



Dietitians Association of Australia Statement

Dietary fats and age-related macular degeneration

A public statement summarising the current Dietitians Association of Australia (DAA) perspective on an issue of importance to the nutritional welfare of the community.
Authorised September 2004

DAA Position

Epidemiological studies into dietary fats and age-related macular degeneration (AMD) have produced disparate results. At this early stage of the research, there is no consistent association between either total fat, or any class of fats, and AMD. Associations between dietary cholesterol and AMD are also inconsistent. There is little consistency between the accepted associations between dietary fats and coronary heart disease and the associations observed between dietary fats and AMD, bringing into question the atherosclerosis hypothesis of AMD. Therefore, there is currently no plausible mechanism to explain how total fat, animal fats, vegetable fats or cholesterol might increase AMD risk. Although there is a plausible role for long-chain omega 3 fatty acids in maintaining the integrity of the macula, the associations between fish, or long-chain omega 3 fatty acids, and AMD are also inconsistent. No specific dietary recommendations about dietary fats and macular degeneration are possible based on the existing evidence.

Recommendation

Due to the lack of evidence, it is not possible to provide an evidence-based recommendation regarding fat consumption and AMD. With regard to fat intake, DAA supports the Dietary Guideline for Australians for fat intake i.e. To limit saturated fat and to moderate total fat intake.

Background

The macula is the area located at the centre of the retina and is responsible for detailed, fine central vision. With age, degenerative changes in the macular region can occur leading to blurred vision, straight lines appearing wavy and the appearance of a dark or empty area in the centre of vision. AMD is the leading cause of vision loss in Australia and other developed countries. The impact of AMD continues to grow as the size of the elderly population increases. Among people over 75 years of age, about a quarter have some signs of macular degeneration and 6-8 per cent have some loss of vision.

The aetiology of AMD is poorly understood and few risk factors, other than age, have been identified. Associations of increased AMD risk with overweight (1), high blood pressure (2), serum lipids (3), inactivity (1) and low intakes of antioxidants (4) have been

observed, but not consistently. Subjects with elevated cardiovascular risk have increased risk of AMD, which has led to the hypothesis that AMD is related to atherosclerosis in the blood vessels that supply the retina (5). The consistent finding that smoking increases AMD risk provides some support for this hypothesis (6, 7) and has led to the further hypothesis that dietary fats may affect AMD risk. If true, the consumption of saturated, trans fatty acids and possibly dietary cholesterol would be expected to be associated with increased AMD risk and the consumption of linoleic acid and alpha-linolenic acid associated with lower risk. Total fat per se would not be expected to increase AMD risk.

Studies of dietary fat and AMD

To date, few studies into the possible relation between dietary fats and AMD have been conducted. Early findings from the retrospective Beaver Dam Study provided support for the atherosclerosis hypothesis – dietary intakes of saturated fat and cholesterol were associated with increased risk of early AMD (8). There were similar findings in the cross-sectional Blue Mountains Eye Study, though the relation with saturated fat failed to reach significance (9). Another cross-sectional study based on the NHANES III database in the United States showed no significant association between prevalence of AMD and either total fat or specific fatty acids in the diet (10). A case-control study conducted in the United States found higher vegetable fat consumption was significantly associated with increased risk for AMD (11). Monounsaturated fatty acids, polyunsaturated fatty acids and linoleic acid were associated with increased AMD risk. Saturated fats and alpha-linolenic acid were not significantly associated with risk of AMD in this study.

Only two prospective studies of dietary fats and AMD risk have been reported. Cho et al (12) examined the relation between intakes of total fat and specific types of fat and the incidence of AMD in the Nurses' Health Study and Health Professionals Follow-up Study cohorts. Total fat intake was positively and significantly associated with risk of AMD, though this relation appeared to be due to the intake of an individual fatty acid, alpha-linolenic acid, rather than to total fat intakes per se. The consumption of saturated fats was associated with a modest, marginally significant increase in risk of AMD in this study. Cholesterol intake was not related to AMD risk.

Seddon et al (13) conducted a prospective cohort study of subjects with existing AMD. After 4.6 years of follow-up, higher total fat intake was significantly associated with increased risk of progression to advanced AMD. When analysed separately, intakes of both vegetable and animal fat were positively associated with progression, though the relation with animal fat was not significant. Monounsaturated and trans fatty acids were significantly associated with increased likelihood of progression of AMD, the stronger and more significant association being with trans fatty acids. Polyunsaturated fatty acids were significantly associated with increased risk of AMD in some analyses but not others. In spite of these associations, the consumption of nuts was associated with decreased risk of AMD. Dietary cholesterol was not reported in this study.

A protective effect of fish against the development or progression of AMD has been suggested in several studies (9, 11-13). These associations were not significant in all

analyses and in some cases were only significant when the subjects were stratified by linoleic acid intake (11, 13). Fish, or the long-chain omega 3 fatty acids found in fish, were not associated with protection against AMD in the Beaver Dam Study (8). In a case-control study, plasma levels of long-chain omega 3 fatty acids were not significantly associated with AMD (Sanders et al 1993).

No randomised controlled trials of dietary fat and AMD have been conducted.

Summary of findings

Study	Significant associations of total fat and fat type with AMD
Mares-Perlman et al (1995)	Saturated fat
Smith et al (2000)	Nil
Heuberger et al (2001)	Nil
Seddon et al (2001)	Vegetable fat Monounsaturated fat Polyunsaturated fat Linoleic acid
Cho et al (2001)	Total fat α -linolenic acid
Seddon et al (2003a).	Total fat Vegetable fat Monounsaturated fat ? Polyunsaturated fat Trans fatty acids

References

1. Seddon JM, Cote J, Davis N, Rosner B. Progression of age-related macular degeneration: association with body mass index, waist circumference, and waist-hip ratio. *Arch Ophthalmol* 2003a;121:785-92.
2. Sperduto RD, Hiller R. Systemic hypertension and age-related maculopathy in the Framingham Study. *Arch Ophthalmol* 1986;104:216-9.
3. Tomany SC, Wang JJ, Van Leeuwen R, Klein R, Mitchell P, Vingerling JR, Klein BE, Smith W, De Jong PT. Risk factors for incident age-related macular degeneration: pooled findings from 3 continents. *Ophthalmology* 2004;111:1280-7.
4. VandenLangenberg GM, Mares-Perlman JA, Klein R, Klein BE, Brady WE, Palta M. Associations between antioxidant and zinc intake and the 5-year incidence of

- early age-related maculopathy in the Beaver Dam Eye Study. *Am J Epidemiol* 1998;148:204-14.
5. Snow KK, Seddon JM. Do age-related macular degeneration and cardiovascular disease share common antecedents? *Ophthalmic Epidemiol* 1999;6:125-43.
 6. Delcourt C, Diaz JL, Ponton-Sanchez A, Papoz L. Smoking and age-related macular degeneration. The POLA Study. *Arch Ophthalmol* 1998;116:1031-5.
 7. Smith W, Mitchell P, Leeder SR. Smoking and age-related maculopathy: the Blue Mountains Eye Study. *Arch Ophthalmol* 1996;114:1518-23.
 8. Mares-Perlman JA, Brady WE, Klein R, VandenLangenberg GM, Klein BE, Palta M. Dietary fat and age-related maculopathy. *Arch Ophthalmol* 1995;114:235-6.
 9. Smith W, Mitchell P, Leeder SR. Dietary fat and fish intake and age-related maculopathy. *Arch Ophthalmol* 2000;118:401-4.
 10. Heuberger RA, Mares-Perlman JA, Klein R, Klein BE, Millen AE, Palta M. Relationship of dietary fat to age-related maculopathy in the Third National Health and Nutrition Examination Survey. *Arch Ophthalmol* 2001;119:1833-8.
 11. Seddon JM, Rosner B, Sperduto RD, Yannuzzi L, Haller JA, Blair NP, Willett W. Dietary fat and risk for advanced age-related macular degeneration. *Arch Ophthalmol* 2001;119:1191-1199.
 12. Cho E, Hung S, Willett WC, Spiegelman D, Rimm EB, Seddon JM, Colditz GA, Hankinson SE. Prospective study of dietary fat and the risk of age-related macular degeneration. *Am J Clin Nutr* 2001;73:209-18.
 13. Seddon JM, Cote J, Rosner B. Progression of age-related macular degeneration: association with dietary fat, transunsaturated fat, nuts, and fish intake. *Arch Ophthalmol* 2003b;121:1728-37.
 14. Sanders TA, Haines AP, Wormald R, Wright LA, Obeid O. Essential fatty acids, plasma cholesterol, and fat-soluble vitamins in subjects with age-related maculopathy and matched control subjects. *Am J Clin Nutr*. 1993;57:428-33.
