Early malnutrition and programming of adult degenerative diseases: experimental, epidemiological and preventive studies

Results in Brief

Dietary influence from conception to old age

Epidemiological studies have strongly indicated that early life events, even as early as the foetal stage, can play a significant role in a range of adult diseases. Scientists have investigated the effect of protein restriction in the maternal diet on the cell mass of the foetal pancreas.

HEALTH

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Foetal programming, where the maternal diet during pregnancy affects the chances of development of diseases in the child and into adult life is gaining increasing interest from researchers. Not only does the evidence point to an effect on the incidence of cardiovascular disease and diabetes but to conditions like depression.

Consequently, the European project NUTRIX aimed to analyse early cellular events induced by malnutrition and identify their consequences in later life on organs like the heart, liver and pancreas. Partners at the Université catholique de Louvain in Belgium specifically targeted the effects of a protein restricted diet on the cell mass of the pancreas.

The aim was to elucidate the underlying mechanisms responsible for a reduction in beta cells, responsible for insulin production and also release of amylin involved in glycaemic control. Up until weaning, levels of 8\;% protein were given to an animal model as opposed to the recommended 20\;% during pregnancy. Investigation showed that the offspring had reduced beta cell mass.

The next step in the research involved finding out the biochemical basis for this reduction in endocrine tissue. Other NUTRIX studies showed that total food reduction also brings about reduction in beta cell count but this is due to a drop in glucocorticoid level. In the case of protein shortage, these levels were found to be normal.

The answer lay in reduced beta cell multiplication coupled with an increase in programmed cell death or apoptosis. Furthermore, the beta cells seemed to be more prone to toxic aggression, a phenomenon apparent in the pathology of diabetes type 1. What seems more pertinent is that destruction of beta cells by toxic aggression was still evident until adulthood even though a normal diet was given after weaning.

The implication is that the developmental damage inflicted in utero is not necessarily reversible. Dietary recommendations for expectant mothers as a result of this research are especially applicable in developing countries. Also, in affluent societies, social norms like vegetarianism and the 'desire to be thin' may be the cause of nutritional imbalance.

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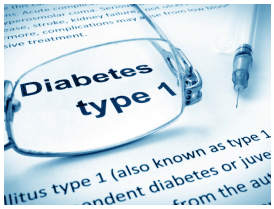

Developing technology that will help type 1 diabetes patients forget their disease

Project Information

NUTRIX

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