

A New Study Shows B Vitamins and Omega-3s May Prevent Memory Loss

Changing the Brain Health Paradigm

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Want to know how to prevent memory loss? Every once in a while a breakthrough study comes along that has the potential to change paradigms. A recent study (Jerneren et al, Am J Clin Nutr, 102: 215-221, 2015) looking at the potential of B vitamins and omega-3s to slow brain shrinkage in the elderly is just such a study. It has the potential to forever change the way we think about preserving brain health as we age.

One of the most terrifying aspects of aging is the thought that we might literally lose our minds. On one hand, it seems to be an almost inevitable part of the aging process. Every year millions of older Americans develop mild cognitive impairment, and as they age many of them progress on to dementia or Alzheimer disease. In fact, one recent study (Plassman et al, Ann Neurol, 70: 418-426, 2014) estimated that for individuals 72 and older in the United States every 6 years:

- 4.8 million will develop mild cognitive impairment.
- 3.4 million will develop dementia.
- 2.3 million will develop Alzheimer disease.

Unfortunately, there is no effective drug treatment for preventing this cognitive decline, and there don't appear to be any promising new drugs on the horizon. So it is only natural to ask whether there are diet and lifestyle changes that might reduce the rate of cognitive decline as we age.

As I discussed in previous issues of "Health Tips From the Professor" there are clinical studies suggesting that [B vitamins](#) and [omega-3 fatty acids](#) can both slow the brain shrinkage and cognitive decline associated with aging. Unfortunately, there are also clinical studies that have come up empty. They have found no effect of B vitamins or omega-3 fatty acids on brain shrinkage or cognitive decline. Because of these conflicting clinical results, many experts are simply not ready to endorse natural approaches for preventing cognitive decline.

That's what makes the current study (Jerneren et al, Am J Clin Nutr, 102: 215-221, 2015) paradigm-changing. If this study is correct, you need both B vitamins and omega-3 fatty acids together to prevent cognitive decline. Neither one will work without the other.

That would explain a lot! The previous studies have not been designed to test the

effects of both B vitamins and omega-3 fatty acids simultaneously. Whether or not the diets of previous study participants were adequate with respect to B vitamins and omega-3s was a matter of pure chance. If the diets were adequate in both B vitamins and omega-3s, the study outcome might be positive. If the diets were only adequate in just one or the other, the outcome would almost assuredly be negative.

Why Might B Vitamins and Omega-3s Both Be Required for Brain Health?

It is easy to understand why B vitamins and omega-3s each might be important for preventing cognitive decline individually. Cognitive decline is closely associated with elevated levels of homocysteine, a toxic amino acid metabolite, and multiple clinical studies have shown that the combination of folic acid, vitamin B12 and vitamin B6 is effective at lowering homocysteine levels.

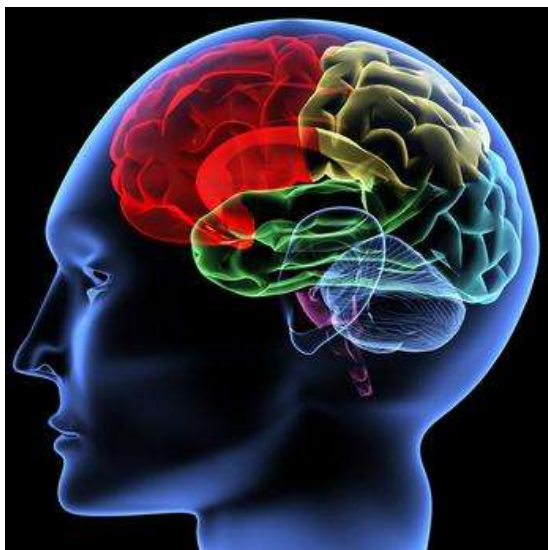
The omega-3 fatty acids are an integral part of the myelin sheath that coats our neurons. You can think of myelin as being like the plastic coating on an electrical wire that allows the electrical current to travel from one end of the wire to the other without shorting out. Myelin plays essentially the same role for our neurons.

But what is the possible connection between B vitamins and omega-3s with regard to brain health? The authors of this study had an interesting hypothesis. It turns out that when homocysteine levels are elevated due to B vitamin deficiency methionine levels and the levels of a number of downstream metabolites, including phosphatidylcholine, are reduced – and phosphatidylcholine is what delivers omega-3 fatty acids to the brain.

If their hypothesis is correct, adequate levels of B vitamins are required to deliver omega-3 fatty acids to the brain. That means that omega-3 fatty acids would only be effective at preventing brain shrinkage and/or cognitive decline in studies where the subjects were receiving adequate B vitamins as well.

Conversely, if we assume, as the authors suggested, that the real role of B vitamins is to assure the presence of enough phosphatidylcholine to deliver omega-3 fatty acids to the brain, B vitamins would be effective only in clinical studies where the subjects were also getting sufficient omega-3s from their diet.

Are B Vitamins and Omega-3s Both Required To Prevent Memory Loss?



The study itself included 168 adults over the age of 70 (average age = 77) with mild cognitive impairment at the beginning of the study. Half of them were given a high dose B vitamin supplement (800 ug folic acid, 500 ug vitamin B12, and 20 mg vitamin B6), and the other half were given a placebo.

Brain MRI scans were performed at the beginning of the study and again 2 years later to

measure brain volume. Blood levels of omega-3 fatty acids were assessed at the beginning of the study. When the data were analyzed at the end of the study, the subjects with blood omega-3 levels of >590 umole/L were classified as having high omega-3 status, and subjects with blood omega-3 levels <390 umole/L were classified as having low omega-3 status.

The results were pretty striking:

- 1) B vitamin treatment reduced brain shrinkage by up to 70% over a two year period in adults over the age of 70.
- 2) The B vitamin treatment was only effective when the subjects were deficient in B vitamins at the beginning of the study, as indicated by elevated homocysteine levels.
- 3) The B vitamin treatment was also only effective in subjects with high omega-3 status. The B vitamin treatment had no benefit in subjects with low omega-3 status.

What Is The Significance Of This Study?

In today's scientific world, "gold standard" clinical studies are considered to be those in which a single variable is evaluated in a double-blind, placebo-controlled clinical trial. Unfortunately, this reductionist approach can sometimes lead to misleading and confusing results.

For example, I once attended a session in which a world renowned expert was giving his talk on colon cancer. He said, "I can show you, unequivocally, that colon cancer risk is significantly decreased by a lifestyle that includes a high-fiber diet, a low-fat diet, adequate calcium, adequate B-vitamins, exercise and weight control. But I can't show you that any one of them, by themselves, is effective."

The question that came to me as I heard him speak was: "What's the message that a responsible scientist or responsible health professional should be giving to their patients or the people that they're advising?" You've heard experts saying: "Don't worry about the fat" "Don't worry about calcium." "Don't worry about B-vitamins." "Don't worry about fiber." "None of them can be shown to decrease the risk of colon cancer." Is that the message that we should be giving people? Or should we really be saying what that doctor said many years ago – that a lifestyle that includes all of those things significantly decreases the risk of colon cancer?

Similarly, in a recent "Health Tips From the Professor" I shared a [study](#) showing that a holistic program involving exercise, a healthy diet, socialization and memory training significantly reduced cognitive decline in the elderly. Once again, it has been very difficult to reproducibly show that any of those interventions individually prevent cognitive decline.

That is what makes the current study so exciting. It is a single study, and it is a relatively small study. It definitely needs to be repeated. However, it has the potential to be a paradigm-shifting study.

Previous studies looking at the effect of B vitamins and omega-3s on brain shrinkage and/or cognitive decline have been inconsistent. Many have shown a benefit, but some have not. But, until now, none of the studies have looked at B vitamins and omega-3s together. If this study is correct, all future studies should examine the effect of both B vitamins and omega-3s together. The paradigm will have been forever changed.

Does It Matter?

The important question is whether this is just an academic discussion or does it really matter? If most older adults were getting adequate amounts of omega-3s and B vitamins in their diet, this would merely be an academic discussion. Unfortunately, that is not the case.



Our oceans and rivers are becoming more and more polluted, and many people are avoiding fish because of concerns about heavy metal or PCB contamination. There is also an increasing emphasis on eating “sustainable” fish. That usually means the fish are farm raised, and farm raised fish are the most likely to be contaminated with PCBs, which is unfortunate. For example, I recently went to a nice restaurant that had a delicious sounding salmon dish on their menu. They could guarantee that the salmon was sustainably raised, but they couldn’t guarantee it was PCB-free. I chose not to eat the salmon.

It is no wonder that many adults aren’t getting enough omega-3s in their diet. In a recent [“Health Tips From the Professor”](#) I reported a study showing that a shocking 75% of pregnant and lactating Canadian women were not getting enough omega-3s in their diet! Other studies suggest those of us in the United States don’t do much better.

We don’t do much better with respect to B vitamins either. For example:

- The most frequent cause of B12 deficiency is the age related loss of the ability to absorb vitamin B12 in the upper intestine. This affects 10-30% of people over the age of 50.
- Chronic use of acid-suppressing medications such as Prilosec, Nexium, Tagamet, Pepcid and Zantac also decreases B12 absorption and increases the risk of B12 deficiency. Millions of Americans use those drugs on a daily basis.
- Overall, B12 deficiency has been estimated to affect about 40% of people over 60 years of age.

- Deficiency of the enzyme methylenetetrahydrofolate reductase (MTHFR) substantially increases the requirement for folic acid. About 10% of the US population has this enzyme deficiency.
- About 25% of Americans have low blood levels of B6

Clearly, this is not just an academic argument. Millions of older Americans are deficient in B vitamins or omega-3s or both.

The Bottom Line

1) A recently published study looked at the effect of high dose B vitamin supplementation on brain shrinkage over a two year periods in adults over 70 (average age 77) with mild cognitive impairment at the beginning of the study. This study differed from all previous studies in that it also measured omega-3 fatty acid levels in the blood at the beginning of the study to assess omega-3 status.

- B vitamin treatment reduced brain shrinkage by up to 70% over the two year period compared to placebo.
- The B vitamin treatment was only effective when the subjects were deficient in B vitamins at the beginning of the study, as indicated by elevated homocysteine levels.
- The B vitamin treatment was also only effective in subjects with high omega-3 status at the beginning of the study. If they had low omega-3 status, the B vitamin supplementation was ineffective.

2) This study has the potential to forever shift the paradigm for preventing cognitive decline in the elderly. Past studies have looked at the effect of B vitamins and omega-3s at reducing cognitive decline separately, and these studies have been inconsistent. If this study is correct, consistent benefits will only be seen when both B vitamins and omega-3 fatty acids are present at adequate levels.

3) This is a concern because millions of older Americans are deficient in B vitamins or omega-3s or both.

4) Of course, B vitamins and omega-3s are just part of a holistic approach for preventing cognitive decline. Weight control, exercise, a healthy diet, adequate sleep, socialization, and memory training (mental exercise) are also important if we want to retail our full mental capacity into our 90s and beyond.

These statements have not been evaluated by the Food and Drug Administration. This information is not intended to diagnose, treat, cure or prevent any disease.

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