Wetenschappelijke publicaties Omega-3 en omega-6 vetzuren, jan–mei 2008

Omega-3 fatty acids and coronary heart disease risk: Clinical and mechanistic perspectives William S. Harris *et al.* Atherosclerosis 2008;197(3):12-24.

The most common omega-3 fatty acids contain 18–22 carbons and a signature double bond at the third position from the methyl (or *n*, or omega) end of the molecule. These fatty acids must be obtained in the diet as they cannot be synthesized by vertebrates. They include the plant-derived α-linolenic acid (ALA, 18:3*n*-3), and the fish-oil-derived eicosapentaenoic acid (EPA, 20:5*n*-3) and docosahexaenoic acid (DHA, 22:6*n*-3). Normally, very little ALA is converted to EPA, and even less to DHA, and therefore direct intake of the latter two is optimal. EPA and DHA and their metabolites have important biologic functions, including effects on membranes, eicosanoid metabolism, and gene transcription. Studies indicate that the use of fish oil is associated with coronary heart disease risk reduction. A number of mechanisms may be responsible for such effects. These include prevention of arrhythmias as well as lowering heart rate and blood pressure, decreasing platelet aggregation, and lowering triglyceride levels. The latter is accomplished by decreasing the production of hepatic triglycerides and increasing the clearance of plasma triglycerides. Our focus is to review the potential mechanisms by which these fatty acids reduce cardiovascular disease risk. **Keywords:** Omega-3 fatty acids; Coronary heart disease; Arrhythmia; Platelet aggregation; Triglyceride.

Maternal n–3, n–6, and trans fatty acid profile early in pregnancy and term birth weight: a prospective cohort study. Manon van Eijsden *et al.* Am J Clin Nutr 2008;87(4):887-895.

Background: Maternal n–3, n–6, and trans fatty acids are claimed to affect fetal growth, yet evidence is limited. **Objective:** We investigated the association between maternal n–3, n–6, and trans fatty acids measured early in pregnancy and fetal growth. **Design:** Amsterdam pregnant women (n = 12 373) were invited to complete a questionnaire (response 67%) and donate blood around the 12th pregnancy week for nutrient analysis. For 4336 women, fatty acid concentrations were measured in plasma phospholipids (gas-liquid chromatography). Associations of these concentrations with birth weight and small-for-gestational-age (SGA) risk were analyzed (liveborn singleton term deliveries, n = 3704). **Results:** Low concentrations of individual n–3 fatty acids and 20:3n–6, the precursor of arachidonic acid (20:4n–6), but high concentrations of the other n–6 fatty acids and the main dietary trans fatty acid (18:1n–9t) were associated with lower birth weight (estimated difference in univariate analysis –52 to –172 g for extreme quintile compared with middle quintile). In general, SGA risk increased accordingly. After adjustment for physiologic, lifestyle-related and sociodemographic factors, low concentrations of most n–3 fatty acids and 20:3n–6 and high concentrations of 20:4n–6 remained associated with lower birth weight (–52 to –57 g), higher SGA risk, or both (odds ratios: 1.38–1.50). Infants of the 7% of women with the most adverse fatty acid profile were on average 125 g lighter and twice as likely to be small for gestational age. **Conclusion:** An adverse maternal fatty acid profile early in pregnancy is associated with reduced fetal growth, which, if confirmed, gives perspective for the dietary prevention of lower birth weight.

A Macadamia Nut-Rich Diet Reduces Total and LDL-Cholesterol in Mildly Hypercholesterolemic Men and Women. Amy E. Griel *et al.* J Nutr 2008;138(4):761-767.

Epidemiologic studies and clinical trials have demonstrated that the unique fatty acid profile of nuts beneficially affects serum lipids/lipoproteins, reducing cardiovascular disease (CVD) risk. Nuts are low in SFA and high in PUFA and monounsaturated fatty acids (MUFA). Macadamia nuts are a rich source of MUFA. A randomized, crossover, controlled feeding study (5-wk diet periods) compared a Macadamia nut-rich diet [42.5g (1.5 ounces)/8.79 MJ (2100 kcal)] [MAC; 33% total fat (7% SFA, 18% MUFA, 5% PUFA)] vs. an [MAC; 33% total fat (7% SFA, 18% MUFA, 5% PUFA)] vs. an average American diet [AAD; 33% total fat (13% SFA, 11% MUFA, 5% PUFA)] on the lipid/lipoprotein profile of mildly hypercholesterolemic (n = 25; 15 female, 10 male) subjects. Serum concentrations of total cholesterol (TC) and LDL cholesterol (LDL-C) following the MAC (4.94 ± 0.17 mmol/L, 3.14 ± 0.14 mmol/L) were lower than the AAD (5.45 ± 0.17 mmol/L, 3.44 ± 0.14 mmol/L; $P < 0.05$). The serum non-HDL cholesterol (HDL-C) concentration and the ratios of TC:HDL-C and LDL-C:HDL-C were reduced following consumption of the MAC diet (3.83 ± 0.17, 4.60 ± 0.24, and 2.91 ± 0.17, respectively) compared with the AAD (4.26 ± 0.17, 4.89 ± 0.24, and 3.09 ± 0.18, respectively; $P < 0.05$). There was no change in serum triglyceride concentration. Thus, macadamia nuts can be included in a heart-healthy dietary pattern that reduces lipid/lipoprotein CVD risk factors. Nuts as an

isocaloric substitute for high SFA foods increase the proportion of unsaturated fatty acids and decrease SFA, thereby lowering CVD risk