

Letter to the Editor

No scientific support for linking dietary saturated fat to CHD

(First published online 14 December 2011)

Pedersen *et al.*⁽¹⁾ express concern that recently published research had downplayed the importance of SFA consumption as a risk factor for CHD⁽²⁾. Their main argument is that prospective cohort studies are unreliable. There are of course uncertainties in such studies, but it is difficult to ignore that more than thirty cohort studies have shown that patients with CVD did not eat more SFA than had heart-healthy people; in six of them^(3–8), stroke patients had actually eaten less.

To make their case, Pedersen *et al.* presented a small and biased subset of ecological studies apparently linking reduced consumption of SFA to a low incidence of CHD. However, they neglected to mention the many ecological studies that have documented findings from groups with a high consumption of SFA, but with low rates of CHD, including Masai people⁽⁹⁾, French⁽¹⁰⁾, Italian-Americans⁽¹¹⁾ and Polynesians⁽¹²⁾. They also claim that the association between the decline of CHD mortality in Finland and the lowered intake of SFA was causal. However, the decline began in North Karelia 3 years before the start of the cholesterol campaign, and it occurred also in the districts where no advice was given⁽¹³⁾.

Pedersen *et al.* asserted that SFA with twelve to sixteen carbon atoms are the most potent LDL- and total cholesterol-raising fatty acids. However, other researchers reported that the serum content of these fatty acids is inversely associated with serum cholesterol⁽¹⁴⁾, and in seven studies, the content of twelve to sixteen carbon fatty acids in the blood or the fat cells was similar or lower in patients with acute CHD than in healthy people^(15–21). The content of certain SFA in the serum reflects the intake of dairy fat^(22,23), and such intake is inversely associated with BMI, waist circumference, ratio of LDL:HDL and fasting glucose concentration, and positively associated with HDL and apoA-I^(22–25). In accordance, a meta-analysis of twenty-five cohort studies showed that the lowest total mortality, cardiovascular incidence and mortality, and incidence of diabetes were seen among those with the highest intake of dairy fat⁽²⁶⁾.

Pedersen *et al.* endorse the many reports emphasising the importance of increasing the intake of PUFA. This advice is not based on randomised, controlled dietary trials, because no such trial has ever succeeded in lowering cardiovascular or total mortality by exchanging SFA with PUFA⁽²⁷⁾. Rather, the advice is based on statistical calculations using data from unreliable cohort studies. Pedersen *et al.* refer to a meta-analysis of such trials, the authors of which claimed benefit, but they had excluded two trials, where CHD

mortality had increased in the treatment groups^(28,29), and included a trial where a decreased risk was seen only in the participants who increased their intake of fish⁽³⁰⁾, and also the Finnish Mental Hospital Study⁽³¹⁾, a trial which does not satisfy the quality criteria for a correctly performed randomised controlled trial. A reduction of SFA was part of the intervention in three multifactorial trials, but these trials were unsuccessful as well^(32–34); in one of these, total mortality was twice as high in the treatment group⁽³³⁾.

Numerous studies on laboratory animals and human subjects have also shown that an increased intake of PUFA, in particular of the *n*-6 type, is associated with many adverse health effects such as allergy, asthma, immunosuppression, decreased fertility, pre-eclampsia, encephalopathy and cancer^(35–41). In accordance with this, Israeli Jews have a high intake of the 'recommended' *n*-6 type of PUFA (from grains and soyabean oil), and they exhibit a high incidence of cancer and CHD mortality compared with other Western countries⁽⁴²⁾.

In conclusion, Pedersen *et al.* do not provide sufficient evidence to implicate SFA in CHD risk. There is increasingly strong evidence that SFA are not involved^(2,28,43–47).

Uffe Ravnskov
Magle Stora Kyrkogata 9
22350 Lund
Sweden
email ravnskov@tele2.se

David Diamond
Departments of Psychology
Molecular Pharmacology and Physiology
Center for Preclinical and Clinical Research on PTSD
J.A. Haley Veterans Hospital
University of South Florida
Tampa
FL 33612
USA

M. Canan Efendigil Karatay
Medical Faculty
Istanbul Science University
Moda Cad 120
Kadikoy
Istanbul 34710
Turkey

Donald W. Miller
 Division of Cardiothoracic Surgery
 University of Washington School of Medicine
 Seattle
 WA
 USA

Harumi Okuyama
 Open Research Center for Lipid Nutrition
 Kinjo Gakuin University
 Nagoya
 Japan

doi:10.1017/S000711451100660X

References

- Pedersen JI, James PT, Brouwer IA, *et al.* (2011) The importance of reducing SFA to limit CHD. *Br J Nutr* **106**, 961–963.
- Siri-Tarino PW, Sun Q, Hu FB, *et al.* (2010) Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease. *Am J Clin Nutr* **91**, 535–546.
- Takeya Y, Popper JS, Shimizu Y, *et al.* (1984) Epidemiologic studies of coronary heart disease and stroke in Japanese men living in Japan, Hawaii and California: incidence of stroke in Japan and Hawaii. *Stroke* **15**, 15–23.
- McGee D, Reed D, Stemmerman G, *et al.* (1985) The relationship of dietary fat and cholesterol to mortality in 10 years: the Honolulu Heart Program. *Int J Epidemiol* **14**, 97–105.
- Gillman MW, Cupples LA, Millen BE, *et al.* (1997) Inverse association of dietary fat with development of ischemic stroke in men. *JAMA* **278**, 2145–2150.
- Seino F, Date C, Nakayama T, *et al.* (1997) Dietary lipids and incidence of cerebral infarction in a Japanese rural community. *J Nutr Sci Vitaminol* **43**, 83–99.
- Iso H, Stampfer MJ, Manson JE, *et al.* (2001) Prospective study of fat and protein intake and risk of intraparenchymal hemorrhage in women. *Circulation* **103**, 856–863.
- Iso H, Sato S, Kitamura A, *et al.* (2003) Fat and protein intakes and risk of intraparenchymal hemorrhage among middle-aged Japanese. *Am J Epidemiol* **157**, 32–39.
- Mann GV, Spoerry A, Gary M, *et al.* (1972) Atherosclerosis in the Masai. *Am J Epidemiol* **95**, 26–37.
- Renaud S & de Lorgeril M (1992) Wine, alcohol, platelets, and the French paradox for coronary heart disease. *Lancet* **339**, 1523–1526.
- Stout C, Marrow J, Brandt EN Jr, *et al.* (1964) Unusually low incidence of death from myocardial infarction. Study of an Italian American Community in Pennsylvania. *JAMA* **188**, 845–849.
- Prior IA, Davidson F, Salmond CE, *et al.* (1981) Cholesterol, coconuts, and diet on Polynesian atolls: a natural experiment: the Pukapuka and Tokelau island studies. *Am J Clin Nutr* **34**, 1552–1561.
- Salonen JT, Puska P & Mustaniemi H (1979) Changes in morbidity and mortality during comprehensive community programme to control cardiovascular diseases during 1972–7 in North Karelia. *BMJ* **2**, 1178–1183.
- Samuelson G, Bratteby LE, Mohsen R, *et al.* (2001) Dietary fat intake in healthy adolescents: inverse relationships between the estimated intake of saturated fatty acids and serum cholesterol. *Br J Nutr* **85**, 333–341.
- Kark JD, Kaufmann NA, Binka F, *et al.* (2003) Adipose tissue *n-6* fatty acids and acute myocardial infarction in a population consuming a diet high in polyunsaturated fatty acids. *Am J Clin Nutr* **77**, 796–802.
- Scott RF, Daoud AS, Gittelsohn A, *et al.* (1962) Lack of correlation between fatty acid patterns in adipose tissue and amount of coronary arteriosclerosis. *Am J Clin Nutr* **10**, 250–256.
- Lang PD, Degott M, Heuck CC, *et al.* (1982) Fatty acid composition of adipose tissue, blood, lipids, and glucose tolerance in patients with different degrees of angiographically documented coronary arteriosclerosis. *Res Exp Med* **180**, 161–168.
- Wood DA, Butler S, Riemersma RA, *et al.* (1984) Adipose tissue and platelet fatty acids and coronary heart disease in Scottish men. *Lancet* **ii**, 117–121.
- Pedersen JI, Ringstad J, Almendingen K, *et al.* (2000) Adipose tissue fatty acids and risk of myocardial infarction – a case–control study. *Eur J Clin Nutr* **54**, 618–625.
- Yli-Jama P, Meyer HE, Ringstad J, *et al.* (2002) Serum free fatty acid pattern and risk of myocardial infarction: a case–control study. *J Intern Med* **251**, 19–28.
- Clifton PM, Keogh JB & Noakes M (2004) Trans fatty acids in adipose tissue and the food supply are associated with myocardial infarction. *J Nutr* **134**, 874–879.
- Smedman AE, Gustafsson IB, Berglund LG, *et al.* (1999) Pentadecanoic acid in serum as a marker for intake of milk fat: relations between intake of milk fat and metabolic risk factors. *Am J Clin Nutr* **69**, 22–29.
- Wolk A, Furuheim M & Vessby B (2001) Fatty acid composition of adipose tissue and serum lipids are valid biological markers of dairy fat intake in men. *J Nutr* **131**, 828–833.
- Rosell M, Johansson G, Berglund L, *et al.* (2004) Associations between the intake of dairy fat and calcium and abdominal obesity. *Int J Obes Relat Metab Disord* **28**, 1427–1434.
- Brevik A, Veierod MB, Drevon CA, *et al.* (2005) Evaluation of the odd fatty acids 15:0 and 17:0 in serum and adipose tissue as markers of intake of milk and dairy fat. *Eur J Clin Nutr* **59**, 1417–1422.
- Elwood PC, Pickering JE, Givens DI, *et al.* (2010) The consumption of milk and dairy foods and the incidence of vascular disease and diabetes: an overview of the evidence. *Lipids* **45**, 925–939.
- Ravnskov U (1998) The questionable role of saturated and polyunsaturated fatty acids in cardiovascular disease. *J Clin Epidemiol* **51**, 443–460.
- Rose GA, Thomson WB & Williams RT (1965) Corn oil in treatment of ischemic heart disease. *BMJ* **1**, 1531–1533.
- Woodhill JM, Palmer AJ, Leelarthae-pin B, *et al.* (1978) Low fat, low cholesterol diet in secondary prevention of coronary heart disease. *Adv Exp Med Biol* **109**, 317–330.
- Watts GF, Lewis B, Brunt JN, *et al.* (1992) Effects on coronary artery disease of lipid-lowering diet, or diet plus cholestyramine, in the St Thomas' Atherosclerosis Regression Study (STARS). *Lancet* **339**, 563–569.
- Turpeinen O, Karvonen MJ, Pekkarinen M, *et al.* (1979) Dietary prevention of coronary heart disease: the Finnish Mental Hospital Study. *Int J Epidemiol* **8**, 99–118.
- Multiple Risk Factor Intervention Trial Research Group (1982) Multiple risk factor intervention trial. Risk factor changes and mortality results. *JAMA* **248**, 1465–1477.
- Miettinen TA, Huttunen JK & Naukkarinen V (1985) Multifactorial primary prevention of cardiovascular diseases in

- middle-aged men. Risk factor changes, incidence, and mortality. *JAMA* **254**, 2097–2102.
34. World Health Organization European Collaborative Group (1986) European collaborative trial of multifactorial prevention of coronary heart disease: final report on the 6-year results. *Lancet* **1**, 869–872.
 35. Dam H & Søndergaard E (1962) The encephalomalacia producing effects of arachidonic and linoleic acids. *Z Ernährungswiss* **2**, 217–222.
 36. Pinckney ER (1973) The potential toxicity of excessive polyunsaturates. Do not let the patient harm himself. *Am Heart J* **85**, 723–726.
 37. West CE & Redgrave TG (1974) Reservations on the use of polyunsaturated fats in human nutrition. *Search* **5**, 90–95.
 38. McHugh MI, Wilkinson R, Elliott RW, *et al.* (1977) Immunosuppression with polyunsaturated fatty acids in renal transplantation. *Transplantation* **24**, 263–267.
 39. Simonsen N, van't Veer P, Strain JJ, *et al.* (1998) Adipose tissue omega-3 and omega-6 fatty acid content and breast cancer in the EURAMIC study. *Am J Epidemiol* **147**, 342–352.
 40. Clausen T, Slott M, Solvoll K, *et al.* (2001) High intake of energy, sucrose, and polyunsaturated fatty acids is associated with increased risk of preeclampsia. *Am J Obstet Gynecol* **185**, 451–458.
 41. Leitzmann MF, Stampfer MJ, Michaud DS, *et al.* (2004) Dietary intake of *n*-3 and *n*-6 fatty acids and the risk of prostate cancer. *Am J Clin Nutr* **80**, 204–216.
 42. Yam D, Eliraz A & Berry EM (1996) Diet and disease—the Israeli paradox: possible dangers of a high omega-6 polyunsaturated fatty acid diet. *Isr J Med Sci* **32**, 1134–1143.
 43. Oddy WH, de Klerk NH, Kendall GE, *et al.* (2004) Ratio of omega-6 to omega-3 fatty acids and childhood asthma. *J Asthma* **41**, 319–326.
 44. Weinberg SL (2004) The diet-heart hypothesis: a critique. *J Am Coll Cardiol* **43**, 731–733.
 45. German JB & Dillard CJ (2004) Saturated fats: what dietary intake? *Am J Clin Nutr* **80**, 550–559.
 46. Volek JS & Forsythe CE (2005) The case for not restricting saturated fat on a low carbohydrate diet. *Nutr Metab* **2**, 21.
 47. Kuipers RS, de Graaf DJ, Luxwolda MF, *et al.* (2011) Saturated fat, carbohydrates and cardiovascular disease. *Neth J Med* **69**, 372–378.