**Origins of Lifetime Health Around the Time of Conception**
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Tom P Fleming [1], Adam J Watkins [2], Miguel A Velazquez [3], John C Mathers [4], Andrew M Prentice [5], Judith Stephenson [6], Mary Barker [7], Richard Saffery [8], Chittaranjan S Yajnik [9], Judith J Eckert [10], Mark A Hanson [11], Terrence Forrester [12], Peter D Gluckman [13], Keith M Godfrey [14].
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This manuscript reviews the potential for epigenetic changes before pregnancy and during pregnancy. There are two illustrations that are worth a thousand words.

## Abstract

Parental environmental factors including diet, body composition, metabolism and stress affect the health and chronic disease risk of people throughout their lives, as captured in the 'Developmental Origins of Health and Disease' (DOHaD) concept. Research across epidemiological, clinical and basic science fields has identified the period around conception as being critical in the processes mediating parental influences on the next generation's health. During this time, from the maturation of gametes through to early embryonic development, parental lifestyle can adversely influence long-term risks of offspring cardiovascular, metabolic, immune and neurological morbidities, often termed 'developmental programming'. We review 'periconceptional' induction of disease risk from four broad exposures: maternal overnutrition and obesity; maternal undernutrition; related paternal factors; and from the use of assisted reproductive treatment. Human studies and animal models demonstrate the underlying biological mechanisms, including epigenetic, cellular, physiological and metabolic processes. A novel meta-analysis of mouse paternal and maternal protein undernutrition indicate distinct parental periconceptional contributions to postnatal outcomes. We propose that the evidence for periconceptional effects on lifetime health is now so compelling that it calls for new guidance on parental preparation for pregnancy, beginning before conception, to protect the health of offspring.