Oily fish and omega 3 fat supplements

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Health recommendations conflict with concerns about dwindling supply

Research p 752

Seventy five years ago, long chain omega 3 fatty acids were added to the list of essential nutrients. Later in the 20th century, the properties of marine polyunsaturated oils were linked with several health benefits, including protection from cardiovascular disease. However, a high quality systematic review published in this week's *BMJ* draws attention to uncertainties about some of the health benefits attributed to omega 3 fats.[1]

The review shows that the evidence for a reduction in cardiovascular events and mortality is less conclusive than we believed. A previous meta-analysis indicates that mortality is reduced owing to fewer fatal coronary events among people ingesting omega 3 fatty acids,[2] but the current review found no strong evidence of a reduction in combined cardiovascular events. The claim that omega 3 fats reduce the risk of cancer is not supported here or by another recent systematic review.[3] For each health outcome there are too few trials with adequate allocation concealment, and too few cohort studies in which the intake of omega 3 fat rather than total fish intake was measured.

Recent findings complicate our understanding of the cardioprotective effect of omega 3 fat. Until the publication of the DART-2 trial in 2003,[4] the evidence showed that omega 3 from oily fish or supplements reduced the risks of fatal myocardial infarction, sudden death, and overall mortality among people with existing disease.[2] DART-2 included 3114 men with stable angina and tested the hypothesis that the main benefit of omega 3 fat is derived from its anti-arrhythmic action in the presence of chronic disease.[5] Surprisingly, DART-2 did not confirm this, showing an excess of sudden and total cardiac deaths. The excess was clearest in participants taking fish oil capsules rather than eating oily fish.

DART-2 is not the only study to show that omega 3 fat supplements have pro-arrhythmic as well as anti-arrhythmic actions. A two year trial randomised 200 participants with an implantable cardioverter defibrillator and a recent episode of ventricular tachycardia or ventricular fibrillation to 1.3 g/day of omega 3 fats or placebo. The supplements did not prevent recurrent arrhythmia and seemed to be pro-arrhythmic in patients with ventricular tachycardia.[6] Despite the biological plausibility of a generally beneficial anti-arrhythmic effect of omega 3 fats, based on in vitro studies and animal models,[5] it may be wise to make a distinction between patients with chronic disease such as angina and those with acute myocardial infarction, since in the latter the evidence does support early protection against sudden death.

For the general public some omega 3 fat is good for health. Long chain omega 3 fatty acids are structural components of neuronal and other cell membranes, and they modulate the production of eicosanoids and inflammatory cytokines. Whether omega 3 fat prevents cognitive impairment and dementia is currently being tested in trials, with the first results expected in 2008.[7] Extreme nutritional deficiency of these fats results in a neuropathy that can be reversed with rapeseed oil or other vegetable oils containing α-linolenic acid (18:3 omega 3).[8] α-Linolenic acid is a precursor of long chain omega 3, but endogenous conversion to eicosapentaenoic acid (20:5 omega 3) and docosahexaenoic acid (22:6 omega 3) is limited and inefficient.

Adequate intake of omega 3 fats is particularly important for women of childbearing age. An estimated 25 g of maternal docosahexaenoic acid is required during pregnancy and lactation to support the development of the fetal and infant brain.[9] Higher maternal intake in pregnancy may also reduce the risk of allergic disease in the offspring, although a study of omega 6:omega 3 fatty acid ratios in umbilical cord blood showed only very weak direct associations with the onset of eczema and wheeze in infants.[10] Women of childbearing age are recommended to eat one or two portions of oily fish per week (about 0.4-0.8 g/day of omega 3 fats) but not more, given hypothetical concerns about toxic contaminants.[9] Dioxins and dioxin-like polychlorinated biphenyls, and methylmercury are linked respectively to cancer and neurological damage but the risk to the child is probably minimal unless there is prolonged high maternal intake. Women before and during pregnancy and children under 16 are accordingly advised by the UK government to avoid consumption of large predatory fish such as swordfish, which have accumulated a considerable concentration of mercury. For other adults, a maximum of four portions of oily fish per week is advised, including no more than one of swordfish, shark, and the like.

We are faced with a paradox. Health recommendations advise increased consumption of oily fish and fish oils, within limits,[9] on the grounds that intake is generally low. However, industrial fishing has depleted the world's fish stocks by some 90% since 1950,[11] and rising fish prices reduce affordability particularly for people with low incomes. Global production trends (figure) suggest that, although fish farming is expanding rapidly, we probably do not have a sustainable supply of long chain omega 3 fats.

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Increasing the number of medical students from under-represented minorities

Innovative method needs to be replicated elsewhere

Better health care and a reduction in health disparities occur when the physician workforce is diverse in background, ethnicity, culture, and race.[1 2] Unfortunately, there are not enough students from economically and educationally deprived backgrounds in the pipeline to achieve a sufficiently diverse physician workforce. A paper by Greenhalgh and colleagues in this issue describes an innovative and thoughtful approach of reaching and engaging these students.[3] The project steering group used "partnering" schools and teachers in inner London to identify students from deprived backgrounds who had motivation and ability in the sciences. Teachers reaffirmed the problems the students needed to overcome to be successful in gaining a medical education: lack of self determination, lack of confidence, and lack of information. The group used the summer school programme to target these deficiencies and ignite in the students a sense of purpose and confidence, which was the first step in engaging them in a career in medicine. Interacting with medical students of similar ages and experience increased self confidence and the perception that a career in medicine is possible. Focusing on the deficiencies of the environment rather than on those of the student was also key to providing the students with information about careers in medicine. Collaboration of pupils, teachers, and parents makes all of them stakeholders with a vested interest in the outcome. The action research approach, which uses cycles of observation, data gathering, and reflection, is ideal for this type of project.

In the United States attaining a diverse medical workforce raises similar issues. Additionally, men from ethnic minorities are the least represented in medical education. The educational attitudes of many students from under-represented groups have evolved to a point where education has no value at all. Despite this, some programmes have been effective in recruiting and retaining students from ethnic minorities in medical school. The Early Medical School Selection Program (EMSSP) at Boston University School of Medicine has a successful track record of 25 years of recruiting second year college students from 11 institutions with predominately black and Mexican-American students as part of a consortium. During the summers after their second and third years in college the students attend Boston University Summer School and take undergraduate courses for credit towards their bachelor's degrees. They then take their senior undergraduate year at Boston University, taking courses from the medical school curriculum. If they pass these courses they are promoted to the medical school. Ninety per cent of the students get through to the third year of medical school without academic difficulty, and 85% pass step 1 of the United States Medical Licensing Examination on the first try.[4] This is remarkable because many of these students had not previously performed well on standardised tests. The success of this programme relies on the academic and personal support the students receive during their premedical and medical education. Despite the obstacles the students face they are able to do the work and achieve careers in medicine.

Research p 762

The challenges of lack of confidence, lack of information and lack of self determination that students encounter in Greenhalgh et al's experience and ours are are important. However, if we are going to successfully address health disparities, programmes like these need to be replicated and applied elsewhere. Also, the authors' plan to follow up this cohort will be essential to assess the long term impact of this programme. Our societies are becoming more multicultural and diverse. Many of the students in this study were either first generation immigrants or the children of immigrants from 19 countries in Africa, the Caribbean, Asia, and Europe. Understanding the culture, religion, and customs of others is imperative if we are going to live together and reduce health disparities.

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