

# Amount and Type of Dietary Fat Plays a Role in Vision

Evidence shows high-fat and low-fish diets may increase the risk for ARM.

BY CÉCILE DELCOURT, PHD

**T**here is increasing evidence for a major role of nutrition in the etiology of age-related maculopathy (ARM). Among other factors (antioxidants, macular pigment), dietary fat may play an important role.<sup>1,2</sup>

## HIGH FAT INTAKE, OBESITY

Several animal models have been developed that show that the combination of high fat intake and human variants of genes coding for apolipoproteins lead to modifications in the retina, similar to those observed in ARM. Epidemiological studies also suggest that obesity, disturbances of the lipid metabolism (ie, high plasma HDL cholesterol), and the apolipoprotein E4 allele increase the risk of developing ARM.<sup>2</sup> This suggests that high fat intake probably has a role in the development of ARM in humans.

The retina is extremely rich in polyunsaturated fatty acids, in particular docosahexaenoic acid (DHA), a fatty acid in the omega-3 family. DHA, provided mainly by fatty fish, probably has structural, functional, and protective functions in the retina. Several epidemiological studies have suggested that patients who consume a diet high in DHA may be at reduced risk for ARM.<sup>3-5</sup>

Epidemiological data on the associations of ARM with type and quantity of dietary fat remain scarce and are partially inconsistent. Therefore, my colleagues and I investigated these associations with age-related eye diseases in the framework

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of a population-based study from the South of France called the Pathologies Oculaires Liées à l'Age (POLA Study).

## POLA STUDY

The POLA study was conducted in Sète, a small harbor of the French Mediterranean. From 1995 to 1997, 2,584

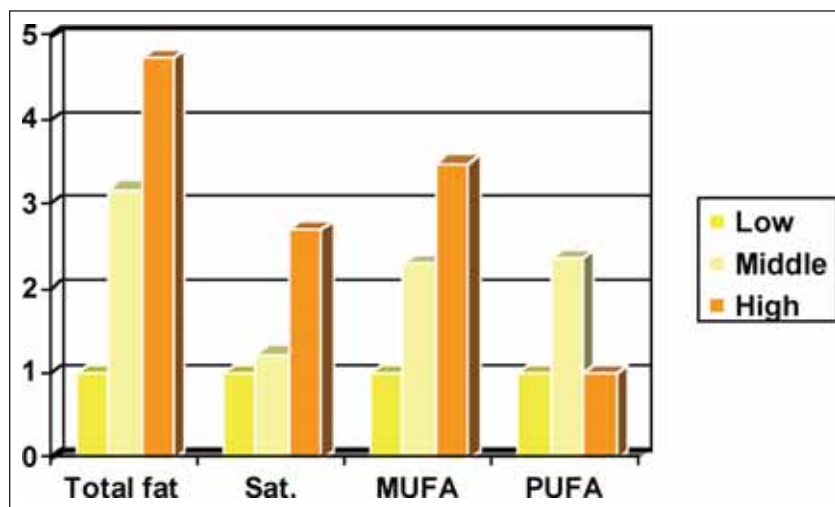


Figure 1. Risk of ARM according to dietary fat intake in the POLANUT Study (multivariate odds ratios after adjustment for age, gender, smoking, body mass index, and self-reported cardiovascular disease).

**DIETARY SOURCES OF DHA AND OMEGA-3 FATTY ACIDS**

Fatty Acid	Food Sources
<i>Omega-6 Types</i>	
LA, linoleic acid	Vegetable oils (corn, safflower, sunflower, soybean), animal meats
AA, arachidonic acid	Animal sources only (meat, eggs)
<i>Omega-3 Types</i>	
ALA, alpha-linolenic acid	Flaxseed, canola oil, English walnuts, specialty eggs
EPA, eicosapentaenoic acid	Fish, fish oils, marine sources
DHA, docosahexaenoic acid	Fish, fish oils, specialty egg/dairy products

The best sources of DHA are: **seafood, algae**, and especially **coldwater fish**. Popular sources of DHA are salmon, sardines, and tuna. Eggs and organ meats contain a small amount of DHA, but the healthiest source of dietary DHA is seafood. Nutrition experts recommend two 4-oz servings of omega-3–rich fish per week.

In addition to fish oils, **vegetable oils** (primarily flaxseed, soy, and canola) are also rich sources of omega-3 fatty acids, with flaxseed oil being the best. Other good sources include dried ground cloves, walnuts, dried ground oregano, cauliflower, mustard seeds, and cabbage.

Sources: [www.askdrsears.com](http://www.askdrsears.com), [www.whfoods.org](http://www.whfoods.org), [dhaomega3.org](http://dhaomega3.org).

patients aged ≥60 years underwent a complete ophthalmological examination, completed a questionnaire on risk factors, and had a fasting blood sample taken. From 1998 to 2000, 1,947 of 2,452 available patients participated in a follow-up examination.

A nutritional add-on study, POLANUT (Pathologies Oculaires Liées à l'Age and Nutrition), was conducted in survivors of the cohort aged ≥70 years between 2002 and 2003.<sup>6</sup> Trained dietitians administered a food frequency questionnaire to 832 patients at their homes. Dietary fat intake was compared among patients with and without ARM, which was defined by the presence on the photographs taken at the follow-up examination of neovascular ARM, and/or geographic atrophy, and/or early ARM (ie, soft indistinct drusen [ $>125\ \mu\text{m}$ ] and/or soft distinct drusen [ $>125\ \mu\text{m}$ ] with pigmentary abnormalities).

We found that patients with high total fat intake had an almost fivefold increased risk for ARM (Figure 1), adjusting for age, gender, smoking, body mass index, and self-reported cardiovascular disease. Saturated and monounsaturated fats were similarly associated with an

increased risk for ARM, although these associations were weaker. We found no association between ARM and polyunsaturated fat.

**FOOD COMPOSITION**

Because the food composition table used in the POLANUT Study did not include omega-3 and omega-6 fatty acids, my colleagues and I investigated the associations of fish intake with the risk of ARM, as fish is the main source of DHA. Total and white fish intakes were not significantly associated with the risk of ARM. By contrast, consuming fatty fish more than once a month was associated with a 60% reduced risk for ARM (odds ratio = 0.41,  $P=.01$ ).

These results may lead to future dietary recommendations for the elderly that encourage decreased fat intake and increased fish intake.

These results are consistent with previous studies, which have shown an increased risk for ARM in patients with high total fat intake and decreased risk among regular consumers of fish—and in particular among those consuming fatty fish. These results may lead to future dietary recommendations for the elderly that encourage decreased fat intake (which is excessive in Western countries) and increased fish intake (see sidebar, Dietary Sources of DHA and Omega-3 Fatty Acids). Clinical trials are ongoing to evaluate whether supplementation with DHA may decrease the risk of developing late ARM. ■

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