

Oily Fish, Omega 3, and the Impact on Children's Wellbeing – Is it more than a “Red Herring?”

This draft information sheet has been developed by Dave Rex, Specialist Dietitian for ASD and ADHD. It has been produced because many families are very interested in the role that diet can play in helping with their child's mood, learning, general development and health. This is especially true of families who have ASD, ADHD or another “neurodevelopmental” diagnosis. There is also interest in this topic from families that have children with diagnosed mood disorders and behavioural difficulties. There are many aspects of diet that affect the brain. This information is specifically about oily fish and the essential fats they contain.

Fish has long been thought of as “brain food”. Specifically, there is much interest in omega 3 fats that are found in oily fish, and their role in the brain. This information sheet includes the most commonly “Frequently Asked Questions” by parents and carers of children with ASD and ADHD on this topic. A great deal of care has been taken to ensure that the information is both scientifically accurate and of practical use. It is a draft at this stage and comments from families and professionals are welcome. Research papers can be made available to anyone who wants to check out the evidence behind any of the statements made.

Is it true that fish is good for the brain?

Fish is important for brain development, concentration, mood, sleep and general health.

What is it in fish that's so good for us?

This is because it contains important minerals like selenium, iodine and zinc, vitamin A & D, and essential fats known as **long chain omega 3 fatty acids**. These are all important for the brain and the intake of each of these is often quite low in children's diets.

I've heard that omega 3 fish oils can help children. What sorts of difficulties can it help with?

There is some evidence omega 3 fats might be helpful for children with ADHD, anxiety, sleep problems, asthma and eczema. These difficulties:

- Are more common in people with low omega 3 levels or low oily fish intakes
- Can be **partly** managed by increasing the intake of omega 3 fats

Oily fish and the omega 3 fats they contain, are also thought to be important for a healthy heart and brain as we get older. This is the main reason why including oily fish is included in healthy eating guidelines for the general population.

My child will eat white fish like haddock. Does this contain any omega 3?

It contains a little. Most children and adults in the UK eat some fish, but most of this is not very high in omega 3 fats. Only oily fish provide high levels of essential omega 3 fats. Fish with high levels of omega 3 fats include **sardines, mackerel, herring, salmon, trout and anchovies**.

Lean white fish and shellfish contain about 10 to 30% the level found in oily fish. Fresh tuna can be rich in omega 3 fat, but canned tuna usually has quite low levels. Other oily fish are still rich in omega 3 when they

are canned. All fish and seafood are nutritious even those that are not rich in omega 3 fats. Eating fish of any kind, twice a week is an important part of a healthy diet.

How much oily fish should children eat?

The “*Scottish Dietary Goal*” is that we should all eat at least one 140g portion of oily fish per week. There are further benefits from 2 portions of oily fish per week and even from 4 portions. There is no known benefit from more than 4 portions a week. The average intake in the UK is one quarter of 1 portion per week!

If my child will not eat oily fish, should I give a fish oil supplement?

Children who do not eat oily fish should take a fish oil supplement. They are as important to the brain as calcium is for healthy bones. Remember though that oily fish comes in many forms. If your child does not like one, try a different kind. That means not just different species, but different forms like smoked, pickled, canned, bread crumbed, fresh and canned in sauce, water or brine, or in pate. Canned oily fish like mackerel and some sardines, are also now available without skin and bones.

My child eats oily fish once or twice a month. Is it still worth taking a fish oil supplement?

The benefit of oily fish occurs right up to 4 portions a week for boys or two portions a week for girls. Realistically, very few children will eat 4 portions a week. If your child has a condition, diagnosis or difficulty where omega 3 has been shown to have some benefit, but only occasionally eats oily fish, then it might well be worth taking a supplement as well.

How long should I expect it to take to see a difference?

Omega 3 takes time to get into brain tissue and elsewhere in the body. Expect to see some possible differences in 6 weeks. By 6 months, you should be seeing the maximum benefit (if any). If you are not sure, stop for a few weeks, after a 6 month trial and see if you think things are getting worse. Even if there is no apparent difference, it will still be worth taking at least 250mg EPA + DHA per day if a child rarely eats oily fish.

How strong is the scientific evidence that omega 3 fat can help?

There are many biochemical and physiological mechanisms through which omega 3 is known to reduce inflammation and improve aspects of brain function. These include the composition and function of brain cell membranes, and the inhibition of substances called “cytokines” that cause inflammation. We know this from animal studies and “*in vitro*” (test tube) studies. In addition, population based (“*prospective*”) studies with thousands of people tells that what we see in animals and test tubes, also happens in humans. Finally, there are also some clinical trials that show a positive effect.

Is omega 3 better than medication?

If you are already taking medication to help with one of these conditions, continue with this. The evidence that the medication helps, may well be stronger than the evidence in support of omega 3. The types of evidence in favour of nutrition and medication are often very different to each other so it is hard to compare. In most cases, you can take both medication **and** omega 3.

The level of proof we need in favour of essential nutrients like omega 3, is less than we need for medication. There are three reasons for this:

- Firstly, essential fats like omega 3 are essential by definition, and have many important functions in the body.
- Secondly, we know that most people have intakes that are well below the optimum range for good health and wellbeing.
- Thirdly, nutrients have fewer negative side-effects than medication, except at excessively high doses.

It is also worth bearing in mind that nutrition research has less funding than research into new medicines. This is because foods are not patentable as they already exist in nature. There is therefore a lack of commercial incentive to prove the benefits of essential nutrients like omega 3.

Examples are given below of specific conditions, difficulties and diagnoses where omega 3 may play a helpful role, is covered in more detail in Appendix II.

If my child is deficient in omega 3, how will I know?

We can get a clue from looking at the diet. However, some people need more than others so assessing oily fish intake is not always a reliable way of knowing if someone has enough omega 3 to meet their personal needs.

In the future, it may be possible to test the level of omega 3 in the blood. This happens only in scientific studies and private practice at present. Some children actually show clinical, physical signs of deficiency in essential fats. These can include:

- Raised red bumps / sandpaper texture at the tops of the arms and sometimes the thighs
- Frequent thirst and urination (without diabetes)
- Dry, dull or brittle hair
- Weak or brittle nails
- Dry patches on skin

Having just 1 of these symptoms may just be co-incidence and nothing to do with fatty acid deficiency. Having several of them may be a clue that someone is deficient. To help you decide how likely it is that your child will benefit from omega 3 supplements, look at the checklist in appendix 1. If you tick 3 or more, it might well be worth trying.

What is the ideal intake of oily fish or omega 3 supplements?

250 mg of EPA+DHA per day is about the same as the amount provided by the Scottish Dietary goal of 140g of oil rich fish per week. This is a “minimum target”. The European Food Safety Authority’s recent “Scientific Opinion” of seafood consumption suggests that benefits of seafood consumption increase up to and including 4 portions a week, with no clear addition benefit at higher intakes. If all 4 portions were oil rich, this would be an intake of 750 to 1000mg per day of EPA + DHA. This seems like a sensible limit to the consumption of omega 3 from supplements (with tighter limits for girls and women of reproductive age – see later). However, clinical trials have successfully used doses of 1500mg in adults and older children for various conditions and difficulties. Some trials in adult psychiatry have suggested very high doses may be counterproductive.

Can you take too much omega 3?

For long chain omega 3 fats, the Food and Agriculture organisation (FAO) the European Food Safety Authority (EFSA), and regulatory bodies from various countries have tried to suggest safe limits. EFSA have said that there are no known harmful effects from up to 5000mg per day for adults. The strictest limit comes from FAO who set a daily limit of daily of 2000mg per day from EPA and DHA combined. In setting these limits, it is acknowledged that a number of successful clinical trials have used higher doses with no harmful effects; and that seafood consumption in some countries also exceeds this level of intake with no known harmful effects. Few authorities will commit to a separate safe limit for children. In the absence of any clear official guidance, we suggest not exceeding the 2000mg (EPA+DHA) limit for older children, and a tighter safe limit of 1000mg per day for younger children (with no specific guidance on limits for EPA and DHA individually). This could be reviewed upwards if clear evidence of benefit of higher doses becomes available from clinical trials in the future. Note that some products also contain Vitamin A. This is found in cod liver oil, or it can be added to omega 3 oil. If this is present, it will be stated on the label. For products containing vitamin A, you must not exceed the recommended dose as too much vitamin A can be toxic. It is best to choose an omega 3 product without vitamin A because then you can give the ideal level of omega 3 without risking too much vitamin A.

Summary table of safe and potential helpful oily fish and omega 3 intakes

Age	Estimated Minimum requirements	Possible optimum range	Do not exceed
12 years of age and older	250 to 500mg EPA+DHA (or 1 to 2 portions oily fish per week)	500 to 1500mg EPA + DHA (or 2 to 4 portion oily fish per week)	2000mg EPA + DHA (or 4 portion of oily fish per week)
Younger children (2 to 12 years)	250 mg EPA+DHA	250 to 800mg EPA + DHA (depending on age)	1000mg EPA + DHA

(Advising on omega 3 requirements for children under 2 years of age is out with the scope of this information sheet. However, omega 3 fats are important in brain development both before birth and in infancy. In addition, the omega 3 content of breast milk is higher in women who eat fish compared to those who do not)

My child dislikes oily fish and isn't good at taking tablets and capsules. Is there a liquid version?

Don't give up hope on oily fish! In the meantime, long chain omega 3 comes in capsule form from both fish and from algae. The fish version also comes in liquid form. Younger children tend to prefer the liquid which often flavoured and easy to swallow. Older children may prefer capsules which have little taste. Some products are actually quite low in omega 3 so choose carefully.

Some supplements are high in DHA and some high in EPA. Which is the best to choose?

We are not sure. Some studies with older children and adults suggest that EPA is the most important. This may just be because it takes longer for DHA to have an effect. We think DHA may also be important so choose one with some of each. Be careful with cod liver based products. They are also rich in vitamins A and D. If you use one of these, do not exceed the stated dose as you may get too much vitamin A.

How much fish do you have to eat to get as much omega 3 as you would get from supplements?

Herring, salmon, mackerel, sardines, anchovies, trout typically contain 1000 to 2000mg of EPA + DHA per 100g. Eating this kind of fish, at one to two 140g portions per week, provides an average of 250 to 500mg (EPA+DHA) per day. Clinical trials with omega 3 sometimes use higher doses. Populations with good public health records also have higher intakes than this as they eat even more fish.

I've heard people say that it's not safe to eat lots of fish. Is this true?

Very high intakes of oily fish can expose the body to pollutants called "PCBs" and "Dioxins". Very high intakes of tuna and moderate intakes of swordfish, marlin and shark may expose the nervous system to too much mercury which is also toxic. All of this means that girls and women who are pregnant, or hoping to become pregnant should:

- Avoid more than two 140g portions of oily fish per week.
- Avoid more than 2 tuna portions a week.

This advice is just to make sure that pollutants in certain fish are not consumed at such a high level that they might harm an unborn child. Finally, swordfish, marlin and shark should not be eaten at all by children, or by woman who are pregnant, or trying to become pregnant as these are the highest in mercury. Other adults can eat this kind of fish once a week. Supplements have to meet a tight European Union legal standard to meet for maximum toxin levels.

Are there are other foods that contain omega 3 and do these have the same health benefits?

Vegetarian sources of omega 3 can be found in nuts, seeds and their oils. The body can convert some of this into the long chain omega 3 fats found in fish. Foods like walnuts, rapeseed oil and flaxseed oil are good examples. Because the conversion in the body cannot be relied upon and is limited anyway, omega 3 from fish provides far clearer and more consistent health benefits.

How can vegetarian children get the same kinds of fat found in oily fish?

Vegetarians can get exactly the same omega 3 fats that are found in oily fish, by taking omega 3 supplements made by algae. These are available online but are very expensive. Taking a teaspoon of flaxseed oil, a tablespoon of rapeseed oil or 30g of walnuts a day, will have some benefit. Our bodies can convert a small amount into the more useful omega 3 fats found in oily fish and algae. Your body will convert more if you don't eat too much of another essential fat called omega 6 (see later).

I've seen supplements that say they have omega 3, 6 and 9. Do we need all of these?

Omega 3 is only 1 type of essential fat. The other kind is called **omega 6**. Having a diet rich in omega 6 fats, is thought to increase your need for omega 3. Omega 6 and omega 3 fats often have opposite effects on the

body. Omega 6 fats help promote inflammation and blood clotting. Omega 3 tends to reduce inflammation and helps prevent blood clots. Omega 9 is another name for the “monounsaturated fats” we get from olive oil. Monounsaturated fats are not essential but are a healthy alternative to saturated fats.

If omega 6 fats are also essential, are we likely to be deficient in this too?

Most people already get enough and some get too much already. However, a few people may not get enough! You are only likely to be deficient in omega 6 if you avoid vegetable oils, nuts, eggs and meat. In those very specific circumstances, you might need to increase omega 6. The modern British diet is much higher in omega 6 than omega 3. Typically we consume five to eight times as much omega 6 as we do omega 3. We should not really have more than two to five times as much omega 6 as 3. Limiting your omega 6 intake from vegetable oils can help reduce your requirements for fish and omega 3.

What foods contain the most omega 6 fats?

The richest sources are sunflower, soyabean and corn oils and foods with high levels of these like vegetable oil based spreads, and some deep fried foods. You can reduce your intake of omega 6 fats by switching from sunflower, corn or soyabean oil based products to olive, rapeseed based ones. Nuts are also high in omega 6, but very nutritious overall so they are still worth including in the diet. Walnuts are particularly good to include because they are high in omega 3 too.

There are so many kinds of fat. Which ones are good for us and which ones should we limit?

Omega 3 and 6 fats are **essential “polyunsaturated”** fats. Most people do not get enough omega 3 fat. A few people get too little omega 6 but more people have too much. Other **non-essential** fats include saturated fats and monounsaturated fats. Most of us already eat quite a lot of saturated fat. This is found in fatty meat, cheese, cream, butter, lard, pastry, cakes, biscuits and many other foods. Saturated fat tends to be solid at room temperature. If we replace some saturated fat with monounsaturates, it may be better for brain and heart health in the long term. Monounsaturated fats are found in olive oil and avocados. Rapeseed oil and nuts are high in both monounsaturated and polyunsaturated fats.

Appendix 1

Symptom / diagnosis / difficulty	
Raised red bumps on tops of arms (follicular keratosis) and sometimes the thighs	
Dry, dull or brittle hair	
Weak or brittle nails	
Dry skin, dermatitis, eczema or psoriasis	
Asthma or wheezing	
Excessive thirst and urination (but no diabetes)	
ADHD, ASD, DCD or dyslexia	
Poor mood / anxiety	
Strong family history of difficulties above	
Poor sleep	
Oily fish eaten rarely or never	

How many of the above apply to your child? If you find that you can tick three or more of these, it might be worth taking an omega 3 supplement. It will also be worth taking a supplement, at least at a low level, even if you have only ticked the last box. The more boxes you tick, the more likely it is that your child will benefit from an omega 3 supplement. These benefits might be related to physical health, mood or any other aspect of brain function. If your child already eats oily fish regularly, and you have not ticked any other boxes, it is less likely that an omega 3 supplement will help.

Appendix II – Conditions and difficulties where oily fish or omega 3 fats might be beneficial

- **ADHD:** Omega 3 fats play important roles in brain cell membranes. Several clinical trials have successfully used omega 3 to reduce ADHD symptoms. Results vary but on average, omega 3 seems to have a mildly positive effect on ADHD symptoms. Most of the benefit seems to be on attention rather than hyperactivity. There is also some evidence that children with ADHD find emotional processing more difficult if they have a low level of omega 3 fats.
- **Autism:** Too little research has been carried out on ASD to know how helpful it might be, but low levels of omega 3 are more common in children with ASD than the general population.
- **Dyspraxia:** Omega 3 has also been used to improve reading, spelling and ADHD symptoms in a population of children with dyspraxia (DCD).
- **Reading difficulties:** Low levels omega 3, partially predict reading difficulty in people with and without dyslexia. Trials in dyslexia not produced consistent results but signs of omega 3 deficiency are often observed in people with dyslexia. Omega 3 is essential for development of a healthy visual system.
- **Anxiety:** Omega 3 fats have been successfully used to reduce anxiety and inflammation in students. These students did not have a diagnosis of anxiety disorder, but were less anxious if they took omega 3.
- **Sleep problems:** We know that omega 3 fats (and other nutrients) are required for the production of melatonin (the hormone that makes us fall asleep when it gets dark). They also influence the production of chemical called prostaglandins which are important in regulating sleep. Low DHA levels in the blood are associated with sleep problems. In a small study, omega 3 supplements increased sleep by an average of 58 minutes. This recent research needs to be replicated the larger numbers.
- **Depression:** Omega 3 fats have been used in clinical trials to treat depression with mixed results. Trials using mostly EPA (rather than DHA) have sometimes been effective in treatment people with a diagnosis or clinical depression, but not effective in people with “poor mood” but no actual diagnosis of depression.
- **Eczema and Asthma:** Eczema and Asthma involve inflammation in the skin. Omega 3 fats are known to reduce the production of chemical in the body that cause inflammation. Eating fish at least once a week in early childhood appears to reduce the risk of eczema. Similarly, eating fish appears to reduce the risk of Asthma in young adults. Trials giving fish oil to treat eczema and asthma have produced conflicting results, with some showing a benefit and others not. It may be that increasing omega 3 and reducing omega 6 intake can help reduce the risk of getting eczema and asthma, or the severity of it.

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