

Veganism, DHA and Brain Health

Over the past few years there has been a boom in interest around veganism, with people choosing to switch to plant based foods and products for a variety of reasons - namely environmental, ethical and health related. This surge of interest is reflected by supportive vegan food trends, social media influencers and the launch of impactful documentaries such as 'What the Health?' and 'Cowspiracy' that have all played a large role in encouraging people to consider removing animal based foods from their diet.

Whilst increasing vegetables and fruit intake is crucial for improving health due to their richness in micronutrients, fibre and antioxidants, when it comes to brain health there are some key nutrients that cannot be found easily in a vegan diet that must be taken into consideration, if we want to keep the brain healthy on a long term basis. For example nutrients such as B12, Zinc and omega 3 fats, are examples of where the vegan approach can be at a shortfall when compared to diets that contain animal-based foods. For the purpose of today's article, the focus will be on DHA (one of two components of omega 3 fats), why it is so important for the brain and if you choose a vegan, vegetarian or a more plant-based diet what you need to consider in trying to get adequate amounts.

What is DHA?

DHA (Docosahexaenoic acid) is one of two components of Omega 3 fats (the other being EPA - Eicosapentaenoic acid), a family of fats that our body is not capable of producing, and as such, are necessary to be consumed through our diet to support health. DHA is particularly important for building and protecting brain cell membranes, which are the very intelligent outer structures of cells that play a central role in signalling - i.e how our cells communicate with each other via neurotransmitters, helping us learn, develop and keeping us emotionally stable. It is also well known that the membranes are in fact the 'brain' of our cells, rather than the nucleus. This is because when the membrane is healthy, it is able to selectively manage the intake of nutrients and the removal of waste, effectively acting like a traffic steward - allowing in all the good stuff that keeps our cells healthy and filtering out toxins that are no longer needed.

Another of DHA's key factors is its ability to switch on BDNF, the brain's growth hormone, which supports neuroplasticity. This is a mechanism that allows the brain to build new, healthy neural pathways, preventing brain injury and supporting learning and cognition. [Studies](#) show that those with higher levels of DHA in red blood cells have larger volumed brains, less incidence of stroke and better memory and cognitive function.

DHA and Pregnancy

Where DHA is perhaps most important in all life stages is throughout pregnancy. Fetal brain development depends on levels of DHA provided by the mother. The accumulation of DHA in fetal brain is [mainly in the last trimester of pregnancy and continues up until the end of the second year](#), helping to lay down the groundwork for a healthy brain for the rest of their lives. It is therefore commonly known that DHA needs increase at this critical lifestage in order to support fetal growth, particularly of the brain and eyes. [Animal studies](#) have highlighted that deprivation of omega 3 fats during pregnancy is associated with both behavioural and visual deficits that cannot be reversed with postnatal supplementation.

In order to optimise pregnancy outcomes and fetal health, [consensus guidelines](#) have recommended that pregnant women consume at least 200 mg of DHA per day. This can normally be obtained from eating roughly two portions of fish or seafood per week, however, those on a vegan diet would have to supplement with alternative algae supplements that contain concentrated amounts of EPA and DHA.

Vegan Sources of DHA

DHA can be acquired from both vegan and non-vegan diets. However, the form in which it is found in changes according to whether it is coming from an animal or plant source and is therefore processed by the body differently. For example, DHA is readily found in oily fish such as salmon, mackerel, anchovies, sardines and herring. Once ingested, the body does not need to do anything to it for it be used adequately. However, this is not the case with a plant-based diet - the body must first convert another fat called ALA (alpha-linolenic acid), via enzymes, in order to create DHA. ALA is found in flaxseeds, walnuts, chia seeds, pumpkin seeds, green leafy vegetables and algae. [Some Studies](#) show that conversion rates are, however, very low - with only about 5% of ALA being converted to EPA, while less than 0.5% is converted to DHA, meaning that those choosing vegetarian or vegan diets may benefit from including these foods in their diets every day in order to have adequate amounts.

However, recent investigations have suggested in the absence of fish in the diet, the body may be able to adapt, increasing the efficiency of the conversion from ALA to EPA and DHA. According to [findings published in the American Journal of Clinical Nutrition](#), in a cohort of 14,22 women and men between 39 and 78 years of age, the average DHA level in fish eaters was 271 micromoles per litre, compared with 241.3, 223.5 and 286.4 micromoles per liter for non-fish-eating meat eaters, vegetarians and vegans, demonstrating that there is not so much difference in DHA levels between those excluding fish in their diet to those including fish in their diets.

It is necessary, however, to point out that this study also presented with some significant limitations in that only a statistical estimation of ALA to EPA and DHA conversion was used. This meant that both the actual conversion rate and the end product of ALA was not measured, meaning that accurate knowledge of how effectively ALA actually converts was not gathered.

It is important to also add that the conversion rate of ALA to EPA and DHA can be inhibited by a variety of factors. For example, high levels of alpha-linoleic acid (omega 6 fat), as well as nutrient deficiencies that play an important role in the functioning of the enzyme that triggers conversion and other factors like genetics and health status can all impact the rate of conversion.

How to Optimise Conversion of ALA to EPA and DHA

- **Avoid Cooking with Plant Oils:**

Omega 6 is a fat that is widely found in plant oils such as sunflower oil, rapeseed oil, corn oil and soybean oil - these are commonly used in a vegan diet and must therefore be avoided to help optimise conversion rate. Instead, opt for coconut oil for sauteing foods - it has a very small amount of omega 6 and is able to withstand high temperatures without becoming damaged, unlike other plant and seed oils.

- **Ensure Optimal Intake of Cofactor Nutrients:**

The very clever enzyme that is responsible for converting ALA to EPA and DHA is called Omega 3 Desaturase. In order for its proper functioning, it needs the cofactor nutrients niacin (vitamin B3), vitamin B6, vitamin C, zinc and magnesium. Niacin, B6 and vitamin C are widely found in the diet, however, zinc and magnesium can often be a little more tricky to get enough of. Great vegan sources of zinc are pumpkin seeds, hemp seeds and tofu. Magnesium is found in green leafy vegetables, dark chocolate and avocado. Be sure to have regular intake of these foods to make sure you're loading up on all the necessary vitamins and minerals that help your body make enough DHA.

A final word on DHA...

Levels of DHA may depend on a variety of factors, so if this is something that concerns you, you may want to consider having a blood test to check your levels of essential fats and also see how well your body is converting ALA to EPA and DHA. There are some private test companies such as [Medichecks](#) and [Invivo Health](#),

which offer tests to measure both omega 3 and omega 6, as well as other fats to gain a full picture of what you may be lacking.

If you're vegan or vegetarian and would like to supplement with omega 3, companies such as [Nordic Naturals](#) and [Cytoplan](#) and [Holfordirect](#) offer algae based supplements that have good quantities of EPA and/or DHA.

Lastly, as a final reminder, if paying for supplements isn't within your budget, be sure to have abundant amounts of ALA sources in your diet to make sure you're making enough EPA and DHA. Good sources of ALA are:

- Walnuts, hemp seeds, chia seeds, flaxseeds and pumpkin seeds
- Green leafy vegetables