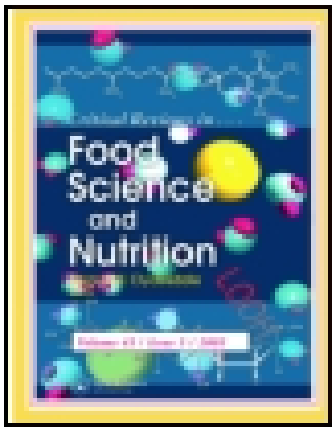

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Palmitic Acid and Health: Introduction

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Palmitic acid and health: Introduction

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Abstract

Interest in the dietary role and metabolic effect of saturated fatty acids has been recently renewed on the basis of epidemiologic observations and economical approach to health and well being. Saturated fats may favorably increase blood HDL-Cholesterol levels without significant changes of the total cholesterol/HDL-Cholesterol ratio . Also, the negative effect of saturated fat on cardiovascular diseases risk has recently been challenged. Palmitic acid, among all, may have special structural and functional roles in utero and in infancy, and indeed is it is being delivered in a unique form in human milk. Future research should include objective cost-benefit analyses when disentangling the role of saturated fats in dietary recommendations.

Keywords: palmitic acid, blood cholesterol, infancy, cost-benefit analyses

This collation of papers on dietary saturated fats provides a spectrum of old and emerging evidence on the impact of these ubiquitous fats in preserving health and well-being.

In adults, worldwide, the leading cause of death is coronary heart disease. Current guidelines generally recommend reduced consumption of saturated fat to lower the risk of cardiovascular diseases. However, some evidence suggests that consumption of saturated fat does not increase that risk. Recently, to address the saturated fat controversy, i.e., whether or not saturated fat is a risk factor for cardiovascular diseases, a number of systematic reviews and meta-analyses were performed and failed to reach a consensus with some showing an advantage of replacing saturated fats with long chain polyunsaturated fat and some showing no effect at all. Current assessments of risks due to dietary fat consumption emphasize the confounding nature of the dietary macronutrients substituted for dietary saturated fats giving broader recognition to dietary patterns as a whole as the most productive approach to an overall healthy diet. Accordingly, continuous updating of existing reviews, as well as the development of new systematic reviews, is needed. For instance, all fats increase HDL-Cholesterol (HDL-C) when replacing dietary carbohydrates and, although the differences are not great, saturated fats increase HDL-C more than mono-and poly-unsaturated fats, with no significant effects on the TC/HDL-C ratio (Micha and Mozaffarian, 2010).

Palmitic acid (16:0) is a saturated fatty acid present in the diet and synthesized endogenously. Although often considered to have adverse effects on chronic diseases in adults, palmitic acid is an essential component of cell membranes, secretory and transport lipids, with crucial roles in protein palmitoylation and palmitoylated signal molecules (German. 2011). In addition to the placental transfer of dietary fat, at birth, the term infant contains 13-15% body fat, with 45-50%

being 16:0, much of which is derived from endogenous synthesis in the fetus. After birth, the infant accumulates adipose tissue at high rates, reaching 25% body fat by 4-5 months. Over this time, human milk provides 10% dietary energy as palmitic acid , but in unusual structure where this fatty acid is placed on the center of the glycerol center carbon (SN-2 position). Since the infant is endowed with large amounts of fat and specifically with palmitic acid, the deviations in absorption and transport of palmitic acid when present not at the center of the glycerol backbone (in infants fed vegetable oil formulas) may have health consequences. Indeed, assuming fetal fatty acid synthesis, the constant concentration and unusual delivery of 16:0 in human milk evolved to afford survival advantage to the neonate. It is timely to question whether 16:0 might even be considered an essential component of tissue lipids, whereby both deficiency and excess are detrimental.

Finally, an economic analysis should also be considered for any type of nutritional interventions and possible consequences. For social interventions aimed at improving nutrition behavior, evidence from randomized trials cannot represent the only approach of research activities. Interventions on dietary habits require considerations of food security, economic and environmental sustainability, and a broad meaning of well-being which includes, but also goes beyond, direct effects on health (Ioannidis , 2013). The model of research in nutrition requires a new consideration of observational studies, mainly through different analytical models that exploit the availability of natural experiments and promote the design of pilot studies when interventions are implemented. Nutrition and food studies need research programs where medical (nutrition and health), psychology (how we behave), economics (how resources are used and their impact on wellbeing) and sociology (how social determinants shape behavior) collaborate.

According with these new perspectives, Dennis Bier reviewed the scientific evidence underlying dietary recommendations to limit the consumption of all SFA and the reasons why these have been sharply criticized (Bier , 2014). Then two more papers, by Szajewska and Szajewski and Sheila Innis, deserve special commendation both on a methodological and biological perspective, respectively. Recognizing the limits and weaknesses of meta-analyses (Szajewska and Szajewski, 2014) and the peculiarities of infant developmental demands regarding 16:0 (Innis , 2014), maybe in sharp contrast with adult dietary balances, make these contributions especially valuable. Accordingly, future goals of research in lipid nutrition should consider all these aspects , whichever the type of fat involved, to give scientists and consumers a true realistic picture.

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