

## DOCTORS OVERLOOK BENEFITS OF OMEGA-3 FATTY ACIDS FOR BONE HEALTH

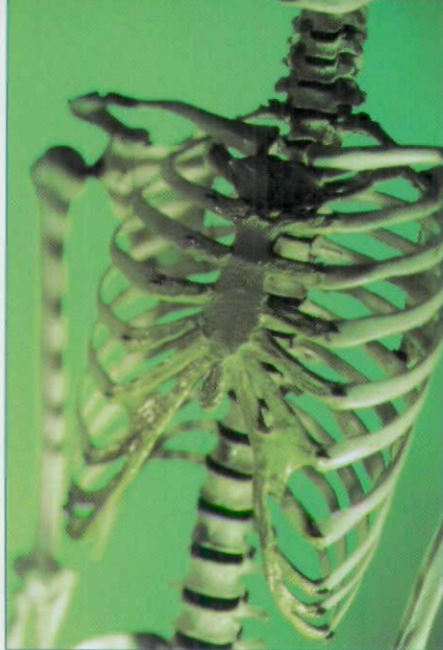
By Dale Kiefer

As we age, preserving strong, healthy bones becomes a top priority. Today, mainstream medical doctors routinely recommend minerals such as calcium and vitamin D, and drugs like Fosamax<sup>®</sup>, to help maintain healthy bone mass.

However, accumulating research indicates that traditional prescriptions for preserving bone health may be missing one vital ingredient: omega-3 fatty acids from fish oil. Exciting studies show that omega-3 fatty acids improve bone structure by enhancing calcium absorption, reducing bone loss, and maintaining bone mineral density. In fact, scientists now know that optimal levels of omega-3 fats such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) help support healthy bone tissue throughout life.<sup>1</sup>

In this article, we survey the latest findings pointing to omega-3 fatty acids as an essential yet largely overlooked component of a strategy to ensure life-long bone health. >>>





## Bone: A Dynamic Body Tissue

While many people imagine that their bones are inert, static tissues, nothing could be further from the truth! In fact, bones are dynamic, living structures that continuously undergo a remodeling process that involves building and breaking down. Healthy bone structure and density depend on this delicate balance between bone building (formation) and bone breakdown (resorption). Omega-3 fatty acids appear to help maintain healthy bone mass by playing integral roles in this dynamic process.<sup>2-5</sup>

### Omega-3s Prevent Bone Loss

*Just how do omega-3s influence bone loss?*

To determine the effects of omega-3 fatty acid consumption on bone loss in aging males, scientists have conducted experiments in an animal model of male aging. Beginning with a group of middle-aged rats, the researchers analyzed bone mineral density and then divided the remaining animals into several groups. One group received a diet rich in fish oil, another group received omega-6 fatty acids from safflower oil along with omega-3 fatty acids from fish oil, and a third group received only omega-6 fatty acids.<sup>6</sup>

After 20 weeks, all three groups demonstrated some age-associated loss of bone mineral density.

However, the animals fed supplemental omega-3 fatty acids alone had higher bone mineral content and density compared to animals fed the omega-3-plus-omega-6 diet or the omega-6-only diet.<sup>6</sup>

The scientists also measured levels of various hormones and other biochemicals involved in bone production, maintenance, and destruction. Here again, the omega-3-fed rats had higher values for substances related to good bone health, while the omega-6-fed animals had higher levels of biochemicals related to bone loss.

While human studies are needed, these findings in animals lend considerable support to the positive role of omega-3 fatty acids in preventing age-induced bone loss.<sup>6</sup>

### Omega-3s Increase Calcium Absorption

Omega-3 fatty acids have also been shown to increase the absorption of calcium, one of the key minerals that are incorporated in bone matrix to provide it with rigidity and strength.<sup>3</sup>

In another animal study, researchers noted that rats fed a diet rich in fish oil had significantly healthier bones than those fed a diet rich in corn oil, which supplies omega-6 fatty acids. In fact, several markers of bone health—including calcium absorption, bone mineral density, and bone calcium content—were markedly higher in the animals fed fish oil. Interestingly, DHA increased the incorporation of calcium in bone significantly more than did EPA.<sup>3</sup>

This study suggests that another mechanism by which omega-3s positively influence bone health is by increasing the absorption of bone-protective calcium.

### Omega-3s Maintain Bone Mass

Since bone loss particularly affects women after menopause, scientists have also examined the effects of omega-3 fatty acids on bone health in an animal model of postmenopausal osteoporosis.

Once again, animals that consumed a diet rich in the omega-3 fatty acid DHA demonstrated notably less bone loss compared to animals whose diet was low in DHA. These intriguing findings suggest that DHA helped preserve bone mineral content in the absence of estrogen, as would be experienced by postmenopausal women.<sup>7</sup>

To determine whether the bone-protective effects of omega-3 fatty acids apply to people as well as animals, scientists examined data collected during a long-term investigation of the effects of nutrition on health. Conducted between 1988 and 1992, this study examined the nutritional habits of more than 1,500 men and women. Bone mineral density was measured using an imaging technique known as dual-energy x-ray absorptiometry, and the test results were then compared with nutritional intake data.<sup>8</sup>

The researchers concluded that subjects with the highest ratios of omega-6 to omega-3 fatty acid intake had the lowest bone mineral density. In other words, people who consumed the least omega-3s had the weakest bones. These findings strongly suggest that consuming plentiful omega-3 fatty acids may be critical in preserving healthy bone mass in aging adults.<sup>8</sup>

Another intriguing study suggests that omega-3 fatty acids may be particularly important in preserving bone mass in people suffering from rheumatoid arthritis, a painful inflammatory condition associated with a greatly increased risk of osteoporosis. Using an animal model of human rheumatoid arthritis, scientists found that subjects consuming a diet rich in fish oil had much greater bone mineral density than similar animals fed a diet deficient in omega-3 fats. The omega-3-fed animals also displayed less inflammation of the joints than did those that did not receive omega-3 fats. This study indicates that omega-3 fats can help maintain bone mineral density as well as help curtail inflammation in individuals with rheumatoid arthritis.<sup>9</sup>



## Omega-3s May Promote Dental Health

Periodontal disease, one of the most common dental problems faced by adults, involves inflammation that can result in weakened bone in the jaw and erosion of the bony ridges that help secure teeth in the bone of the jaw. Emerging research suggests that a recently discovered, powerful anti-inflammatory compound derived from omega-3 fatty acids may help protect against the inflammation that can trigger tooth and bone loss.

While scientists have long appreciated the anti-inflammatory properties of omega-3 fatty acids, they recently discovered another way in which these fats suppress inflammation. Harvard University researchers found that the omega-3 fatty acid EPA serves as a molecular building block for an anti-inflammatory compound that has been dubbed *resolvin E1*. This novel compound works by putting the brakes on runaway inflammation, with important implications for periodontitis (infection or inflammation of the gums).<sup>11-14</sup>

In an animal model of human periodontal disease, EPA-derived resolvin E1 offered dramatic protection against the tissue inflammation and bone loss associated with peri-

odontitis.<sup>15</sup> This finding suggests that omega-3 fats may be an important part of a strategy to guard against periodontal disease.

Periodontal disease has been linked with other chronic inflammatory disorders, such as diabetes, cardiovascular disease, asthma, and arthritis. This has led scientists to speculate that nutritional therapeutics such as omega-3 fatty acids that benefit periodontal disease may hold promise in treating other inflammation-related illnesses.<sup>15-17</sup>

## EPIDEMIC OF LOW BONE MASS THREATENS AGING WOMEN AND MEN

Osteoporosis is widely viewed as a disease of older adults, and especially of postmenopausal women, in whom it is linked to declining levels of estrogen. However, aging men are also susceptible to the ravages of this bone-weakening disease. Of the 10 million Americans believed to have osteoporosis, at least 2 million are men.<sup>10</sup>

According to the National Osteoporosis Foundation, another 34 million Americans have low bone mass, a condition known as *osteopenia* that increases their risk for osteoporosis. Thus, more than half of all people 50 years of age or older are at risk of suffering bone fractures due to low bone mass.<sup>10</sup>

Osteoporosis is often called a "silent disease" because it is a gradual, painless process that becomes evident only after fractures occur. As bone loses its mineral content, it loses mass and becomes more porous. This leads to structural weakening and an increase in the likelihood of fractures, which most commonly occur in the bones of the spine, hip, and wrist. Hip fractures usually require hospitalization and major surgery, and may lead to prolonged or permanent disability, and even death. Spinal fractures are similarly serious, potentially resulting in severe pain, disability, loss of height, or permanent deformity.

To assess a patient's risk of osteoporosis, physicians may recommend specialized examinations called bone mineral density tests, which measure bone density at various sites of the body. Generally, the higher the mineral content of bone, the denser the bone. Denser bone is associated with a lower risk of fractures.

## Conclusion

Although scientists are only just beginning to unravel the important benefits of omega-3 fatty acids for bone health, preliminary study findings in animals and humans offer compelling evidence that these fish oil-derived nutrients play a crucial role in promoting and preserving bone strength and integrity, especially as we age.<sup>18-21</sup>

These initial findings suggest that, among other effects, omega-3 fatty acids may prevent age-related declines in bone mineral density while increasing the absorption of bone-protective calcium. The bone-strengthening and anti-inflammatory effects of omega-3 fatty acids may hold special value for postmenopausal women at risk for crippling osteoporosis, as well as for aging adults suffering such maladies as rheumatoid arthritis and periodontitis.

While much remains to be learned about how omega-3 fatty acids affect bone health, the scientific findings to date lend considerable support to including optimal levels of fatty acids such as EPA and DHA as part of a nutritional regimen for preserving strong, healthy bones over a lifetime. ■





## BORON COMPLEMENTS BONE HEALTH BENEFITS OF OMEGA-3 FATTY ACIDS

In emerging research studies, scientists are learning that the bone health benefits of omega-3 fatty acids may be greatly magnified when these essential fats are combined with the critical trace mineral boron.<sup>22</sup>

Boron promotes healthy bones by supporting the utilization of vitamins and minerals that are crucial to bone tissue, including calcium, magnesium, vitamin D, and phosphorus.<sup>23-31</sup> Intriguing new research findings suggest that boron's bone-supporting effects may be greatest when omega-3 fatty acids are also available.

For example, when laboratory animals consumed a diet rich in both omega-3 fatty acids and boron, they demonstrated greater bone mineral density and stronger bones compared to animals fed other dietary fats and boron. These findings suggest that omega-3 fatty acids and boron may work together to support dense, strong bones.<sup>22</sup>

While boron has not yet been classified as an essential nutrient, this may soon change. Growing evidence suggests that boron plays many essential roles in maintaining skeletal health.

Boron beneficially affects the compositional and functional properties of bone, while boron deprivation adversely affects these parameters of bone health.<sup>23,27,32</sup> In humans, boron deprivation is associated with increased excretion of calcium in urine, signifying loss of calcium from bone.<sup>33</sup> Other studies suggest that boron plays an important role in preventing osteoporosis and alleviating osteoarthritis pain.<sup>23</sup>

Scientists from the US Dept. of Agriculture note that most adults do not consume more than 1 mg of boron a day, while larger doses of 1-13 mg per day may be needed to support optimal bone health.<sup>31</sup>

The studies just cited offer powerful support for optimizing intake of boron and omega-3 fatty acids as part of a nutritional strategy for maintaining strong, healthy bones.

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