

# Eye nutrient products for age-related macular degeneration: what do they contain?

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## Abstract

**Background and purpose** Patients are increasingly well informed about the availability of antioxidant products and the claims made for their benefits in age-related macular degeneration (AMD). Consequently, their use is becoming widespread. The purpose of this study is to conduct a survey of the commonly encountered products, and to compare their ingredients with the current Age-Related Eye Disease Study (AREDS) recommendations.

**Methods** A search was undertaken for products sold as 'eye nutrients' at local pharmacies and health food shops, and for products advertised via the Internet. Information about these products was collated and analysed.

**Results** We identified 22 eye nutrient products. Analysis of their constituents showed that, although over 75% contained all the constituents used in AREDS, only two matched the dosage profiles recommended in the study.

**Conclusion** The authors draw no conclusion on the efficacy of nutritional supplements in the prevention of AMD. In order to advise their patients, ophthalmologists should be familiar with these products. The compiled list in this paper should provide a useful reference for them.

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**Keywords:** antioxidant; eye nutrient; zinc; age-related macular degeneration

## Introduction

In recent years, several clinical trials have been conducted to evaluate the role of zinc and antioxidant supplements for the protection

against the development of advanced age-related macular degeneration (AMD) and severe visual loss in elderly patients with early AMD.<sup>1–10</sup> Current evidence for the use of such antioxidant supplements comes from the Age-Related Eye Disease Study (AREDS), which reported that treatment with zinc and antioxidants reduced the risk of progression to advanced (AMD) and vision loss in patients who have high-risk characteristic lesions defined by extensive intermediate drusen, large drusen, noncentral geographical atrophy in one or both eyes (Category 3) or if they have advanced AMD (GA involving centre of the macula or signs of choroidal neovascularisation—Category 4) in the first eye. AREDS did not show any benefit of supplementary nutrients in patients with milder drusen and retinal pigment epithelial abnormalities.<sup>11</sup>

Although general practitioners and ophthalmologists are not routinely prescribing such supplements to patients with AMD, many patients, in our experience, are self-medicating with a variety of proprietary pharmaceutical products, which are available over the counter without prescription. In the light of recent recommendation from the AREDS on the use of high doses of vitamins and zinc and because of the scarcity of information in the medical literature on these pharmaceutical products, we conducted a survey of the commonly encountered products to investigate their constituent ingredients in relation to the current AREDS recommendations.

## Method

A search was carried out in local pharmaceutical and health food outlets as well as on the Internet for products sold or advertised under the general category of 'eye

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nutrients'. For each product, information on name, manufacturer, inclusion in the British National Formulary 2002, source of purchase, recommended dosage, route of administration and dosages of constituent ingredients were collected. Inclusion in the National Health Service Drug Tariff list was also determined for each product. Where dosages were quoted in international units (IU), a conversion was made into milligrams for ease of comparison with the dosage regimen from AREDS. The conversion scale used estimated 1 mg of vitamin E to be equivalent to 1 IU of vitamin E and 1 mg of Vitamin A to be equivalent to 833 IU of vitamin A.<sup>12</sup>

### Results

In all, 22 different eye nutrient products were identified (Table 1). Nine were available from local health foods or pharmaceutical outlets and 13 others were available by

purchase from Internet websites or mail order companies. These products are formulated as tablets, capsules, or in the case of PURE FOCUS<sup>®</sup>, oral spray. Recommended dosages, described as 'servings per day' varies from one to six tablets or capsules per day. None of the products were specifically included in the British National Formulary, nor the National Health Service Drug tariff list indicating that these products would not be available on prescription.

Of the 22 products identified, 17 contain all the constituents used in AREDS, which are vitamin C (500 mg), vitamin E (400 IU),  $\beta$ -carotene (15 mg), and zinc (as zinc oxide 80 mg). VISIOMAX<sup>®</sup> does not contain zinc, while MACUVITE<sup>®</sup> and PURE FOCUS<sup>®</sup> does not contain any of the constituents used in the AREDS. OCUVITE PRESERVISION<sup>®</sup> and VISIVITE ORIGINAL FORMULA<sup>®</sup> were the only two products found that contain all the constituents that match the formula recommended by AREDS.

**Table 1** Summary information on eye nutrient products found in this study

Name (manufacturer) [source]	Daily dose	Vit C (mg)	Vit A (mg)	Vit E (mg)	Zn (mg)	Cu (mg)	Comparison to AREDS	Other constituents
CENTRUM SILVER (Wyeth) [Internet]	1 tab	60	4	45	15	2	All doses lower	1,3,4,8
CLINICAL NUTRIENT EYE (Bnatural) [Internet]	3 tab	600	6	60	9	1	Lower vit E, A and zinc	1,3,4,5,8
EYEBRIGHT (Rosemary's) [Retail]	1 tab	250	3	50	15	—	All doses lower	1,5,6,8
EYEBRIGHT COMPLEX (Solgar) [Retail]	2 cap	300	3	83	10	—	All doses lower	1,2, 3,5,6,8
EYE CARE FORMULA (Nutricia) [Retail]	2 tab	600	1.86	134	15	3	Lower vit E, A, zinc	1,2,4,5,8
EYE SUPPORT (Baar Product) [Internet]	3 cap	300	15	200	25	—	Equivalent in vit A only	1,3,4,5,8
EYE VITES (Allergan)[Retail]	1 tab	200	6	100	6	2	All doses lower	8
ICAPS (Alcon) [Retail]	2 tab	400	4	150	60	4	Lower vit E, A	1,3,4,8
MACUVITE (Springfield) [Internet]	2 tab	—	—	—	—	—	No AREDS constituents	1,2
MAXIVISION (Medical Ophthalmics)[Internet]	4 cap	500	9	400	30	2	Lower vit A and zinc	1,3,4,5,6,7,8
OCUGUARD PLUS (Twinlab) [Internet]	4 cap	1500	48	400	25	—	Very high vit A and C, lower zinc	1,3,4,5,6,7,8
OCUPOWER (Neutraceutical) [Internet]	6 cap	1500	18	500	25	1	Very high vit C, lower zinc	1,3,4,5,6,7,8
OCUVITE (Bausch and Lomb) [Pharmacy]	1 tab	200	1.2	60	40	2	All doses lower	1
OCUVITE- PRESERVISION (Bausch and Lomb) [Pharmacy]	2 tab	452	15	400	69.6	1.6	Equivalent in all	
OCUVITE LUTEIN (Bausch and Lomb) [Internet]	1 cap	60	—	30	15	2	All doses lower no vit A	1
OCUVITE XTRA (Bausch and Lomb) [Internet]	1 tab	300	1.2	100	40	2	All doses lower	1,3,4,7,8
OPTIMEYES (Bodywise) [Internet]	3 tab	1000	9	100	20	2	Very high vit C	1,3,5,6,8
PURE FOCUS (Vision Works) [Internet]	3 puff	—	—	—	—	—	No AREDS constituents	1,2,8
VISIOMAX (Wassen) [Retail]	1 tab	90	2.5	12	—	—	Lower than AREDS, no zinc	3,4,5
VISIONACE (Vitabiotics) [Retail]	1 tab	150	0.3	60	7.5	1	All doses lower	3,4,5,8
VISI VITE ORIGINAL FORMULA (Vitamin Science) [Internet]	2 cap	500	15	400	80	2	Equivalent in all	
VISI VITE SMOKER'S FORMULA (Vitamin Science) [Internet]	2 cap	500	—	400	80	2	Equivalent without Vit A	1

Code for other constituents: 1 = lutein, 2 = zeaxanthin, 3 = selenium, 4 = vitamin B complexes, 5 = bilberry, 6 = taurine, 7 = glutathione, 8 = others.

### *Vitamin C*

Maxivision, Visivite Original Formula and Visivite Smoker's Formula have an exact dose match for vitamin C with AREDS recommended dose of 500 mg/day. This is equivalent to 625% of recommended daily allowance (RDA). ICAPS, Eye Care Formula, Clinical Nutrient Eye and Ocuvite Preservision contain Vitamin C dosages very close to the recommended dosage while others were less comparable. For instance, Ocuguard Plus and Ocupower contain three times the recommended dosage. A few products have vitamin C contents lower than the AREDS recommended dosage.

### *β-Carotene (Vitamin A)*

Eye Support, Ocuvite-Preservision and Visivite Original Formula contain the same vitamin A content as the AREDS recommended dose (15 mg), which is equivalent to 1875% of RDA. Ocuguard Plus and Ocupower were the only products found with vitamin A content higher than the AREDS recommendation.

### *Vitamin E*

The dosage of Vitamin E used in AREDS was 400 mg. This is equivalent to 2666% of the RDA. We found that Maxivision, Ocuguard Plus, Ocuvite Preservision, Visivite Original Formula and Visivite Smoker's Formula contained 400 mg of vitamin E, while many other products had much lower vitamin E content.

### *Zinc*

Ocuvite Preservision, Visivite Original and Visivite Smoker's Formula contain an equivalent amount of zinc as that recommended by the AREDS (80 mg). This represents 842% of RDA. However, all the other products contain less than this amount with some containing as low as 6 mg.

### *Copper*

The formulations used in AREDS contained copper supplements in the form of 2 mg cupric oxide to prevent copper deficiency anaemia, which can occur from high doses of zinc. Nine of the products contained at least 2 mg of copper and one product contain 4 mg. Eyebright, Eyebright complex, Eye support, and Ocuguard plus contain zinc but no copper.

### *Other ingredients*

Pure Focus is the only product with a single ingredient of lutein. Many other products contain numerous other ingredients, such as lutein, selenium, zeaxanthin, vitamin

B complex, bilberry, and other herbal extracts, iodine, manganese, and magnesium. Ocupower contains as many as 36 ingredients.

### **Discussion**

We found a wide array of eye nutrient products available for patients to purchase over the counter, via the Internet or mail order without a prescription. It was not possible to include all the products identified in our search, as they were too numerous. We believe the list we have compiled in this report is fairly comprehensive and is likely to be a useful source of reference for medical practitioners and ophthalmologists who may have to advise their patients on such medications.

Although it is generally acknowledged that zinc and antioxidant supplementation in patients with moderate to severe ARMD has been shown to delay progression of macular disease and visual decline, there has not been any firm guidance on the routine prescription of these products for potentially suitable patients.<sup>10</sup> Several of the eye nutrient products we surveyed, for example, OCUVITE were listed on the Part XVIII list ('black list') of the National Health Service Drug tariff for England and Wales and therefore cannot be prescribed normally. As none of these products are actually licensed, the Prescription Pricing Authorities of Primary Care Trusts in England and Wales would generally not approve of the prescription charges. Therefore, when patients wish to consider paying for their eye nutrient products and seek our advice regarding the decision to use such products, it is important to ensure that they understand the evidence available on the benefit of such products. It is important that patients understand the different types of ARMD as this helps them to understand the evidence that supplements are beneficial only if they have high-risk characteristics in one or both eyes or if they have advanced ARMD in the fellow eye. There is currently still no evidence that supplement help to reduce the risk in patients with mild disease. It is also important that they appreciate the variation between different products and their potential adverse effects.

In AREDS, the dosages of the antioxidants are much higher than the recommended daily allowances. The daily recommended dietary allowances (RDA) for vitamin C is 75–90 mg, vitamin E 15 mg, vitamin A 700–900 µg, zinc 8–11 mg, and copper 900 µg.<sup>13,14</sup> Comparing AREDS dosages to normal daily recommended allowances; vitamin C is six times more, vitamin E is 26 times more, vitamin A is 18 times more and zinc is eight times more. Patients must realise that it would be difficult in a normal diet to achieve the high doses used in AREDS and for them to achieve the amount of risk reduction seen in the AREDS population,

it is probably necessary to supplement their normal intake of zinc and antioxidants.

The variation in dosages of the main constituents of the eye nutrient products could also present a potential quandary for patients. Vitamin C varied from 0 to 1500 mg in the group of products surveyed in this study, while vitamin E varied from 0 to 500 mg, vitamin A from 0 to 48 mg, and zinc from 0 to 80 mg. As AREDS<sup>11</sup> is the only study to have shown a treatment benefit, it is not known whether higher or lower dosages of constituents than those used in the AREDS would have any different effect. Furthermore, the variation in dosages of the constituents may not have actually result in as much variation in the effective dose due to differences in the shelf-life of the products to account for natural degradation of the constituents.

Although adverse effects of high-dose antioxidants and zinc are infrequent, it is worth noting that copper deficiency anaemia from zinc and risk of lung cancer are potential risks. It was surprising to find that some products like Eyebright, Eyebright complex, Eye support, and Ocuguard Plus contain zinc but no copper.

The risk of lung cancer in smokers attributable to  $\beta$ -carotene means that some eye nutrient products might be contraindicated in smokers. For smokers or recent smokers (within 5 years), VISIVITE smokers formula, which has vitamin A replaced by another carotenoid, lutein, may be a safer choice.

At present, the routine use of eye nutrient products by patients at risk of visual loss to AMD is still controversial despite the positive results from AREDS. Although results from other large-scaled studies may also support their role in the future, it is likely that the issue will remain controversial. Owing to the devastating effects of AMD on visual function, patients will continue to seek all possible means of prophylaxis. In the absence of firm guidelines on prescribing policy of such products, it is important for clinicians to be equipped with some basic and essential knowledge on eye nutrient products in order to assess and counsel patients properly.

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