

## Genetics of early growth and metabolic disorders

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Many early life developmental phenotypes such as birth weight, birth length, gestational age, and postnatal growth are known to associate with later life metabolic health. The mechanisms underlying these associations are poorly understood. We have used data from the birth cohorts of Finland, UK, Netherlands, Australia and USA, among others, to identify genetic determinants of early growth and how these may associate with adult phenotypes. Further, we have used longitudinal data modelling which takes into account the temporal relationships and interactions between variables.

We have identified several genetic variants which both associate with foetal growth and metabolic diseases. These explain part of the association between lower birth weight and adverse metabolic phenotypes. We were able to show that early life stress may modify the association between genetic variants and size at birth. In addition, we have recently discovered variants that associate body mass index (BMI) at adiposity peak in infancy and age/BMI at adiposity rebound in genome-wide meta-analyses of genetic data on over 20,000 individuals. Polymorphisms in the discovered genes are associated with adult adiposity. Our research provides insight into the mechanisms linking early growth patterns with later metabolic health and further evidence that the genetic variants shown to associate with adult phenotypes seem to impact on disease development early in life. Our methodological novelty is the use of life-course modelling and phenotypes from longitudinal growth models. These methods are valuable for understanding bio-mechanisms for preventive purposes. The future challenge is to explore how early environment may induce epigenetic modifications.

### Biography

Marjo Riitta Jarvelin is Professor in Public Health and Lifecourse Epidemiology, affiliated at Imperial College London, UK, but holds an honorary professorship at the University of Oulu, Finland. She is a director of the acknowledged Northern Finland Birth Cohort Research Program, has published over 450 original papers and been funded by the Academy of Finland, MRC UK, Wellcome Trust UK, the EU and NIH USA among others. She has received an award of excellence in genetic epidemiology at Imperial College London and in 2012 she was honoured by the title of the Epidemiologists of the Year in Finland.

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