



Saturated Fatty Acids and Cardiovascular Disease

IDF Factsheet – April 2016

*Cardiovascular disease (CVD) remains a leading cause of death in Western countries, and saturated fatty acids (SFAs) have played a key role in hypotheses relating diet to the risk of coronary heart disease (CHD). Early evidence based on animal studies as well as controlled feeding clinical trials with total and LDL cholesterol as the endpoint biomarkers support an adverse effect. However, science is evolving and important information has emerged about the role of SFAs and the applicability of intermediate biomarkers such as total and LDL cholesterol. At present there is **no clear relationship** between SFA intake and CVD incidence. Recent research highlights the importance of food sources of SFAs, the type of SFAs, and their matrix effects.*

- Saturated fatty acids (SFA) are provided by a variety of foods (e.g. full fat dairy products, fatty meat and certain vegetable oils) and can be synthesized by the body (from carbohydrates amongst others). SFA chain lengths range from 2 to 24 carbons.
- Ruminant fat is the most complex fat in the human diet, consisting of more than 400 distinct fatty acids. SFAs represent 65-70% of total fatty acids in dairy fat. The major SFAs in dairy fat are myristic acid (10-12%), palmitic acid (25-30%) and stearic acid (10%). Short and medium chain SFAs (C4:0- C12:0) represent 10-12% of total dairy fatty acids. A wide range of dairy products is available with very different fat and SFA content.
- SFAs cannot be regarded as a unit because they differ in their structure, their metabolism and their cell functions.
- For the last 30 years, a focus of dietary recommendations for cardiovascular disease prevention and treatment has been a reduction in saturated fat intake, due to their LDL cholesterol raising effects. However, dietary SFAs mainly raise the large, less dense LDL particles (particles not strongly associated with CVD risk), and not the small dense LDL particles that are most associated with detrimental CVD riskⁱ.
- Most prospective studies have not supported the hypothesis that in typical diets there is a link between total SFA intake and CVD risk. Recent reviews and meta-analyses found no correlation between dietary intakes of saturated fats and CVD risk^{ii,iii}.
- The FAO/WHO expert panel reported no convincing effects of SFAs on risk of CVD (other than on LDL cholesterol levels)^{iv,v}.
 - o Regarding the latter an IOM expert panel reported that LDL cholesterol is not a good surrogate endpoint for cardiovascular outcomes with food interventions (i.e. an effect on this marker via a food intervention does not predict a specific cardiovascular outcome)^{vi}.
- The role of saturated fat in health is dependent on the source and type of saturated fat consumed rather than on the total amount. The food source of SFA matters when determining the effect of SFA on cardiometabolic risk:
 - o SFAs from dairy products are associated with lower CVD risk while SFA from some other food groups are associated with higher risk^{vii}.
 - o High versus low intakes of full-fat dairy products (such as milk, cheese, yogurt, and even butter) are not associated with an increased risk of mortality (all-cause, cardiovascular or from cancer) while high versus low intakes of some other SFA-rich food groups did increase mortality risk^{viii}.
 - o There is a growing body of evidence that dairy products (including full fat) are associated with reduced risk for type 2 diabetes.^{ix}

- ⁱ Bier DM. Saturated fats and cardiovascular disease: interpretations not as simple as they once were. *Crit Rev Food Sci Nutr* 2015 Mar DOI: 10.1080/10408398.2014.998332
- ⁱⁱ Siri-Tarino PW, Sun Q, Hu FB, Krauss RM. Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease. *Am J Clin Nutr*. 2010 Mar; 91(3):535-46
- ⁱⁱⁱ Chowdhury R, Warnakula S, Kunutsor S, et al. Association of dietary, circulating, and supplement fatty acids with coronary risk: a systematic review and meta-analysis. *Ann Intern Med*. 2014 Mar 18; 160(6):398-406
- ^{iv} Fats and fatty acids in human nutrition. Proceedings of the Joint FAO/WHO Expert Consultation. November 10-14, 2008. Geneva, Switzerland. (2009). *Ann Nutr Metab.*, 55(1-3):5-300
- ^v de Souza RJ, Mente A, Maroleanu A. Intake of saturated and trans unsaturated fatty acids and risk of all cause mortality, cardiovascular disease, and type 2 diabetes: systematic review and meta-analysis of observational studies. *BMJ* August 2015; 351
- ^{vi} Institute of Medicine (2010). Evaluation of biomarkers and surrogate endpoints in chronic disease. Micheel CM and Ball JR, Editors. The National Academies Press, Washington DC.
- ^{vii} De Oliveira Otto MC, Mozaffarian D, Kromhout D, et al. Dietary intake of saturated fat by food source and incident cardiovascular disease: the Multi-Ethnic Study of Atherosclerosis. *Am J Clin Nutr*. 2012; 96(2):397---404
- ^{viii} O'Sullivan TA, Hafekost K, Mitrou F, Lawrence D. Food sources of saturated fat and the association with mortality: a meta-analysis. *Am J Public Health*. 2013 Sep; 103(9):e31-42
- ^{ix} Ericson, U., S. Hellstrand, et al. Food sources of fat may clarify the inconsistent role of dietary fat intake for incidence of type 2 diabetes." *Am J Clin Nutr*. 2015

