

Press release

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Perinatal programming

Fish oil during pregnancy does not protect against excessive adipose tissue development

Is obesity in infants “programmed” in the womb? Previously, researchers assumed that consumption of “bad” fats during pregnancy contribute to excessive infant adipose tissue growth and that “good” Omega 3 fatty acids prevent expansive adipose tissue development. An intervention study run by the Technische Universität München (TUM) showed no evidence to support this “perinatal programming” theory. Expectant mothers increased their intake of Omega 3 fatty acids with fish oil capsules and fish-based meals during pregnancy and breastfeeding. This intervention diet did not have any discernable effect on the fat mass of the offspring. At 12 months, the babies were as rotund or slim as the children in the control group.

Obesity has become a global epidemic with more and more younger children affected by the overweight trend. According to the Robert Koch Institute, 15 percent of children aged between 3 and 17 are overweight. With serious consequences – childhood obesity is a risk factor for type 2 diabetes and also increases the chances of developing coronary heart disease or cancer in adult life. Nutritional experts are therefore keen to find effective prevention methods. “Efforts to control weight gain and obesity should target the earliest possible stages of development,” says Professor Hauner, Head of the Else Kröner-Fresenius Centre for Nutritional Medicine at TUM.

To achieve that, Prof. Hauner decided to research early adipose tissue growth. In their INFAT study, Hauner and his colleagues, explored how the composition of fatty acids in the mother’s diet during pregnancy and lactation affected the offspring. The research focused in particular on the ratio between Omega 6 fatty acids – present in meats, cold cuts and sausages – and Omega 3 fatty acids – concentrated in oily saltwater fish in particular. The team hypothesized that decreasing this ratio in the mother’s diet was a promising way of preventing infant obesity. Cell culture and mouse studies had shown that arachidonic acid – an Omega 6 fatty acid – resulted in increased adipogenesis and growth of fat mass in offspring. Experiments with Omega 3 fatty acids, however, revealed a curbing effect on adipose tissue growth among mice offspring.

The results of the INFAT study challenge the validity of this “lean” perinatal programming theory. Hauner and his researchers closely observed and monitored 208 expectant mothers from the start of their pregnancies. One group increased its intake of Omega 3 fatty acids by taking fish oil capsules and reducing meat-based meals during pregnancy and breastfeeding.

Technische Universität München Corporate Communications Center 80290 München www.tum.de

Dr. Ulrich Marsch
Dipl.-Soz.wiss. Undine Ziller

Sprecher des Präsidenten
PR-Referentin

+49.89.289.22778 marsch@zv.tum.de
+49.8161.71.5403 ziller@zv.tum.de

The control group maintained its usual diet and refrained from taking fish oil capsules. In both groups, skinfold thickness (SFT) measurements were used to estimate infant adipose tissue growth at regular intervals up until the age of 12 months. For the first time in infants of this age, ultrasound was also used to measure the fat layer at defined sites over the abdomen. The results show no difference in infant adipose tissue growth between the two groups. This study thus refutes the perinatal programming theory. The INFAT study thus revealed no evidence to support the effectiveness of fish oil capsules during pregnancy as a way to control excessive weight gain in infants.

So how seriously can we take claims that food supplements increase intelligence, protect against allergies and help avoid obesity? “Many of the claims associated with food supplements should be treated with caution,” continues Hauner. “Prenatal development is a complex process that cannot be reduced to a simple correlation between nutrient intake and fat mass growth. There are a number of additional, environmental factors and mechanisms that influence body weight – for instance in daycare or at school.” Hence the INFAT study will continue to monitor the children at regular intervals until they reach the age of five. The team now plans to explore other assumptions surrounding the beneficial properties of Omega 3 fatty acids – in relation, for example, to protection against asthma or neurodermatitis. INFAT is the first prospective, dietary intervention study to provide a rich data set to explore these assumptions.

The INFAT study (The impact of nutritional fatty acids during pregnancy and lactation on early human adipose tissue development) is sponsored by the German Ministry of Education and Research (through the competence network on obesity), the European Union (EARNEST consortium), the Danone Research Center, the Else Kröner-Fresenius Trust and the Unilever Foundation.

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+49.8161.71.5403

marsch@zv.tum.de
ziller@zv.tum.de

The Entrepreneurial University.



Technische Universität München

Contact:

Technische Universität München
Lehrstuhl für Ernährungsmedizin
Klinikum rechts der Isar
Prof. Hans Hauner
Tel.: +49 (0)89-289 249 11
E-mail: hauner@tum.de

Technische Universität München (TUM) is one of Europe's leading technical universities. It has roughly 460 professors, 9,000 academic and non-academic staff, and 31,000 students. It focuses on the engineering sciences, natural sciences, life sciences, medicine, and economic sciences. After winning numerous awards, it was selected as an "Elite University" in 2006 by the Science Council (Wissenschaftsrat) and the German Research Foundation (DFG). The university's global network includes an outpost with a research campus in Singapore. TUM is dedicated to the ideal of a top-level research based entrepreneurial university. <http://www.tum.de>

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Dr. Ulrich Marsch	Sprecher des Präsidenten	+49.89.289.22778	marsch@zv.tum.de
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