lence of a genotype associated with increased susceptibility to rheumatoid arthritis.[2]

The association of decreased emergence of rheumatoid arthritis with increased fish intake is supported by results of a case–control study of women with the disease. Results indicated that fish consumption was higher in healthy controls than in the women with rheumatoid arthritis. Dietary estimations indicated that being in the top 10% of omega-3 fat intake (> 1.6 g daily) was associated with an approximate 70% decreased probability of having (seropositive) rheumatoid arthritis.[3]

Ecological and case–control studies provide evidence of associations between dietary fish intake and decreased disease occurrence. Only dietary intervention studies can provide direct evidence of a protective or therapeutic effect of omega-3 fatty acids. Therefore, it is significant that 13 double-blind, placebo-controlled studies with rheumatoid arthritis patients have found benefits from ingestion of fish oil. Not all outcome measures improved in all studies. Tender joint count was the measure which improved in most studies (9 of 11 studies), but other measures to improve were the duration of morning stiffness, grip strength, and time to fatigue.[4] Also, there was an indication of an anti-inflammatory drug-sparing effect. It was apparent that 12 weeks was the minimum time at which effects were seen. The finding of a beneficial effect on tender joint count is supported by a meta-analysis.[4]

An assessment of the value of these results can be made from several viewpoints. When one considers that the median intake of the omega-3 fatty acids (eicosapentaenoic acid [EPA] and docosahexaenoic acid [DHA]) in these studies was 3.3 g daily, the therapeutic effect may seem modest. On the other hand, the subjects had long-standing disease (mean duration, more than 10 years) and the fish oils were taken in addition to a full range of anti-inflammatory and antirheumatic medication. Overall, it is clear that the effect is genuine and it is possible that the effect size may be larger in more favourable conditions such as early-onset disease, where there is little or no joint damage.

When considering whether subjects with rheumatoid arthritis may benefit from fish oil ingestion, an important consideration additional to arthritis therapy is the potential for collateral health benefits. Rheumatoid arthritis has a standardised mortality ratio $\geqslant 2$, which is attributable mainly to increased cardiovascular mortality, and this has led to the conclusion that prevention of cardiovascular disease must be added to one of the aims of rheumatoid arthritis treatment.[5] Thus, recommending use of dietary omega-3 fats in rheumatoid arthritis treatment is well justified for preventive effects in cardiovascular disease.

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Diabetes

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Summary

- Total fat intake is not related to the risk of diabetes, but, while polyunsaturated fat reduces the risk, monounsaturated fat is neutral and saturated fat may increase the risk.
- Body weight is far more critical than macronutrient composition.[10]

WHETHER FAT HAS A ROLE in preventing type 2 diabetes has been a vexed question for the past 50 years. There have been two very large prospective studies in women[1,2] and one in men.[3] The Nurses Health Study showed no relationship between the incidence of type 2 diabetes and intakes of total dietary fat, saturated fat or monounsaturated fat.[1] However, polyunsaturated fat was protective and *trans* fatty acids were harmful, so that replacing 2% of energy from *trans* fatty acids with polyunsaturated fat lowered the incidence of type 2 diabetes by 40%. In Australia, where *trans* fatty acids are much less relevant (as they are not present in margarines and hardened fats as they are in the United States), this would translate to replacing 5% of energy from carbohydrates with polyunsaturated fat, resulting in a decrease of 37% in the incidence of diabetes. Similar but weaker findings in relation to vegetable oils came out of the Iowa Women's Study (although *trans* fatty acids were found to be protective).[2] Some smaller studies have found a relationship between total fat intake and incidence of diabetes,[4] while other studies have found a relationship between saturated fat intake and fasting glucose levels,[5] fasting and postload insulin levels[6] or levels of HbA_{1c}.[7] Insulin sensitivity may not be altered by fat intake, as the Insulin Resistance and Atherosclerosis Study found no such association,[8] confirm-

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ing the findings of most intervention studies. Only one recent study has shown that substituting saturated fat for monounsaturated fat improved insulin sensitivity in healthy men and women.[9]

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