

## Editorials

## Oily fish and omega 3 fat supplements

*Health recommendations conflict with concerns about dwindling supply*

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 draws attention to uncertainties about some of the health benefits attributed to omega 3 fats.<sup>1</sup>

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,<sup>2</sup> 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.<sup>3</sup> 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 cardio-protective effect of omega 3 fat. Until the publication of the DART-2 trial in 2003,<sup>4</sup> 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.<sup>2</sup> 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.<sup>5</sup> 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.<sup>6</sup> Despite the biological plausibility of a generally beneficial anti-arrhythmic effect of omega 3 fats, based on in vitro studies and animal models,<sup>5</sup> 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.

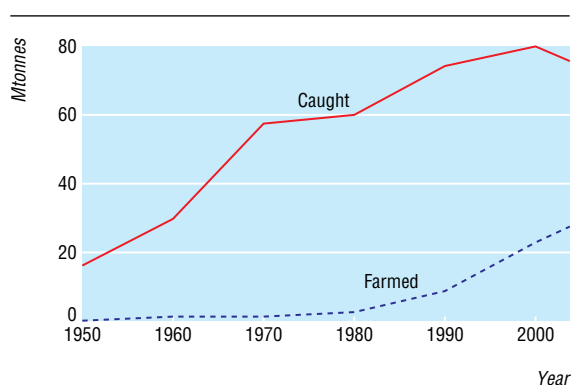
For the general public some omega 3 fat is good for health. Long chain omega 3 fatty acids are structural components of neuronal and other cell membranes, and they modulate the production of eicosanoids and inflammatory cytokines. Whether omega 3 fat prevents cognitive impairment and dementia is currently being tested in trials, with the first results expected in 2008.<sup>7</sup> Extreme nutritional deficiency of these fats results in a neuropathy that can be reversed with rapeseed oil or other vegetable oils containing  $\alpha$ -linolenic acid (18:3 omega 3).<sup>8</sup>  $\alpha$ -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.<sup>9</sup> 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.<sup>10</sup> 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.<sup>9</sup> 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,<sup>9</sup> on the grounds that intake is generally low. However, industrial fishing has depleted the world's fish stocks by some 90% since 1950,<sup>11</sup> 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.

Competing interests: None declared.

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Global fish catch and aquaculture, 1950-2003. Worldwide about 50% of fish stocks are fully exploited, 28% are overfished or depleted, and 25% have some capacity to produce more than at present. Source: Food and Agriculture Organisation

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UCL Department of Epidemiology and Public Health, Royal Free and University College London Medical School, London WC1E 6BT (e.brunner@ucl.ac.uk)  
Eric Brunner reader in epidemiology and public health