being evaluated.

P2.19.
MOMS MATTER: THE IMPACT OF MICRO-/NANOPLASTICS ON THE UTERO-PLACENTAL CIRCULATION IN MICE

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Objectives: Our group has recently reported in mice that maternal exposure to micro-/nanoplastics (MNPs) has a significant impact on the fetus including fetal growth restriction, abnormal feto-placental blood flow and metabolism, and abnormal postnatal brain development. While traditional environmental exposures (e.g., air pollution and per- and polyfluoroalkyl substances) have been associated with maternal disorders of pregnancy (e.g., preeclampsia and gestational diabetes), the influence of MNPs on the mother is understudied. The objective of this abstract is to elucidate the impact of MNPs on maternal health.

Methods: Pregnant CD-1 mice were exposed to polystyrene spheres of different particle sizes (e.g. 50 nm, 50 μm) at environmentally relevant concentrations via their drinking water. To determine the impact of MNPs on hemodynamics in the uterine circulation, high-frequency ultrasound (Vevo F2, VisualSonics) was used to measure uterine artery blood velocity at three timepoints in gestation. At embryonic day 17.5, the utero-placental vasculature was perfused with an X-ray contrast agent (Microfil, Flow-Tech). 3D images of the utero-placental specimens were acquired using a 1272 micro-CT scanner (Bruker Skyscan). Uteroplacental canal, spiral artery, radial artery and uterine artery luminal diameters and lengths were measured using digital calipers.
Results: The results of this study will determine how exposure to MNPs effects maternal health and breeding success. Biomedical imaging of the utero-placental circulation will demonstrate whether alterations to the maternal circulation are partially responsible for the deleterious impact of MNPs exposure on the fetus and whether remodelling/adaptations occur to alter utero-placental blood flow.
Conclusion: Taken together with the known impact on fetal health and feto-placental function, the maternal data from this study provides a more complete picture of the impact of MNPs on pregnancy.

P2.20.
EXPLORING PLACENTAL DNA METHYLATION IN IVF PREGNANCIES REVEALS MALE-SPECIFIC CPG SIGNATURES AND INCREASED FEMALE VARIABILITY

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Objectives: This study aims to assess sex specific placental DNA methylation changes associated with *in vitro* fertilization (IVF); an important