

harnessing the brain pt. 1

nutritional neuroscience

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ALIVE!

ONE OF the most exciting fields in nutrition is nutritional neuroscience. It is the study of how components of the diet impact the central nervous system, specifically cognitive function and mental health. The idea that food impacts brain function was considered ridiculous not too long ago. Today, however, it is a proven fact.

Richard Wurtman, M.D., is a professor of neuroscience in Massachusetts Institute of Technology's (MIT) Department of Brain & Cognitive Sciences, and of Neuropharmacology in the Harvard-MIT Division of Health Sciences & Technology. Speaking of the dynamic relationship between food and brain function Wurtman says, "The ability of a meal's composition to affect production of brain chemicals distinguishes the brain from all other organs. The crucial compounds that regulate other organs are largely

independent of whatever was in the last meal we ate, but not the brain."¹ The brain uses consumed carbohydrates for fuel. Amino acids are an essential ingredient in the production of the chemicals integral to the brain's internal communication. Antioxidants, vitamins, and minerals protect the brain. When it comes to the composition of the brain, fat is crucial. Sixty percent of the brain is made up of fatty acids, the individual constituents of fat.² Even the athlete with a body mass of only 10 percent fat still has a brain that is 60 percent fat. It is one place you don't want to lose fat.

The kinds of fat you eat play a significant role in determining what kind of fat will be found in the brain. In fact, the chemistry of fat can profoundly influence the very architecture of brain cells, thus affecting intelligence, learning, memory, attention, concentration, and mood. It also influences what type of

neurotransmitters brain cells make and release and has been found to switch on genes and hormones that influence how you feel. What do we mean by the chemistry of fat? Fat is classified into three main categories: saturated, polyunsaturated, and monounsaturated.

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Within the polyunsaturated category, omega-9, omega-6, and omega-3 varieties reside. We typically refer to avocados and olive oil as rich in omega-9 fat. We think of vegetable oils as omega-6s and fish and flaxseeds as omega-3s. In reality, a combination of unsaturated fat and saturated fat is found in foods. For example, olive oil's fatty acid composition is 70% omega-9 monounsaturated, 20% saturated, and 10% omega-6 unsaturated. Yet, even within these categories there are a variety of individual and unique fatty acids. Three specific omega-3 fatty acids exist: alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). Examples of ALA rich foods include flaxseeds, chia seeds, walnuts, and some green vegetables, such as Brussels sprouts, kale, and spinach. The other types, EPA and DHA are primarily found in fatty fish. Have I confused you yet? Trust me, the only reason I am making a big deal about the specific types of fat is because



your brain makes a big deal about them.

These fats we have mentioned are chemically different. The chemistry of fat is referring to the arrangement and composition of the molecule, how its atoms are arranged, and what it looks like. All fats look different. And the resounding lesson in the study of chemistry is that structure determines

enhancing learning and memory tasks in aged animals. Research on humans is revealing the same.³

The following study was aimed at investigating the potential benefit of DHA supplementation on cognitive functioning in young adults. One hundred seventy-six healthy subjects of mixed genders, ages 18-45, were

and he will be still wiser; teach a just man, and he will increase in learning” (Proverbs 9:9, NKJV). At face value, this sounds redundant. But think about it. It may be easy to skim over what I’ve shared with you of the nitty-gritty of unique fatty acids. When the brain is given too much information that seems irrelevant, it is all too easily deflected. It is my hope however, that just enough of the bottom line will be internalized and assimilated to help guide meal-based decisions, helping you to become, or remain, truly wise.

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function. If composed differently, the molecule will act differently and serve a different purpose. That is the bottom line. Now let’s look at its application in your brain.

The American diet is excessive in omega-6 intake, as found in vegetable oils, and disproportionately low in omega-3. Diets with greater than a 1:10 ratio of omega-3 to omega-6 are typical. Very unhealthy ratios of 1:25 and 1:50 are common, especially with regular consumption of fast and fried foods. Japanese, on the other hand, eat as much omega-6 as Americans; but they also eat 30 times more omega-3!

As we mentioned already, there are three different kinds of omega-3 fats. DHA is the principle omega-3 fatty acid in the brain. It is essential for the growth and functional development of the brain in infants and for maintenance of normal brain function in adults. Deficiencies are associated with deficits in learning, attention deficit hyperactivity disorder, depression, aggressive behavior, hostility, cognitive decline during aging, and with onset of sporadic Alzheimer disease. Supplementation has been found to restore brain levels,

given cognitive performance testing and then again six months later. “Episodic memory,” referring to immediate and delayed word recall, delayed word recognition, and delayed picture recognition, as well as “working memory” was tested. Roughly half of the group (85 subjects) received daily supplementation of 1,160 mg DHA (plus 170 mg EPA) while the control group (91 subjects) received a daily placebo supplementation. When blood measures of omega-3 were taken a marked increase in the levels of DHA and EPA were found after six months in the red blood cells of the group receiving omega-3 supplementation, but not in those taking the placebo. Those that received supplementation experienced a significant improvement in the reaction time, responding faster to the tasks than the controls. Episodic memory improved significantly as well. The authors concluded that, “young healthy adults may cognitively benefit from an increased consumption of DHA.”⁴

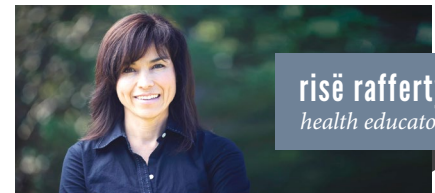
Who would have thought that one of the most effective ways to harness or hinder the human brain was through what went into the mouth? Scripture says, “Give instruction to a wise man,

¹ Daniel Goleman, “Food and Brain: Psychiatrists Explore Use of Nutrients in Treating Disorders,” *The New York Times*, <http://www.nytimes.com/1988/03/01/science/food-and-brain-psychiatrists-explore-use-of-nutrients-in-treating-disorders.html?pagewanted=all&src=pm>.

² Gerald Deas, “Are you a fat head or a fat head?,” *New York Amsterdam News*, [serial online]. October 25, 2007:32, Available from: Academic Search Premier, Ipswich, MA.

³ LA Horrocks, YK Yeo, “Health benefits of docosahexaenoic acid (DHA),” *Pharmacological Research*, <http://www.ncbi.nlm.nih.gov/pubmed/10479465>.

⁴ Stephen Daniells, “Far-reaching benefits: DHA omega-3 may boost memory for healthy young people,” *NutraIngredients-USA.com e-newsletter*, <http://www.nutraingredients-usa.com/Research/Far-reaching-benefits-DHA-omega-3-may-boost-memory-for-healthy-young-people>.



Risë has been writing on various health subjects for over 20 years. She has inspired many through her research and down-to-earth writing and speaking style. She believes that healthy living is intimately tied to happiness and wholeness.