



Diabetes and heart disease – will the tide turn?

Healthcare professionals should not feel despair at the rising tide of diabetes and heart disease, for it can still turn back. The key is to focus upon the younger generation, says **Mark Hanson**, BHF Professor of Cardiovascular Science, University of Southampton

When King Canute sat on the seashore, it was apparently to demonstrate to his courtiers that, flatter him as they might, he really had no control over the forces of nature. Today, faced with the burden of cardiovascular disease linked to the tsunami of diabetes, which threaten to overwhelm health systems worldwide, we might sympathise with him. The fact that we know the major risk factor to be overweight and obesity, but cannot reverse the rising prevalence of that either, makes the feeling of impotence even worse.

A fatalistic view would be that the rapid adoption of urban, Western lifestyles puts us in environments so different from those for which our biology evolved that it is not surprising that a Palaeolithically useful response of laying down fat goes into overdrive. But, 'mismatched' as we are, there is another aspect of the story, and one which operates on a life course timescale rather than over millennia¹. A clue lies in the fact that we are the fattest of all mammals at birth. The amount, composition (white/brown/beige adipocytes) and location of this fat are affected by the prenatal environment in terms of maternal diet, body composition and lifestyle.

Recent evidence shows that aspects of the father's life can also have profound effects, which start operating even in early gestation. Then, soon after birth, processes controlling appetite, food preference and satiety are also partly set. Cues from our developmental environment, including our parents, help develop the structure and physiology of our bodies which will be best suited to living in their environment². Thus, we are mismatched in another way, now that we live in environments which have changed so much over recent generations.

Will we become matched to these environments in future? The answer seems to be 'No', because the obesity and diabetes which beset us lead to transmission of this 'diabesity' to the next generation.

Reasons for optimism

Against this background, I am optimistic. Why? Because, while we can't turn back the clock and rerun our evolution, we *can* make the development

of the next generation healthier. Thankfully, the risk of diabetes in them will be determined very little by their inherited genes in isolation. Environmental factors will operate on those genes, using epigenetic processes³ to alter how they develop, but we already have a good list of those factors and, importantly, they are all in principle modifiable.

Obesity tracks from childhood into adulthood and strongly predicts the risk of cardiovascular disease⁴. If we can improve the behaviour and health of today's adolescents as the parents of tomorrow, we can not only help them to become healthier adults but, in turn, to have healthier children. Interventions to promote healthy diet, physical activity, sleep and avoiding toxins need to start early in the life course, and to be

maintained. There are WHO and UN documents which demand such action^{5,6}. Our political leaders need our encouragement in order to realise that, unlike Canute, they do have the power to influence the forces which swell the tide of diabetes and cardiovascular disease.

BIOGRAPHY

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Mark Hanson is a BHF Professor and Director of the Institute for Developmental Sciences at the University of Southampton School of Medicine. He is President of the International Society for Developmental Origins of Health and Disease. His research focuses on how the developmental conditions in the womb influence the risk of heart and circulatory disease, Type 2 diabetes and obesity occurring in later life.

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- 4 Twig G, Yaniv G, Levine H et al (2016). Body-Mass Index in 2.3 Million Adolescents and Cardiovascular Death in Adulthood. *New England Journal of Medicine* April 13 Epub ahead of print
- 5 WHO ECHO Commission on Ending Childhood Obesity. www.who.int/end-childhood-obesity/en
- 6 UN Global Strategy for Women's Children's and Adolescents' Health 2015. <http://globalstrategy.everywomaneverychild.org>

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