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Report

# Groundbreaking Study Reveals New Mechanism Behind Fish Oil's Health Benefits

By Logan Bronwell

By now most people know that **omega-3 fatty acids** from fish oil have remarkable health-protecting benefits. In fact, the science behind it is so strong that Big Pharma has jumped on board with expensive **fish oil prescription drugs**.1

But if you've ever been tempted to pay top dollar for Big Pharma's knockoffs,2-4 a **2012** study shows once and for all that a quality fish oil supplement provides everything you need for powerful protection against some of the most dreaded diseases of aging.

This landmark study found that the components in **fish oil** not only stop inflammation in its tracks—they actively treat inflammation that is already present. But better than that, the researchers discovered the secret behind fish oil's super-nutrient status.5

After nearly a decade of intense research and discovery, scientists uncovered a newly characterized class of inflammation-regulating molecules that add an entirely unique dimension to the benefits of fish oil.6

In this article, we'll explore how these molecules contribute to—and expand—the already impressive array of health benefits obtainable from omega-3 fatty acids.6,7 Then we'll look at compelling studies that demonstrate how fish oil can help you avoid or reduce the **chronic inflammation** that contributes to all of the diseases of aging.

## How to Activate Your Body's Inflammation "Stop Signs"

It is well known that a diet rich in omega-3s reduces the body's overall burden of inflammation, a fact that gained relevance as scientists discovered the growing role of **chronic inflammation** in causing the diseases (or symptoms) of aging.7

Although many studies have demonstrated the vast array of health benefits of omega-3s, scientists have only begun to uncover exactly how they function in the body in order to produce these results.

Researchers at the ***University of California-San Diego*** have published a groundbreaking study to show how fish oil works inside a cell to produce its anti-inflammatory effects. This discovery is so profound that it's likely to change the way we think about inflammation for years to come.

While studying acute inflammation in animals, scientists noticed the production of small molecules released in response to inflammation, especially in the presence of high levels of omega-3 fats.8,9 These molecules had a dual set of actions.6 First, they sent out a "stop signal," quickly putting a stop to runaway inflammation.2 Next, they triggered the active resolution of inflammation.6

In other words, having enough omega-3s in your system provides your body with the tools necessary to combat *and* resolve

acute inflammation almost as soon as it is triggered.6,10,11

It is important to note that acute inflammation is beneficial to the body. Without it, wounds and infections would never heal. The pro-inflammatory mediators that produce inflammation are essentially cellular "battle troops" that attack and destroy invaders (such as microorganisms or cancer cells). After the temporary inflammation takes care of the problem, your body releases a set of molecules that shuts off the inflammation before it can get out of control. It's yet another one of your body's systems of checks and balances. These post-inflammatory molecules eradicate dead and dying tissue, mop up excessive inflammatory waste products, and promote healing.2,6,10

These specialized molecules are called ***pro-resolution molecules***. The first of these pro-resolution molecules to be studied were called *lipoxins*. Later, other members of the family, called *resolvins* and *protectins* (think "resolve and protect") were discovered. Each of these molecules provides different but overlapping functions in actively resolving acute inflammation.7

The whole system works beautifully under normal conditions of acute inflammation. But with chronic inflammation, something goes wrong. Instead of controlled resolution, inflammation continues to jog along at a reduced, but still active level.6 This chronic, out-of-control inflammation occurs as a result of reduced levels of pro-resolution molecules.

Studies have shown that people with diseases that involve chronic inflammation have reduced levels of pro-resolution molecules.12-14 Other studies have revealed that these molecules are sharply reduced with age. In fact, it is this deficiency that is now recognized as one of the chief reasons that we increasingly suffer from **chronic inflammation** as we grow older.15

**SOURCES AND EFFECTS OF NEWLY-DISCOVERED INFLAMMATION-ENDING MOLECULES**

| Family | Derived From | Main Effects |
|---|---|---|
| Lipoxins | Arachidonic Acid (AA), especially in presence of omega-3 EPA and DHA from fish oil6 | Potent triggers that end acute inflammation6 |
| Resolvins | Omega-3 EPA and DHA from fish oil6 | Trigger the resolution phase of acute inflammation6 |
| Protectins | Omega-3 DHA from fish oil6 | Especially active in protecting brain tissue by promptly ending acute inflammation; synthesis of Protectins begins immediately after acute injury11,102 |

Fortunately, by restoring levels of ***pro-resolution molecules*** to normal levels, many inflammatory processes can be rapidly resolved and healing can begin.10

The best way to restore those levels is by taking fish oil to boost your body's omega-3 content, since pro-resolution molecules are produced in response to a high omega-3 concentration.6 The resolvins and protectins are directly formed from the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Interestingly, beneficial **lipoxins** are formed from **arachidonic acid**, but require high **omega-3** concentrations for their production.6,16

Big Pharma wants to modify these molecules, patent them, and sell them for huge markups. But by simply supplementing with their precursors, the EPA and DHA in fish oil, you'll be giving your body what it needs to create these molecules directly in the cells where they're needed the most.5,6 And as you'll see, by doing so, you can directly impact some of the most common diseases of aging by battling age-induced inflammation.

# Metabolic Syndrome

The skyrocketing obesity epidemic is evident everywhere you look. Chronic, low-grade inflammation is now recognized to be one of the devastating consequences of excessive body fat.17 Fat tissues are not inactive storage depots; rather, they are biologically active factories pumping out a steady stream of inflammatory mediators.18

Those mediators ultimately trigger many of the signs of metabolic syndrome, including insulin resistance, elevated lipids, hypertension, and fatty liver infiltration.17

In addition to that, it is becoming clear that high-fat diets and obesity result in decreased levels of at least one of the pro-resolution molecules: protectins.14 This "resolution deficiency" contributes to the persistence of the fat-induced inflammatory state.

Fortunately, supplementation with fish oil rich in omega-3s can reverse these processes, boosting levels of all the pro-resolution molecules.17,19

Studies show that these novel substances are at the root of omega-3s' ability to improve insulin sensitivity.20 They switch on genes for cellular energy sensors, glucose transport molecules, and the protective cytokine *adiponectin*, all of which contribute to lower blood sugar and decreased liver fat stores.21,22

In one remarkable study, high levels of omega-3s completely protected mice against experimentally induced diabetes, retaining normal insulin production and producing no inflammatory cytokines in their fat tissues.23 Not surprisingly, elevated levels of lipoxins and resolvins were found in their bodies.

Human studies abound on the benefits of fish oil in preventing or minimizing the effects of metabolic syndrome. Here are a few highlights from recent literature:

- Omega-3 supplementation **(1.24 grams/day)**, along with a low-fat, high-carbohydrate diet that contained additional EPA/DHA resulting in **total** EPA/DHA intake of **1,400 mg/day**, can reduce the prevalence of metabolic syndrome by more than **20%.**24
- Daily supplementation providing a minimum of **930 mg** EPA and **230 mg** DHA improves blood vessel function, contributing to lower blood pressure in obese patients.25,26
- The after-meal decrease in vascular function common in type 2 diabetes is reduced with daily supplementation of **920 mg** EPA and **760 mg** DHA.27
- Low-doses of EPA **(180 mg)** and DHA **(120 mg)** prevented increased triglycerides in a group of elderly patients.28 When higher doses **(1,240 mg/day) of EPA and DHA** were used, this effect was augmented, particularly during the critical after meal period.29
- Consuming **223 mg** EPA and **149 mg** DHA along with **1.9 grams** ALA (alpha-linolenic acid, a plant based omega-3) reduced the risk of deadly heart arrhythmias by **84%** in diabetics who had experienced heart attacks.30
- At-risk obese patients improved their insulin sensitivity and decreased their fasting insulin levels with just **540 mg** EPA and **360 mg** DHA from fish oil.31
- Omega-3 supplementation can slow or prevent the development of non-alcoholic fatty liver disease, a common finding in metabolic syndrome.32

**WHAT YOU NEED TO KNOW - OMEGA-3S: THE KEYSTONE IN THE BATTLE TO RESOLVE INFLAMMATION**

- Fish oil's multiple benefits have long been attributed to its effects on reduced inflammatory signaling by cytokines.
- New discoveries reveal that the omega-3 fats in fish oil directly trigger resolution of inflammation and promote early healing.
- Molecules called lipoxins, resolvins, and protectins are all derived from, or produced in response to, omega-3 fats.
- Deficiencies in pro-resolution molecules have been identified in most of the chronic, inflammation-related diseases of aging.

- Aging itself produces a total-body loss of these health-promoting molecules.
- Multiple studies reveal that supplementing with omega-3-rich fish oil boosts production of pro-resolution molecules and quickly brings your body back to a non-inflamed state.
- Human clinical trials demonstrate anti-inflammatory effects of fish oil supplementation in metabolic syndrome, cardiovascular disease, lung diseases, neurodegenerative conditions, and cancer, with additional evidence flowing in daily.
- Fish oil can no longer be considered an optional supplement; rather, it is a must-have for the prevention of the inflammatory conditions of aging.

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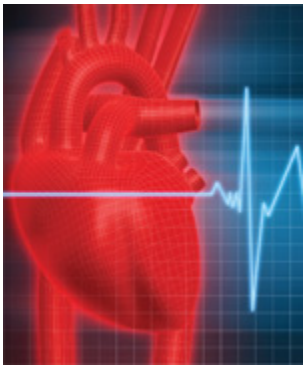
## Cardiovascular Disease



New evidence reveals that people with atherosclerosis have reduced levels and function of pro-resolution molecules, which helps explain their vulnerability to the inflammation that causes the disease.33

Boosting levels of these pro-resolution molecules would be especially important to people with cardiovascular disease because they have been found to reduce cholesterol, lower blood pressure, block clot-promoting platelet activation, prevent heart arrhythmias, prevent vascular inflammation and improve vascular function, and protect the heart muscle following a heart attack.34-39 That immense spectrum of action has led some researchers to describe omega-3s as a "polypill," capable of attacking multiple targets of cardiovascular health at once.34,40

Human studies of the long chain omega-3 fatty acids found in fish oil in individuals with cardiovascular disease reveal the following important effects:

- People with the highest blood levels of the EPA have about a **50%** lower risk of congestive heart failure compared to those with the lowest levels, and survival in heart failure patients is enhanced by **35%** in those with the highest levels of omega-3s.41,42
- Supplementing with **300 mg** EPA and **1,500 mg** DHA from fish oil significantly improves electrical parameters in the hearts of people with paroxysmal **atrial fibrillation**, a potentially dangerous heart arrhythmia.43
- **Two grams/day** of omega-3s yielding **850** to **882 mg** of EPA and DHA nearly doubles the likelihood of successfully treated paroxysmal atrial fibrillation one year after **electrical cardioversion** treatment.44
- **2,000 mg/day** of omega-3s decreases triglyceride levels by **21%** and improves endothelial function in a fashion similar to that of the lipid-lowering drug fenofibrate.45
- Supplementing with approximately **1,860 mg** EPA and **1,500 mg** DHA, significantly increases heart muscle pumping ability and gives a survival advantage to people with chronic heart failure, improving endothelial function and lowering the inflammatory mediator IL-6.46
- Adding **1,800 mg/day** of EPA to statin treatment prevents the progression of arterial stiffness more effectively than statins alone.47
- Blood pressure spikes from mental stress can be reduced by supplementing with **1,000 mg** EPA and **400 mg** DHA.48

**Paroxysmal atrial fibrillation** is a type of atrial fibrillation in which the irregular heartbeat occurs every so often. The heart eventually returns to its normal rhythm. It is hard to predict when episodes of paroxysmal atrial fibrillation will occur, and the causes are generally unknown. About 1 in 4 people with this condition will eventually develop permanent atrial fibrillation. Recent studies showing that EPA/DHA supplements double **electrical cardioversion** treatment efficacy make **omega-3 supplements** an exciting adjuvant approach in the control of atrial fibrillation.

# Lung Disease: Asthma and COPD

Lung diseases such as asthma and chronic obstructive pulmonary disease (COPD) are well known to involve out-of-control inflammation.49-51 Recent discoveries reveal that asthmatics have reduced production of pro-resolution molecules.12,49,52 Other studies have found that experimental animals treated with these omega-3 derivatives have less severe asthma attacks.53-55

Those observations have led to experiments showing that supplementation with fish oils containing omega-3s boosts tissue levels of pro-resolution molecules, with marked improvement of asthmatic symptoms.53,56,57

It is becoming clear that the abnormal inflammation in asthma begins in utero, before a child is born58 —possibly because of inadequate amounts of the pro-resolution molecules derived from omega-3s. This has led to intense interest in supplementing pregnant women with fish oil to prevent asthma and allergies in their offspring.58,59

Over the past decade, higher-dose omega-3-rich fish oil supplements have been used with remarkable success in reducing inflammation and the severity of asthma and COPD in humans:

- Supplementing with **1,000 mg/day** EPA and **2,000 mg/day** DHA from fish oil reduced levels of inflammatory cytokines in newborns; infants of supplemented mothers had a **3-fold** lower risk of positive skin testing for egg allergy, and less severe eczema in later life.59
- A long-term follow-up of pregnant women supplemented with **320 mg** EPA and **230 mg** DHA from fish oil revealed a **63%** reduction in the rate of asthma in their children, and an **87%** reduction in the rate of allergic asthma.58
- Supplementing with fish oil containing **3,200 mg** of EPA and **2,200 mg** of DHA per day in athletes with exercise-induced asthma improved their pulmonary function nearly 5-fold, while lowering levels of inflammatory cytokines.60
- In non-athletes, **3,200 mg/day** of EPA and **2,000 mg/day** of DHA improved lung function to the point that exercise-induced asthma was no longer diagnosable, and led to a significant reduction in the use of asthma medications.61
- Children with a high risk of asthma had a **10%** reduction in coughing over a 3-year study of omega-3 supplementation.63
- Children with moderate asthma who took omega-3 supplements experienced marked improvements in asthma symptoms and lung function.64
- Following omega-3 supplementation, COPD patients experienced significant improvements in difficulty breathing, oxygen saturation in their blood, and in the distance they could walk in **six** minutes.51

# Cognition

Inflammation is widely recognized as a major contributor to chronic neurodegenerative diseases such as Alzheimer's and Parkinson's; it is an active component of damage from strokes and other vascular diseases of the brain.65

Studies now show that fish oil-derived pro-resolution molecules play an important role in stopping neuro-inflammation.65,66 That's leading to widespread hope that these mediators might help prevent and resolve some of the most heartbreaking conditions of aging.67-69

Extensive data exist on the role of omega-3 (especially DHA) supplementation in the cognitive decline of aging. Here are

some of the most compelling findings:

- Reduced intake of DHA produces faster rates of cognitive decline and more rapid development of dementia.70
- DHA supplementation improves moderately severe dementia that arises from certain kinds of strokes.71
- Daily supplementation of **1,700 mg** of DHA and **600 mg** of EPA in patients with Alzheimer's disease produced a reduction in the rate of decline on the mini-mental status exam, but only in patients with early, mild disease.68 This study shows the importance of routine supplementation before developing symptoms.
- Daily supplementation of **1,700 mg** of DHA and **600 mg** of EPA was shown to produce significant increases in appetite and body weight in patients with Alzheimer's.72
- Patients with mild cognitive impairment or age-related cognitive decline showed significant improvements in immediate memory, learning, and attention after up to **900 mg** of DHA supplementation.73,74
- Patients with Parkinson's disease and depression showed a significant reduction in depression scores following 12 weeks of fish oil supplements.75
- Older women, even those without diagnosed cognitive impairment, showed improved verbal fluency and memory scores, with improved rates of learning, following four months of DHA supplementation.76

## Cancer

One of the deadliest results of unresolved chronic inflammation is cancer.77 Years of study have shown that cancer development is associated with increased amounts of inflammatory cytokines.78

Newer research is revealing that fish oil has exciting possibilities for slowing—or even preventing—cancer.79,80

Here's what recent studies are showing:

- Women with a history of breast cancer who have the highest EPA and DHA intakes have about a **25%** lower risk of additional breast cancer events compared with those having the lowest intake.81
- **4,000 mg/day** of EPA supplements produced a **36%** increase in skin sunburn threshold and reduced DNA damage from ultraviolet light; together these effects reduce the risk of skin cancer.82
- **2,000 mg/day** of EPA significantly reduced findings of abnormal precancerous "crypt cells" on colonoscopy, indicating a reduction in colon cancer risk.83
- Animal studies show that fish oil supplementation delays the progression of lymphoma in mice through the modulation of immune responses and inflammation.84
- Men taking **1,000 mg** EPA and **1,835 mg** DHA fish oil daily prior to radical prostate surgery showed significant reductions in cancer cell proliferation.85
- Lung cancer patients on chemotherapy taking **2.2 grams** of EPA/day prevented treatment-associated weight loss with **69%** of patients gaining weight after supplementation.86
- Another lung cancer study showed increased chemotherapy response and a trend toward greater one-year survival in patients supplemented with fish oil.87

## Summary

The growing importance of fish oil in the diet is highlighted by the remarkable discovery of the **pro-resolution** molecules lipoxins, resolvins, and protectins.

These molecules initiate an active healing process, triggering the resolution of inflammation within minutes of its beginning. The problem has been in the chronic inflammatory diseases of aging—and in aging itself—there's a shortage of these healing substances.

A breakthrough **2012** study revealed that these molecules can be directly produced in tissues from the **omega-3 fatty acids** found in fish oil. That eliminates the need for synthetic drugs aimed at mimicking the effects of pro-resolution healing molecules and opens the door to self-management by supplementation with a high-quality fish oil supplement.

Doses of **2 to 6 grams/day** of omega-3 rich fish oil have been shown to reduce the occurrence and consequences of metabolic syndrome, cardiovascular disease, lung disease, the major neurodegenerative diseases, and cancer. Additional benefits are being reported in arthritis, age-related eye diseases, and oral health.8,88-101

Fish oil, rich in omega-3 fats, is no longer optional; it is a must-have for those interested in quelling inflammation and promoting natural healing in their bodies. •

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

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