

Omega Three Fatty Acids

What is a fatty acid? The official definition is - a carboxylic acid consisting of a hydrocarbon chain and a terminal carboxyl group, especially any of those occurring as esters in fats and oils. They are the building blocks, for fats, in our bodies, and there are different types. Notice that they are an acid, and it is their COOH cap that is the reason these molecules are acids. They are very familiar to an acetic acid, except they form much longer chains. In order to make a fat you need to take three fatty acids and bond them with glycerol to form a triglyceride, notice the 'tri' in the name, indicating the three fatty acids. The type of fatty acids that make up a triglyceride will control many attributes about the fat, such as how healthy it is, or how it looks or if it is a solid or a liquid at room temperature, these characteristics of fat will often divide them into categories of saturated or unsaturated fats. Triglycerides are one of three of the main classes of esters, the other two being phospholipids and cholesterol esters. Esters are defined as a chemical compound derived from an acid where at least one OH (Hydroxyl) group is replaced by an O (alkoxy) group. Esters are, usually, derived from carboxylic acid and an alcohol, and glycerides are fatty acids esters of glycerol. The Omega three fatty acids are derived from, you guessed it, three main different types of acids, Alpha-linolenic acid *ALA which has a 18 carbon chain, eicosapentaenoic acid *EPA which has a 20 carbon chain, and docosahexaenoic acid *DHA which has a 22 carbon chain. The DHA and the EPA are found mainly in fishes and other seafoods, while the ALA's are mainly found in plant/nut oils like flaxseed, soybean and canola oils. Fatty acids are essential for our body and our body cannot make them, which means it needs to be consumed from an outside source. ALA's can be processed by the body and produce small amounts of DHA and EPA but not in a significant amount, so getting DHA and EPA from foods or supplementation is necessary to maintain adequate level. Omega threes are the food for our brain, sperm and eyes and plays a huge role in brain, eye, heart, cardiovascular, immune, and endocrine health. Studies are only just now stretching the surface of the vast array of benefits derived from Omega three supplementation.

Lets first look at Cardiovascular disease and omega three's, here we find, what at first may seem to be a web of conflicting information, but upon further examination both are supported by scientific data. This proves to be a conundrum worth exploring further. First we have key data showing that Omega threes can decrease inflammation throughout all parts of the body, it also can also decrease triglycerides, remnant lipoprotein levels, decrease rate of growth of atherosclerotic plaque, improve endothelial function, slightly lower blood pressure, decrease risk of arrhythmia and risk of thrombosis. In large scale epidemiologic studies with coronary heart disease (CHD) in relation to omega three consumption, secondary prevention studies suggest intake of . 5-1.8 grams per day from a fish source of DHA and EPA. With suggested intake of 1.5-3 grams per day of ALA which comes from plant and nut sources. This same study shows that 2-4 grams of EPA+DHA per day can lower triglyceride levels by 20-40%. It is also noted that Eskimo's have a very high normal dose of Omega three over generations and this has cause many interesting traits to develop. A study in Alaska in the town of Yup'ik, Eskimos on average consumed 20 times more omega three than people in the

lower 48 states. After taking blood and measuring the concentration on DHA and EPA in the local population and then found an interesting data set. The study showed that obesity did not necessarily increase your risk of heart disease. That while most of the natives were obese, only those that had very low levels of DHA and EPA in their blood had increased blood triglycerides and c-reactive proteins *called CRP and is a measure of inflammation in the body, and it is these elements that increase the risk of heart disease. The people tested at high levels of DHA and EPA in their blood, despite being obese still tested at the same triglyceride and c-reactive protein levels as that of a 'normal weight person' indicating that the high omega-3 levels in the blood protected the individual from the harmful effects of obesity. It was also found that blood may have a harder time clotting at high levels of omega three intake, in the normal population, than in the Eskimos, who have existed for generations with this mainly fish diet. Another example, in a recent meta-analysis showed that omega-3 fatty acids from fish can provide a 36% reduction in an unambiguous, endpoint-death from coronary artery disease.

Now let's look at the other side. There have been many more recent randomized studies on the supplementation of oil, that have show little to no effect on cardiac effect. The analysis, in JAMA Cardiology, collected data from 10 randomized trials in people who had had cardiovascular disease or were at high risk for it. There were 77,917 people in the trials, 61% men, and their average age was 64. Studies lasted, on average, 4.4 years, and the dose of omega-3's ranged from 226 to 1,800 milligrams a day. No matter how the researchers looked at the data, they could find no association of the supplements with lowered risk for death from heart disease, or with nonfatal heart attacks or other major cardiovascular events. Another trial, The researchers examined 79 randomized trials of omega-3 fats, of which 25 were considered highly trustworthy because they were designed and carried out well, that supported the claim of Omega three's having no effect on heart health.

What is all of this about? How can we have two different data sets that both claim evidence to contradict each other? Well one idea is about the non regulation of supplementation through the FDA. This means that no one makes sure that what is listed on the bottles label is actually in it. Meaning that unless the studies tested all of the supplements given, for accurate levels of DHA and EPA themselves then they may have been in much less concentration than advertised, if there was any at all in the brand taken, which would not give accurate results in the study. Because in studies that took actual blood DHA and EPA levels could prove a benefit to those higher blood concentration levels. Indicating a gross oversight. As not one study that I found, that indicated no heart health benefits, used any measure of DHA or EPA blood level measurements nor did I find any indication of measuring the actual levels of DHA and EPA in the individual pill supplementation programs.

Lastly we will take a look at my own 16 year observations in using omega three fatty acids at 1TBS per day per 100-200lb body mass, over the course of 5 generations of canines. In the early years, with my first generation which I started on Omega threes at 6 and 9 months of age daily, in my first generations from these pairings I had on average 1 pup out of 2 litters that ended up having heart issues. One sire in-particular threw 4 pups in one 'out' litter *meaning the female was not owned by me and omega threes were not administered at the dose I use, it was later learned that he had a heart

issue and lived till he was 6... of the puppy owners of 2 of the effected pups, who did keep their pup on high levels of omega threes and they lived till 5 and 6 years, the 2 other families that did not use the additional supplementation, lost their pups at 2 years of age in both cases. This sire had other litters prior to that at my house where the females were kept on omega threes during pregnancy and out of the other 5 breedings he had we only had three total other reported cases of heart issues in his pups. He was retired at these findings as were his daughters, but I did have two grand daughters who have now been on omega three fatty acids for two generations, that I did keep and after each had 3 total litters, not a single pup was produced with a heart issue. Actually with my very first generation of pups, with each new line I have brought in, which were produced by a mom taking omega threes for the first time in her lines, occasionally will have a heart issue pop up, but after 3 generations of moms being fed the omega threes, I have yet to have a heart issues in a pup of that next 4th generation.

Next I would like to look a infant health and development with the addition of DHA and EPA. Studies are indicating that higher levels of omega threes during pregnancy can improve brain functions. In the double blind, placebo controlled randomized study 'Judge et al' with consumption at 1500mg/wk found that Maternal DHA intake was associated with enhanced infant problem-solving skills but not recognition skills at 9 mo old. Another double blind, placebo controlled randomized study 'Dunstan et al' giving DHA at 2.2 g/d and EPA at 1.1 g/d found that at 21/2 year of age children whose mother were supplemented had significantly better scores of hand and eyes coordination. The study at Olsen done with 2.7 g/d of DHA +EPA showed that moms who had had previous preterm deliveries were better able to carry their baby to term. Another done with 2.7 g/d showed a decreased incidence of Asthma in children at 16. Actually the only studies that did not show a positive correlation in DHA and EPA were those given at lower doses like the study at Makrides which only did 800mg/d and showed no real improvement in cognitive development ... but again one may want to look at the quality of the supplement used, as these are unregulated fish oil capsules used in the study, but this could also indicate a correlation with higher levels having greater than proportion benefits than that at lower levels of supplementation. My own experience with this, is that pups who have been given adequate and consistent doses of Omega threes by way of mothers consumption, are easier to potty train, and have a less distracted nature compared to pups who's moms were not of any extra dose of omega threes. This has come by way of pups that I bring into my program and their trainability, or in other words how many lessons each pup needs before understanding what is being asked of that puppy, as well as attentiveness. Pups Brought into my program from outside breeders always take longer to potty train, sometimes being an adult and still having accidents even with a dog door present, they do not respond to verbal communication as well and take longer to learn new lessons they also have a shorter attention span, this is consistent with litters of my own. Reference one is with Cleo between her 2nd and 3rd pregnancy. During Pregnancy #2 , I had runout of Omega threes and was slow reordering and she only had them through her 2nd week, prior to embryonic implantation which occurs at around 18 days post tie. Litter two was still having potty training issues at week 8, and were very distracted pups that could not seem to calm down enough to listen. Then litter #3 we had her on the omega threes through out the pregnancy and that litter fully potty trained to a puppy door by 6 weeks

of age, they were also overall a much calmer litter of pups that all learned to sit for me by 8 weeks of age as a group. Reference two refers to three different puppies that I Brough in all from different breeders and all the same age by weeks and all brought to me during the same time frame. Two of the pups learned much faster, could calm down and listen to me and picked up our puppy door the first day we had them, while puppy #3 was wild and would not listen at all for weeks, it just seemed to distracted to listen, it also had several accidents that first week inside the house. When I contacted the breeders the two breeders that had produced the calmer, smarter pups, these two breeders who had been mentored by me and had the mothers on the omega threes during pregnancy and growth, while the third pup's breeder had not used any omega three supplementation during pregnancy or after.

Omega threes are also essential in the formation of the retinas, the cell membrane of the eye has one of the highest concentration of DHA in the body at 50-60% DHA in the total fatty acid content within rod outer segments of photoreceptors. These photoreceptors have the ability to constantly renew due to the amount of continuous oxidative damage to the eye, this means that the eyes need a constant source of DHA for its very composition. Higher levels of DHA in the photoreceptors which number 60 to each single pigment of eye color, has a positive correlation to flexibility of the bilayer, and adopt a hairpin-like structure, which increased the interfacial area per lipid. Another interesting fact about the eyes are that they renew from the inside out, the center which has high regeneration, but then these cells pile on top of each other to add old disks at the tip which have no regeneration ability, higher levels of DHA allows for greater shedding of these old receptors/disks allowing more new and fresh re-synthesis of new membranes. Without enough DHA in the membranes, it can cause loss of membrane fluidity and function which could alter the process of the outer segments renewal. In a study that looked at depriving rats over the course of three generations found that by the 3rd generation the retinas were reduced by 55% the amounts of omega three as rats fed a normal diet, this led to severe reduction in retina sensitivity. Another study 'Carrie et al. showed that supplementation with phospholipids rich in DHA restored retinal level of DHA and amplified the b-wave amplitude on an ERG. Dietary supplementation of DHA during aging improved the visual abilities both in the control and deficient mice. This study suggested that Omega threes could potentially reverse any retinal dysfunction that was linked with omega-3 deficiency earlier in the mouse's life, even if reversal did not begin until the animals were of much older average age. Literature goes on to state that the pre mentioned anti-inflammatory role that the omega threes have also play a positive role in eye health by inhibiting the formation of cyclooxygenase and lipoxygenase products of AA, this shift in the amount of omega threes results in anti-inflammatory effects. High omega threes also decrease the production of platelets, and modulates the effects of C-reactive proteins, vascular adhesion molecules, intercellular adhesion molecules and homocysteine. Omegas threes also can promote vascular regrowth after injury, thereby protecting against neovascularization, which is the formation of blood vessels, which in the eye could cause serious sight problems, and many sight-threatening diseases have a first stage where there is vessel loss, then it is followed by hypoxia-driven destructive neovascularization, basically a stress driven response to damage where new blood vessels will grow in places to increase blood supply to try and repair damage, but in

some places like the eye or the joints this can cause more damage to the area than the original injury. These findings indicate that increasing the amount of omega-3 or their bioactive products will reduce pathological angiogenesis. Omega threes were shown in a study with rats showed protection from neurotoxicity by way of ischemia, or prevention of blood from getting to the eye organ, which will poison the eye. But the rats with higher levels of DHA were quicker to recover by way of preserving the mitochondrial membranes potential and inhibiting caspase activation. Another huge plus for omega's and the eyes are its benefits to AMD or age related macular degeneration. There is now a correlation between low DHA in the retina and early onset AMD, but the best news is that with increased consumption of omega threes, but more specifically ALAs which can be found in both fish and nuts, that these increased levels, decreased the risk of AMD progression.

Another brain benefit from Omega threes are in the areas of dementia with Alzheimers disease. Unfortunately the reverse of that is that not consuming enough omega threes can lead to an increased risk for age-related cognitive decline or dementia such as Alzheimer's disease. With out the neuroprotective properties of adequate levels of omega three you risk not being protected from an array of factors, one of the key factors is that a diet high in omega threes with limits the production and accumulation of the amyloid β peptide toxin that is widely believed to drive the disease. Another nine epidemiological studies support increased dietary intake of fish as associated with the educed risk for cognitive decline or dementia, by a whopping 40-50%. Several studies will back up this, such as the study done in Kalmijn at al 1997, which showed an inverse correlation with cognitive decline. In the 'Morris at al 2003' study it showed a reduced risk with DHA but not EPA for AD. Two studies correlated a dose dependent effect these were 'Nurk at al 2007 and Can Gelder at al 2007. The prospective Framingham study from Schaefer et al. 2006 used DHA levels in the blood, taken 10 years prior to cognitive assessment showed protection from omega three fatty acids, with an average age of 76 years old . This study show that the higher levels of DHA in the blood was predictive of lower risk, and slower decline and that no other lipid showed these predictive measures.

Is it any wonder that with all the benefits that omega three's give the brain that now there are findings that lower levels of omega threes can lead to compounding existing brain disorders like ADHA, and certain mood disorders. Adequate levels of omega threes in the brain can lower stress levels, increase mood, and now such findings have led to the hypothesis that lack of sufficient amounts of specific fatty acids affects brain function in such a way as to cause or worsen the symptoms of ADHD.

Fish, and more importantly the omega threes in them have been show to also reduce the risk of breast and prostate cancer. At around 8 times more effective than plant based sourced for prevention. Study co-author Prof. David Ma, who currently works in the Department of Human Health and Nutritional Sciences at the University of Guelph, and colleagues recently reported their findings in the Journal of Nutritional Biochemistry. In this study the mice given fish oil derived omega 3's experienced a 60-70% reduction in tumor size and a 30% decrease in the overall number of breast tumors present. Also if you will remember that Omega threes will help prevent the growth of new blood vessels, that same function also prevents new blood vessels to form with tumors which get their blood supply through the blood vessels that are there

to 'heal' them. Without the extra blood vessels feeding the tumors they can cause decline, on top of restricting tumor cell growth high levels of omega threes have shown cancer cells to self-destruct.

With all of the amazing things that omega threes can do for our insides, some may forget how beneficial they can be to our outsides as well. Omega threes can improve complexion, reduce wrinkles, lessen acne, and improve tone. This is because DHA and EPA are also incorporated into cell membranes in the top layer of skin (the epidermis) forming a protective layer. They work on the phospholipid bilayer helping it to hold moisture and stay plumper. EPA also blocks the release of enzymes caused by sun damage, this boosts collagen and prevents lines and sagging. My own experience with skin conditions in the canine have also proven very rewarding. Skin issues of my chosen breed the Great Dane is what launched my exploration in to the omega threes back in my early youth. My first Dane female had skin acne diagnosed as a staph infection, was given antibiotic after antibiotic, it would only go away briefly and then reappear and always coincide with a secondary UTI infection, after months of no results my vet provided me with my very first omega three oils. Within three days of use the acne has disappeared, within a 3 week period her hair had grown back and was shiny and soft and fuller than before I also noticed a huge reduction in shedding. Over the years my findings have been consistent. Puppies and dogs on omega three fatty acids have improved coat health, and fewer skin issues like acne, hot spots, Demodex mange, or any yeast related skin issues, than dogs not on it. I have also noticed a positive correlation with omega threes and just the shine and denseness to the coat compared to dogs not on them. My findings show that for the benefits to be received you must take an adequate amount of them. I feed 1TLB per 100-200lb even 1/2 that amount per day will be noticed with more shedding and less shine, and more skin issues within a month, and a complete stop of the omega threes will show in the hair and skin on the canines within weeks. But it also works both ways and they only have to be on them consistently for a few weeks to begin to notice the benefits again. The one area where I have noticed long term effects of Omega three fatty acids, regardless if they are continued or not is in 2nd plus generations that had been fed high doses of omega threes during pregnancy. Over the years and generations of puppies being on the omega threes during gestation I have noticed that I have fewer and fewer skin issues in my pups, lower cases of allergy induced responses. I've also noticed fewer and fewer genetic defects affecting my puppies and stronger immune systems with longer lived lives, proportionally more so for the more generations a certain line has been with me, and this strong evidence is worthy of additional research.

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Fall semester 2018

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