

Studies show that diet is important in reducing the risk of Macular Degeneration (MD) and slowing its progression. Eating a healthy, well-balanced diet that includes eye health foods is good for overall wellbeing as well as eye health.

Key eye health practices

Adopting simple eye health practices as a normal part of your diet can reduce the risk of MD whether or not you have been diagnosed with the disease.

- Eat a healthy, well balanced diet.
- Eat green leafy vegetables and fresh fruit daily.
- Eat fish 2-3 times a week.
- Choose low glycemic index (GI) carbohydrates instead of high GI.
- Eat a handful of nuts a week.
- Limit intake of fats and oils.
- Maintain a healthy lifestyle, control weight and exercise regularly.
- Consider taking a supplement in consultation with your doctor.

Nutrition for eye health

Antioxidants are important to our health and are found in the foods we eat. When your cells turn food and oxygen into energy they also produce free radicals. These are thought to be a contributing factor in the cause of MD and other diseases.

If your system is operating at peak health then free radicals are neutralised by antioxidants before they can cause any damage.

A range of other nutrients are important for good macular health. If your diet is lacking in these you should consider taking a supplement.

Lutein and zeaxanthin

These are present in high concentrations in a healthy macula. Lutein and zeaxanthin are found in dark green leafy vegetables such as spinach, silver beet and kale. They are also present in a range of other vegetables such as peas, pumpkin, brussel sprouts, broccoli, corn and beans.



Omega 3

Omega-3 fatty acids are found in high levels in the retina and are involved in cell development and renewal. All fish and shellfish contain omega-3 but higher concentrations are found in oily fish varieties such as salmon, mackerel, anchovies, trout, herring, sardines and tuna.

Other nutrients

Your diet should include a range of other nutrients that support good macular health. These include zinc (sources include oysters, nuts and legumes), vitamin E (sources include nuts and whole grains), vitamin C (sources include citrus fruit, berries and tomatoes) and selenium (sources include nuts, especially Brazil nuts).

Any changes to diet and lifestyle, including the taking of supplements should be undertaken in consultation with your doctor

Carbohydrates and Glycemic index

The glycemic index (GI) is a ranking of carbohydrates on a scale of 1-100 according to how much they raise blood sugar after eating. There is good evidence that those who eat a higher proportion of carbohydrates with a low GI compared to high GI have a lower risk of developing MD.

Low GI carbohydrates are digested more slowly, giving a more gradual but longer release of energy. Low GI foods include most fruit and vegetables, legumes, whole grain cereals and whole grain breads. GI only applies to carbohydrates so foods such as meat, fish, eggs and cheese do not have a GI.

People who have low GI diets tend to have less heart disease, lower cholesterol, less obesity, less diabetes and also less MD.



Nutrient contents of foods

| Nutrient | Daily Intake [†] | Examples of food sources | | Examples of food sources | |
|-----------------------|---------------------------|--------------------------|-----------------------|---------------------------------|-----------------------|
| | | | Contains ⁱ | | Contains ⁱ |
| Lutein and zeaxanthin | 6 mg [‡] | 1/2 cup (65 g) kale | 11.9 mg | 1/2 cup (120 g) pumpkin | 1.2 mg |
| | | 1/2 cup (90 g) spinach | 10.2 mg | 1/2 cup (125 g) brussel sprouts | 1.2 mg |
| | | 1 cup (30 g) raw spinach | 3.7 mg | 1/2 cup (80 g) broccoli | 0.8 mg |
| | | 1/2 cup (80 g) peas | 1.9 mg | 1/2 cup (80 g) corn | 0.6 mg |
| | | 1 cup (55 g) cos lettuce | 1.3 mg | 2 eggs | 0.5 mg |
| Omega-3 | 0.9-1.6 g | 100g salmon | 1.8 g | 100g tuna | 0.2 g |
| | | 100g sardines | 0.9 g | 100g prawns | 0.2 g |
| Vitamin C | 45 mg | 1 medium orange | 69 mg | 1/4 cup capsicum | 47 mg |
| Vitamin E | 7-10 mg | 20 almonds (30 g) | 7.8 mg | 1 Tbsp wheat germ | 2.2 mg |
| Zinc | 8-14 mg | 7 oysters (100 g) | 59 mg | 1/2 cup rice bran | 3.5 mg |
| Selenium | 60-70 mcg [#] | 2 Brazil nuts (8 g) | 80 mcg | 24 cashew nuts (30 g) | 5.6 mcg |

[†] Recommended Daily Intake (RDI) per National Health and Medical Research Council (NHMRC). The RDI refers to the amount of a specific nutrient (vitamins, minerals, energy or protein) considered adequate to meet the nutritional requirements of healthy people. The RDI was formulated as a way to help prevent nutritional deficiency diseases in healthy people, and does not address the extraordinary needs of people who smoke, suffer from ill health or are on medication.

[‡] There is no standard daily intake for lutein. 6 mg is the accepted amount in lutein supplements.

[#] The measure mcg is a microgram. 1 mg = 1000 mcg.

ⁱ www.nal.usda.gov

Supplements for eye health

Supplements are vitamins, minerals or other substances taken in tablet form.

Supplements play an important role in eye health. It is important to speak to a doctor about the most appropriate for your individual needs.

The AREDS I and II study

The Age Related Eye Disease Studies (AREDS I and II) are 2 major clinical trials conducted by the National Eye Institute in the USA.

AREDS I identified a specific formula of antioxidants, including high dose zinc, that was effective in slowing the progression of age related MD. It showed that taking the AREDS formula every day significantly reduced the relative risk of progression of MD and delayed visual loss.

- Those with intermediate stage MD (who had large drusen at their macula) reduced their risk by approximately 25%.
- Those with late stage MD and loss of vision in one eye reduced their risk of developing severe changes in their other eye by approximately 20%.

AREDS II evaluated the effect of adding lutein, zeaxanthin and/or omega-3 to the AREDS I formula on slowing the progression of MD over 5 years. The study also measured the effect of removing beta-carotene and decreasing the level of zinc in the original AREDS formula.

AREDS II confirmed the findings of the AREDS I study and found that adding lutein and zeaxanthin, while removing beta-carotene, provided an additional 18% reduction in the relative risk of developing advanced MD. The effect was greatest in patients who had the lowest dietary intake of lutein but took an AREDS formula with lutein and zeaxanthin during the study. These patients were about 25% less likely to develop advanced MD compared with patients with similar diets who did not take lutein and zeaxanthin.

AREDS II clearly supports the addition of lutein and zeaxanthin to the AREDS I formula and removal of beta-carotene. Beta-carotene reduces the absorption of lutein and zeaxanthin and increases the risk of lung cancer in smokers. People who smoke or who have asbestosis should not take a supplement that contains beta-carotene.

A lower dose of zinc (25 mg) in AREDS II did not provide any benefit over the original 80 mg dose used in the AREDS I study. It did not have fewer side effects and there was a trend (statistically not significant) towards reduced effectiveness compared to the 80 mg dose.

The AREDS formula

| | |
|---------------------------------|---------------|
| Zinc (as zinc oxide) | 80 mg |
| Copper (as copper oxide) | 2 mg |
| Vitamin E | 400 IU |
| Vitamin C | 500 mg |
| Lutein | 10 mg |
| Zeaxanthin | 2 mg |

There is no single formulation available in New Zealand that matches this formula exactly. The AREDS study group recommend continued use of the original AREDS formula but with beta-carotene removed and replaced by lutein and zeaxanthin. Taking a supplement based on the AREDS formula is not a cure for MD, nor does it stop or reverse damage caused by MD. It is important to read the label to understand how many tablets need to be taken to match the AREDS II formula. Check the correct dose suitable for you with your doctor.

Supplementing the diet

An AREDS based supplement and a diet rich in lutein and omega-3 is appropriate for those diagnosed with MD.

Lutein supplement

If you are over 50 years old or have a family history of MD and are not eating sufficient dark green leafy vegetables, a lutein supplement may be appropriate. A daily lutein intake of 6 mg is generally considered adequate.

Omega-3 supplement

The AREDS II study failed to show a beneficial effect of a fish oil supplement on reducing the risk of progression of MD. However, evidence from other nutritional studies suggests omega-3 may be beneficial. If you cannot get sufficient omega-3 in your diet (2-3 serves of fish per week), you should consider taking an omega-3



Frequently Asked Questions

Do I need to be careful with leafy greens and certain medications?

Most of the best natural sources of lutein, including kale, spinach, silver beet, brussel sprouts and broccoli, contain high levels of vitamin K that can interfere with the function of some medications including warfarin (a blood thinner). That is why it is important to speak to your doctor before making changes to your diet, especially for those on warfarin. If you cannot get enough lutein from your natural diet then a lutein supplement should be considered.

Are carrots the best food for eyes?

Carrots are a good source of vitamin A that is important for general health. However, contrary to popular belief they are not the best food for eyes. Choose dark green leafy vegetables as the main eye health vegetable and eat carrots in moderation as a part of a balanced and varied diet.

Does food have to be fresh?

No. Frozen and tinned foods, such as fish or vegetables, are very good and convenient options if the fresh alternative is not readily available.

Which nuts should I eat?

A handful of nuts each week, or a few nuts each day, is a good addition to any diet. Choose raw, unsalted nuts and mix a selection such as almonds, walnuts, Brazil nuts, pine nuts, pecans and pistachios.

What about seeds?

Seeds, such as flax seeds (linseeds), are often recommended by nutritionists for their high essential fatty acid content. However, their relationship to MD has not been studied.

Why take the AREDS formula as a supplement and not through diet?

In general, eating a balanced diet is the best way to obtain your nutrients. However, where high dose antioxidants are used to treat disease, supplements may be the only way to get the right amounts. For example, to get the same quantities as the AREDS formula you would need to eat around 135g of oysters, 7 oranges and 123 tablespoons of wheat germ every day.



Are there reasons people should be cautious when considering the AREDS formula?

Yes. There are reasons to be cautious in using high dose vitamins and minerals. They can interfere with medications and other nutrients so it is important to follow the advice of your doctor.

Which product should I buy?

There are many supplement products on the market containing the AREDS formula. The most important thing is to check the label and make sure that the product you buy contains the exact AREDS formula from the study, either in taking one or two capsules daily. Remember that beta-carotene has been removed from some products and this is supported by the Foundation. It is also important to check the labels of any lutein supplement products to ensure that you are aware of all the ingredients it contains. Your optometrist or your ophthalmologist can recommend a specific product.

I have not been diagnosed with MD; what is the best supplement for me?

If your diet is low in lutein-rich foods, such as green and yellow vegetables; a lutein supplement should be considered.

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