New study shows vitamin D-related 'molecular switches' predict childhood bone mass

August 15 2013

Researchers at the MRC Lifecourse Epidemiology Unit, University of Southampton, have demonstrated that the degree to which a gene related to vitamin D action is switched on or off, when measured at birth, predicts bone density of the child at four years of age.

In the study, 230 boys and girls were assessed at 4 years as part of the Southampton Women's Survey (SWS), a large ongoing mother-offspring cohort. The children visited the Osteoporosis Centre at Southampton General Hospital for measurement of their bone size and density using a DXA scanner. The researchers were able to measure the extent to which a particular gene, RXRA, is switched on or off by measuring epigenetic marks on the DNA sequence of the gene in cells taken from umbilical cord tissue which had been collected at birth. They found that the less marking (which usually means greater gene activity), at birth, the greater the bone density of the child at four years old. Furthermore, one of the epigenetic marks was related to the mother's blood vitamin D concentrations in late pregnancy.

Dr Nicholas Harvey, Senior Lecturer at the MRC Lifecourse Epidemiology Unit, University of Southampton, who led this project said, "RXRA is essential for the action of vitamin D and several other hormones; taken together with the relationship we found between mothers' vitamin D levels and RXRA marking, this study provides further support for the potential importance of vitamin D in pregnancy.

We are now testing whether mothers should be supplemented with vitamin D in pregnancy in a randomised controlled trial, the MAVIDOS Maternal Vitamin D Osteoporosis Study, which will report early next year."

Professor Cooper, Professor of Rheumatology and Director of the MRC Lifecourse Epidemiology Unit, University of Southampton and who oversaw this work, added "This study forms part of a larger programme of research at the MRC Lifecourse Epidemiology Unit and University of Southampton in which we are seeking to understand how factors such as diet and lifestyle in the mother during pregnancy, and of the child in early life, influence a child's body composition and bone development. This work should help us to design interventions aimed at optimising body composition in childhood and later adulthood and thus improve the health of future generations".

More information: Childhood bone mineral content is associated with methylation status of the RXRA promoter at birth. Harvey NC, Sheppard A, Godfrey KM, McLean C, Garratt E, Ntani G, Davies L, Murray R, Inskip HM, Gluckman PD, Hanson MA, Lillycrop KA, Cooper C. *J Bone Miner Res.* 2013 Aug 1. DOI: 10.1002/jbmr.2056. [Epub ahead of print]

Provided by International Osteoporosis Foundation