Intrauterine environment and cardiovascular disease risk in later life

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Cardiovascular disease (CVD) remains the number one killer in Western societies. Exposure to an adverse intrauterine environment is thought to predispose the offspring to adult life CVD. Based on early epidemiological findings, Barker and colleagues initially proposed the "fetal origins of disease hypothesis" which suggested that being born small could be a risk factor for cardiovascular disease in adult life. This theory has since then been confirmed by many others with evidence for increased CVD risk following intrauterine growth restriction as well as other pregnancy complications mainly preeclampsia. Systematic review and meta-analyses of data from long term follow up studies demonstrate that children and young adults born to pregnancies complicated by preeclampsia demonstrate cardiovascular risk factors which are evident from early life. These include increased blood pressure, BMI, cholesterol, glucose and impaired endothelial function with the predominant phenotypes being elevated blood pressure and BMI. In the SCOPE pregnancy cohort (SCreening fOr Pregnancy Endpoints study) of 5336 women, those who were born with a birthweight <2500g were at increased risk of developing all the major pregnancy complications including gestational hypertension, preeclampsia, spontaneous preterm delivery, gestational diabetes mellitus and having a small for gestational age infant. The highest risk was among women who had a low birth weight and subsequently became overweight or obese. Considering that pregnancy complications are now considered a risk for later life CVD, these findings suggest that intrauterine life plays a major role in vascular health throughout the life course. Two mechanistic theories can be suggested regarding the relationship between intrauterine environment and subsequent vascular health. One would be inherited risk. The second could be unfavourable influences that program metabolic homeostasis affecting blood pressure, glucose tolerance and lipid regulation. The placenta plays a crucial role in this second mechanism as it is the fundamental organ that determines the success of a pregnancy. Impaired placentation is a hall mark of the main pregnancy complications and placenta is considered a "programming organ" for later life cardiovascular disease. At present, the relative contribution of each of these mechanistic pathways is unclear but there are data that support both. From a public health perspective, those exposed to adverse intrauterine environments appear to have a unique lifetime cardiovascular risk profile that is evident from early life. Therefore, early monitoring and implementation of primary preventive strategies may be beneficial in reducing the global cardiovascular disease burden.