

What new fats in processed food might do to your brain?

Modern life and the increase in the work load led us, over the years, to a great consumption of processed food with high energy density and fats. Therefore, the industry has been using lipid sources that could maintain their texture and increase shelf life. For a long time, these products were primarily made up of partially hydrogenated fat rich in trans fatty acids, in foods such as margarines, several cookies and ice creams. However, intense research in nutritional biochemistry area have demonstrated that the use of these fats in certain periods of life can trigger alterations in people's health, such as obesity, cardiovascular diseases and other factors related to metabolic syndrome. This fact resulted in the regulation of a number of laws in several countries, including Brazil, restricting or even prohibiting the use of trans fat in formulation of foodstuff. Since then, the industry has been using other lipid sources for replacement of trans fat in foods.

Nowadays, the most used fat source is palm oil, with high amounts of saturated fat, and interesterified fat, a mixture of saturated fats with unsaturated vegetable oils. These fats are already being used by food industry, even though little is known about health risks related to them. Our research group aims to assess the possible risks that the dietary intake of these fats commonly used by the food industry, in early stages of development, using for that a metabolic programming protocol in mice. In the work recently published entitled "Interesterified fat or palm oil the substitutes for partially hydrogenated fat during the perinatal period produces changes in the brain fatty acids profile and leukocyte-endothelial increases interactions in the microcirculation brain from the male offspring in adult life", we elaborated and offered diets to female mice with lipid content according to the nutritional recommendations, differentiated only on the type of lipid in each diet. The diets were prepared with trans fat, palm oil or interesterified fat, and were offered to mice only during pregnancy and lactation. After weaning, the pups were fed with regular commercial diet, within nutritional recommendations until adulthood when we evaluated the effects of each fat in the offspring brain's health. Results indicated that dietary consumption of trans fat or its main substitutes in foodstuff modified the composition of lipids in the brain of the offspring in adult life, reducing the levels of eicosapentaenoic acid (EPA), one of the fatty acids from omega-3 family.

In addition, we observed that these fats trigger inflammatory processes in the brain. Through the technique of intravital microscopy, we found that dietary intake of trans fat, palm oil or interesterified fat increased leukocytes number in the brain microcirculation veins. Also, the consumption of these fats caused a slightly increase in inflammation-related proteins, such as the TLR4 protein, classically described as responsible for activating the innate immune system. These data suggest that the industry has been replacing trans fat with other lipid sources in order to maintain the same characteristics and shelf life of the products. However, our results shows that consumption of regular amounts of trans fat, as well as palm oil or interesterified fat, only during pregnancy and lactation, were able to promote deleterious effects on health and proper function of mice offspring's brains in adult life. Further studies must be done in order to really understand the effects of the use of trans fat substitutes in health. Our goal is to evaluate the effects of their consumption, contributing to novel information to warn the food industry and alert the population

about the use of processed foods in critical stages of life.

Patricia Coelho de Velasco and Maria das Graças Tavares-do-Carmo
Universidade Federal do Rio de Janeiro (UFRJ), Brazil

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[Interesterified fat or palm oil as substitutes for partially hydrogenated fat during the perinatal period produces changes in the brain fatty acids profile and increases leukocyte–endothelial interactions in the cerebral microcirculation from the male offspring in adult life.](#)

Misan V, Estato V, de Velasco PC, Spreafico FB, Magri T, Dos Santos RM, Fragoso T, Souza AS, Boldarine VT, Bonomo IT, Sardinha FL, Oyama LM, Tibiriçá E, Tavares do Carmo Md.

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