Mary Jane Black, J Nutr Food Sci 2013, 3:4
http://dx.doi.org/10.4172/2155-9600.S1.008

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July 15-17, 2013 Courtyard by Marriott Philadelphia Downtown, USA

Maternal diet during pregnancy and lactation affects nephron endowment in the kidneys and the complement of cardiomyocytes in the heart of offspring

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Over recent years, early life nutrition has been recognized as a major contributor to long-term health and disease. Intrauterine growth restriction, as a result of poor maternal nutrition, is strongly linked to adult cardiovascular disease. It is therefore imperative to gain an understanding of how intrauterine growth restriction affects the development of the heart and kidneys. In addition, with the increased prevalence of vitamin D deficiency world-wide, it is important to gain an understanding of how maternal vitamin D deficiency during pregnancy and lactation affects the development of the heart and kidneys in the offspring. Using rodent models, we have separately examined the effects of maternal protein restriction (which results in intrauterine growth restriction) and vitamin D deficiency during pregnancy and lactation on the development of the heart and kidneys in the offspring. We have found that at the time of birth, maternal protein restriction leads to a reduced complement of cardiomyocytes in the heart of offspring, however, by weaning the number of cardiomyocytes is similar to that of the control. Nephron endowment is significantly reduced in the offspring exposed to maternal protein restriction. In contrast, maternal vitamin D deficiency during pregnancy and lactation leads to a significant increase in the number of nephrons in the kidneys and to a significant increase in the number of cardiomyocytes within the heart of offspring, when compared to controls. Our findings clearly show that maternal diet during pregnancy and lactation can directly affect the development of the heart and kidneys in the offspring.

Biography

Mary Jane Black is the Deputy Head of Department (Teaching and Research Training) in the Department of Anatomy and Developmental Biology at Monash University. She has a strong background in cardiovascular cell biology and in the fetal programming of cardiovascular and renal disease; she has published over 90 research papers in this field. Her current research focuses on the effects of perturbations in early life on the development of the heart and kidney and the long-term consequences. Her research group has made major contributions to understanding the mechanisms of the developmental programming of cardiovascular and renal disease.

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