HEART HEALTH & ALASKA SEAFOOD

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We have all heard that consuming more fish is beneficial to reducing your risk for heart disease, but have you ever stopped to wonder why? One of the primary reasons is that fish, especially fatty fish such as salmon, contain important omega-3 polyunsaturated fatty acids (PUFA) such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

THE EFFECTS OF OMEGA-3 FATTY ACIDS ON HEART HEALTH ARE ONE OF THE MOST STUDIED AREAS OF NUTRITION SCIENCE, AND RESEARCH HAS PROVEN THEIR BENEFITS TO BE FAR REACHING.[14]

MORE ON OMEGA 3-FATTY ACIDS

Several different types of omega-3 fatty acids exist, but the most researched are docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and alpha-linolenic acid (ALA). Omega-3 fatty acids are high quality fats that are critical components of our diets because our bodies cannot produce ALA, and only small quantities of EPA and DHA. Omega-3 fatty acids are a part of every cell in our bodies, but especially the cells of our eyes, heart and brain.

DHA AND EPA HAVE THE GREATEST HEALTH BENEFITS

and are found in seafood and fatty fish such as salmon, herring, sardines, oysters, and black cod.

ALA is found in plant foods such as soybean oil, canola oil, nuts, flaxseed, chia and hemp. The body's ability to convert ALA to EPA is at a rate of 5% to 15%, and <1% of ALA reliably converts to DHA. [23] Because of this, consuming EPA and DHA directly from food is the best way to increase levels of these beneficial fatty acids in the body.

HEART DISEASE AND DEATH

Every year, 610,000 people die from heart disease, which is the leading cause of death in both men and women. [30, 31] The most common form of heart disease is coronary heart disease [25] and studies show that fish consumption reduces the risk of dying from coronary heart disease, even when eating fish as little as one time per week. [16, 17, 18] Sudden cardiac death is responsible for 15% of all deaths

Fish consumption reduces the risk of dying from coronary heart disease, even when eating fish as little as one time per week.

in westernized countries. The higher the combined dietary intake of EPA and DHA, especially from seafood, the lower the risk of fatal heart attacks in adults as measured by laboratory tests that measure the amount of DHA and EPA in the blood, called the omega-3 index. [6, 7, 8, 9, 13, 30]

CHOLESTEROL

Omega-3 fatty acids can dramatically lower the number of triglycerides in blood, thus reducing the risk of heart disease. [25,26] People with type 2 diabetes and certain types of heart disease can have very high levels of blood triglycerides, which can increase their risk of heart disease.

Eating omega-3 fatty acids from seafood,

and from supplementation, is one of the best ways to lower triglyceride levels. [27]

Another heart healthy benefit of eating seafood with high levels of EPA and DHA is that it helps to increase blood levels of HDL cholesterol. [29] People who have higher levels of HDL, or "good" cholesterol, in their blood are less likely to develop heart disease or heart failure. [28] HDL cholesterol is beneficial as it removes cholesterol from the blood vessels, before it causes harm. Some research has shown that seafood omega-3's do not lower LDL or "bad" cholesterol levels and may raise them modestly. [26] Because of this, it is recommended that an individual work with their doctor to individualize any therapeutic doses of fish oil supplementation or pharmaceutical and lifestyle approaches to improve triglyceride levels.

HEART RATE

The heart circulates oxygen and nutrients throughout the body and brings back waste products. When heart rate is too fast or the rhythm is irregular, these functions are impacted. An elevated resting heart rate is a major risk factor for sudden cardiac death. Consuming EPA and DHA has proven to be beneficial in controlling heart rate in a variety of ways.

EPA AND DHA

decrease a person's risk of dying after a heart attack due to arrhythmia (abnormal heart beat). [10]

EPA and DHA can also reduce a person's resting heart rate and help return heart rate to a resting rate more quickly after exercise. [11]

STROKE

Stroke is the third most common cause of death following cardiovascular diseases and cancer. [30] It's concerning and important to note that in recent years, the number of individuals who die from stroke continues to grow. [2]

Omega-3 fatty acids reduce inflammation, oxidative stress and endothelial dysfunction associated with stroke.

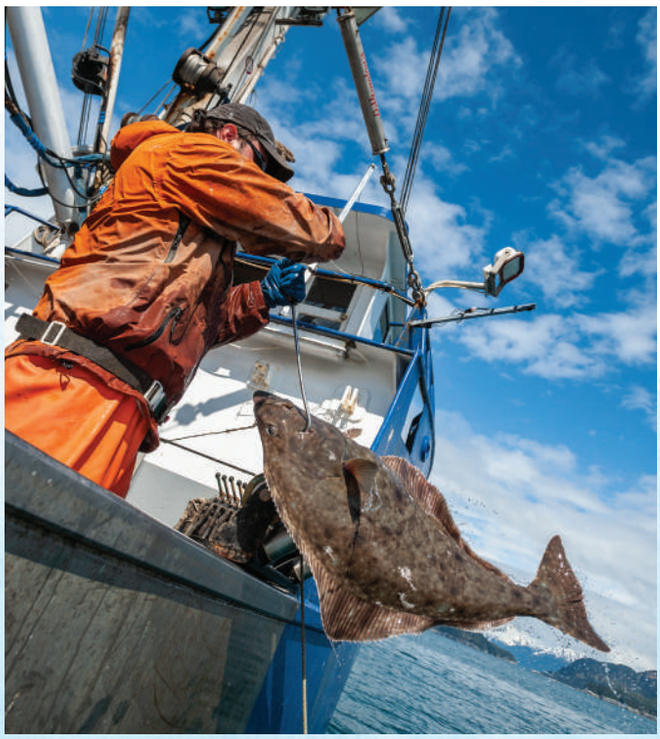
Additionally, omega-3 fatty acids reduce blood cholesterol and blood pressure, both of which are related to risk of stroke. [19] DHA also lowers blood levels of triglycerides and may also reduce insulin resistance, which increases a person's risk of stroke. [2,3,4,5,12]

HIGH BLOOD PRESSURE

High blood pressure, or hypertension, is one of the leading risk factors in the development of cardiovascular disease. [20] Unfortunately, many individuals who have hypertension have poor control over their blood pressure. According to 2009-2012 NHANES data, 46% of individuals with hypertension do not have it controlled. [21]

OMEGA-3 FATTY ACID CONSUMPTION AND SUPPLEMENTATION HAS SHOWN TO BE BENEFICIAL IN LOWERING BLOOD PRESSURE. [22, 33]

Clinical standards for supplementation still have not been established, so talk to your doctor for more information.



INFLAMMATION

Inflammation is a part of our immune system that plays an important role in healing. For example, if you cut your finger, your body's inflammatory response helps to fight germs and heal the wound. However, chronic, low-grade Inflammation has been found to be an underlying cause in many diseases including Alzheimer's, arthritis, cancer, diabetes, depression and heart disease. This type of inflammation can occur when an individual does not live a healthy lifestyle due to factors such as smoking, being sedentary, eating a poor diet, poor sleep habits, or stress.

Chronic, low-grade inflammation is closely linked to atherosclerosis, or the buildup of fatty deposits on the inside of the wall of arteries. This buildup can eventually lead to the formation of harmful blood clots, which can cause a heart attack or stroke. Omega-3 fatty acids from fish contain anti-inflammatory properties, which help to reduce this risk. [1]

Omega-3 fatty acids are involved in the reduction of inflammation in our bodies by reducing inflammatory compounds.

Omega-3 fatty acids are involved in the reduction of inflammation in our bodies by reducing inflammatory compounds such as pro-inflammatory cytokines, interleukin-6 (IL-6) and tumor necrosis factor alpha (TNF-a). [15, 31, 32]

KEY RECOMMENDATIONS FOR CONSUMPTION:

- For optimal benefit, consume seafoods that are highest in EPA and DHA such as salmon, sardines, herring, anchovies, and sablefish.
- The Dietary Guidelines for Americans recommend that adults consume 8 ounces (approximately 2 servings) or more of seafood per week for the prevention of coronary heart disease.
- The American Heart Association recommends at least two servings of fish per week, preferably fatty fish, providing a total of 1000+ milligrams of EPA and DHA. [23] Note that Recommended Dietary Allowance (RDA) or Estimated Average Requirements (EAR) of omega-3 fatty acids have not yet been established.
- Supplementation of omega-3 fatty acids can also be beneficial; however, consensus guidelines have not yet been established. Talk to your doctor or registered dietitian for more information.

SEAFOOD AND HEART HEALTH

It is abundantly clear that incorporating nutrient dense seafood into your diet can have a tremendous benefit on your overall heart health.

EPA AND DHA FROM SEAFOOD

Seafood is the best food source of EPA and DHA, and one of the easiest ways to incorporate heart protecting omega-3 fatty acids into your diet.

By doing so, you could lower inflammation; decrease your risk of coronary heart disease; reduce your risk of dying from a heart attack or stroke; and improve triglyceride and cholesterol levels.

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BRAIN HEALTH AND ALASKA SEAFOOD

When our brain suffers, so does our quality of life. For many people, brain health is a growing concern as factors in our lives such as stress, toxins, nutrient deficiencies and aging all contribute to changes in our cognition and mood. The impact of lifestyle and diet has been extensively studied on brain health, and we now know that there are multiple interventions that can improve our cognition and reduce risk of dementia, Alzheimer's disease, and mental health disorders. Some of the positive lifestyle changes include increasing physical activity, having healthy social relationships, engaging in mentally stimulating activities, avoiding toxins in our environment, and eating a nutrient-dense whole food diet.

ONE OF THE PRIMARY REASONS SEAFOOD, ESPECIALLY FATTY FISH, CONTRIBUTES TO BRAIN HEALTH

is the fact that it is rich in vital long-chain omega-3 polyunsaturated fatty acids (omega-3's), particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

There are many components of a diet to support brain health, and the inclusion of seafood is proving to be essential. DHA is the dominant omega-3 in the brain and is a critical structural component of every cell. DHA has the ability to turn on the growth of new brain cells as well as offer protection for existing brain cells. [9] It also increases neuroplasticity, which is the ability of the brain to connect one brain cell to the next. [9] This allows us to learn, to have new ideas and to heal after an injury to the brain. Omega-3 fatty acids, DHA in particular, also help to decrease inflammation in the brain [9], which can occur in people who have had traumatic brain injuries, spinal cord injuries, Alzheimer's disease, Parkinson's Disease or Multiple Sclerosis.

EPA and DHA are synthesized by the body in small amounts, but not in quantities considered to be enough to support all the vital functions they perform in the body. Couple this with the fact that the majority of Americans do not consume 8-ounces of seafood per week as recommended by the Dietary Guidelines for Americans 2015-2020, and it is easy to see why most people are not getting adequate amounts of these essential fatty acids. [30] Because of this, it is important to focus on the consumption of food sources of omega-3 fatty acids, especially those highest in EPA and DHA.

The best-known sources of EPA and DHA on the planet are high-quality seafood, such as the wild seafood originating from Alaska waters.

ALZHEIMER'S DISEASE AND DEMENTIA

Alzheimer's disease is an irreversible and progressive condition that affects 5.4 million Americans and is the 6th leading cause of death among adults in the U.S. Alzheimer's disease is not fully understood, but it is thought to be the result of a combination of genetic, environmental and lifestyle factors. Alzheimer's disease begins an average of 30 years before the first symptoms are seen, [10] with the risk of developing Alzheimer's disease and other late- life dementia doubling every five years after the age of 65. [1, 31] Due to the constant aging of the population worldwide, the incidence of Alzheimer's disease has increased exponentially. [2] Alzheimer's disease can cost a family both financially and in emotional burden with the chronic stress of having to caretake an adult.

Cognitive decline, which is a response to aging neurons and the decreased speed at which the brain functions, is inevitably linked with the aging process and manifests itself as worsening memory, processing speed and attention.

Consuming as little as one seafood meal per week has been associated with decreasing one's risk for both AD and dementia.

Nutrition interventions, such as increased consumption of fatty fish, and the subsequent increases in EPA and DHA levels in the blood, have proven to decrease the risk of developing dementia and Alzheimer's disease. [5,7, 8, 31] In fact, consuming as little as one seafood meal per week has been associated with decreasing one's risk for both AD and dementia. [4] The reduction in both cognitive decline and Alzheimer's disease which is associated with increased omega-3 intake are attributable to the neurogenerative (production of new brain cells) and anti-inflammatory effects of omega-3 fatty acids. Omega-3 fatty acids also enhance the immune system's ability to clear the brain of beta amyloid plaques, which are one of the hallmarks of Alzheimer's disease. [33, 34] Increases in gray matter, brain volume and cognitive improvements are also evident when individuals have increased levels of EPA and DHA levels in their blood. [3, 6] Low omega-3 fatty acid intake is also a risk factor for the development of cardiovascular disease, diabetes, and hypertension, all of which also increase an individual's risk for the development of cognitive decline and Alzheimer's Disease. [31]

DESPITE THE CLEAR EVIDENCE THAT EATING FISH IS GOOD FOR BRAIN HEALTH, IT'S POSSIBLE THAT OMEGA-3'S INTAKE MAY HAVE AN EVEN GREATER IMPACT ON CERTAIN INDIVIDUALS WHO ARE AT HIGH RISK FOR DEVELOPING ALZHEIMER'S DISEASE AND COGNITIVE DECLINE DUE TO GENETICS.

These are individuals who are carriers of the APOE4 gene. In these individuals, the presence of the APOE4 gene is associated with earlier onset of the symptoms of Alzheimer's Disease, and the protective benefits of DHA from fish appears to be particularly potent, especially when taken during the pre-dementia state of Alzheimer's disease. [31, 32] In one study, consuming one seafood meal per week protected against decline in multiple cognitive domains, especially if an individual was a carrier of the APOE4 gene. [29]

Wild Alaska Seafood

such as salmon, sablefish, halibut, oysters, herring, and many others are some of the greatest sources of brain protective omega-3 fatty acids on the planet.

The evidence is clear that consuming seafood rich in omega-3 fatty acids can protect the brain from cognitive decline and Alzheimer's disease. In order to promote brain health, consuming Alaska seafood twice per week is a proven strategy to decrease the risk of cognitive decline and Alzheimer's disease.

DEPRESSION

Depression is a serious public health problem and is the leading cause of disability worldwide. [15] It affects about 16 million American adults each year, and 1 in 6 adults will have depression in their lifetime. Antidepressants are one of the most commonly used therapeutic drug classes in the United States, and use has increased almost 65% in a 15-year period. 12.7% of people over age 12 are estimated to have taken anti-depressant medication within the past month with approximately 25% of those taking antidepressant medication had done so for 10 years or more. [11]

When it comes to the prevention of depression and reducing symptoms of depression, diet is a well-known factor. [17, 20] Adherence to a nutrient-rich diet that is high in fruits, vegetables, whole grains, olive oil, antioxidants and fatty fish, such as the Mediterranean diet, reduces symptoms of depression. [21, 42] In countries where seafood consumption is higher, such as Japan and Korea, there appears to be lower rates of depression. [16, 18]

Consumption of seafood has been linked to reductions in the rate of post-partum depression [14] as well as depression in general in adults. [13]

The mechanisms by which increased seafood intake reduces rates of depression is still under investigation, but a key link is inflammation. Inflammation that increases levels of proinflammatory cytokines such as interleukins IL-6 and IL-1B and TNF-alpha are known to result in depression and inhibit memory. [39] EPA and DHA, which are found in higher quantities in seafood, and are known for their anti-inflammatory [19], antioxidative, neuroprotective and neurogenesis [22] effects.

EPA AND DHA FROM SEAFOOD

help to protect, restore and rebuild the brain.

These are important factors when protecting against depression as well as other diseases. In addition to diet, other studies have shown that supplementation with EPA (>60% of total EPA and DHA) has shown significant benefits for reducing depression [23], although, again, the mechanism is not clearly defined. EPA is neuroprotective and has anti-inflammatory effects, which are suggestive to drive this effect. [12]

Another key component when it comes to mood and cognition (memory) is a brain chemical called serotonin. Serotonin plays a critical role in brain function by helping information to transmit across the nervous system (neurotransmission) and as a hormone. The majority of serotonin is located in the gut, but it is also located in regions of the brain that have been dubbed "the social brain" as these areas regulate social cognition and decision-making. Serotonin affects a wide-range of cognitive functions, and low levels have been linked to memory problems, low mood (depression), aggression, impulsivity, anxiety, psychopathology and personality disorder. [39]

Wild Alaska salmon contains unique nutritional properties that help to support serotonin production.

Consuming wild Alaska seafood can help boost serotonin in the brain in a variety of ways. First, it is proposed that omega-3 fatty acids support serotonin release into the brain by reducing inflammation in the brain. [39] One of the mechanisms for this is that EPA increases serotonin release by reducing inflammatory properties (E2 series prostaglandins) that inhibit serotonin release. DHA also influences serotonin uptake by making receptors more sensitive, which makes the uptake more effective. This means that when levels of omega-3 fatty acids are low in the blood; the body may not utilize serotonin efficiently. [39]

Next, the amino acid tryptophan is necessary for the production of serotonin. Tryptophan is the sole precursor of serotonin produced in the body, [43] and is therefore necessary for the production of serotonin. However, because the body cannot manufacture tryptophan, it must be acquired through dietary sources. Tryptophan is available in a variety of protein-related food sources, with wild Alaska salmon and halibut being good sources of this amino acid.

It must be noted that despite the importance of serotonin in the brain, it is not an isolating factor in neuropsychiatric disorders as these conditions are multifactorial and influenced by several complex interactions including genetics, nutrition and environment.

When it comes to implementing dietary strategies to reduce the risk of depression and symptoms of depression, including 4-ounces of seafood twice a week as a part of your diet can be beneficial.

Wild Alaska seafood high in EPA and DHA is an important part of many of the proven dietary patterns than enhance mood and reduce depression.

Wild Alaska seafood is a high quality, nutrient dense food that includes the brain supporting nutritional components of EPA, DHA, tryptophan and Vitamin D. Because of this, Alaska seafood is known for its anti-inflammatory and neuroprotective effects and may increase serotonin levels in the brain, all of which are critical elements for brain health.

PERINATAL DEPRESSION

According to the CDC, 1 in 9 women, or 10-20%, experience symptoms of postpartum depression. [35] Symptoms of postpartum depression may include crying more often than usual, feelings of anger, withdrawing from loved ones, feeling numb or disconnected from your baby, and feeling guilty about not being a good mom or doubting your ability to care for your baby. [35]

The amount of omega-3 fatty acids in the blood decline during pregnancy and lactation because the fetus uses omega-3s for the development of its nervous system, and the mother's body uses omega 3's after birth to make breastmilk. [14] Unfortunately, **most pregnant women's diets are inadequate in omega 3's due to low consumption of dietary sources high in omega 3's, such as seafood.** Because of this, blood levels of omega-3 fatty acids in pregnant and breastfeeding woman may not be optimal and can impact not only child development, but may also put a pregnant mother at risk for the development of post-partum depression.

MOST PREGNANT WOMEN'S DIETS ARE

INADEQUATE IN OMEGA 3'S

DUE TO LOW CONSUMPTION OF DIETARY SOURCES HIGH IN OMEGA 3'S, SUCH AS SEAFOOD.

Research that measures blood levels of omega-3's during pregnancy shows a clear link between low blood levels of omega-3's and increased rates of post-partum depression. [36] Other studies have demonstrated that DHA concentrations in the blood are often significantly lower in postpartum women experiencing depressive symptoms than those who are not. [37,38] In one study, every 1% increase in DHA in the blood was associated with a 59% reduction in the reporting of depressive symptoms in pregnant mothers. [40] It is thought that the benefits of omega-3 fatty acids are related to the reduction in pro-inflammatory cytokines that promote inflammation are elevated during depression.

One of the best food sources of omega-3 fatty acids is seafood; however, pregnant women tend to consume small quantities of fish. One of the reasons women may omit fish in their diet is due to concerns over the mercury content. Methylmercury is a known neurotoxin that accumulates in aquatic food chains with levels that vary in species depending on their size and diet. Mercury can cross the placenta placing a fetus at risk for exposure. Longer living predatory fish such as shark, tilefish, mackerel and swordfish should be avoided due to their high levels of mercury.

Additionally, these foods are excellent sources of selenium, which protects against mercury toxicity.

Table 1

Mercury and Fish Consumption During Pregnancy

Fish to Consume*	Fish to Avoid
Shrimp	Shark
Salmon	Swordfish
Pollock	Mackerel
Scallops	Tilefish

**Have less than 0.05 ppb of mercury per 6-oz serving, eexcept light tuna, which has 1.2 ppb. 1 µg/kg = 1 ppb*

Unfortunately, when pregnant women consume small quantities of seafood, their diets are insufficient in omega-3 fatty acids. This dietary omission can place women at risk for developing perinatal depression. Omega-3 fatty acids are well known for their ability to reduce neuroinflammation (inflammation in the brain), which is a key association of perinatal depression. Pregnant women should consume 4-ounces of fatty fish per week twice a week, as is recommended by the 2015 Dietary Guidelines for Americans. Especially important is to include seafood that is high in omega-3 fatty acids and low in methylmercury.

Wild Alaska seafood is an excellent choice since salmon, herring and sablefish are some of the greatest sources of omega 3's on the planet. Because they are wild-caught in the pristine waters of Alaska, they are low in levels of methylmercury and are safe to consume during pregnancy.

Click here[1] for more information on recommendations for pregnant women and children regarding mercury and Alaska seafood.

1) https://www.fda.gov/food/consumers/eating-fish-what-pregnant-women-and-parents-should-know

VITAMIN D

Vitamin D3, or cholecalciferol, is a fat-soluble vitamin that functions as a hormone precursor. Vitamin D3 occurs naturally in foods such as fatty fish, as well as in fortified food products such as milk or orange juice. It is also found in small amounts in other foods such as mushrooms exposed to UV light, cheese, egg yolk and beef liver. Vitamin D is also synthesized in the skin after exposure to sunlight or other sources of ultraviolet light. Vitamin D is functional in the body as it enhances the absorption of calcium and phosphorus, which promote bone mineralization and remodeling. Vitamin D also plays a role in neuromuscular function and influences cellular growth and differentiation. Additionally, Vitamin D appears to enhance the secretion and action of insulin.

Throughout most of human history, Vitamin D has been obtained almost exclusively through the skin.

However, due to modern lifestyles, individuals spend less time outdoors and most Western populations are deficient in this key nutrient. [26]

Individuals who are especially at risk for developing Vitamin D deficiency are those who live above 35 degrees in latitude; being elderly or obese; having dark skin; avoiding sunlight exposure through staying indoors or excessive use of sunscreen; having low dietary Vitamin D intake; having a condition that causes malabsorption; breastfed infants; or taking Vitamin D-depleting drugs.[24] Interesting to note is that, with the exception of infants, these are the same populations that are at risk for depression. [28]

Low levels of Vitamin D are often found in individuals who suffer from depression, anxiety and other mental health disorders. [28] The link between Vitamin D and cognitive function is that Vitamin D plays a neuroprotective role. Low levels have also been associated with an increased risk of substantial cognitive decline in several population-based studies. Vitamin D deficiency has also been linked to an array of diseases such as rickets, cardiovascular disease, osteoporosis and cancer. [25]

In order to obtain adequate amounts of Vitamin D, the best ways are adequate exposure to sunshine [27], supplementation or consumption of foods high in Vitamin D. Very few foods naturally contain Vitamin D, so in order to ensure adequate consumption, it is important to include the best sources in your diet. Wild Alaska seafood is an excellent source of Vitamin D. For example, canned **Alaska sockeye salmon provides 720 IU's per 3-ounce portion, meeting 120% of the RDA. Another example is 3-ounces of Alaska sockeye contains 570 IU's of Vitamin D, almost 100% the RDA for an adult.** Alaska seafood is an excellent source of vitamin D.

Click here[1] to learn more about the nutritional value, including Vitamin D levels, of Alaska seafood.

1) https://uploads.alaskaseafood.org/2018/12/NutritionalValues_Final.pdf

Table 2: Recommended Dietary Allowances (RDAs) for Vitamin D [1]

Age	Male	Female	Pregnancy	Lactation
0–12 months*	400 IU (10 mcg)	400 IU (10 mcg)		
1–13 years	600 IU (15 mcg)	600 IU (15 mcg)		
14–18 years	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)
19–50 years	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)	600 IU (15 mcg)
51–70 years	600 IU (15 mcg)	600 IU (15 mcg)		
>70 years	800 IU (20 mcg)	800 IU (20 mcg)		

* Adequate Intake (AI)

SEAFOOD PROMOTES BRAIN HEALTH

The connection between diet and brain health is very clear. Consuming a nutrient-dense diet that contains key nutrients known to reduce one's risk of developing Alzheimer's disease, cognitive decline and depression is essential. Omega-3 fatty acids are one of the key nutrients most people do not consume enough of due to a general decline in the consumption of seafood in Western countries over the past century. Given that the brain is largely made up of omega-3 fatty acids [41], the importance of increasing these fats in our diet deserves greater attention to promote brain. Additionally, blood levels of Vitamin D are often inadequate, which also places people at risk for depression, anxiety and cognitive decline.

ONE OF THE BEST WAYS TO ENSURE ADEQUATE CONSUMPTION OF NUTRIENTS CRITICAL TO BRAIN HEALTH IS TO CONSUME WILD ALASKA SEAFOOD.

Wild Alaska salmon, halibut, and sablefish contain Vitamin D, amino acids such as tryptophan, and the omega-3 fatty acids EPA and DHA, all of which are necessary to supporting mood and cognition. Additionally, wild Alaska seafood is an excellent source of protein, selenium, and B vitamins that are essential to health and well-being.

In order to ensure adequate consumption, consuming 4 ounces of wild Alaska seafood, twice a week is recommended.

Also, aim to consume a daily average of 250 mg of EPA/DHA throughout the week. Last, a whole food nutrient-dense diet based upon the Mediterranean diet, can support the brain and reduce a person's risk of chronic disease. Focusing on these nutrition interventions, with the inclusion of wild Alaska seafood, are important steps toward optimizing brain health and reducing risk of Alzheimer's disease, cognitive decline, and depression.

KEY RECOMMENDATIONS

1. Consume 8 ounces of seafood per week (4 ounces of seafood, twice a week).
2. Focus on consuming fish high in EPA and DHA such as Alaska salmon, sablefish, oysters, halibut, and sardines. Average daily consumption should consist of 250 mg of EPA and DHA per day.
   - 3-ounces of Alaska king salmon contains 1476 mg EPA/DHA
   - 3-ounces Alaska sockeye salmon contains 730 mg EPA/DHA
   - 3-ounces Alaska black cod contains 1543 mg EPA/DHA
   - 3-ounces Alaska halibut contain 201 mg EPA/DHA
   - Click here[1] for more information on EPA/DHA in Alaska Seafood.
3. Alaska seafood high in EPA and DHA is anti-inflammatory, protects the brain, and boosts serotonin levels.
4. Consume a Mediterranean style diet consisting of nutrient dense whole foods such whole grains, fruits and vegetables, nuts and fish. Avoid processed foods. Click here[2] to learn more.

1) https://uploads.alaskaseafood.org/2018/12/NutritionalValues_Final.pdf
2) https://oldwayspt.org/system/files/atoms/files/StepsforMedDiet.pdf

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ALASKA SEAFOOD AND HEALTHY MOMS AND BABIES

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ALASKA SEAFOOD AND HEALTHY MOMS AND BABIES

Dietary fat intake during pregnancy and lactation has a significant impact on pregnancy outcomes and child growth, development and health. General recommendations for fat intake for pregnant and lactating women remain consistent with those for the general adult population, except for an increase in the recommendations for consumption of omega-3 polyunsaturated fatty acids. The increased need for omega-3 fatty acids is because docosahexaenoic acid (DHA) is the predominant fat found in the brain and central nervous system, making up over 90% of the omega-3 fatty acids in the brain, [7] affecting neurocognitive development. Both eicosapentaenoic acid (EPA) and alpha-linolenic acid (ALA) are present, but only in minimal quantities.

Wild Alaska seafood is naturally high in omega-3 fatty acids including DHA, making it an excellent inclusion in the diets of pregnant and lactating women and developing children.

Wild Alaska seafood is naturally high in omega-3 fatty acids including DHA, making it an excellent inclusion in the diets of pregnant and lactating women and developing children.

DHA IN PREGNANCY

DHA is rapidly accumulated in the brain during pregnancy and in early infancy through breastmilk. Half of the brain's DHA accumulates during pregnancy [7], with accretion being highest during the last trimester at 30-45 mg per day. [2,3]

The quantity of DHA in a mother's diet determines the amount of DHA available to be transferred to a fetus or infant.

Increased availability of DHA from the mother enhances supply to the fetus and leads to higher DHA concentration in cord blood or infant blood levels [4]. A higher DHA supply to the fetus during pregnancy and to the infant after birth provides maximum benefits on the development of visual acuity, cognitive functions and attention, the maturity of sleep patterns, spontaneous motor activity, and immunity. [1]

Breastfeeding

THE IMPORTANCE OF ADEQUATE DHA OBTAINED FROM MOTHER'S MILK CANNOT BE OVERLOOKED AS THERE ARE SPECIFIC BRAIN-RELATED BENEFITS IN INFANTS.

These include a better ability to adjust to changes in surroundings, better mental development, improved hand-eye coordination, better attention scores and memory performance later in life. [7] The amount of DHA available to a breastfeeding infant is directly related to the amount available in breastmilk. If a mother's diet is deficient in DHA, supply to the infant will be suboptimal. Also, the duration of breastfeeding and the greater total volume of breastmilk throughout an infant's life impact total DHA accretion in the brain and increase cognitive benefits. [24] Additionally, studies have demonstrated that DHA levels are higher in breastfed infants, compared to formula-fed infants. [13]

BEHAVIOR

THE AMOUNT OF OMEGA-3 FATTY ACID AVAILABILITY DURING PREGNANCY AND THROUGHOUT LIFE IMPACT NEUROBEHAVIORAL DEVELOPMENT INCLUDING ANXIETY AND SOCIAL BEHAVIORS.

Additionally, higher blood levels of DHA have been an area of growing interest for a nonpharmacological intervention for children with ADHD. Improvement in ADHD behaviors is associated with the impact that omega-3 fatty acids play on inflammation in the brain, as well as changes in gut microbiota composition affecting the gut-brain axis. [27, 28]

COGNITION

The supply of DHA to the brain's frontal and prefrontal lobes is essential because the frontal lobe of the brain is responsible for executive and higher-order cognitive activities including sustained attention, planning and problem-solving. [8] The pre-frontal lobe is responsible for social, emotional and behavioral development. [9]

The provision of DHA through breastmilk, diet or supplementation during the first year of life leads to enhanced cognitive development, improved processing speed, working memory and executive function later in life. [25,26]

Studies, where boys ages 6-12 had lower blood levels of omega-3 fatty acids, were correlated with a high number of learning and behavior problems. [14] Additional studies have demonstrated improvements in verbal learning, spelling, reading, and executive function with supplementation of DHA. [15, 16]

ASTHMA AND ALLERGIES

Consumption of omega-3 fatty acids through seafood and fish oil supplements reduces inflammation and has a positive impact on the body's immune response.

This has been associated with a reduced number of food allergies and atopic dermatitis in infants' birth to 12 months of age. Additionally, fish oil supplementation in children leads to changes in immune function and decreases the risk of developing other allergies and asthma. Ongoing studies are needed in this area but are very promising to date. [30]

Vision Omega-3 fatty acids are believed to affect visual acuity and development in infants and are therefore essential for the development of normal vision. Accretion of DHA takes places at highest levels during the third trimester of pregnancy, and because of this, infants born prematurely are at risk for the development of retinopathy of prematurity. Evidence is strong that **DHA HAS PROTECTIVE BENEFITS FOR OPTIMAL VISION DEVELOPMENT IN BOTH PREMATURE INFANTS AND INFANTS OF NORMAL GESTATION. [23]**

PREMATURE BIRTH

Preterm birth (babies born before 37 weeks of pregnancy) accounts for 85% of all perinatal complications and death, and globally is the leading cause of death in children under the age of 5. [21] Approximately 50% of all preterm births have unknown or unclear causes, but the consequences of a child being born too soon range both short and long term. Infections or inflammation contribute to the most common disease of immaturity including bronchopulmonary dysplasia, retinopathy of prematurity, necrotizing enterocolitis and white matter injury of the brain. Since most of the accretion of omega-3 fatty acids occurs in the third trimester of pregnancy, infants born prematurely are at high risk for developing a deficiency of omega-3 fatty acids. Inadequate levels of DHA place premature infants at risk for cognitive, visual and neurological deficits in the long term. [21]

Provision of DHA and EPA may reduce the incidence or severity of the most common comorbidities of prematurity by enhancing immune and anti-inflammatory responses. [21]

Studies have also demonstrated that supplementation or adequate intake of omega-3 fatty acids during pregnancy can reduce the chances of preterm birth and increases the duration of pregnancy. [22]

MATERNAL DEPRESSION

Women who are of childbearing years are vulnerable to depression and being pregnant or giving birth precipitates postpartum depression in some women. Perinatal depression can result in psychosocial dysfunction, suicide, and adverse childcare. [19]

Increased rates of depression are found in women who have an inadequate amount of omega-3 in their blood as omega-3 fatty acids affect neurotransmission and deficiency creates neuro-inflammation in the brain. [17]

Additionally, omega-3 fatty acids in a woman's diet may attenuate maternal psychosocial stress and reduce rates of depression by supporting a positive mood and altering perceived stress and anxiety. [18] Studies have shown that nutrition interventions through increase intake of foods high in omega-3 fatty acids can be effective for perinatal depression. [20] Supplementation of omega-3 fatty acids or **intake of foods sources such as 4 ounces of omega-3 rich wild Alaska seafood twice a week are recommended.**

MERCURY IN SEAFOOD

Although consuming fish is an effective strategy to ensure adequate intake of omega-3 fatty acids for pregnant women, breastfeeding women, and children, the predominant drawback is that some species of fish contain methylmercury. Methylmercury is undetectable by humans but is toxic to the developing brain of a baby and may adversely affect child growth. Mercury contamination occurs in oceans, river and other bodies of water.

Levels of bioaccumulated contaminants, such as mercury, tend to be highest in larger predatory fish, [5] with the highest amounts found in shark, tilefish, swordfish and king mackerel. Since concerns about methylmercury in seafood have arisen, there has been a decline in fish consumption among pregnant women. [29]

Studies have demonstrated

that high fish intake by pregnant women can lead to high infant cognition, verbal intelligence, pro-social behavior, fine motor, communication, and social development score. [5,6]

Because of this, it has been determined that the advantages of consuming seafood, outweigh potential risk associated with mercury contamination [1]. Women should select fish that are known to be lower in levels of methylmercury such as wild Alaska salmon, sablefish, and herring. In addition to these species possessing low levels of mercury,

Wild Alaska seafood also naturally contains selenium, an element which prevents mercury from interacting with tissues and minimizing if not eliminating mercurial risks.

RECOMMENDATIONS:

Studies have shown that the consumption of seafood is one of the best ways to ensure adequate intake of DHA for mothers and infants.

A large study (N = 11,875) showed that lower seafood intake resulted in suboptimal infant development. In contrast, children whose mothers had a high seafood intake during pregnancy, demonstrated excellent pro-social behavior, better fine motor development, and high verbal intelligence at eight years of age. [12] Benefits were also seen in supplementation with DHA.

For mothers who are considering increasing seafood consumption while pregnant or breastfeeding, the recommendations call for the inclusion of wild alaska seafood such as salmon, sablefish, herring, and cod, as these are excellent sources of beneficial DHA.

Omega-3 fatty acids are found in a limited number of food sources. The most significant sources of DHA in our diets is oily fish such as wild Alaska salmon, sablefish, herring, and cod. Other sources of omega-3 fatty acids include omega-3 enriched eggs. Food such as flaxseeds contains a type of fatty acid called alpha-linolenic acid, ALA, which is not easily converted to DHA.

UNFORTUNATELY, THE INTAKE OF OMEGA-3 FATTY ACIDS RARELY MEETS THE RECOMMENDED AMOUNTS AND IS INADEQUATE IN MOST PEOPLE'S DIET DUE TO THE DECREASED CONSUMPTION OF SEAFOOD. Low consumption is especially true for pregnant and breastfeeding mothers, as well as children.

To ensure optimal development of the brain, eye nervous system and immune system in their growing child, and decrease their risk of perinatal depression, **A PREGNANT AND LACTATING WOMAN SHOULD AIM TO ACHIEVE AN AVERAGE DIETARY INTAKE OF AT LEAST 200 MG DHA PER DAY. CONSUMING 4-OUNCES OF FATTY FISH TWICE PER WEEK WILL HELP WOMEN TO ACHIEVE THIS GOAL.**

The evidence for recommendations for DHA consumption by children is still emerging; however, current guidelines range from 250 to 500 mg EPA + DHA per day. [10, 11]

The increased intake of wild Alaska seafood during pregnancy and the early years of life extended beyond the contribution of critical omega-3 fatty acids. Wild Alaska seafood is also nutrient-dense food sources that contribute to protein, vitamin D, selenium, potassium and B vitamins to the diet. All of these are essential nutrients for human health and development.

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