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See-food: Eat fish for healthy eyes

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Resources for understanding omega-3 fatty acids and macular degeneration

Atlantic salmon is a top source of omega-3 fatty acids.

As we age, parts of our body start to falter, but we can assist ourselves in the fight against time with nutrition. Let's take our eyesight for example.

Macular degeneration, also known as age-related macular degeneration (AMD or ARMD), is a medical condition that may result in blurred or lost vision and is the **leading cause of blindness** (https://medlineplus.gov/magazine/issues/summer08/articles/summer08pg14-15.html) in the developed world. There are no early symptoms but over time, some people experience a gradual worsening of vision that could impact one or both eyes.

Typically, macular degeneration occurs in older people but genetic factors and smoking also play a role in damaging the macula of the retina. Unfortunately, there is no cure or treatment that returns vision already lost. Diagnosis is by a complete eye exam and the severity of disease is divided into early, intermediate and late types.

The late type is further divided into "dry" and "wet" forms with the dry form making up 90 percent of cases. Prevention is always better than cure and that includes exercising, eating well, and not smoking, and some studies have highlighted that **antioxidant vitamins and minerals** (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5244028/) do not appear to be useful for prevention.

While the condition may not result in complete blindness, loss of central vision can make life hard in recognizing faces, driving, reading, or performing other daily activities. Additionally, visual hallucinations may occur and can be confused as mental illness. In 2013, AMD was the **fourth-most common** (https://www.researchgate.net/publication/258958730_Current_knowledge_and_trends_in_age-related_macular_degeneration_Genetics_epidemiology_and_prevention) cause of blindness after cataracts, preterm birth and glaucoma but it seems to be on the rise.

Macular degeneration is the leading cause of vision loss, affecting more than 10 million Americans, according to the American Macular Degeneration Foundation (**AMDF** (https://www.macular.org/)). The condition most commonly occurs in people over the age of 50 with about 0.4 percent of people between 50 and 60 experiencing the disease, while it occurs in 0.7 percent of people 60 to 70, 2.3 percent of those 70 to 80, and nearly 12 percent of people over 80 years old.

It is important to note that visual impairment is one of the top four reasons for loss of independence. Age-related diseases of the eye are common and costly. For example, 18 percent of all hip fractures among seniors are attributed to age-related vision loss (hip fracture patients have a substantially increased risk of death for at least six years post-fracture).

Sadly, the AMDF seem to have ignored the importance of fish and seafood in their approach to nutrition, something that is strongly promoted by the **Macular Disease Foundation Australia** (https://mdfoundation.com.au/).

Both organizations offer a cookbook, but the Australian version seems to be very focused on fish/seafood. "Eating for Eye Health" by Patron Ita Buttrose AO OBE and chef Vanessa Jones is loaded with delicious recipes made up of the foods we should be eating to keep our eyes functioning properly. **The book** (https://www.mdfoundation.com.au/content/eating-eye-health#sthash.ZHbwSJgC.dpuf)

features more than 90 recipes that are easy to prepare and good for our eye health, many featuring fish. The Australian Foundation **free e-recipe book** (https://www.mdfoundation.com.au/content/macula-menu-MM18) can be downloaded here.

Omega-3s and Macular Disease

There is a direct correlation between the essential omega-3 fatty acids (also called **omega-3 fats** (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3134638/) and n-3 fats) and **eye health.** (https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/)

Omega-3s are a **type of polyunsaturated fat** (https://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/fats-and-cholesterol/types-of-fat/omega-3-fats/) that play many critical roles in our bodies. And, just like minerals and most vitamins, our body cannot make them; they must be ingested in food. Fish and seafood are the best natural sources of omega-3s: Long-chain omega-3s are found in oily fish, non-oily fish and shellfish, and to a much lesser extent in meats and eggs. Docosahexaenoic acid (DHA), one of the long-chain omega-3 fatty acid, is a major building block of the brain, and the retina in the eye is very concentrated in DHA. Other vital organs, such as the heart, are rich in long-chain omega-3s.

Research has also shown consistently that **regular and increased consumption** (https://jamanetwork.com/journals/jamaophthalmology/fullarticle/1106372) of omega-3 fatty acids can reduce the risk of developing Macular Disease.

Augood et al. concluded that **habitual consumption of oily fish** (https://www.ncbi.nlm.nih.gov/pubmed/18689376) at least once a week was linked to a 50 percent reduction in the risk of developing wet AMD. Further, people who consumed at least 300 mg per day of DHA and eicosapentaenoic acid (EPA) were 69 percent less likely to have wet AMD then those consuming less.

A **meta-analysis study** (https://jamanetwork.com/journals/jamaophthalmology/fullarticle/420564) by Chong and co-workers determined that a higher intake of the omega-3 fatty acids EPA and DHA reduced the risk of age-related macular degeneration (AMD). In analyzing nine studies that included roughly 88,900 participants, the Australian authors report that higher intakes of EPA and DHA cut the risk of early AMD substantially and yielded a 38 percent risk reduction for advanced AMD.

Sardines are a very rich source of omega-3 fatty acids and a staple in the Mediterranean diet.

Mediterranean diet and eye health

Merle et al., in one of their research studies, aligned the **Mediterranean diet with eye health** (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4625588/). The Mediterranean food pyramid has vegetables, fruits, legumes, whole grains and nuts and seeds making up the bulk of the diet. Seafood and fish comprise most of the protein with much smaller quantities of poultry, eggs and dairy products; and red meats and sweets are the smallest tip of the pyramid. The diet also includes drinking plenty of water and moderate wine consumption.

Their research in 2015 started on the basis that for some time researchers and medical practitioners had understood that adhering to a Mediterranean diet lowers the risk of heart disease and other health conditions. This study was a follow-up of over 2,500 patients who had been participants in previous studies.

They evaluated the patients' diets over a 13-year period looking at their consumption of alternate Mediterranean diet components: vegetables, fruits, whole grains, beans, fish, meats, alcohol and the kinds of fats consumed and assigned a score based on the closeness to the target diet. They also assigned scores for 10 different genetic components that included vulnerabilities to macular degeneration.

They assessed the diet score, the genetic score and the combination of diet and genetic scores to determine results. Their results found that a high diet scores were associated with the lowest risk of advanced macular degeneration (considering age, gender, other health or vision conditions). The high diet score carried even more weight when the genetic risk score was low. Their conclusion was that if genetic risk is not a strong issue, then the greater the consumption of a Mediterranean diet, the lower the risk of developing advanced macular degeneration.

In 2016, Cachulo and colleagues looked at populations in **two Portuguese towns** (https://onlinelibrary.wiley.com/doi/full/10.1111/aos.12950), one inland and one coastal. Their population-based study revealed that the prevalence of early (11.22 percent) and late AMD (0.98 percent) in a representative Portuguese population is comparable to what has been described to other Western and Asian countries. The strongest predictor of AMD prevalence was age, but, for both early and late disease, it was also linked to the study site of inclusion (coastal or inland town), probably representing lifestyle profiles, including dietary patterns. Subjects from the inland town had higher rates of macular degeneration and pointed to the needed to investigate why geographic location was important.

In 2017, Hogg and Woodside reported on their studies to assess the diets and macular health of more than 5,000 randomly selected **elderly subjects** (https://www.aaojournal.org/article/S0161-6420(16)31351-3/fulltext) from seven countries (Estonia, France, Greece, Italy, Norway, Spain, and the United Kingdom). The participants all received eye examinations and retinal photographs which were then graded according to the International Classification System which assigns values the severity of AMD and presence of drusen, the yellowish fatty deposits at the macula which are hallmarks of AMD. The participants also completed a food intake questionnaire which was graded according to their Mediterranean Diet Score (MDS).

The higher the MDS score the less severe the AMD. For patients with very early AMD there was little correlation with the MDS; there was a weak inverse relationship between the MDS and the presence of large drusen. Comparing the patients with the highest and lowest MDS, the risk of AMD was 20 percent less.

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