Journal of Developmental Origins of Health and Disease

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In This Issue

Cite this article: Ross MG. (2022) In This Issue. *Journal of Developmental Origins of Health and Disease* **13**: 135–136. doi: 10.1017/S2040174422000125

CAMBRIDGE UNIVERSITY PRESS

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April 2022

This issue of the Journal of Developmental Origins of Health and Disease contains one excellent review, two brief reports, and 12 original manuscripts. Several of the manuscripts provide important new information emphasizing the critical role of epigenetics in fetal development and offspring programming.

Review article

Characterizing and monitoring preconception health in England: A review of national population-level indicators in core data sources. Schoenaker et al identified national and international preconception guidelines and policies. Unfortunately, a measure of preconception health assessment and care was not identified in any current national data source. The authors suggest that this assessment forms the foundation for developing a national surveillance system for preconceptional health.

Brief reports

Growth from birth to 6 months of infants with and without intrauterine preeclampsia exposure. Gow et al examined the growth of infants exposed to normotensive or preeclamptic pregnancies over the first six months of life. Preeclamptic exposed infants were more likely to be born SGA than normotensive exposed infants, but those SGA infants were more likely to have rapid weight gain than those born appropriate for gestational age. By 6 months of age weight measurements and weight gain Z-score were similar among the groups.

Prenatal nicotine exposure leads to decreased histone H3 lysine 9 (H3K9) methylation and increased p66shc expression in the neonatal pancreas. Raez-Villanueva and coauthors explored the effect of maternal nicotine exposure in rats on the neonatal pancreas, as evidence demonstrates that nicotine exposure during pregnancy may increase the risk of offspring metabolic disorders, including type 2 diabetes. Nicotine increased expression of the pro-oxidative adaptive protein p66shc, as well as a key histone lysine demethylase and decreased a key histone lysine methyltransferase. These findings indicate that nicotine exposure may have significant impacts on pancreatic function via histone modifications.

Original articles

Association between maternal prepregnancy body mass index with offspring cardiometabolic risk factors: Analysis of three Brazilian birth cohorts. Dias and colleagues used three Pelotas birth cohorts to assess the relation between maternal prepregnancy BMI with offspring cardiometabolic risk factors. The findings suggest that maternal prepregnancy BMI is positively associated with offspring blood pressure and blood lipids, partly with this association explained by offspring BMI.

Folate and vitamin B12 status: Associations with maternal glucose and neonatal DNA methylation sites related to dysglycaemia, in pregnant women with obesity. van Weelden and coauthors examined obese pregnant women who participated in the U.K. Pregnancies Better Eating and Activity Trial to determine folate and B12 status and the relation between maternal dysglycaemia and neonatal DNA methylation. The authors found no evidence to link folate and B12 status with differential methylation of neonatal DNA previously observed in association with dysglycaemia.

Maternal soy protein isolate diet during lactation programs deleterious effects on hepatic lipid metabolism, atherogenic indices, and function of adrenal in adult rat offspring. Ferreira and coauthors assigned lactating rats to casein, soy protein, and soybean diets. The authors found that maternal consumption of soy protein isolate diets during lactation worsened atherogenic indices of offspring in adulthood, associated with increased liver cholesterol and decreased adrenal catecholamines. The authors suggest that consumption of soy protein isolate diets should be done with caution.

Effect of embryo cryopreservation duration on pregnancy-related complications and birth weight after frozen-thawed embryo transfer: A retrospective cohort study. Xu and coauthors performed the retrospective cohort study of all frozen embryo transfer cycles over a seven year period. Compared with those within three months, women undergoing frozen embryo transfer after cryopreservation longer than three months did not show any increased risk of the measured pregnancy outcomes. The authors concluded that embryo cryopreservation duration does not have negative effects on pregnancy-related complications or birth weight.

Neurodevelopmental assessment of infants born to mothers with hypertensive disorder of pregnancy at 6 months of age. Sala and colleagues performed a prospective cohort study examining the prevalence of neurodevelopmental disorders in infants born to mothers with and without hypertensive disorders of pregnancy at 6 months of age. At 6 months, the risk of neurodevelopmental delay was significantly greater in infants born to mothers with than without hypertensive disorders of pregnancy, with the risk three times that of the controls.

Maternal exercise during pregnancy modulates mitochondrial function in redox status in a sex-dependent way in adult offspring's skeletal muscle. Hozer et al examined the offspring of Wistar rats divided into groups of sedentary, free swimming and swimming with overload prior to and during pregnancy. The authors found that maternal exercise altered the redox status and mitochondrial function of the offspring's skeletal muscle in a sex-dependent way.

Influence of intrauterine growth status on aortic intima-media thickness and aortic diameter in near-term fetuses: A comparative cross-sectional study. Akhter and coauthors analyzed 136 near-term fetuses from the fetal medicine unit and classified offspring as appropriate for gestational age and growth restricted. As the severity of growth restriction increased, intima-media thickness and aortic diameter showed increasing and decreasing trends, respectively. These findings suggest that the extent of fetal aortic remodeling is influenced by the severity of growth restriction.

Self-reported mental health status of donor sperm-conceived adults. Adams et al completed an analysis of an online health survey by donor sperm-conceived and spontaneously conceived adults. Donor sperm-conceived adults self-reported increased incidents of seeking mental health professionals, learning difficulties, and panic attacks. The authors suggest that the results indicate an increased risk of chronic disease, specifically mental health, in offspring born from donor sperm conceived.

Low levels of sulfur and cobalt during the pre- and periconceptional periods affect the oocyte yield of donors and the DNA methylome of preimplantation bovine embryos. Nochi et al evaluated the effects of varying levels of sulfur and cobalt in maternal diet through pre- and periconceptional periods in cattle. Oocyte yield was lower in heifers from the low sulfur/cobalt group than from controls and embryos from this group exhibited over 2000 differentially methylated regions. The results suggest a significant effect of maternal nutrition on epigenetic reprogramming.

Supraphysiological estradiol levels on the hCG trigger day are associated with SGA for singletons born from fresh embryo transfer. Zhang et al divided embryo transfer cycles by level of estradiol level on the trigger day. The rate of SGA significantly increased when the estradiol level was high. The authors suggest that supraphysiological estradiol levels on the hCG trigger day increase the rate of SGA.

Neonatal nicotine exposure changes insulin status in fat depots: Sex-related differences. Rodrigues and colleagues examined the effects of maternal nicotine exposure during breastfeeding on offspring rats. Nicotine-exposed males showed increased fat, hyperinsulinemia, and higher vitamin D, though these findings were not observed in nicotine-exposed females. These findings indicate that nicotine exposure during breastfeeding may affect hormone status and fat depots of the adult progeny in a sex-dependent manner.

Pregnancy and lactation after Roux-en-Y gastric bypass worsen nonalcohol fatty liver disease in obese rats and lead to differential programming of hepatic de novo lipogenesis in offspring. Bertasso and colleagues examined hepatic lipid metabolism in Western diet obese female rats that underwent Roux-en-Y gastric bypass and in their F1 offspring. The authors demonstrate that Roux-en-Y gastric bypass aggravates nonalcoholic fatty liver disease after pregnancy and lactation and induces gender-dependent differential expression of hepatic lipogenesis pathway markers.

Michael G. Ross, MD, MPH
Editor-in-Chief

https://doi.org/10.1017/S2040174422000125 Published online by Cambridge University Press