Ulster University

DAIRY COUNCIL NORTHERN IRELAND

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# Omega-3 fatty acids: fact or fiction?

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Omega-3 fatty acids are defined by a particular structural characteristic that seems to confer beneficial biological properties. There are several members of the omega-3 fatty acid family, but none is as prevalent in the diet as saturated, monounsaturated or omega-6 polyunsaturated fatty acids. Some omega-3 fatty acids are made in terrestrial plants and consequently they are found in certain seeds, nuts and vegetable oils. Alpha-linolenic acid (ALA) is the main plant omega-3 fatty acid. It is an essential fatty acid and is the most common omega-3 fatty acid in the diet of most people, although its intake is relatively low (about 1 g/day in adults or roughly 1 to 2% of dietary fat or 0.35 to 0.7% of dietary energy). Some other members of the omega-3 family are made in algae and in animals. Of these, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are especially important to human function, health and wellbeing. EPA and DHA are found in seafood, especially fatty ("oily") fish, in fish oil supplements, and in algal oils used in infant formula. There is a metabolic pathway by which ALA can be converted to EPA and DHA in the human body. However that pathway seems to have low activity and conversion to the end product DHA is very low. For this reason, intake of preformed EPA and DHA is important. However, this intake is low in many people (< 0.2 g/day in most adults). This lecture will discuss nutritional aspects of omega-3 fatty acids, their handling in the human body, their roles in health, and how they act. Areas of current research activity and controversy will be highlighted.

It is well described that increased intakes of EPA and DHA from fish, other foods and from supplements result in higher concentrations of EPA and DHA in blood lipids, cells and tissues. This is considered to be very important in promoting the biological effects of these fatty acids that result in improved health and lower disease risk. DHA has vital roles in brain and eye development and function. EPA and DHA have a wide range of physiological roles which are linked to certain health or clinical benefits, particularly related to cardiovascular disease, cancer, inflammation, and neurocognitive function. The benefits of EPA and DHA are evident throughout the life course. Although we already know a lot about these fatty acids, many research gaps remain. Future research will include better identification of the determinants of variation of responses to increased intake of EPA and DHA; more in-depth dose response studies of the effects of EPA and DHA in humans; clearer identification of the specific roles of EPA, DHA and other omega-3 fatty acids; testing strategies to enhance delivery of omega-3 fatty acids to the bloodstream; and exploration of sustainable alternatives to fish-derived very long chain omega-3 fatty acids.