Omega-3 Fatty Acids Increase Brain Volume
While Reversing Many Aspects of Neurologic Aging

By Julius Goepp, MD

The cardioprotective power of omega-3 fatty acids has been thoroughly documented in clinical literature. Less well known is their paramount role in optimizing many facets of brain function, from depression, cognition, and memory to mental health.

Recent research has opened up a new horizon in our understanding of omega-3s’ profound ability to halt age-related decline and pathology, shattering the long-held medical belief that brain shrinkage and nerve cell death is progressive and irreversible. Omega-3s have been shown to possess antidepressant and neuroprotective properties. One recent landmark study found that aging humans who consumed more omega-3s had increased gray matter brain volume and that most new tissue development was observed in the part of the brain associated with happiness.1

Similar findings appeared in the prestigious journal Lancet.2 In one of the largest studies of its kind, scientists analyzing the diets of 12,000 pregnant women found that children of those who consumed the least omega-3 were 48% more likely to score in the lowest quartile on IQ tests.

In this article, the latest research on these essential fatty acids’ importance to the growth, development, and function of the human brain is detailed. You will learn about their intrinsic power to preserve cognition and memory and reverse age-related loss of brain function. You will also discover exciting findings on their unique capacity to combat multiple forms of mental illness, neuropsychiatric disorders, and aberrant behavior, from Alzheimer’s disease and aggression to bipolar disorder and depression.

KEY NUTRIENT FROM THE CRADLE TO THE GRAVE

Approximately 8% of the brain’s weight is comprised of omega-3 fatty acids—the building block for an estimated 100 billion neurons.4 Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) play a host of vital roles in neuronal structure and function, protecting them from oxidative damage, inflammation, and the cumulative destruction inflicted by other chronic insults.5,6

Embedded in the omega-3-rich neuronal membrane are numerous proteins and complex molecules required for electrochemical transmission and signal reception.4 Scientists have recently shown that the precise balance of fatty acids in brain cells helps determine whether a given nerve cell will be protected against injury or inflammation, or whether it will instead succumb to the injury.7

Omega-3s accumulate in the human brain during fetal development. The amount of the omega-3 DHA has been closely tied to intelligence and cognitive performance in infancy and childhood.8 But the omega-3 content of brain cell membranes involved in essential memory-processing areas diminishes with advancing age and in certain chronic brain disorders.9

These findings have led scientists to suspect a role for omega-3 deterioration in development of typical age-related cognitive decline such as that seen in Alzheimer’s and chronic disease.10

Early developmental deficits in brain content of omega-3s have been associated with poor brain maturation and neurocognitive dysfunction.11 These are manifested especially in the area of attention, increasing the risk for attention-deficit/hyperactivity disorder (ADHD) and other behavioral disturbances.8 Later in life, declining levels of DHA and EPA may contribute to development of aggression, anxiety, depression, schizophrenia, dementia, and a variety of other mental health and even criminal conditions.12-
Scientists are having great success at reversing many of the fundamental age-related decreases in brain function correlated with omega-3 deficiency. ADHD and related conditions can be prevented or mitigated by supplementing infants and nursing mothers with DHA. Young rats supplemented with DHA show increased plasticity, or flexibility of function, in their developing brain cells, with highly invigorated development of synapses, the electrochemical junctions where nerve signals are relayed. In aged rats, omega-3 supplementation reverses age-related neuronal changes and maintains learning and memory performance that arise from powerful antioxidant and anti-inflammatory effects.

A remarkable animal study has just revealed that omega-3 fatty acids halt the age-related loss of brain cell receptors vital to memory production, and show potential for increasing neuronal growth.

A NATURAL CRIME FIGHTER?

Recent findings suggest that some criminal and aggressive behaviors are closely correlated with low serum omega-3 levels, which are linked to lower levels of altruism, honesty, and self-discipline. These effects may be related to alterations in serotonin turnover, which controls impulsivity and aggression-hostility behaviors.

There’s solid data indicating that optimal omega-3 intake at all ages is a promising avenue for subduing aggression and hostility. For example, 1.5 grams of omega-3 supplementation (containing 840 mg EPA and 700 mg of DHA) in autistic children with severe tantrums, aggression, or self-injurious behavior produced significant improvements compared with placebo, without adverse effects. And stressed but otherwise healthy volunteers given 1,500 mg/day of DHA reported a significantly improved rate of stress reduction compared to a no-treatment group, suggesting an adaptogenic role for omega-3s (adaptogens help the body respond to imposed stress in a variety of ways).

In a group of substance abusers, supplementation with 2,225 mg EPA and 500 mg DHA for 3 months produced significant decreases in anger and anxiety scores compared to placebo recipients. Amazingly, the two nutrients complemented each other, with EPA increases being most robustly associated with lowered anxiety scores, and DHA increases with lowered anger scores. Similarly, in young adult prison inmates, multi-supplements featuring omega-3s produced significant reductions in antisocial, violent, aggressive, and transgressive (rule-breaking) behavior.

MORE POTENT THAN PROZAC®

Large epidemiological studies repeatedly demonstrate that depressed people have significantly reduced levels of DHA and EPA in red blood cell membranes or serum. One autopsy study revealed lower amount of omega-3s in the brains of those who’d suffered depression compared to those who did not. Low omega-3 status is frequently found in people who have attempted or committed suicide. In fact, seasonal variations in blood levels of omega-3s have been shown to closely parallel similar variations in violent suicide deaths. Patients with deficient omega-3 status also had reduced expression of the vital transporter serotonin at nerve cell junctions.

People who get more omega-3s actually have bigger, more functional brains.

In fact, the serotonin-related benefits of omega-3 supplementation are powerful enough to stand up to a head-to-head comparison with fluoxetine (Prozac®), a common and highly effective member of the selective serotonin reuptake inhibitor (SSRI) category of modern antidepressants. In that study, 50% of subjects responded well to fluoxetine alone, 56% to EPA supplementation (1,000 mg), and an impressive 81% in people who took both forms of treatment.

WHAT YOU NEED TO KNOW: REVERSE BRAIN AGING

- Lipids comprise a significant portion of the brain. Of these lipids, omega-3 fatty acids are particularly important.
- Omega-3 fatty acids exert profound anti-aging effects on brain structure and function, from cognition and memory to mental health and Alzheimer’s prevention.
- They have recently been associated with increased volume of the brain’s gray matter, especially in those regions associated with happiness, and they boost intelligence through enhanced function from birth onwards.
- They support brain cell structure, increase the production of vital neurotransmitters, and blunt oxidative and inflammatory damage.
- Ranges of 1,000-3,000 mg of EPA and 1,000-1,500 mg of DHA have been shown to yield significant improvements in symptoms of depression, aggression, and other mental disorders, as well as protection against early cognitive decline and even early Alzheimer’s.

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At doses above 2,000 mg, results are uniformly dramatic. Double-blind, placebo-controlled trials are revealing substantial superiority of omega-3 therapy to placebo, using standard depression assessment scales. Numerous other studies are further validating these dramatic effects on depression in a host of other contexts: depressive symptoms were alleviated in patients with Parkinson's disease, and in pregnant women with major depressive disorder. A particularly powerful effect was shown in middle-aged women experiencing psychological distress and depressive symptoms during the menopausal transition. In one Israeli study, omega-3 supplementation in children with major depression provided significant improvement across all indices of measurement.