



FATS OF LIFE NEWSLETTER

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FATS OF LIFE STAFF

Editor

Joyce A. Nettleton, DSc
sciencevoice@q.com

Communications Manager

Angela Dansby
angela@fatsoflife.com

Sponsor

DSM Nutritional
Products, Inc.,
Kaiseraugst, Switzerland
www.dsm.com

Letters and editorial comments should be submitted to Nettleton at sciencevoice@q.com and technical comments to Dansby at angela@fatsoflife.com. Subscribe to *Fats of Life* at www.fatsoflife.com.



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HEART HEALTH

Solid Evidence That Omega-3s Improve Arterial Elasticity

Hardening of the arteries from arteriosclerosis and aging increases the risk of future heart events, stroke, dementia and death. Some nutrients, especially the omega-3s in fish, may improve arterial elasticity. This review examined the evidence.

provides a strong basis for predicting future cardiovascular events, such as heart attack and stroke, as well as dementia and death.

Blood pressure is a leading contributor to arterial stiffness, but measuring an individual's arterial stiffness provides an even better predictor of heart risk. Clinicians can measure arterial stiffness using a noninvasive technique known as pulse wave velocity (Figure). This technique measures the difference in the rate of blood flow between the femoral (leg) and carotid (neck) arteries. Pulse wave analysis is another approach that gives a broader assessment of arterial stiffness.

Nutrition, diet and lifestyle factors affect arterial stiffness through their effects directly on the arteries. Certain dietary substances — for example, the omega-3 fatty acids found mainly in fish (omega-3s) — can improve the arterial elasticity, reduce inflammation and lower potentially harmful oxidation products that damage the arteries. Many different food substances have been touted as helping arterial stiffness, but the evidence for them is unclear.

To clarify which substances are most helpful in improving arterial stiffness, scientists in Australia conducted a

detailed review of the evidence for nutrients, animal foods and plants. They included only randomized controlled trials to ensure that they were relying on the best evidence available. Of the 11 studies on animal foods, 9 evaluated the effects of omega-3s on arterial stiffness. There was much less data on plant foods and nutrients, so no conclusions could be supported on these items.



Figure. A patient having his arterial stiffness measured. Image courtesy of Atcormedical.com.

All but one of the omega-3 studies were carried out for at least 6 weeks. Only one of these longer studies did not find an effect of omega-3 supplementation on arterial stiffness. Thus, most studies with omega-3s reported improved arterial elasticity in patients with hypertension, obesity, type 2 diabetes or heart disease. The authors noted that the minimum effective dose of omega-3s was 900 mg/day of EPA+DHA, the two main omega-3s in fish and fish oil. They also reported that a combination of EPA and DHA was more effective than EPA alone. There were no studies on the plant-based omega-3, alpha-linolenic acid, at the time of this review. Since then, one study looked at arterial compliance in healthy individuals who ate walnuts in addition to their usual diet for 4 weeks. There was no effect on arterial stiffness.

Solid evidence supports the consumption of about 1 gram per day of omega-3s from fish to improve arterial elasticity.

One of the values of this timely review is the conclusion that the best evidence available to date shows that the consumption of nearly 1 gram of omega-3s per day may improve the elasticity of the arteries, especially in individuals at high risk of heart disease. Measurement of arterial



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stiffness is a powerful predictor of future heart events and the risk of dementia and death. The review suggests that a moderate intake of about 1 gram per day of EPA + DHA—the amount recommended by the American Heart Association for individuals with heart disease—would be wise dietary insurance for those at increased risk of heart disease.

Heart Failure

Lower Risk of Heart Failure in Women Who Eat Baked or Broiled Fish Often

Heart failure—the inability to pump sufficient blood to the rest of the body—is a highly prevalent type of heart disease in older adults. It occurs more frequently in men than women and increases with age. Studies in the U.S. estimate that one in 5 adults will develop heart failure during his or her lifetime. Is there a way to reduce the chance of developing this condition?

Could a simple dietary change reduce the risk of heart failure? Growing evidence suggests that eating more fatty fish might lower the chance of heart failure in older women.

The conditions known to increase the risk of developing heart failure include high blood pressure, which makes the heart work harder; coronary artery disease, which limits the supply of oxygen-rich blood to the heart; heart attack, which can

damage the heart muscle; diabetes, irregular heartbeats and others. The consumption of the type of omega-3 fatty acids (omega-3s) found mainly in fish is also linked to a lower likelihood of developing heart failure. The protective effects of eating fatty fish have been observed more often in women than men in some studies. The reason for this is not known.

A new report from the Women's Health Initiative, a 15-year study on the effects of hormone therapy, diet and other factors on the major health conditions affecting postmenopausal women, describes the links between fish consumption and the chance of developing heart failure in these women. The investigators collected

information about the types and preparation of fish the participants ate at the beginning of the study and monitored their health for 10 years.

The most striking observation was the 30% lower occurrence of heart failure in women who ate baked or broiled fish 5 or more times per week, compared with women who ate fish less than once per month. The chance of heart failure was even lower among women who ate dark fish, such as salmon, mackerel and bluefish, once a week or more compared with women who ate this type of fish less than once per month. The consumption of lean white fish was not related to the development of heart failure.

Another noteworthy finding was that women who ate fried fish once or twice a week were almost twice as likely to develop heart failure as those who ate fried fish less than once a month. Thus, as other studies have found, the method of preparing

the fish makes an important difference in whether eating fish is healthful. The bottom line from this study and others is that eating baked or broiled fish regularly is good for heart health and may substantially lower the chance of developing heart failure in women after menopause. Choosing fattier types of fish, such as salmon, mackerel, sardines and tuna, may be even more favorable.



High-Dose Omega-3s Linked to Improved Heart Function in Severe Chronic Heart Failure

As described in the preceding article, eating fish that are rich in long-chain omega-3 fatty acids (omega-3s) may reduce the chance of developing heart failure as we age. For those who have already developed chronic heart failure, the effectiveness of supplementation with long-chain omega-3s appears promising. How helpful they might be depends in part on how damaged the heart muscle is and how much omega-3s are consumed.

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Emerging evidence suggests that patients with advanced chronic heart failure may benefit from increasing their consumption of long-chain omega-3 fatty acids. A new study reports significant improvements in heart function after 3 months of a high dose of these omega-3s.

There are reports of improved ventricular function (amount of blood pumped from the heart) and reduced mortality in patients with chronic heart failure who consumed supplemental omega-3s. This study took a close look at

the effect of omega-3s in patients with advanced heart failure.

The researchers compared the effectiveness of 2 doses of omega-3s in patients with severe chronic heart failure who consumed the supplements for 3 months. One group of patients consumed 1 gram of omega-3s per day, another received 4 grams/day and a third group was given a placebo. The investigators assessed the patients' ventricular function, respiratory performance on an exercise test (Figure) and their blood vessel function.



Figure. Exercise stress test. Image courtesy of UConn Health Center.

After 3 months of treatment, the patients who consumed the high dose of omega-3s experienced a significant increase in their ventricular function, the dilation of their blood vessels and the peak amount of oxygen consumed at the end of their exercise test. These improvements occurred only in the group of patients consuming 4 grams/day of omega-3s and reflect clinically important changes in heart function.

There was only a small number of patients included in this study, but the findings may encourage additional

studies in larger numbers of patients with chronic heart failure.

Stroke DHA Given Five Hours After Stroke Limits Damage and Improves Function in Animals

Stroke, the result of a blockage in blood flow to the brain, is a leading cause of death and disability.

Effective treatments for stroke are few and must be given immediately after stroke occurs. A novel approach tested in animals suggests that DHA might extend the time for treatment, reduce tissue damage and improve function.

In the U.S., there are nearly 800,000 strokes each year, mainly in individuals over the age of 65. High blood pressure and smoking are the most important culprits in the risk for stroke.

The most effective treatment for stroke is a drug to dissolve the blood clot blocking an artery. This therapy is

effective, but must be given within 3 hours of a stroke. Because this treatment window is so narrow, few patients get treatment soon enough to benefit from it.

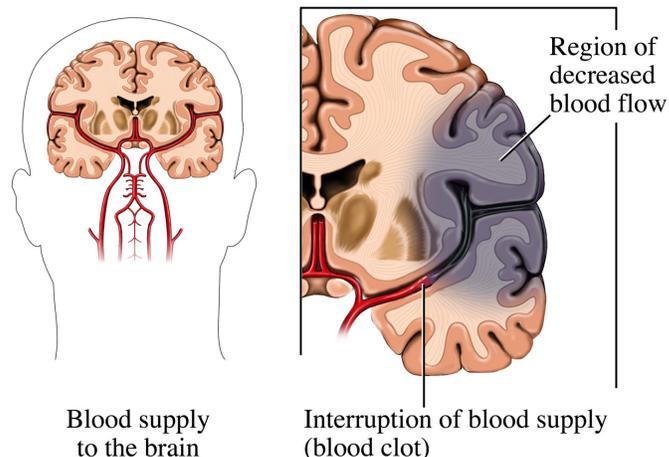


Figure. Image of brain damage resulting from an ischemic stroke. Medical Illustration Copyright © Nucleus Medical Media, All Rights Reserved. www.nucleusinc.com



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A different approach to treatment has been to explore ways to limit the damage occurring in the surrounding tissue and promote its repair. One substance that has been shown to do that in experimental animals is the long-chain omega-3 fatty acid, DHA (docosahexaenoic acid). DHA acts in several ways to promote brain cell survival and was recently shown to improve neurological and tissue outcomes after cerebral ischemia (reduced blood flow). Of necessity, these studies have been conducted in animals.

A recent study examined the timing of DHA treatment following ischemic injury in the cortex. The investigators were especially interested in the possible effects of DHA on the area immediately surrounding the damaged tissue, known as the penumbra. They looked at the timing of administering the DHA, health of the tissues around the site of injury and neurological function of the animals after DHA treatment. They obtained some interesting results.

First, giving DHA at different times after the injury reduced the size of the injured area by as much as 70%. DHA treatment was most effective when given 3 to 5 hours after injury, with the maximum effect at 4 and 5 hours. Treatment given after 6 hours was ineffective. That suggested that treating stroke victims up to 5 hours

Treatment with DHA up to 5 hours after experimental stroke improved the survival of brain cells, reduced the area of injury and improved function. Whether this might be effective in humans remains to be evaluated.

after the occurrence of stroke would be effective and would extend the treatment window by another 2 hours. The investigators also noted that neurological function was improved with DHA treatment up to 5 hours after injury. Function improved as early as 24 hours after injury and continued to improve for 7 days. When the researchers looked at the cortex tissue, they observed more functioning brain cells in 2 regions close to the injury after DHA treatment compared with control animals. Preservation of healthy neurons indicates less tissue damage and reduced loss of function. The investigators also observed that DHA treatment was

associated with less tissue damage in the penumbra close to the site of injury.

These promising findings await confirmation by others to verify the effectiveness of DHA treatment and a longer treatment window after a stroke event. Whether similar results would be obtained in humans is the pot-of-gold question waiting for clinical evaluation.

MOTHERS AND INFANTS

Eating Fish Regularly in Early Pregnancy May Lower Risk of Preterm Birth

There is considerable controversy about whether eating fish or boosting one's intake of long-chain omega-3 fatty acids (omega-3s) reduces the chance of preterm delivery.

Higher consumption of long-chain omega-3 fatty acids may prolong gestation. Findings on whether higher omega-3 intakes lower the chance of preterm delivery are mixed. A positive effect was reported with higher intakes in early, but not later in pregnancy.

Some, but not all, studies have reported a lower likelihood of preterm birth among women whose intakes of fish or omega-3s is high compared with women having low intakes. One study reported that higher fish or omega-3 con-

sumption in pregnancy may prolong gestation only in women whose intakes are low.

A recent clinical study from the National Institute of Child Health and Human Development in the U.S. reported that giving women who had previously had a preterm birth a supplement of 2 grams of omega-3s per day in the last half of pregnancy had no effect in reducing preterm delivery. Still, the researchers wondered whether omega-3 intakes in early pregnancy might be important in protecting against preterm delivery.

The investigators examined the dietary information from the women collected when they enrolled in the study.



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Among the participants, 30% ate fish less than once per month or never and 9% reported eating fish more than 3 times per week. When the researchers looked at the occurrence of preterm delivery according to the women's fish consumption, they found that preterm birth occurred in nearly half (49%) of the women who rarely ate fish compared with women who ate fish more often (36%). They also observed that women who ate fish 2 to 3 times per week were significantly less likely to deliver before 37 weeks' gestation compared with women who ate little or no fish. Similar results were observed when the chances of preterm delivery were analyzed according to the mothers' red blood cell omega-3 concentration. Again, higher levels were linked to lower risk.



This study suggests that eating fish 2 to 3 times per week in pregnancy, especially in the early stages, may lower the risk of preterm delivery.

week throughout pregnancy, or consuming long-chain omega-3 supplements, might lower the chance of preterm delivery. Such a nutrition habit would contribute to building the mother's supplies of these essential fatty acids and ensuring that sufficient long-chain omega-3s would be available for the fetus.

Heavier Preterm Infants Show Slightly More Growth with Higher Amounts of DHA

Ensuring the best nutrition for preterm infants is a challenge because these infants have little or no nutrient

Preterm infants have a shortfall in DHA because they have little body fat and miss receiving DHA during the last trimester. It is not known whether standard or greater amounts of DHA after birth affect their growth. This study aimed to answer that question.

stores and very little body fat. For essential fatty acids, this situation means that preterm infants need to obtain long-chain polyunsaturated fatty acids from breast milk or in formula. Some uncertainty exists about the optimum level of these fatty acids for brain, retina and tissue growth. There is some suggestion from research studies that providing higher levels of DHA, a long-chain omega-3 fatty acid (omega-3), is associated with higher mental development scores, at least in girls. The long-chain omega-6 fatty acid, arachidonic acid, is usually added to formula as well. Breast milk provides both of these fatty acids.

The availability of DHA is more limited than for arachidonic acid. For that reason, attention is given mainly to ensuring that the preterm infant receives sufficient DHA. The amount of DHA in breast milk can be increased if the mother eats fish, especially fatty fish, regularly or consumes omega-3 supplements containing DHA. It would be useful to know whether providing DHA in amounts greater than the average level in breast milk worldwide or the amount in standard infant formula improves infant development. A large study of preterm infants in Australia addressed that question.

Delivery before 37 weeks' gestation is considered preterm. This study included infants born before 33 weeks' gestation who were divided into 2 groups according to whether they weighed more or



Preterm infant. Image: Centers for Disease Control and Prevention.



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less than 1,250 grams at birth. Mothers were encouraged to breastfeed their infants. To increase the DHA content of the mothers' breast milk, mothers were asked to consume tuna oil capsules rich in DHA. For comparison, one group of lactating mothers was given placebo capsules.

Mothers who could not breastfeed gave their infants DHA-enriched formula. One group of formula-fed infants was given the standard level of DHA and the other about 3 times as much. Infants were given their respective feedings until they reached their expected date of delivery. After that time, mothers were encouraged to continue breastfeeding or use DHA-supplemented formula. The investigators measured several growth parameters at different times after entry to the study up to 18 months of age.

Preterm infants fed higher levels of DHA had greater length at 18 months of age than those fed standard amounts. Heavier birthweight and higher DHA intakes favored a few growth parameters.

At 18 months of age, infants receiving the higher amounts of DHA were longer than those in the standard DHA groups. The groups did not differ in weight and head circumference. In the infants weighing more than 1,250 grams at birth, those consuming the higher

amounts of DHA were heavier and longer than those fed the standard DHA levels. There were no differences in growth among infants born weighing less than 1,250 grams. Higher levels of DHA were not linked to any adverse events in any group of infants.

Although the differences among groups were small, they suggest that there may be slight differences in some aspects of growth if more DHA is available to the infant. Whether any of these differences would be observed beyond the age of 18 months is not known. The study also suggests that in very low birthweight infants—those weighing less than 1,250 grams at birth—higher levels of DHA do not affect growth. It is also important to know, however, that higher levels of DHA did not interfere with growth in any of these preterm infants.

Higher Mental Development and Language Scores in Infants Fed DHA for 12 Months

Although it is recognized that mothers and infants need long-chain omega-3 fatty acids (omega-3s) throughout

Term infants who were fed different amounts of DHA, an omega-3 fatty acid, for 12 months had higher mental development and language scores at 18 months of age compared with unsupplemented infants.

pregnancy and lactation, researchers are still trying to determine what the optimum amounts of omega-3s should be and for how long supplementation of infants, if needed, should continue. The current international recommendation from experts advises pregnant and lactating

women to consume at least 200 mg of DHA, an omega-3, per day. Women vary in omega-3 status, number of pregnancies and diets and these factors influence fatty acid recommendations. The need for omega-3s will also be greater if the infant is born preterm.

A research group at the University of Texas Southwestern Medical Center, Dallas, USA, examined the learning and behavioral development of healthy formula-fed infants who received different amounts of DHA, an essential omega-3 for brain development or unsupplemented formula until they were 12 months of age. All infants were born at term. They were fed formula exclusively for 4 to 6 months, and received foods and formula until they were 12 months of age. The infants were assessed for their mental, psychomotor and behavioral development using standardized tests when they were 18 months of age.





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Compared with the infants fed unsupplemented formula, all infants receiving DHA had significantly higher scores for mental development, language and emotional regulation. Other evaluations showed no differences between DHA-supplemented and unsupplemented infants. Healthy term infants are born with fat stores and DHA carried over from the mother in the last trimester. For those reasons, it is more difficult to show clear developmental differences with DHA supplementation in healthy term infants than in preterm infants or those with low DHA status. However, infants who are not breastfed or do not obtain DHA in the formula they receive may have suboptimal mental and neurological development.

This study supports findings from previous studies that infants who receive DHA after birth have higher developmental scores in several areas. This report also suggests that the standard level of DHA in infant formula, 0.32%, appears adequate for improved cognitive development in healthy infants. Supplementation with as much as 3 times more did not confer a developmental advantage in this study, but it was also without any adverse effects.

MENTAL HEALTH

No Link Between Omega-3s and Cognitive Decline in Older Adults with Heart Disease

An unresolved question about omega-3 fatty acids is whether they might prevent or slow the onset of cognitive decline as we age. Studies in populations suggest a link, but studies of omega-3 supplementation have been less encouraging. A new report leaves the question open.

One of the hottest areas of research about omega-3 fatty acids, especially the long-chain ones (omega-3s), is finding a clear answer to whether these substances might prevent or slow the onset of cognitive decline as we age. Studies in populations are more likely to report links between fish or omega-3 consumption and a

lower chance of developing Alzheimer's disease or impaired cognition. In contrast, studies in which individuals with signs of early cognitive decline were given omega-3 supplements were more likely to report no association between omega-3s and cognitive function.

Reasons for these inconsistent reports include the age and cognitive status at which omega-3s are given, genetic influences, differences in assessment tools and the presence of other health risk factors. A new study conducted in France suggests that a person's disease history might affect the response to supplementary omega-3s.

This study involved men and women, on average 61 years of age, who had cardiovascular disease. The types of heart disease included a recent heart attack (myocardial infarction), unstable angina or ischemic



stroke, the most common type in Western societies. The study was designed to evaluate supplementation with B vitamins or omega-3s, separately or in combination. The investigators assessed cognitive function when the participants enrolled and 4 years later. The cognition test was given by telephone and required the participant to name items in each of 4 categories in a limited time.

Supplementation with 600 mg of long-chain omega-3s was not associated with cognitive scores in older adults after 4 years. The dose might have been too low.

The overall results showed that neither supplement affected the participants' cognitive scores after 4 years. The investigators observed that older participants and those who had experienced a stroke had lower overall scores compared

with those who had a myocardial infarction or unstable angina. Thus, this study adds to the reports in which supplementation with omega-3s was not associated with



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cognition. One can ask whether the dose of omega-3s, 600 mg in this study, was possibly too low. This amount is well below the amount recommended by the American Heart Association—1,000 mg per day—for patients with coronary heart disease.

VISUAL FUNCTION

Higher Long-Chain Omega-3s and Antioxidants Linked to Lower Risk of Early AMD

Age-related macular degeneration (AMD) is the leading cause of blindness in developed countries. High intakes of certain nutrients, including omega-3 fatty acids, may reduce the chance of developing AMD, even in people at genetic risk of it.

macula of the retina (Illustration). The outlook for the more advanced forms of the condition are less hopeful. Nevertheless, some progress has been made in this area, especially with the provision of long-chain omega-3 fatty acids. Ultimately, however, the goal is to prevent the disease. That may not be such a starry-eyed dream after all.

Several nutrients are actively involved in eye health and the function of the retina. Studies in patients with AMD have shown that the consumption of certain antioxidant nutrients (zinc, vitamin C, β -carotene

Age-related macular degeneration (AMD) is the leading cause of blindness in developed countries and afflicts approximately 2.5 million older adults in Europe and 1.8 million in the U.S. The prognosis is more favorable if the disease is detected and treated early. Early AMD is characterized by the presence of yellowish deposits in the



Numerous large soft drusen in the macula of the retina is a sign of early age-related macular degeneration. Source: Wikipedia.

and vitamin E) and long-chain omega-3 fatty acids (omega-3s) can slow the progress of this condition to its advanced stages, although they cannot cure it. Other vitamins and the carotenoids (yellow and red plant pigments) lutein and zeaxanthin also protect the macula of the retina.

One factor related to AMD that we cannot change is our genes. Certain variants of particular genes increase the chance of developing AMD. Now, a study from the Netherlands reports that individuals having variants in the *CFH* gene, which increases the chance of AMD, were less likely to develop early AMD if they had high intakes of zinc, β -carotene, lutein, zeaxanthin and long-chain omega-3s. The effect was especially pronounced in individuals who had 2 copies of the gene (homozygous), rather than just one. In these individuals, a high intake of omega-3s reduced the chance of developing early AMD by more than 60%. However, homozygous participants with low intakes of omega-3s had nearly twice the risk of developing AMD as individuals without the gene. These observations showed clearly that diet can affect how our genes are expressed.

Individuals at high risk of AMD because of their genes were about 60% less likely to develop early AMD if they had high intakes of omega-3s. High intakes of antioxidants and zinc were also linked to lower risk of AMD.

The investigators noted that the highest intakes of omega-3s in this study, about 300 mg per day, could easily be obtained in a healthy diet that included at least 2 servings of fatty fish per week and plenty of fruits and vegetables. This study is one of only a few to have reported a

lower risk of early AMD linked to nutrient intakes. The majority of studies have involved patients who had already developed mild or moderate symptoms of AMD. These findings will need to be confirmed in other studies, but they illustrate the powerful potential of a healthy diet rich in fish, fruit and vegetables to improve health.



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CLINICAL CONDITIONS

Chronic Kidney Disease

Lower Chance of Chronic Kidney Disease in Adults Who Eat More Fish or Omega-3s

Impaired kidney function can develop in association with type 2 diabetes, cardiovascular disease, hypertension, obesity or inflammation of the kidney (IgA nephropathy). In the U.S., it is estimated that about 40% of individuals with diabetes have chronic kidney disease. As the rates of obesity and diabetes are soaring, the number of people with the disease is expected to increase substantially.

Chronic kidney disease occurs more often in individuals with diabetes, obesity or heart disease. Higher intakes of fish or long-chain omega-3s may lower the chance of developing the condition.

There are good reasons to think that higher intakes of long-chain omega-3 fatty acids (omega-3s) may slow the loss of kidney function. For example, a 3-year study in older adults observed that those who had higher blood levels of omega-3s and other polyunsaturated fatty acids had a slower decline in kidney function and a lower risk of kidney insufficiency compared with individuals having low levels of these fatty acids. Another reason why omega-3s might be helpful is their anti-inflammatory effects. Chronic kidney disease is characterized by inflammation, which makes the condition worse. In addition, a review and analysis of 17 clinical studies of omega-3s in chronic kidney disease patients found that higher intakes of omega-3s were associated with lower urinary protein excretion, although kidney filtration did not improve.

A large study of older adults living in the Sydney area of Australia has just reported its observations on the associations between fish consumption and omega-3 intakes and the odds of developing chronic kidney disease. Overall fish consumption was unrelated to the chance of developing chronic kidney disease, but higher omega-3 intakes from seafood were linked to lower chances of developing the disease. Interestingly,

the plant-based omega-3, alpha-linolenic acid, was associated with a greater chance of developing chronic kidney disease. Other polyunsaturates were not related to the chance of developing the condition.

A large study in Australia reported that older adults with the highest intakes of fish or omega-3s from seafoods were about 30% less likely to develop chronic kidney disease compared with those having the lowest intakes.

When the investigators grouped the participants according to the amounts of fish or omega-3s they ate and then determined the chances of developing chronic kidney disease, those with the highest intakes of omega-3s were

31% less likely to develop the disease compared with those with the lowest intakes. Similarly, individuals with the highest fish intakes were also about 30% less likely to develop chronic kidney disease. In contrast, the odds of the condition were 73% greater for those with the highest consumption of alpha-linolenic acid.

Eating plenty of fish, especially fatty fish, may lower the risk of heart disease in diabetic individuals, who are also at greater risk of kidney disease. Thus, a prudent diet for individuals who are more likely to develop chronic kidney disease will include fish at least twice a week, as recommended by international health authorities and the American Heart Association.

Type 2 Diabetes

Contrasting Results in Two Studies on Omega-3s and Risk of Type 2 Diabetes

Individuals who consume higher amounts of long-chain omega-3 fatty acids (omega-3s) often have lower risks of developing a variety of chronic diseases, especially heart disease. Whether a similar association occurs for type 2 diabetes is controversial because of the mixed results from several studies. Some investigations have reported greater risks of developing diabetes with fish or omega-3s intakes, some have found no relationship and others have described a lower risk for the disease with high



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In spite of a number of studies examining the relationship between omega-3 fatty acids and risk of developing type 2 diabetes, results show no agreement. Two new studies in different Chinese populations also report contradictory findings. We do not know why results are so inconsistent.

one in Shanghai and the other in Singapore. These studies examined the fish and long-chain omega-3 fatty acid intakes in older adults whose health was monitored from 4 to 9 years. The participants were not obese in either study, removing a common risk for the disease.

Two studies in Chinese adults reported that higher omega-3 intakes were linked to lower risk of type 2 diabetes in Shanghai women, but only higher intakes of alpha-linolenic acid were linked to lower risk of the disease in men and women in Singapore.

For women, as fish and shellfish consumption increased, the risk of developing diabetes fell and then leveled off.

fish consumption. In addition, the results appear different for men and women in some studies. Why are the observations all over the map?

There isn't a good answer to the question, but data continue to accumulate. An example is two recent reports of the risk of developing type 2 diabetes in 2 different Chinese populations,

In the Shanghai study, fish consumption was divided into total fish and shellfish, shellfish, saltwater and freshwater fish and consumption was used to estimate omega-3 intakes. The occurrence of diabetes was higher among women than men, but the average intake of fish was similar in both sexes.

Higher-than-average intakes of fish and shellfish offered no additional reduction in the chance of developing the disease. A similar pattern was observed for omega-3 consumption. The investigators noted that the risk of type 2 diabetes in men was related only to shellfish consumption.

The Singapore study took a slightly different approach in a similar sample of adults, but the researchers reported the findings for men and women combined. They looked at the participants' omega-3 intakes from fish and plants separately. Plants provide more omega-3s in the diet, but the one omega-3 they have is different from and less potent than the omega-3s found in fish and shellfish. In this study, higher intakes of seafood omega-3s were not associated with a lower risk of developing type 2 diabetes, but higher intakes of alpha-linolenic acid from plant sources were. There is some evidence from other studies that higher consumption of alpha-linolenic acid may be linked to improved glucose control and lower insulin resistance, both hallmarks of diabetes.

Again, fairly similar population studies reported contrasting results with respect to seafood omega-3 intakes and the risk of developing type 2 diabetes in non-obese populations. We still need to know whether such

an association occurs in both sexes or mainly in women. It is also worth seeking additional clarification of the association between alpha-linolenic acid intake and this disease. In the end, it may be that omega-3s are only a small factor in the risk of type 2 diabetes, but their benefits in lowering the risk of cardiovascular disease in diabetic patients should be taken into consideration.

