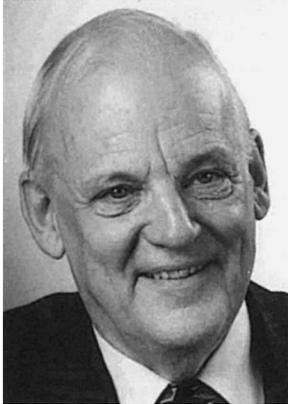


Physical inactivity in adolescence – an obesity risk factor



Gösta Samuelson
gosta.samuelson@htu.se

Obesity is considered to be caused by an over consumption of energy rich foods and reduced energy expenditure or a combination. Low physical activity alone has not been proven to cause obesity. Recently, however, a large and well-designed longitudinal physical activity study in US girls followed up for 9–10 was published. A cohort of 1152 black and 1135 white girls were prospectively followed from ages 9 or 10 to 18 or 19 years with a validated physical activity method at multiple times including overall activity. BMI differences at ages 18 or 19 years between active and non-active girls were about 3 kg/m² and similar differences were found in the sum of skin fold thickness without any significant differences in energy intake. (Sue Kimm et al. *The Lancet*. 2005; 366: 301–307).

Thus, it seems that physical inactivity plays a substantial part in weight-gain during adolescence even though BMI may overestimate a fat increase, since BMI also includes lean body mass and bone, body compartments which increase among adolescents. However, the difference in skinfold measurements between the groups indicate an increase in body fat among those who are physically inactive.

Obesity – a human virus disease?

A positive energy balance is the traditional explanation of the origin of overweight and obesity (see above). Genetically factors, social and behaviour aspects are also considered to be of importance. However, not all obese subjects are inactive or eat too much.

A new approach might be that some cases of obesity are caused by a virus infection. In animal experiments international research groups have found human adenovirus (AD 36) to induce obesity in rats (Dhurandhra et al *Int J Obesity* 2002; 24: 989–996). Recently, Bäckhed et al from their studies suggest that gut microbiota is an important environmental factor that affects energy harvest from the diet and energy storage (*Proceedings of the National Academy of Sciences in USA* 2004; 101 (44): 15718–23).

The Western diet with high content of saturated fat and polysaccharides might change the microbiotic ecology in the gut with increased absorption of energy rich dietary components that will be deposited in the fat depots. The mechanism behind is still unclear. Speculations derived from the referred studies give a new exciting approach to the multifactorial aetiology of obesity.

Nutritional modulation of the "brain-gut axis"

The gut is an important part of the internal ecology of the body. An immense numbers of bacteria form the environment. Besides absorption mechanisms of nutrients, gut hormones and the immune system of the gut, also other intestinal functions are now under rapid mapping. The brain-gut axis is a theoretical model describing the neural pathways between emotional centres in the brain to neuro-endocrine centres and to the enteric nervous system in the gut, R.M. Brummer emphasis in a review article in this issue. Common bowel disturbances in humans as irritable bowel syndrome (IBS) are found in about 20% of the Western population. What mechanisms are responsible for the symptoms? Stress hormones or disturbances in the metabolism of serotonin (5-HT) or other transmitter substances? Studies are underway aiming to find out if dietary modulation is possible towards improvements in 5-HT regulation.

Before any specific dietary intervention in functional gastro-intestinal disorders might be possible a lot of basic physiological and immunological research are needed.