

## In This Issue

This issue of the *Journal of Developmental Origins of Health and Disease* includes 10 original reports, including four human studies and six animal investigations. Human studies include the effects of maternal diabetes and maternal cigarette smoking as well as examinations of development of immune function. Animal studies include examination of effects of maternal hyperglycemia, undernutrition and overnutrition, dietary flaxseed oil and bisphenol exposure. Together, these articles provide important insights into the developmental effects of maternal exposures.

### Original articles

**Maternal gestational diabetes mellitus and overweight and obesity in offspring: a study in Chinese children.** Zhao *et al.* examined the effects of maternal gestational diabetes mellitus (GDM) and breastfeeding on child outcomes through 10 years of age. Maternal GDM was associated with a greater than two-fold increase in offspring overweight and obesity independent of the effects of maternal obesity, birth weight and breastfeeding.

**Association of early and late maternal smoking during pregnancy with offspring body mass index at 4 to 5 years of age.** Grzeskowiak *et al.* utilized a retrospective cohort from the Women's and Children's Health Network in southwest Australia to investigate the association between maternal smoking and offspring body mass index (BMI). Through 5 years of age, children of women reporting any smoking during pregnancy, including quitting smoking, had a significant increase in BMI. The authors suggest that quit smoking campaigns should be introduced pre-pregnancy.

**Fetal sex differences in human chorionic gonadotropin fluctuate by maternal race, age, weight and by gestational age.** Adibi *et al.* sought to evaluate the biologic significance of sex differences in human chorionic gonadotropin (hCG) by examining levels among women participating in prenatal and newborn screening programs in California. The authors report that maternal hCG levels are higher in female as compared with male fetuses in both the first and second trimesters. Fetal sex differences were also associated with maternal race, weight and age. The authors suggest that maternal hCG levels may be associated with physiologic effects on the placenta.

**Sex differences in the early life correlates of natural antibody concentrations.** Palmer *et al.* examined early life nutritional influences on natural antibody concentrations of pre-adolescent children in Nepal. The authors reported associations of natural antibody concentrations with infant size and growth among males though not females. However, season

of birth was associated with concentrations in females. These findings suggest that environmental influences may impact on offspring immune development.

**Maternal hyperglycemia at different stages of gestation and its effects on male reproductive functions.** Akindele *et al.* utilized a model of maternal hyperglycemia to assess male reproductive measures. Maternal hyperglycemia was associated with increased anogenital distance index at GD8 and GD15 in conjunction with a significant reduction in sperm count and reduced testosterone. These findings suggest that maternal hyperglycemia may have significant effects on reproductive function among male offspring.

**Offspring's hydromineral adaptive responses to maternal undernutrition during lactation.** Nuñez *et al.* utilized the model of maternal rat undernutrition during the first half of lactation, a period in which renal development continues in rodents. Although the authors demonstrated changes in Fos expression in brain areas associated with hydromineral homeostasis, there were no changes in plasma osmolality or renal histology. The authors suggest that postnatal maternal undernutrition likely have minimal effects on offspring hydromineral control.

**Programmed regulation of rat offspring adipogenic transcription factor (PPAR $\gamma$ ) by maternal nutrition.** Desai *et al.* examined expression of adipogenic transcription factors in adipose tissue from offspring of under- and overnourished dams. In offspring of both groups, adipose tissue demonstrated increased PPAR $\gamma$ , though with evidence of altered mechanisms underlying the increase. These studies suggest that despite divergent nutrient environments both offspring groups may be associated with programmed increased adipogenesis and obesity.

**Sex-dependent effects of developmental exposure to bisphenol A and ethinyl estradiol on metabolic parameters and voluntary physical activity.** Johnson *et al.* examined energy expenditure, body composition and physical activity in mice offspring developmentally exposed to bisphenol A (BPA) or estradiol. The results indicate that females developmentally exposed to BPA exhibit decreased motivation to engage in voluntary physical activity and altered metabolism of carbohydrates *v.* fats, findings which may have important health implications.

**Body composition in male rats subjected to early weaning and treated with diet containing flour or flaxseed oil after 21 days until 60 days.** Ferolla da Camera Boueri *et al.* sought

to determine if flour or flaxseed oil treatment impacts body composition in male rats undergoing early weaning. Although early weaning has significant impacts on offspring body mass, flaxseed flour in comparison with flaxseed oil contributes to recovery of body composition after early weaning. These results may have important implications for infants in which there is precocious interruption of lactation.

**Hepatic *IGF1* DNA methylation is influenced by gender but not by intrauterine growth restriction in the young lamb.**

Carr *et al.* examined the effects of maternal over nutrition-induced intrauterine growth restriction (IUGR) in lambs on hepatic epigenetic modifications. Although IUGR induced by maternal overnutrition did not significantly alter DNA methylation, gender differences in body confirmation were associated with sexual dimorphism in hepatic IGF1 epigenetics.

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