The international Academy of Human Reproduction

17th World Congress of the Academy of Human Reproduction

15–18 March 2017

Rome, Italy

TITLE

GESTATIONAL EXPOSURE TO PARTICULATE AIR POLLUTION ALTERS FETAL SIZE, CARDIAC FUNCTION, PLACENTAL MORPHOLOGY AND POSTNATAL GROWTH IN MICE

AUTHOR/S

Kaur K (US) [1], Phoon C K (US) [2], Veras M M (US) [3], Blum J L (US) [4], Zelikoff J T (US) [5]

ABSTRACT

Context: Epidemiologic research shows a causal link between Particulate Matter (PM) air pollution exposure and CVD in adults, while fetal CVD outcomes are less explored.

Objective: To examine if maternal gestational exposure to inhaled PM impacts fetal size, cardiac function, placentation and postnatal growth.

Methods: Pregnant B6C3F1 mice were exposed (6hr/d) to either filtered air (FA; 4?g/m3) or concentrated ambient PM (CAPs; 113?g/m3) from Tuxedo, NY from either gestational day (GD) 0.5-16.5 (Window 1; W1) or only during organogenesis GD6.5-14.5 (Window 2; W2). Fetal crown-to-rump length (CRL), fractional area change (FAC), intracardiac and umbilical cord Doppler waveforms were measured by ultrasound on GD12.5. Dams exposed during W1 were euthanized on GD17.5, CRL measured and placentas collected for stereology; at PND21 offspring BW was assessed and hearts collected for stereology.

Results: Fetuses exposed to CAPs during W1 exhibited a significant decrease in FAC (43% vs. 54%, respectively). CRL (W2) on GD12.5 was decreased and offspring BW on GD17.5 (W1) and PND21 (W2) were reduced after CAPs exposure. Fetal isovolumic contraction time was prolonged (32.8ms vs. control 17.1ms) in W1; umbilical artery peak velocity was decreased (69.5mm/s vs. control 82.3mm/s) in W2; labyrinth zone morphology was altered in W1 CAPs-exposed GD17.5 placentas revealing a 26% increase in fetal capillary (FC) surface area density, and a 33% and 25% decrease in FC total volume and surface area ratio between the FC and maternal blood spaces, respectively. At PND21, cardiac stereology revealed a 12% increase in left ventricle volume fraction, a 38% decrease in left atrium total volume in W2 and a 30% increase in cardiomyocyte volume in W1 CAPs-exposed offspring vs. control.

Conclusion: This study suggests that cardiac pathologies linked with PM exposure in adults may begin in utero.

INSTITUTE

[1] New York University School of Medicine, [2] New York University Langone Medical Center, [3] University of Sao Paulo School of Medicine, [4] New York University School of Medicine, [5] New York University School of Medicine