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HEART HEALTH

DHA Supplements Lower Risky Blood Fat Particles

By now, most people know that omega-3s, the long-chain fatty acids found mainly in fish and shellfish, help protect against heart disease. In particular, long-chain omega-3s are linked to cutting the chance of dying suddenly from a heart attack in half. That improvement results mainly from the ability of these omega-3s to stabilize and improve the electrical activity of the heart.

Long-chain omega-3s also improve the pattern of lipids in the blood. We say “lipids” because the blood contains many types of fat-like substances, including fat or triglyceride, cholesterol, fatty acids and other like materials, most of which are chauffeured by different types of proteins. These protein-transported lipids are known as lipoproteins. People at high risk of heart disease or having a heart attack often have abnormal lipoprotein patterns as a result of their genetic makeup, clinical condition (e.g., type 2 diabetes) or diet. Doctors will prescribe medications and dietary changes to improve such blood lipid profiles.

Elevated blood fats or triglycerides are features of type 2 diabetes, the metabolic syndrome and some forms of heart disease that greatly increase the risk of heart attack. Triglycerides and their breakdown products, “remnant-like particles” are reduced by EPA, a long-chain omega-3, but no one knows whether DHA, another long-chain omega-3, does the same.

Dr. Darshan Kelley and colleagues at the U.S. Department of Agriculture’s laboratory in Davis, California, USA, evaluated the effect of providing 3 g/day of DHA for 90 days to 34 men with high blood triglyceride levels. This amount of DHA is the middle of the range recommended by the American Heart Association for lowering triglyceride levels. After 45 days, the investigators observed that the levels of remnant-like particles had dropped by 36% since the beginning of the study. Ninety days later, when the study was completed, remnant-like particles were 21% lower than at baseline, but had not changed in the group of patients who consumed a placebo oil. At both time points, the decrease in remnant-like particles was statistically significant, meaning it was unlikely due to chance.

This study rounds out the picture for the effect of EPA and DHA in fish oils. Both reduce triglyceride and remnant-like particle levels. That’s good news for the legions of patients struggling to bring their lipid patterns in line by changing their diet and lifestyle habits.

MOTHERS & INFANTS

Preterm Infants Benefit from Extra Long-Chain Polyunsaturated Fatty Acids

Babies born weighing less than 1,500 grams or 3.3 pounds face greatly increased chances of illness and mortality. If they survive, they also have a higher risk of developmental and behavioral problems in childhood. One of the reasons for this, scientists believe, is that their early birth deprives them of the long-chain polyunsaturated fatty
acids they would have received from their mothers had they remained in the womb. These fatty acids are vital for the rapid growth of the brain and nervous system that occurs in the last trimester of pregnancy.

Preterm infants may be fed infant formula containing these fatty acids or they may receive human milk, especially if the mother is able to breast-feed. It is standard practice to give the infants approximately the same level of these fatty acids as occurs in breast milk. In the United States and some other western countries, this amount is between 13 and 26 mg/day of DHA, the long-chain omega-3 needed for brain growth. Levels of arachidonic acid, a long-chain omega-6 fatty acid the brain needs, are usually somewhat below those of DHA.

The catch is, babies who are born at or very close to term obtain about twice as much of these fatty acids from the mother. They have a head start on obtaining these fatty acids for brain growth and set aside some in their body fat as well. The preterm infant has almost no body fat, so is without any long-chain fatty acid reserves and has missed the last trimester transfer of these fatty acids. Investigators at the University of Oslo, Norway, decided to find out whether giving higher levels of these fatty acids to very low birthweight preterm infants might improve their development.

To find out, they provided fatty acid supplements to very low birthweight preterm infants who were being breast-fed and therefore, receiving some long-chain fatty acids in breast milk. One group of infants was given additional DHA and arachidonic acid and the other group was given a control oil without them. Infants consumed the supplemental oils and breast milk for approximately 63 days. After that, they were either breast-fed or given term formula containing these fatty acids.

When the infants were 6 months old, their cognitive function was assessed using two different approaches. One was a questionnaire with 5 components completed by a parent. The other involved brain activity measured by electrical recordings. Both evaluations showed differences between the supplemented and control infants. From the questionnaire, the investigators observed significantly higher problem-solving scores in the supplemented infants, but none of the other categories differed between the two groups. With the electrical activity measurements, the response to standard images favored the supplemented infants.

The researchers concluded that infant cognition benefited from the provision of the additional DHA and arachidonic acid provided in early feeding. The preterm infants received the amounts of these fatty acids they would have received had they been born at full term. This study provides additional evidence that the nutrients an infant receives from the mother during pregnancy are critically important for brain development and function. These findings also suggest that a simple revision to current feeding practices for preterm infants might have far-reaching benefits for the child’s later development. However, the study needs confirmation by others. On the horizon,
but not yet published, are findings from a large trial in Australia where preterm infants were given additional amounts of these fatty acids. The preliminary results from this trial suggest that girls might particularly benefit from higher levels of these fatty acids.

Inuit Infants with Higher Prenatal DHA Have Better Visual and Cognitive Development

The advantages to an infant of being exposed to plenty of long-chain polyunsaturated fatty acids before birth are becoming clearer. They have longer gestation and higher birthweights along with better developmental assessments. People with western food habits typically have low intakes of these fatty acids, mainly because they eat very little seafood. Fish and shellfish are the main food source of long-chain omega-3 fatty acids, the type needed to build a healthy brain, nervous system and visual function. These fatty acids can also be obtained from fish oil supplements and some foods fortified with EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). Women need to consume these essential nutrients during pregnancy and nursing to meet the infant’s needs.

Some populations, such as native Alaskans, Inuit and some immigrant groups are accustomed to eating plenty of fish and shellfish. As a result, they have high intakes of long-chain omega-3s. Unfortunately, some seafoods carry environmental contaminants, which may interfere with fetal and infant development. A long-term study among the Inuit in northern Quebec, Canada, aims to learn more about the effects of nutrition and contaminants in infant and child development.

Prenatal DHA was associated with greater birthweight, gestational age, visual memory and visual acuity at 6 months of age, and with mental development at 11 months. These results were observed in spite of maternal exposure to several environmental contaminants.

Investigators studied selected developmental outcomes in infants of mothers living in three villages around Hudson Bay. They examined the composition of cord blood, mothers’ breast milk and visual acuity in the infants at 6 months of age. The children were evaluated again when they were 11 months old for visual function, cognitive and motor development. As might be expected from the mothers’ seafood-rich diet, the levels of DHA in the cord blood, a reflection of what is available to the fetus, were about three times greater than what has been observed in southern Quebec. Similarly, maternal milk had about twice as much DHA as the average breast milk worldwide. The other critical long-chain fatty acid infants need, arachidonic acid, was two times lower than what has been observed in southern Quebec, but there was no indication that these lower levels were a clinical problem. The arachidonic acid level in the Inuit mothers’ milk was about two-thirds of what has been reported worldwide.

At 6 months of age, the infants with higher DHA and lower arachidonic acid had better visual acuity, but acuity scores were not related to either fatty acid individually. The investigators noted that the infants with the highest visual acuity scores also had the highest levels of DHA prenatally. In a test of an infant’s visual memory at 6 months of age, scores were higher with greater prenatal exposure to DHA. This finding is considered important because results of this test have been used to predict later intelligence. Results from another widely used test of infant mental development, the Bayley Scales-II, were also related to prenatal DHA exposure.
when the children were evaluated at 11 months of age. Interestingly, these results remained after the investigators adjusted their analysis for mercury and other contaminants. This suggests that exposure to DHA during fetal development was the most important factor in these evaluations of infant development. Several studies have now reported that although environmental contaminants, especially methylmercury, may reduce developmental scores somewhat—and not all studies have observed such an effect—the overall benefit of having higher levels of DHA is much stronger.

One of the strengths of this study is that it is based on the naturally occurring variation in the amount of DHA and contaminants mothers and their infants have. The results complement the observations of other researchers, who have provided long-chain fatty acids to pregnant women using fish oil or purified fatty acid supplements. This study reinforces the understanding that DHA rather than arachidonic acid is more likely to be in short supply.

Maternal Fatty Acid Status in Pregnancy May Signal Infant Outcomes

Is it possible for a pregnant woman to tell whether her essential fatty acid status might put her developing fetus at risk? Not many women would ask this question, but a group of investigators in the Netherlands did. They wanted to know if a pregnant woman’s fatty acid profile was linked to the outcome of her pregnancy. Dietary questionnaires provide some information about fatty acids, but are not as accurate as a blood analysis.

The Dutch scientists knew that particular fatty acids were related to length of gestation, birthweight and certain developmental assessments. They also knew that other factors such as smoking, hypertension, past pregnancy history and the mother’s age were linked to pregnancy outcomes. They were especially interested in learning whether particular fatty acids affected the infant’s growth in the womb. Infants who grow poorly or are small for their length of gestation have a higher chance for morbidity, mortality and suboptimal development.

The study recruited healthy women early in their pregnancy, about 12 weeks’ gestation, and collected blood samples. Birthweight and weight for the length of gestation were the two main outcomes of interest. The investigators chose to focus on the two most important long-chain fatty acids the developing fetus needs, DHA (docosahexaenoic acid), a long-chain omega-3 fatty acid, and arachidonic acid, a long-chain omega-6 fatty acid. Omega-6 fatty acids predominate in western diets.

The results indicated that the higher the mother’s level of long-chain omega-3s, the higher the baby’s birthweight. On the other hand, the higher the level of omega-6s, mainly linoleic and arachidonic acids, the lower the infant’s weight. After all confounding factors were taken into consideration, EPA (eicosapentaenoic acid, the other main long-chain omega-3 fatty acid) and gamma-linolenic acid, a product of linoleic acid metabolism, were the only fatty acids linked with higher birthweight. High levels of arachidonic acid, meanwhile, remained associated with lower birthweight. By taking these observations into account, the investigators were able to develop fatty acid patterns that identified women who were more likely to have a lighter weight or smaller infant for its gestation time.

What is useful about these findings is that, because they are based on measurements taken early in pregnancy, they would enable a physician to advise a pregnant woman to adjust her food habits to improve her fatty acid levels. Once again, low levels of long-chain omega-3 fatty acids appear to herald possible suboptimal pregnancy outcomes that could be minimized. The simple answer without the numbers would be to play it safe by recommending that pregnant women consume fish regularly during pregnancy. Women should know...
which fish species are the highest in omega-3s with the lowest levels of contaminants. These include salmon, rainbow trout, sardines, mackerel, herring, anchovies and canned light tuna. Recommendations to boost fatty fish intake would also conform to the recent advice from an international working group of fatty acid and medical experts who advise pregnant and nursing women to consume 200 mg of DHA/day.

**High Fish Consumption Linked to Better Child Test Scores in Spite of Mercury**

Many women know that eating fish and shellfish, even during pregnancy, has many health benefits. However, they also fear the contaminants found in nearly all seafoods, even when these substances may exist only in very small amounts. Studies in France and the United States have reported that when advised about mercury (or methylmercury, the form present in seafood), women reduce their fish consumption. Yet, study after study has reported that women who eat seafood during pregnancy—including large amounts of fish and shellfish—have healthier outcomes and infants with better neurodevelopment than women who shun eating fish.

A study of pregnant women and their infants living in the Boston area of the U.S. examined the relationship between maternal fish consumption during pregnancy and the development of their infants. On average, the mothers ate fish 1.5 times/week, with 14% of them never eating fish. In this report, the authors looked at the mothers’ hair mercury content, fish consumption and two assessments of cognitive development in their 3-year old children. One of the tests related to the child’s visual-motor abilities and the other was linked to his verbal ability and understanding of English vocabulary.

The investigators found that children whose mothers ate more than two servings of fish/week had significantly higher scores on their visual motor assessments compared with children whose mothers did not eat fish. Interestingly, in a small group of children whose mothers ate canned tuna at least twice/week, their scores on the picture vocabulary test were higher compared with children whose mothers never ate canned tuna. Adjusting for mercury strengthened these relationships. However, child performance was lower when related to the mother’s red blood cell mercury level.

What does this mean? Essentially, the improved performance of the children whose mothers ate fish was reduced if the mother’s mercury levels were high. However, their performance remained better than that of children whose mothers avoided eating fish. Several aspects of this study complicate the interpretation of these findings. One is that there were only small numbers of mothers who didn’t eat fish or who had high mercury levels. Another is that the developmental tests used in this study are infrequently used, so there are not good reference data for them. In other words, don’t bet the family farm on these findings. The overall analysis suggested that fish consumption benefited the children’s development, although mercury may have reduced the actual scores. Dietary guidance needs to rest on more robust data.

**Immune Function**

**Atopic Dermatitis**

High Dose DHA Improves Eczema Symptoms

Eczema, the itchy, inflamed skin rash doctors call atopic dermatitis, is an allergic condition seen commonly in
children, but also in about 3 of every 10 adults. As in other allergic conditions, the body’s immune responses work overtime, producing an excess of chemical signals that sustain the inflammation. While topical creams may help, the goal is to treat the underlying immune system abnormalities that produce these responses.

Scientists know that polyunsaturated fatty acid metabolism is involved in eczema, but using this knowledge to ease the condition has faced many hurdles. In general, abnormalities in handling omega-6 fatty acids, the kind prevalent in western diets, are characteristic of the condition. The ability to process linoleic acid may be one of them, as levels of this fatty acid are usually elevated in patients with eczema. Some studies have reported that providing a derivative of linoleic acid found in evening primrose and borage oils reduces the severity of the symptoms. Others have observed that levels of long-chain omega-3 fatty acids, those found mainly in fish and shellfish, are usually reduced in eczema patients. However, several studies where omega-3s have been given to eczema patients failed to find improvements.

With this background, few investigators have pursued the possible effects of increased exposure to long-chain omega-3 fatty acids. However, one study reported markedly improved symptoms in patients hospitalized with severe symptoms who were infused with long-chain omega-3s for 10 days. This study, and reports of benefits with high doses of omega-3s in other immune conditions, such as rheumatoid arthritis, encouraged researchers in Berlin, Germany, to give high doses of DHA (docosahexaenoic acid, a long-chain omega-3 fatty acid) to adults with the condition. They gave the patients 5 g of DHA/day or a placebo for 8 weeks, evaluating their condition at the beginning, middle and end of the study.

Within 4 weeks, patients exhibited improved symptoms and decreased eczema severity. By the end of 8 weeks, the scores for the symptoms in patients treated with DHA were significantly reduced compared with the control group. The number of affected areas fell from 12 to 7 in the DHA group. Interestingly, at the end of 8 weeks, the scores between the two groups were not statistically significantly different, largely because the placebo group improved too, but not as much as the DHA group.

These results may prompt other investigators to re-examine the potential benefits of long-chain omega-3s in eczema. It is likely that the high dose in this study contributed to the improved symptoms, similar to observations in patients with rheumatoid arthritis. It would also be worth investigating the effect of EPA (eicosapentaenoic acid, another long-chain omega-3) alone or combined with DHA as found in fish oil. The anti-inflammatory effects of long-chain omega-3s may not be enough to clear the symptoms, but they may make the condition less itchy.

**Impaired Skin Function and Dermatitis Severity Linked to Omega-6 Derivative**

One of the key functions of the skin is to keep unwanted substances out of the body while allowing desirable substances easy passage. Skin permeability allows water to leave the body during cooling and perspiration. The phospholipids in skin—substances attractive to both water and lipid—permit access to oily materials such as skin creams, while blocking entry to water. This function of skin is impaired in atopic (immune-based) dermatitis or eczema, with the result that water may be lost too readily. Impaired skin function also interferes with the ability to handle ultraviolet light and keep out microbes.

One way the body attempts to compensate for changes in skin integrity is to increase its manufacture of phospholipids. This process is impaired if fatty acid metabolism is abnormal. In the extreme case of
essential fatty acid deficiency, one of the characteristics of the condition is dry, scaly skin. For this reason, the ability to process polyunsaturated fatty acids is important for maintaining healthy skin.

In patients with eczema or atopic dermatitis, levels of linoleic acid, the main polyunsaturated omega-6 fatty acid in western diets, are elevated, while levels of omega-3 fatty acids may be unusually low. It appears that in eczema, the processing of linoleic acid may be impaired so that it accumulates while the levels of gamma-linolenic acid, the first derivative of linoleic acid processing, fall. Patients with eczema who have consumed gamma-linolenic acid have often experienced improvements in their condition.

A team of investigators at the National Taiwan University explored the barrier function of skin in patients with atopic dermatitis, other atopic conditions (asthma or rhinitis) and non-atopic control volunteers. All atopic participants had elevated serum immunoglobulin E levels, a hallmark of atopic disease, whereas the controls did not. The investigators observed that gamma-linolenic acid levels were significantly lower in the eczema patients compared with controls. Those with asthma or rhinitis had intermediate values for these fatty acids.

Using a device (illustration) to measure water loss across the skin, they found that water loss was greatest in patients with the lowest levels of gamma-linolenic acid. Moreover, the more severe the disease, the greater the water loss. Children with asthma or rhinitis did not have impaired water loss. These findings indicate that impaired skin permeability is a primary characteristic of atopic dermatitis or eczema and is directly linked to impaired fatty acid metabolism.

**RHEUMATOID ARTHRITIS**

**Long-Chain Omega-3s Reduce Anti-Inflammatory Drug Use in Rheumatoid Arthritis Patients**

As people with rheumatoid arthritis know, this inflammatory immune disease results in painful swollen joints. The disease can progress to deform and destroy the joints, as illustrated in the photo. It is 2 to 3 times more common in women than men, usually striking after the age of 55. Various drugs, including non-steroidal anti-inflammatory agents (NSAIDs), such as aspirin, naproxen and COX-2 inhibitors, are used to treat the condition, but these have their own potentially dangerous side effects. Patients with rheumatoid arthritis are also at increased risk of cardiovascular disease, stroke and some types of cancer. In the quest to improve patient outcomes and reduce the high doses of drugs needed to control pain, rheumatologists have turned to less harmful anti-inflammatory agents, the long-chain omega-3 fatty acids found in fish. These fatty acids are also associated with significantly reduced risk of cardiovascular mortality and stroke.

Researchers in Scotland, U.K., recruited patients with rheumatoid arthritis who were not taking fish oil supplements, but were being treated with NSAIDs and in many cases, other drugs as well. The goal of their study was to see whether taking a blend of fish oil and cod liver oil supplements rich in EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), the two main long-chain omega-3s in fish oil, would reduce the...
patients’ need for NSAIDs. It has already been demonstrated by other researchers that relatively large amounts of fish oil reduce the pain and inflammation of this disease. Patients consumed either 2 g/day of fish oil or placebo capsules for 9 months. They were asked to keep careful track of how much medication they used throughout the study. The investigators were looking for a reduction in NSAID use of 30% or more.

After 9 months, 40% of the arthritis patients taking the fish oil supplements had reduced their NSAID use by 30% or more, while only 10% of those taking the placebo did so. Among the patients who completed the full 9 months of the study, the results were even higher. Nearly 60% reduced their NSAID use by 30% or more compared with 20% in the placebo group. In addition, patients taking the fish oil did not experience deterioration in their disease; in fact, there was a small but significant improvement in their pain scores.

This study is helpful in several ways. First, it shows that dependence upon NSAIDs can be reduced and in some cases eliminated, while still controlling pain. Second, sufficient amounts of fish oil or the long-chain omega-3s they contain are needed to obtain benefits. This usually means 2 or more grams of EPA and DHA each day. Third, it takes several weeks or months to achieve the beneficial effects. In this study, significant reduction in the use of NSAIDs took 6 months. Finally, although this study was not designed to look for it, the consumption of long-chain omega-3s reduces the risk of heart disease and stroke, conditions that are more common among patients with rheumatoid arthritis. Fish oils are a treatment to keep in hand!

**MENTAL HEALTH**

**DEPRESSION**

**Fish Oils May Improve Depression in Some Pregnant Women**

It is estimated that 10% to 15% of women experience depression around the time of pregnancy or within a month after giving birth. Depression around this time puts the welfare of the mother and her infant at risk. Moreover, women who experience depression during pregnancy are often reluctant to take medications, fearing that they may harm the developing fetus. As a result, they may not receive effective treatment.

Fish oils containing long-chain omega-3 fatty acids have been used to ease depressive symptoms in pregnant and postpartum women with mixed results. However, some promising findings have prompted others to undertake additional trials. Two such studies have just released their findings. One included women with major depression during pregnancy or within a month of giving birth and the second study included only pregnant women.

In the first study, women were given daily capsules with either 2 grams of EPA and DHA—the major long-chain omega-3 fatty acids in fish oil—or corn oil and were monitored for 8 weeks. All women were given 6 sessions of psychotherapy as well. Their depression was assessed with two frequently used questionnaires at the beginning and end of the study. At the end, the patients’ depression scores improved in both groups, with no statistically significant difference between the two.

In the second study, women with major depression were recruited between their 16th and 32nd week of gestation. They were asked to consume unmarked capsules of either fish oil or placebo for 8 weeks.
The amount of EPA and DHA in this study, 3.4 grams/day, was nearly twice that in the first study. In both studies, placebo and omega-3 groups improved in their depression rating scores on the same test, but in the latter study, there was significantly greater improvement in the women who were taking the fish oil supplements. The difference was observed after 6 weeks.

As in previous studies with fish oil and depression, the results are not clear cut. Patients improve after taking fish oil, but there is a large placebo effect as well. Whatever it means to participate in a clinical study, patients appear to benefit. They were also helped by psychotherapy, regardless of the supplement they took. We need to learn more about which types of patients are most likely to improve by taking fish oil supplements. It may also be a question of finding the appropriate amount. Here, too, existing studies are inconsistent, with several reporting improvements with doses of about one gram. Knowing that there are limited treatment options to improve the mental wellbeing of pregnant women, fish oils may offer a safe, possibly helpful treatment for depression. In pregnancy, having a plentiful supply of these fatty acids to maintain the mother’s stores and ensure sufficient transfer to the fetus may justify the effort in any case.

EPA Improves Prozac Treatment for Major Depression

Various anti-depressant drugs are used to treat patients with major depression, but many have unwanted side effects and compliance may be low. Long-chain omega-3 fatty acids, the sort found mainly in fish oils, have been used as an addition to medications in depressed patients with some encouraging results. Some studies have observed that EPA (eicosapentanoic acid) is more effective than DHA (docosahexaenoic acid) in depressed patients. A recent study from Iran among patients with major depression evaluated the effectiveness of EPA alone or in conjunction with fluoxetine, popularly known as Prozac. The investigators also included a comparison group treated only with Prozac.

Over the 8-week study, all patient groups improved in their depression rating scores. Those given either Prozac or EPA alone had similar responses, but those given the combination of Prozac and EPA had significantly better improvements in their depression scores. Using the criterion of a 50% improvement in depression score, the results indicated that 81% of the patients treated with the combination therapy achieved the benchmark 50% improvement. Among those treated with either EPA or Prozac alone, 56% of the EPA group and 50% of the Prozac group experienced a 50% improvement. The investigators also reported that more adverse events occurred in the Prozac and combination groups than in the EPA group, suggesting that more people are sensitive to Prozac than to EPA.

This study confirms others that have reported reduced symptoms of depression when long-chain omega-3s, especially EPA, are added to current medications.
CLINICAL CONDITIONS

TOTAL PARENTERAL NUTRITION
Faster Disease Reversal and Greater Survival in Ill Infants Given Intravenous Omega-3s

Infants who experience serious liver disease as a consequence of short bowel syndrome are at high risk of mortality. They are nourished totally by emulsions given intravenously, known as total parenteral nutrition (TPN), until they are well enough to take more nutrients by tube feeding. The challenge their medical team faces is to retard or halt the progress of the infants’ liver disease long enough so that the infants can grow sufficiently to be able to take more nutrients via tube feeding. Many infants don’t make it and one reason may be the type of emulsion they are given at the outset.

A group of researchers at the Children’s Hospital in Boston, USA, reported 3 years ago that patients with liver disease who are maintained on TPN only improve their liver function when they can tolerate enteral or tube feeding. This suggested that something might be missing from the TPN formula. They then noted essential fatty acid deficiency in a patient allergic to soy TPN emulsions who improved when given a fish oil emulsion with long-chain polyunsaturated fatty acids and low levels of linoleic acid. Two years ago, this team reported the reversal of liver disease in 2 infants with short bowel syndrome who were given fish oil-based TPN. In this report, the group describes the experiences of 18 more infants with short bowel syndrome given TPN based on a fish oil emulsion, which provides only linoleic and alpha-linolenic acids as the essential fatty acids. Severely ill infants, who may have little or no body fat stores, may be born several weeks pre-term and those with short bowel syndrome are unable to obtain or make the long-chain polyunsaturated fatty acids they need to sustain life. However, there is no approved TPN product containing long-chain polyunsaturated fatty acids available in the U.S. Using such a product, which is available in Europe, requires special permission from the US Food and Drug Administration, usually on a case-by-case basis. Thus, there are few medical centers in the U.S. able to examine the effectiveness of fish oil-based TPN preparations.

In this report, the investigators studied 18 infants with short bowel syndrome and serious liver disease (cholestasis) who were treated with fish oil emulsion TPN. The medical team monitored the infants for their progress in reversing the liver disease and reaching stable bilirubin measurements of 2 mg/dL or less. As soon as the infants were well enough to accept enteral or oral nutrition they were given their nutrition this way, often in combination with TPN. Enteral feeding allows for greater calorie intake and bowel growth. The transition to enteral feeding is different for each child and depends on his condition.

For comparison purposes, the researchers examined the records of 21 infants with a similar diagnosis who had previously been treated with soybean oil-based TPN. They aimed to compare the amount of time it took to reverse the infants’ liver disease. They also considered mortality, as many infants with short bowel syndrome do not survive. Compared with the previously treated infants given the standard TPN emulsion, the treated infants described here were more severely ill and had a shorter gestation time.

In the total group of infants, there were 9 deaths, 2 in the fish oil group and 7 in the historical group. None of the deaths in the fish oil group were related to liver
This study provides dramatic evidence that TPN with a fish oil emulsion saves lives and hastens the recovery of infants with short bowel syndrome. Infants with this disorder given fish oil TPN were 5 times more likely to reverse their liver disease than those given the traditional soybean oil emulsion.

Among the surviving infants, those on the fish oil emulsions were 5 times more likely to reverse their liver disease than those on the traditional emulsion and they did so more rapidly. The median time for the fish oil-treated infants to reverse their liver disease was 9 weeks, but it took 44 weeks for the soybean oil group to do so. When the investigators included additional confounding factors in their analysis, the odds became even more favorable for the infants receiving fish oil, who were 16 times more likely to reverse their liver disease. Interestingly, there were 5 more reversals of liver disease once the TPN feeding was discontinued in the fish oil-treated infants, but none in those given the soybean oil emulsion.

This study provides dramatic evidence that TPN with a fish oil emulsion saves lives and hastens the recovery of infants with short bowel syndrome. Fish oil-based TPN is superior to soybean oil emulsion in reversing liver disease more often and more quickly compared with what is currently standard treatment in the U.S. There are several reasons why soybean oil emulsions may be unsuitable for seriously ill infants, including the lack of long-chain essential fatty acids and the presence of phytosterols, substances found in some plants and vegetable oils. With these findings and those from other clinics, it appears unjustifiable to provide TPN lacking long-chain polyunsaturated fatty acids, especially those of the omega-3 family, to critically ill infants. This issue warrants immediate attention from the US Food and Drug Administration, which regulates intravenous emulsions.

TPN with Fish Oil Improves Recovery of Patients with Acute Pancreatitis

One of the challenges in treating critically ill patients is to control the inflammatory and immune responses associated with their condition. Healthy immune function helps control disease and hasten the destruction of toxic substances, but severe inflammation often complicates healing and recovery. This is especially true for patients who need total parenteral nutrition (TPN) after surgery, trauma or during acute episodes of disease, such as pancreatitis.

This is now more widely appreciated that long-chain fatty acids contribute to inflammatory processes and also to their resolution. Both the omega-6 and omega-3 families of fatty acids are involved in these processes. However, in many people, exposure to the long-chain omega-3s found most abundantly in fish and shellfish is low. These fatty acids have several anti-inflammatory actions and are used to control inflammation in several diseases, such as rheumatoid arthritis. Their importance in critically ill patients has only recently gained medical attention. They appear to be an effective addition to treating critically ill patients needing TPN.

A team of investigators in Nanjing, China, explored the effect of adding long-chain omega-3s to the TPN emulsions used to treat patients with severe acute pancreatitis. One group of patients received TPN based on a soybean oil emulsion and the other was given a soybean plus fish oil emulsion. TPN treatment was implemented within 72 hours of the onset of severe symptoms and continued for 5 days without any enteral or oral nutrition. The investigators were interested mainly in the effect of the different TPN treatments on two indicators of inflammatory responses.

After 5 days of TPN, both groups had a significant and favorable decrease in their levels of C-reactive protein—a substance produced in response to acute inflammation—in their blood plasma, but the drop in this protein was significantly greater in the patients receiving TPN with fish oil. The other indicator substance did not
change significantly in either group. The investigators also reported a significant improvement in respiratory function in the fish oil-treated patients. These patients also required fewer days of renal replacement therapy compared with the soybean oil group. Although the fish oil treated patients required fewer days in intensive care and in the hospital, these differences were not statistically significant and could have occurred by chance.

Thus, in a short time, the critically ill patients treated with fish oil showed greater improvements in their clinical condition and some protection against systemic organ failure compared with patients given only soybean oil emulsion. These results suggest that TPN containing fish oil may be more effective in the recovery from severe acute pancreatitis and the prevention of system-wide failure compared with soybean oil TPN. One can’t help wondering if the patients would have improved even more quickly and extensively had they received TPN based completely on fish oil. Perhaps these investigators will find out.

Surgery Patients Given Fish Oil TPN Have Less Inflammation and Shorter Hospital Stay

Surgical patients, like those with severe illnesses, often require intravenous nutrition (TPN) after their surgery. Those patients, such as those with colorectal cancer, whose disease requires the removal of a substantial portion of their intestine, almost always require some period of TPN. Their treatment requires control of inflammation and the provision of adequate nutrition and calories. The standard TPN preparation in the U.S. is a soybean oil emulsion, which lacks long-chain polyunsaturated fatty acids, particularly those of the omega-3 family. Recent research in these patients and others needing TPN indicates that patients improve more quickly and effectively if they receive long-chain omega-3s as part of their TPN.

Researchers from Beijing, China, have just reported the results of treating post-surgical colorectal cancer patients with TPN containing some fish oil compared with a soybean oil emulsion. These investigators were particularly interested in the effects of these treatments on the patients’ inflammatory responses as well as their survival and recovery. Patients were given TPN with or without fish oil for 7 days following surgery.

In this study, all patients survived. Those who received TPN containing fish oil left the hospital about 2 days earlier than those on the soybean oil emulsion, but this difference was not statistically significant. In the fish oil patients, there was a significant decrease in a key inflammatory marker (IL-6) compared with the soybean oil group, but other immune markers did not differ between the two groups. As in the preceding report in patients with acute pancreatitis who made better progress with fish oil TPN, one is curious whether the patients would have improved more quickly had they been given solely a fish oil emulsion instead of one containing both soybean and fish oils. Nevertheless, this study is suggestive of better outcomes when patients receive long-chain omega-3 fatty acids after surgery.