Intakes and food sources of omega-6 and omega-3 PUFA

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There have been few human clinical end-point trials that have assessed dietary modification and exercise in directly comparing MUFA and PUFA enriched diets. The most successful diets are rich in MUFA (vehicle oil) and ω-3 PUFA (vehicle margarine enriched with AIA). This reduction was greater than that seen in recent trials with drugs and revascularisation (Colquhoun, D. 2000 Asia Pacific J Clin Nutr. 9:586–590). Supplementation with PUFA ω-3 marine in addition decreases mortality by 30% and sudden death by 45%.

In conclusion, MUFA and PUFA (ω-3) have similar beneficial effects on narrowing the risk factors of coronary disease (ω-3) is superior to lowering triglycerides and preventing sudden death. Food based studies suggest curcumin rich in MUFA are superior. The designer margarine (AIA) enriched calorie and DHA on ferrum vascularity in omega-3 marine is proven beyond reasonable doubt to decrease mortality and ought to be routine for secondary prevention of CHD.

Vascular effects of EPA versus DHA
Trevor Mori; University of Western Australia, Perth

Evidence from animal and human studies suggest that the two principal ω-3 fatty acids in fish and fish oils, EPA and DHA, have different effects on several cardiovascular risk factors, including blood pressure (BP), heart rate, serum lipids and glucose. In a double-blind, randomised, placebo-controlled parallel study, we showed that the ω-3 fatty acid of DHA is not EPA, significantly reduced 24-h ambulatory BP and HR after six weeks, overweight, mildly hyperlipidaemic men. We also determined whether there are specific differences if not more beneficial than nutritional roles, but their exploitation requires more rigorous, hence costly, substanisation. This may be justified in the case of ω-3 supplementation, especially if one considers the potential as an adjunct therapy.

Topic: Regulatory update

Proposed trial of omega-3 fatty acids in coronary heart disease prevention
Trevor Mori and Peter Howe

An international workshop entitled Omega-3 Fatty Acids and Primary Prevention of Ischaemic Heart Disease was held in Melbourne in May 2002 to consider evidence relating omega-3 fatty acids to cardiovascular disease. If, and the evidence indicated that they are effective in reducing the risk of a randomized primary prevention trial of omega-3 fatty acids in a high-risk population, with prevention of cardiovascular disease as an endpoint.

Several trials from secondary prevention trials that dietary omega-3 counterevals the American Heart Association recommends two fish meals per week to reduce the risk of coronary heart disease (CHD). However, no definitive guidelines have been established for the general population. In February 2001, the US Food and Drug Administration issued a Qualified Health Claim for omega-3 fatty acids and CHD: "...the scientific evidence appears to be sufficient to indicate omega-3 fatty acids may reduce the risk of CHD, but not conclusive... It is not known what effect omega-3 fatty acids may or may not have on the risk of CHD in the general population." The workshop's panel of twelve experts in omega-3 fatty acids and clinical trials concluded that in order to ascribe an effect to ω-3 fatty acids, a primary prevention trial was needed which would:

1. provide more data directly linking omega-3 fatty acids to CHD risk reduction;
2. be carried out in patients at high-risk of, but without, diagnosed, CHD;
3. include clinical endpoints and well-recongnised surrogates of CHD risk;
4. demonstrate efficacy of a dose of omega-3 fatty acids that is within reach of dietary recommendations.

If an international trial is initiated through an NIH grant, Australia would have an opportunity to participate.

Regulation of LCPUFA: sources and claims
Janine Lewis; Food Standards Australia New Zealand, Canberra

FSANZ recently approved specific specifications for food ingredients that contain high proportions of LCPUFA, including oils derived from sources such as fungal or marine, that otherwise would be novel. These ingredients are in the form of oils and gels.

Criteria for omega claims were introduced as Standard 1.2.8 of Volume 2 of the Food Standards Code in December 2000 to expand the range of permitted claims for polysaturated fats in response to the increased use of 'omega' in food labelling. Positive and negative criteria were set on the basis of amounts of particular fatty acids in foods, irrespective of official reference daily intakes were available.

For omega-3 claims, all foods, except fish with added saturated fat, must contain less than 28% total fatty acids in saturated and trans forms or no more than saturated and trans fatty acids/100g food. Also, for source claims, the food must contain at least: 200 mg ALA/serve, or 30 mg EPA + DHA/serve for 'good source' claims at least 60 mg EPA + DHA/serve.

For omega-6, -9 claims, all foods must contain no more than 25% of total fatty acids in saturated and trans forms and no more than 40% total fatty acid as the claimed fatty acid.

Fatty acid declarations in the nutrition information panel (NICP) are arranged in nested order according to specificity. For example, "omega-3 fatty acids would require the declaration of fat and types of fatty acids to four levels: fat, nonpolyunsaturated (as well as saturated, monounsaturated and associated with omega-3, and individual fatty acids, eg EPA and DHA.

In summary, the workshop concluded that a primary prevention trial is needed to evaluate the effects of omega-3 fatty acids on CHD risk, and if successful, should be extended to include other cardiovascular endpoints.

Health claims policy
Heather Yeatman; Graduate School of Public Health, University of Wollongong, Wollongong

The review of the regulation of health claims, and of nutrition claims, will be underway in Australia and New Zealand for several years. With the creation of the new food regulatory arrangements in Australia and New Zealand, the Ministerial Council requested the development of policy guidelines to inform the development of regulations in this area. The policy guidelines are currently being developed by the Food Regulation Working Group, a working group chaired by the Food Policy Unit of the Commonwealth Department of Health and Ageing. The Policy Guidelines will be considered by the Ministerial Council in November 2004. The Working Group will incorporate principles agreed in 2002 and a ‘watchdog’ to monitor the use of health and related claims.

Regulatory update – European position
Peter Weber; Roche Vitamins Ltd, Switzerland

In Europe, natural-grade fish oils as well as natural vegetable oils obtained by conventional oil processing are considered components of natural food and can be added to foodstuffs without any registration as long as the food standards for fats, oils and related products are met. Food supplements containing natural marine oils are separately regulated in the different member states of the European Community (EC). Products derived from microorganisms (eg algae) as well as concentrated oils are regarded as Novel Food within the EC. These were therefore harmonised EC Novel Food Regulation (ECN 258/97). Omega-3/6 oils for use in infant formula are regulated in separate Directives (ECN 91/52; EC 96/4). For products containing ethyl esters, different regulations apply in the individual member states of the EC. Regarding health claims related issues, the EC currently plans to harmonize the claims individually regulated by the different countries of the EC. However, the EC is intending to harmonise food law on health claims and a draft paper has been proposed.

In extracts of ω-6 and ω-3 PUFA intakes and food sources in the Australian diet were assessed using food records from 10,811 adults in the 1995 Australian National Nutrition Survey and the composition data on 1,690 foods taken from the Supplement to NUTTAB95 was used together with a new nutrient benefit calculator to estimate the fatty acid content and the food sources.

Average daily intake of linoleic, arachidonic, total ω-6 PUFA, ω-6 linoleic (LNA), EPA, DPA, DHA, very...
Omega-3 fatty acids: US Dietary Reference Intake (DRI) and Acceptable Macronutrient Distribution Range (AMDR)

Mary Van Elswyn; Martek Biosciences, Boulder, CO USA

The most recent DRI for energy, carbohydrates, fibre, fat, and protein were released on 5 September 2002. The DRI for fat were limited to adequate intakes (AI) for linoleic acid (17 g/day for men; 12 g/day for women), alpha-linolenic acid (1 g/day for men; 1.1 g/day for women), and linolenic acid (1 g/day for men; 1.2 g/day for women). EPA and DHA were not recognised among the DRI as the committee failed to find adequate data to support a recommended dietary intake for EPA or DHA deficiency symptoms were evident. All the n-3 fatty acids, however, were recognised in the newly established AMDR. An AMDR is an intake range, for a given nutrient above or below which the risk for chronic disease is believed increased. AMDR were established for all the fatty acids except for EPA and DHA. Other words, the committee recommended a range of 133-267 mg of EPA and/or DHA per day (based on 2000 calories) to help prevent the risk of chronic disease such as coronary heart disease.

Recommended Dietary Intakes – the process of assessment and adoption in Australia

Katherine Bagnar, CSIRO Health Sciences and Nutrition, Adelaide

The RDI for Australia and New Zealand will be reviewed by the NHMRC in the next two years. The review will be based on the United States/Canadian reference Nutrient Intakes (RNI). The RNI for each nutrient may include an Estimated Average Requirement (EAR), from which is derived a Recommended Dietary Intake (RDI). The EAR is calculated to meet the needs of 50% of the population. The RDI for women of all ages can range from 100 to 1500% of the EAR, depending on the nutrient.

Pulsed electric fields technology

Pulsed electric field (PEF) technology is used for the electric field treatment of foods. The PEF technology is based on the application of a high voltage power supply to the food, which results in a transient electric field that disrupts the cell membranes of microorganisms and heats the food. PEF technology is a non-thermal method of processing foods, meaning that it does not require the application of heat.

Update on nonthermal food processing technologies: Pulsed electric field, high hydrostatic pressure, irradiation and ultrasound

G. V. Barbosa-Cánovas and J. J. Rodriguez

Traditionally, foods have been preserved by using heat (commercial sterilisation, pasteurisation and blanching), preservatives (antimicrobials), or by changing conditions in the environment for microorganisms such as pH (fermentation), water availability (dehydration, concentration), or temperature (cooling and freezing). Heat is by far the most widely technology utilised to inactivate microbes in foods. Physical technologies (non-thermal methods) such as pulsed electric field, high pressure, irradiation (ultrasound), and electronic waves (microwave heat), explain their mechanisms of action on microbial inactivation, and illustrates their interaction with food systems.

Despite the effectiveness of traditional technologies from a microbial safety standpoint, they also cause nutritional and sensory deterioration in processed foods. Thus, there is a great demand for "fresh" or "more natural" foods that preserve the rich flavor, nutrient value and natural composition of foods. New technologies such as pulsed electric field have the potential to improve the quality of foods while reducing the risk of microbial contamination.

Four of these new technologies, their mechanisms of action and interaction with food systems are outlined below:

Pulsed electric fields technology

Pulsed electric field (PEF) technology is based on the application of a high voltage power supply to the food, which results in a transient electric field that disrupts the cell membranes of microorganisms and heats the food. PEF technology is a non-thermal method of processing foods, meaning that it does not require the application of heat.

Effects on microbial inactivation

PEF technology is used in the areas of genetic engineering and biotechnological production of microorganisms, as well as in the production of microorganisms for pharmaceutical and biotechnological processes. PEF technology can be used to inactivate microorganisms in food without affecting the nutritional value and sensory properties of the food.

References


Different arrangements of capacitors, inductors, and resistors produce different types of pulses. Pulse polarity can be constant or alternating, and pulse waveform can be square, triangular, or sinusoidal. The electrical field strength of these pulses is determined by the type of pulse and the device used to generate them. Pulsed electric field (PEF) technology is an emerging method of food processing that uses high voltage electrical fields to inactivate microorganisms and extend the shelf life of food products. PEF technology has the potential to improve food safety, extend shelf life, and reduce the need for traditional preservation methods.