

In This Issue

This issue of the *Journal of Developmental Origins of Health and Disease* contains an exciting array of articles bridging human and animal studies. We have 11 original articles, one review article and one brief report from investigators throughout the world. Two of the original articles focus on the adverse health effects of high-carbohydrate (sucrose, fructose) diets in early life, a topic with important public health implications.

Review Article

The effect of adverse intrauterine conditions, early childhood growth and famine exposure on age at menopause: a systematic review. Sadrzadeh *et al.* investigated if early adverse life influences impact on age at menopause. After a comprehensive systematic review, the authors assessed 11 eligible studies. The findings demonstrate that prenatal and childhood exposure to famine is associated with an earlier age at menopause, varying from 4 months to 1.7 years, although low birth weight alone does not appear to impact natural menopause. The authors provide an excellent discussion of both the potential mechanisms and public health implications of younger age at menopause.

Brief Report

Poor perinatal growth impairs baboon aortic windkessel function. Kuo *et al.* examined the ability of the aorta to provide diastolic perfusion in young adult baboons who were growth restricted at birth (Windkessel function). The results demonstrated that intrauterine growth restricted (IUGR) offspring had reduced distal descending aortic cross-section area and reduced aortic distensibility, indicating an intrinsic vascular pathology which may impact on adult blood pressure regulation, coronary perfusion and/or heart disease.

Original Articles

Maternal body weight trajectories across the life course and risk of preterm delivery. Straughen *et al.* examined the association between life course body weight percentile trajectories and the risk for preterm delivery in a cohort of 1410 Black women in Detroit Michigan. Analyzing body weight trajectories in two periods (birth weight to age 18, age 18 to pregnancy) the authors noted that low–low trajectories appear to have a higher prevalence of preterm delivery. These results suggest that strategies to improve pregnancy outcomes may require a focus on life course events beginning at or prior to birth.

Hitting a triple in the non-alcoholic fatty liver disease field: sucrose intake in adulthood increases fat content in the

female but not in the male rat offspring of dams fed a gestational low-protein diet. Nicolás-Toledo *et al.* hypothesized that a high-carbohydrate offspring diet in offspring of dams fed a low-protein diet during pregnancy would promote fatty liver and oxidative damage. The authors confirmed their hypothesis in female, though not male rat offspring. These findings provide important evidence indicating that female offspring from low protein, undernourished dams are more prone to hepatic oxidative stress and fatty liver, particularly in response to a high-carbohydrate diet.

Effective neonatal orally administered S-allyl cysteine in high-fructose diet fed Wistar rats. Lembede *et al.* hypothesized that neonatal oral administration of the antioxidant S-allyl cysteine (SAC) would protect offspring against high-fructose diet-induced metabolic outcomes. The authors demonstrated that neonatal SAC attenuated high-fructose diet-induced hepatic liver accretion, but did not reduce visceral obesity. These results provide additional support for limitation of the diet carbohydrate content.

Effect of human milk formula with bovine colostrum supplementation on bone mineral density in infant cynomolgus macaques. Tay *et al.* investigated the effects of formula milk with and without insulin-like growth factor 1 (IGF1) supplementation on growth and body composition during the first 6 months of life, as compared to bovine colostrum supplementation. Among the groups, the infants that received bovine colostrum supplementation demonstrated greater bone mineral density, suggesting that supplementation with colostrum may have significant benefit. In determination of the mechanism of colostrum action, the authors determined that this effect did not depend on IGF1.

Lead promotes abnormal angiogenesis induced by CCM3 gene defects via mitochondrial pathway. Sun *et al.* utilized a developmental model of mouse embryos to study the interaction of lead and CCM3 gene. Both CCM3 heterozygous embryos and lead exposure resulted in abnormal morphology and altered angiogenesis. These findings support a common angiogenesis pathway involving lead and CCM3 gene expression.

Microarray expression profile of lncRNAs and mRNAs in the placenta of non-diabetic macrosomia. Song *et al.* quantified long non-coding RNAs and messenger RNAs in the placenta of macrosomic births using microarray. The authors demonstrated several altered pathways among macrosomic as compared with normal birth weight placentas, with significant differences among long non-coding RNAs. This study provides

new insights into the programming effects of macrosomia and the function of long-coding RNAs.

Birth weight in postnatal microbial exposures predict the distribution of peripheral blood leukocyte subsets in young adults in the Philippines. McDade *et al.* assessed the association between birth weight and leukocyte subsets in young adulthood among a Philippine birth cohort. The results suggest that measures of microbial exposure in infancy alter the proportions of lymphocytes and granulocytes. These findings indicate an important role of both nutritional and microbial exposures in infancy on adult immune competency.

Effects of bisphenol A treatment during pregnancy on kidney development in mice: a stereological and histopathological study. Nuñez *et al.* exposed pregnant mice to bisphenol A (BPA) (10 or 100 ug/kg/day) during mid-pregnancy early nephrogenesis. The kidneys of BPA-exposed female offspring had significantly reduced glomerular number and histopathologic alterations as compared with controls. These findings add to the array of BPA-induced adverse programming effects.

Associations between maternal prenatal stress, methylation changes in *IGF1* and *IGF2*, and birth weight. Montoya-Williams *et al.* utilized a study of 24 mother–newborn dyads in the Democratic Republic of the Congo to assess mechanisms of IGF expression. The results indicate links between the maternal epigenome and low birth weight, though dependent on mechanisms outside the known imprinting methylation pathways. These findings may have important implications for

the impact of low birth weight and health disparity on adult phenotype.

The impact of periconceptional alcohol exposure on fat preference and gene expression in the mesolimbic reward pathway in adult rat offspring. Dorey *et al.* investigated the effects of periconceptional alcohol exposure on offspring food preferences and gene expression. At 15 months of age, male alcohol exposed offspring consumed more high-fat food compared with controls, in conjunction with lower expression of the dopamine receptor type 1 in the ventral tegmental area. These results indicate that periconceptional alcohol exposure can alter the mesolimbic reward pathway and the intake of highly palatable foods.

In rats, gestational iron deficiency does not change body fat or hepatic mitochondria in the aged offspring. Rees *et al.* examined the offspring of maternal rats fed iron-deficient diets during gestation. Offspring were randomized at 1-year of age to a high-fat or control diet. Although the high-fat diet increased hepatic triglycerides, there was no effect of prenatal iron deficiency. Furthermore, iron deficiency did not alter mitochondrial function. The authors discuss the differences their results and those of prior studies, which demonstrated increased visceral fat in offspring of iron-deficient dams fed a high-fat diet in adult life.

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