

Understanding how early nutrition can influence lifelong health

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Credit: AI-generated image ([disclaimer](#))

EU-funded research has revealed how nutrition in the womb and during our early years could affect our susceptibility to obesity, diabetes, heart disease, chronic lung disease, as well as lifelong behavioural and cognitive functions. These findings from the EARNEST ('Early nutrition programming') project have now been translated into practical advice,

which could have a long-term beneficial impact on the health of Europe's next generation.

The EU-funded EARNEST project, co-ordinated by Prof Berthold Koletzko of Ludwig Maximilians-Universität (LMU), brought together an international team of scientists to identify the factors behind the phenomenon of 'early nutrition programming'. The EARNEST project followed over 1,000 children across five EU countries from birth to the age of two years, with further follow-up thereafter.

The ultimate goal was to study the effects of [infant feeding](#) on later obesity. The results obtained so far show that the infants fed a formula with lower [protein content](#) - more similar to breast [milk composition](#) - weighed significantly less at two years than those on higher protein formula, and that their weights were more similar to breast fed infants. Differences emerged by six months of age and persisted, even after the intervention ceased and the children went onto similar diets.

In fact, this difference in early growth predicts a reduction of obesity at 14 - 16 years of age by as much as 13 %. Furthermore, a new, high-technology technique applied at the Hauner Children's Hospital at Univ. of Munich enables the measurement of a profile of more than 200 metabolites from one drop of the child's blood. This technique allows researchers to understand how infant feeding with different [protein levels](#) can affect the [metabolic pathways](#) that modulate the growth and health of children.

Substantial evidence was gathered on 'positive programmers'; such as breast milk. Breast milk not only affects [future health](#) via its nutrients, but also possibly through its non-nutrient components. This research has served to highlight once again the protective effects of breastfeeding on later obesity risk, mediated primarily by the lower protein content of breast milk relative to bottle milk formula. Reducing the protein content

of formula to levels closer to that found in [breast milk](#) could therefore provide this protective advantage to bottle-fed children.

Another 'positive programmer', the Mediterranean or Healthy Diet, can protect mothers from premature delivery and pre-eclampsia and from postnatal depression, as well as improving the immune function of their babies, and the IQ of their children when they are five. With fish, it appears to be the long chain omega 3 fatty acids that provide the benefits, but so far researchers have not been able to identify a specific effect of the folates within vegetables.

'Programming' also has another side. Environmental factors such as maternal smoking, air pollution and endocrine disrupting chemicals can act as 'negative programmers' and can adversely affect the health of mother and child.

The EARNEST project also explored 'gender effects in programming'. For example, in one of the project's trials, the effects of early nutrition on later cognitive achievements was found to differ between girls and boys born prematurely, with much larger effect sizes in boys. Also the effects of infant nutrition on the growth factor IGF-1 was very different in girls and boys.

'This research has enormous potential for improving the health and well-being of future generations, reducing costs for health care and social services, and for enhancing the productivity and wealth of societies,' says Professor Berthold Koletzko from the University of Munich, the coordinator of the EARNEST project. Indeed, one important goal of the EARNEST Early Nutrition Programming Project has been to translate solid research findings into practice. For example, the project partners have collaborated in developing evidence-based recommendations for dietary fat intake in pregnancy, during breastfeeding, and in infancy.

Another part of this European research collaboration has explored what drives parental decisions on nutrition and lifestyle, and which messages are provided to them in information materials issued for example by governmental offices, scientific bodies and non-governmental organisations. Exciting new discoveries in this field await however, which is why Prof. Koletzko feels 'like a mountaineer, who has reached one summit, only for another to appear behind it. More research is required to fully understand how environmental factors adversely affect long-term outcomes and the extent to which the mother is able to protect her child against them.'

More information: EARNEST www.metabolic-programming.org

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