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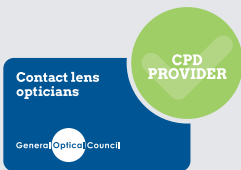
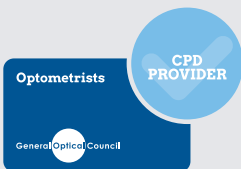


SPECIALTY:
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PROFESSIONAL GROUPS



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Discussing nutrition

The role of the dispensing optician

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Nutrition plays an important role in eye health. The idea that nutrition has an impact on health is not new or novel, but many do not see the association with eye disease. Optometrists and dispensing opticians (DOs) are in the perfect position to convey this message to their patients. By doing so, we can help reduce the chances of long-term eye conditions and have a huge impact on patients' day-to-day wellbeing.

With sight often cited as being the most important sense¹, it is likely that increased awareness of preventable strategies would be well received – especially by those who have seen the devastating effects that conditions like age-related macular degeneration (AMD) can have on family members. There are also nutritional considerations for dry eye disease, which is becoming more and more prevalent with our modern lifestyles².

This brings into question the role that DOs and contact lens opticians (CLOs) can play within optometric practice. Optometrists are likely to discuss AMD with their patients, and nutritional advice may be given along with this. However, with the amount of information that is conveyed in the testing room, it is sensible to think that much of what is said can be lost. Studies suggest that 40 to 80 per cent of what is said by a healthcare practitioner is immediately forgotten³. The more information that is given, the lower the correct recall percentage.

DOs may be in the perfect position to have these conversations after an eye examination has taken place. Whilst DOs also have a significant amount of information that needs to be discussed, it seems more likely that there will be less time constraints and more chance to have follow-up conversations. Having a firm understanding of nutrition can help solidify the patient's overall understanding, and perhaps encourage them to take action, which could have a significant impact on their long-term eye health. CLOs are in a unique position as they often encounter anterior eye conditions, such as dry eye.

This article discusses the latest research on nutrition and eye disease, and aims to help DOs and CLOs to become more comfortable when discussing the subject. Hopefully, it will also encourage further reading on the subject.

Whilst nutrition plays a role in almost all diseases, we will be focusing on two specific eye conditions: AMD and dry eye disease. Other conditions, such as glaucoma, appear to have a link with diet, but it is far less clear, so will be omitted for this article. Diabetes and its associated ocular disease are more complexly related to nutrition, and better managed under a nutritionist. The research for the two conditions that are discussed in this article are more straightforward in their nutritional recommendation, and within the scope of optometric practice.



The Mediterranean diet is inherently anti-inflammatory

Age-related macular degeneration

AMD is the leading cause of severe vision loss in the UK⁴. Some of the main risk factors for AMD are⁵: age; smoking; nutrition; and genetics. There are other considerations, such as high myopia⁶ and ethnicity⁷, that also play a role, which we are not going to discuss in this article.

Smoking is still the largest modifiable risk factor, with smokers who have susceptible genes being around 10 times more likely to develop AMD in their lifetime than non-smokers⁸. They are also more likely to develop the condition around 10 years earlier. Nutrition also plays a significant role.

Epidemiological studies are clear that increased intakes of fruits, vegetables, oily fish and wholegrains is protective against advanced AMD⁹. There is an increased positive association with the

Mediterranean diet, which is high in all of the aforementioned as well as other protective compounds such as olive oil. The diet is also lower in some of the foods that have been implicated as damaging, such as sweets and refined foods – often found in the typical Western diet¹⁰.

UNDERLYING CAUSES INFLAMMATION

One of the reasons that the Mediterranean diet is thought to offer protection is its association with oxidation and inflammation. It is clear that inflammation plays a role in most disease states¹¹, and eye disease is no different. Inflammation plays a crucial role in both AMD¹² and dry eye disease¹³.

There are various factors that affect whether a diet is inherently inflammatory or anti-inflammatory, such as levels of processed, simple sugars and saturated fats (pro-inflammatory). Fruits and vegetables are, on the whole, very anti-

inflammatory¹⁴, as too are nuts and seeds. The Mediterranean diet contains large amounts of vegetables, nuts, seeds, wholegrains, fish and fruits, making it inherently anti-inflammatory.

Being realistic, it is not likely that optometric practice is going to make significant inroads into the modern UK diet. However, one of the areas that is more easily modified is levels of omega-3 (n3) and omega-6 (n6). Both are essential fatty acids that we need from our diet. But the typical western diet is far higher in n6 than n3.

In the typical western diet, which represents the UK diet, it is thought that most of us have a ratio of around 20:1 of n6:n3, tipping the balance in favour of inflammation. The ideal ratio is thought to be around 4:1 or less¹⁵ n6:n3. This is a more anti-inflammatory ratio, and closer to what we evolved on.

The best sources of n3 are oily fish, such as salmon, sardines and mackerel. There are also moderate levels in flaxseeds and walnuts for those who do not eat fish, albeit in a form that is less easily digested due to the length of the fatty acids. Vegetarian sources are more poorly converted to the beneficial long chain fatty acids, EPA and DHA¹⁶, with the exception of algae oil, which is a newer supplement on the market.

Oily fish contains EPA and DHA already, does not require any conversion and is therefore more popular as a supplemental source. As for n6, it is highly prevalent in the UK diet. Most people do not need to actively seek out foods that are high in n6¹⁵. Examples of such foods include processed ready meals, vegetable oils, pastry, cakes and spreads.

One of the interesting parts about increasing levels of n3 is that by doing so, people actively lower their levels of n6, because they compete for the same enzymes¹⁷ – with n3 being preferred by the body. So, by simply increasing levels of n3 in the diet (or through supplementation) it is possible to re-balance the n3:n6 ratio.

Of course, the best approach would be to look at reducing intake of ultra-processed foods and focus on natural, unprocessed foods that are naturally going to help with this balance. This is most likely outside of the scope of DOs and optometrists. However, underlying evidence-based knowledge is useful for more in-depth discussions with patients.

OXIDATIVE STRESS

Another area that plays a crucial role in the development of eye disease is oxidative stress. Oxidative stress is the imbalance between oxidants and antioxidants¹⁸. Oxidation is a natural part of life, and our bodies are well equipped to deal with this if there is ample antioxidant defences. Our bodies have their own, in-built defence system, but this is dependent on nutritional co-factors.

As with inflammation (which goes hand in hand with oxidative stress), there are foods that are beneficial and foods that can actually increase oxidative stress, thus promoting disease. Not only this, but prolonged oxidative stress can actually lead to chronic inflammation¹⁹.

It is no surprise that the foods that increase oxidative stress are similar to those that cause inflammation, i.e. overly-processed convenience foods. Foods very high in processed carbohydrates and saturated fats are some of the worst, such as pastries, cakes and most highly-processed ready meals.

Foods higher in antioxidants include fruits, vegetables, nuts, seeds, legumes, olive oil and oily fish. This is what we could consider to be the traditional Mediterranean diet. This diet is also high in polyphenols, which are compounds found in plants that act as antioxidants and anti-inflammatory agents²⁰. They are protective for various disease states, from cancer to AMD²¹.

DIET AND DISEASE

Whilst there are many different ways in which inflammation and oxidative stress can be managed through diet, it is also very difficult to pinpoint exactly which mechanisms are most important when it comes to AMD. Simply increasing antioxidants through the use of supplements has been shown to be ineffective in some studies²².

There have, of course, been other studies that have shown a clear benefit from supplements, which we will discuss shortly²³. However, diet appears to be the clear winner in this versus the approach to increasing levels of protective elements when compared to supplements. There are various reasons for this. Firstly, when you increase vitamin C by eating an orange, you are not just increasing vitamin C intake; you are also

ingesting many other compounds such as vitamin E, potassium, B vitamins and polyphenols. This makes it extremely difficult to pinpoint a single, protective element found in food. Instead, studies often focus on dietary patterns and their associated disease modification.

One such study looked at the adherence to a Mediterranean diet, measured through a mediSCORE. The score represented the amount of foods that were typically found in the Mediterranean diet, and was graded from zero to nine, with the higher number representing adherence to the Mediterranean diet.

For those with a >6 score, their risk of AMD was 60 per cent lower than those with low adherence²⁴. The foods that were responsible for the higher mediSCORE (and thus AMD protection) were vegetables, legumes, cereals, fish, olive oil and alcohol. The protective effect of some alcohol in AMD is not new, with other studies suggesting a protective effect²⁵. The reason for this is that certain alcoholic drinks, such as red wine, are fantastic sources of polyphenols. Importantly, the levels in the previous study were moderate, and not excessive.

Perhaps the biggest drawback from studies such as these is their use of food questionnaires. Often, participants are asked to give a recap of what foods they ate over the course of a typical week, which is then analysed for the compounds present, such as vitamins and minerals, from the food source.

Unfortunately, recall of foods eaten is often quite unreliable²⁶, with many overestimating how good they eat, and underestimating the levels of ultra-processed foods in their diet. Food diaries and online trackers can go some way in helping with this, and there are some excellent tools available that measure daily intakes of important vitamins, minerals and phytochemicals, such as the Cronometer app.

NUTRITIONAL SUPPLEMENTS

This leads us to a discussion surrounding supplementation. Supplements are often much easier and straightforward to recommend. With a supplement, you can be sure that there are specific compounds that have been studied directly, with less ambiguity. That is why it is much easier to study their effects directly.

AREDS/AREDS 2

One of the largest studies to be conducted on AMD, the Age Related Eye Disease Study (AREDS)²³, explored the role of nutritional supplementation in the prevention of AMD progression. The study used a combination of antioxidant vitamins and minerals to assess the changes that were found in patients who had AMD who took the supplement, compared to those who took a placebo. It was found that there was little difference in the overall change in early progression of AMD, but that there was a significant protective effect when it came to changes from intermediate to advanced AMD for the supplement group.

Due to its success, the trial was followed up with the AREDS 2 study, which took place between 2006 and 2012. New formulations were used to explore any further protective effects that could be gained. They found that the introduction of two antioxidants, lutein and zeaxanthin, was preferential over previous formulas that included beta-carotene, which should not be supplemented with for smokers and /or previous smokers due to the associated risks of cancer²⁵.

Whilst the AREDS and AREDS 2 (published in 2013) trials have been hailed as ground-breaking research, which has given insight into the role that nutritional supplementation can play in AMD progression, they were not without criticism. One of these was that the participants were more well-nourished than the average person in the United States, with the vast majority taking a multivitamin and mineral supplement before the trial began²⁷. The argument against this is that if the participants were already well nourished, there would not be a large effect from extra supplementation.

Despite any criticisms, AREDS 1 and 2 were ground-breaking papers that highlighted that nutrition/nutritional supplementation plays a role in AMD as a disease. This is over a relatively short period of time when discussing age-related decline. If the criticism is merited, it only highlights that the results could be even more promising in the real world, with the average diet being worse than what was represented in the study.



Supplements should enhance an already good diet

SUPPLEMENTS VS REAL FOOD

Unfortunately, supplements often do not work as effectively as dietary interventions for a variety of reasons. Firstly, as previously mentioned, we do not just get one vitamin or mineral when we eat whole foods, we get many different combinations. Our bodies are also designed to take in vitamins and minerals alongside other compounds, such as polyphenols.

Nutrients often work better in synergy with one another²⁸. With nutrition being an ever-evolving field, it is unlikely that we will know exactly what interactions between the thousands of different compounds are most beneficial. Nature may have the answer with real food, as most contain a cocktail of nutrients that we have evolved on.

There is also the risk of imbalance, as

increasing one vitamin and mineral can offset another. When taken together, some minerals compete and the overall absorption is then decreased for one of the minerals²⁹, making the overall combination important. This may be a slightly negative outlook on supplementation, but there is another way we can view their use.

If we were to pick between diet and supplementation there would be a clear winner – diet. Instead, if we look at filling in areas of insufficient intake, or bridge the gap, supplements can become much more useful. An example of this would be a patient who attends with a family history of AMD, who doesn't like oily fish. If they want to be able to do everything in their power to reduce their chances of developing the condition, then n3 needs to be considered.

One option would be to discuss other sources of n3, such as flaxseeds or walnuts, but they have much lower levels of the beneficial, long-chain fatty acids EPA and DHA. Instead, we could look at increasing their levels of beneficial foods, such as fruits and vegetables, whilst also suggesting an n3 supplement to fill this gap. After all, as the name implies, supplements should supplement an already good diet.

NUTRIENTS FOR MACULAR HEALTH

Based on the clinical data from AREDS 2 and other studies³⁰, most macula health supplements will contain some or all of the following: vitamins C and E; n3; EPA/DHA; and lutein plus zeaxanthin. If we were to try to increase levels of these through diet, there are various foods we could focus on.

For example, vitamin C can be increased with higher amounts of fruit, especially citrus fruit. High levels of vitamin E are found in nuts, seeds and avocados to name a few. N3 (specifically the long chain fatty acids EPA and DHA) are found in oily fish, such as sardines or salmon. Lutein and zeaxanthin are found primarily in green leafy vegetables, with spinach and kale being the best source.

Importantly, lutein and zeaxanthin appear to be the most beneficial nutrients when we are considering AMD³¹. Zeaxanthin is an isomer of lutein, which can be synthesised by the body when we ingest lutein. Therefore, it is the lutein intake that should be focused on.

The average western diet is thought to contain only 2mg of lutein, whereas 10mg is thought to be optimal³². For reference, a cup of spinach contains approximately 8mg of lutein, and a cup of kale around 11mg³³. To get an optimal dose of lutein requires a diet that is very high in green leafy vegetables, making a supplement a more palatable approach. As previously discussed, spinach and kale both provide a myriad of protective compounds from magnesium to iron and vitamin K, making the food source more beneficial than a simple supplement. A supplement can ensure adequate levels of lutein and zeaxanthin alone, which is still important.

Dry eye disease

Dry eye is a multifactorial disease, with inflammation as one of the hallmarks of the condition³⁴. CLOs will undoubtedly be fully aware of the increased prevalence of dry eye, especially as it pertains to contact lens drop-out, with dry eye often being cited as one of the main causes³⁵.

Luckily, we have recently been gifted with the work that the Dry Eye Workshop (DEWS) produced. Its panel of researchers looked at multiple aspects of dry eye in order to come up with a consensus on the definition, diagnosis and management of the disease. It has also enabled future studies to be more closely aligned so that the results can corroborate with less disparity.

The DEWS II consensus is as follows: "Dry eye is a multifactorial disease of the ocular surface characterised by a loss of homeostasis of the tear film and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage and neurosensory abnormalities play etiological roles".

INFLAMMATION

As with AMD, there is a strong link between inflammation and dry eye. Studies have shown that increasing levels of anti-inflammatory ingredients can improve the ocular surface and reduce dry eye³⁶. There is no stronger link than the n3:n6 ratio in regards to nutrition.

The DEWS II management algorithm was designed to help practitioners manage their patients in a step-along approach, often starting from least invasive to most invasive³⁷. Step one provides a range of recommendations, which includes patient education on potential dietary modification, specifically stating oral essential fatty acid supplementation. We are fortunate to have had such a large-scale project that gives practitioners an evidence base to help their patients. Yet, the link between n3 intake and dry eye has not always been so straightforward.

POSITIVE AND NEGATIVE STUDIES

There have been numerous studies that have looked at dry eye disease and n3 intake or supplements. Many of these studies have found a strong correlation



Inflammation is one of the hallmarks of dry eye disease

with dry eye signs and symptoms³⁸. A meta-analysis of 17 randomised controlled trials (published in 2019) found a significant improvement in tear break-up time, dry eye symptoms and fluorescein staining³⁹.

However, not all studies agree. There was some confusion when the DREAM (dry eye assessment and management) study was released. It was expected to show a strong correlation between n3 intake and dry eye, in agreement with previous studies.

The study was conducted over one year with sufferers of moderate to severe dry eye. Participants were given either n3 (3g per day) or a placebo (olive oil). The results went against the previous consensus in that those who were assigned to the n3 supplement were no better off at the end of the trial when

compared to the placebo⁴⁰. There are numerous possible reasons for this, such as their use of olive oil as a placebo⁴¹. As previously mentioned, olive oil plays a significant role in the Mediterranean diet, which is anti-inflammatory by nature. For this reason, it has caused some division in the weight that the study holds.

There is limited data on the use of the Mediterranean diet in dry eye disease, with a recent meta-analysis suggesting mixed results for dry eye, but a positive association with AMD⁴². Other studies have found a benefit from multiple nutrients, such as vitamin C, B1 and polyunsaturated fats⁴³.

As with other areas of nutritional research, there is still more to be done before we will fully understand the role that n3 and the Mediterranean diet play in dry eye disease. However, we currently

have a large amount of research that suggests increased n3 intake is associated with a reduction in both signs and symptoms of the disease, making it a useful tool in dry eye management for CLOs.

There is also some scientific backing for increased water intake and reduced dry eye symptoms⁴⁴. This is another recommendation that is accessible and easy to implement.

Role of the DO and CLO

The author is fortunate enough to have worked in most roles within optometric practice, so has more insight than most when it comes to understanding how we can all play our role in helping patients.

It can be intimidating to approach the subject of nutrition with a patient, especially when they have already had a full eye examination and perhaps have not had a full discussion regarding the use of diet and supplementation. Care needs to be taken not to step over the line, but at the same time it is important to understand that we all have limitations and should do the best we can for our patients.

Often, clinics are extremely busy, with multiple pieces of information being given in a patient-friendly manner. Patients may need more clarity when they leave the test room. This is where the DO can play a vital role. Having a firm understanding of the latest research on

nutrition and eye health can enable them to guide patients to make healthier choices and consider options such as a dietary supplement.

CLOs will undoubtedly be used to talking about dry eye, and n3 is just one tool that can be considered. Just like dry eye drops, not everyone will see a full resolution of their condition from a single treatment, so we shouldn't be surprised that the same is true for dietary intervention. However, discussions surrounding their current intake of n3 (i.e. oily fish) can be beneficial in understanding whether or not a supplement could improve their condition.

As with anything in optical practice, a whole team approach is best. It is vital that everyone understands the tools that are available for long-term care, and nutrition is one of these. Just like the discussions around smoking cessation, talking about diet can be difficult, but patients need to be fully educated.

Thinking about what you would do if it were your family member may be useful. If they have a family history of AMD, why would we not discuss lutein and zeaxanthin? The patient who turns up every month to replenish their drops may benefit from an n3 supplement. Having team members there to discuss options in some detail could reduce their symptoms. These follow-up questions could be with a qualified member of the team, such as a DO.

Conclusion

Getting comfortable with nutrition is a tricky concept, because it is ever-evolving. Dietary habits and advice have changed throughout the years, and it is not unusual to see something being touted as health promoting only to be deemed harmful a few years later. That is why keeping on top of the latest research is useful so that you can help your patients make an informed decision.

IAIN JOHNSON is optometrist director at Johnson and Leatherbarrow Opticians, having previously worked in roles as a dispensing optician and contact lens optician. He has undertaken additional training in nutrition, personal training, dry eye and myopia management. Iain has won numerous awards including Contact Lens Practitioner of the Year (Optician Awards 2019 and 2021).

REFERENCES

References can be found when completing this CPD module. For a PDF of this article with references, email abdocpd@abdo.org.uk

LEARNING OUTCOMES FOR THIS CPD ARTICLE

DOMAIN: Communication

1.6 & 1.8: Communicate appropriately, within your personal-professional scope of practice, with patients about nutrition, diet and supplements in relation to their ocular health, and considering any research they may have previously undertaken and their personal clinical and lifestyle circumstances.

DOMAIN: Clinical Practice

5.3: Demonstrate an understanding of the latest evidence-based research in relation to nutrition and AMD and dry eye disease.

7.1: Conduct adequate assessment within your personal-professional scope of

practice for the purpose of the optical consultation including a discussion on nutrition and ocular health when appropriate.

DOMAIN: Contact lens speciality

Develop an understanding of the latest evidence-based research in the area of ocular health and nutrition and consider how this may be applied within your professional scope of practice.



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