Prof. Atul Singhal

University College London, Institute of Child Health, UK

Atul Singhal is Great Ormond Street Hospital Children's Charity Professor of Paediatric Nutrition at University College London, Institute of Child Health, and Honorary Consultant Paediatrician at Great Ormond Street Hospital. He graduated in Medicine from the Royal Free Hospital, London in 1986 and has been a consultant in paediatrics since 1998. Previously, he was the Director and Deputy Director of the Childhood Nutrition Research Centre, UCL Institute of Child Health.

He has broad interests in paediatric nutrition, but his current research focuses on the influence of early nutrition for long-term health, the effects of nutritional interventions to reduce long-term cardiovascular risk, and nutritional interventions for obesity.

Developmental origins of health and disease; where are we now

The idea that nutrition may act during a critical window early in development to permanently affect, or 'program'[1], long-term health first emerged from studies in animals[2] but is now strongly supported in humans. Nutrition throughout the life course, including fetal life, infancy, the preschool, or toddlers years, and in adolescence has been shown to impact on long-term health, a hypothesis known as the developmental origins of health and disease[3].

Some of the earliest evidence for nutritional programming in humans was obtained from observational studies from the late 1980's linking low birth weight with adult cardiovascular disease[4]. Now, both under and over-nutrition during pregnancy has been associated with adverse outcomes in the offspring such as neuro-cognitive impairment, obesity and an increased risk of cardiovascular disease[4]. Importantly, recent experimental (randomised) evidence supports a causal link between over-nutrition during pregnancy and an increased risk of obesity in the offspring[5].

Postnatally, the strongest evidence for nutritional programming has been obtained for the long-term benefits of breast-feeding. Breast-feeding, not only has benefits for short-term health, but has been shown to have major advantages for long-term cognitive function[6,7], atopic disease[8], bone health[9], and risk of obesity and cardiovascular disease[10,11]. There is particularly strong evidence that breast-feeding can improve later cognitive development, a hypothesis supported by several systematic reviews, evidence of a dose-response association[12], data from a cluster randomised trial[13], as well as evidence of benefits of breast-feeding on visual development[13] and structure of the brain[14,15].

The mechanisms underlying the cognitive benefits of breast feeding are uncertain, but previous studies have investigated differences between human milk and formula in concentrations of biologically active factors such as nucleotides, lipids, and the milk fat globular membrane. More recent research focuses on the impact of breast milk nutrients (e.g. tryptophan, nucleotides and long-chain fatty acids) on sleep modulation and early brain development in infancy[16].

This presentation will give an update on the development origins of health and disease[11] including an overview of the role of human milk intake on long-term cognitive function and the possible mechanisms involved. It will highlight the key role of promoting exclusive breast-feeding[13], the potential impact of specific breast milk nutrients, and the importance of experimental (randomised) studies in interpreting the effects of early nutrition on later health. Finally, it will consider the implications of nutritional programming for nutritional, clinical and public health practice.

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