

Features

Why use the BrainSpan Fatty Acid Blood Spot?

BrainSpan is the only dried blood spot test paired with a functional brain health test with independent validation. Studies indicate that patients who maintain well balanced fatty acids have a 67% slower aging rate than most other patients who leave imbalances unaddressed. BrainSpan independently found that patients receiving the SP report improve on average over **85% in fatty acids** in less than 90 days and within that same time frame **improve brain function 34%**.

BrainSpan is one of the very few fatty acid tests that correlates 98% to whole blood RBC testing done with our same CLIA approved lab partner where over 200 studies have validated the method and stability of our results. Specially treated, proprietary cards ensure fatty acids are stable for 30 days and technique does not require patient fasting like most other labs. This approach has also been validated and published by the US military in combat settings.

What makes BrainSpan unique?

BrainSpan is the only dried blood spot test paired with a functional brain health test with independent validation. Studies with BrainSpan indicate that patients who maintain well balanced fatty acids have a 67% slower aging rate than most other patients who leave imbalances unaddressed as measured by telomere attrition. Patients who are age 50 or more who have high AA/EP A ratio have worsening in cognitive flexibility.

Fatty acid imbalances can be both a causative factor or major contributor to:

- **Variety of chronic diseases to include cognitive decline, heart disease, stroke, arthritis, and decreased joint mobility**
- **Chronic pain**
- **Symptoms such as fatigue, bloating and excessive weight gain**
- **Performance decrements involving aerobic athletic performance as well as cognitive mental acuity**
- **Mood disorders such as depression and anxiety**
- **Learning disorders in children**
- **Premature aging of the skin, hair, and nails**

Other uses of the fatty acid blood spot test include healthy pregnancy, optimal childhood developmental support, peak performance, general wellness, anti-aging, skin and beauty. The fatty acid blood spot and report can quickly and efficiently educate patients on the need for fatty acid supplementation, dietary modifications and GI programs, and auxiliary supplementation that supports/augments conditions or symptoms associated with the fatty acid imbalances. These include supplements that target inflammation, metabolic efficiency/glucose metabolism, GI health, and cognitive function.

<p>Healthcare Provider: Standard Process</p> <p>Office Address: Functional Chiropractic 6789 Main St. Dallas, TX 75211</p> <p>Office Phone Number: (800) 535-1518</p>	<p>Date of Assessment: 05/10/2020</p> <p>Lab Processing Date: 04/03/2019</p> <p>Barcode ID: VIP-11260</p> <p>Client Name: Test Patient</p>
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Where life begins

All health, just like all illness, begins in our cells. We must measure, track, and improve the nutritional and functional health of them. They are the simplest unit of life on which all life is built upon. Our brain represents a collection of 80 billion cells.

What This Report Measures: This report quantifies the 1) health of the tissues in your body by examining closely specific levels of key nutrients in the red blood cells and 2) the functional capacity of a subset of cells, called neurons, that make-up the human brain. This test is measuring the health of all your tissues through a functional lens of cognitive demand.

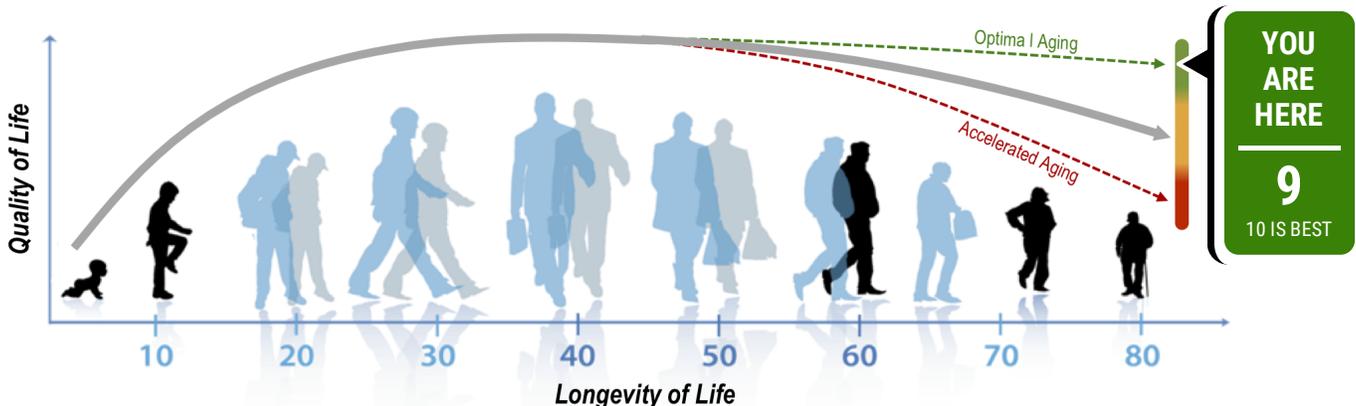
Why It Matters: By measuring key nutrients called fatty acids in the red cell, we get a broad understanding into the overall health of your diet and where targeted but also supportive nutritional changes are needed. We are not chasing numbers but through measuring and tracking and adopting a holistic approach, we can re-establish an entirely new cellular climate in 3-4 months. This results in lower levels of inflammation and more resilience to aging and stress. Exciting new possibilities emerge when we improve the functional capacity of our most vital organ, the brain through improving key building blocks to brain cells such as DHA, an Omega-3 measured on this test.

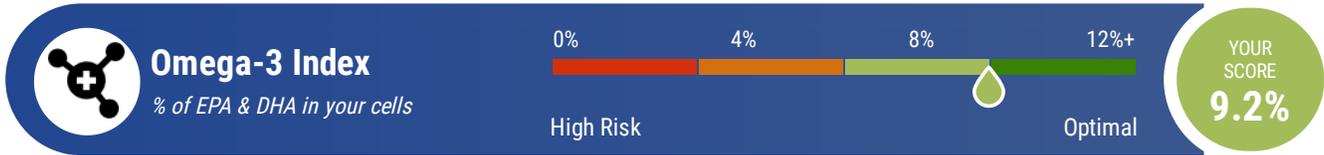
The Problem: Most Americans have major fatty acid imbalances driven largely by dietary changes that affect everything from metabolism and appetite control to pain and inflammation. 96% percent of us have a greatly disturbed cellular climate. Leading diseases like heart disease, dementia, and arthritis can erode our quality of life if we do not measure and act on optimizing fatty acids and providing the right cellular environment. Measuring, tracking, and improving these cell vital signs is a first line preventive strategy for all chronic disease.

The Solution: Working with your provider a new, healthy and resilient cellular climate is possible by building a roadmap of specific but comprehensive nutritional changes. BrainSpan highly recommends to adopt a "3-4" test protocol. "3-4" approach refers to 3 tests over 4 months each 2 months apart in order to correct, maintain, and sustain the changes if necessary, although it is important to work with your doctor on development a re-testing program that is right for you.

Your BrainSpan Trajectory Index*

*Your BrainSpan Trajectory Index is based on the results from your blood cell test and brain function assessment. Each score in this report has been weighted based on relevant scientific literature regarding age-related cell degeneration and cognitive decline. Research shows that maintaining your scores in the "green zone" lowers your risk of cognitive decline and helps prevent chronic inflammatory diseases like Alzheimer's Disease and heart disease.





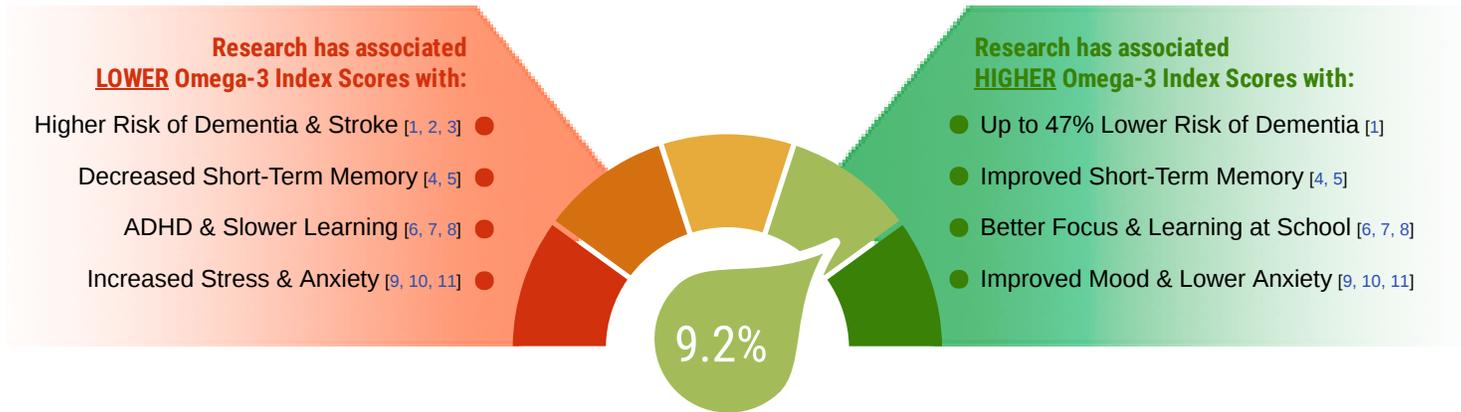
YOUR OMEGA-3 INDEX:

Omega-3 fatty acids are the building blocks of the brain, determining the brain's integrity and ability to perform. They are to your brain cells what calcium is to your bones – or what protein is to your muscles.

These crucial molecules cannot be made by your body, so it is critical to obtain them by eating fish or taking fish oil. The most important factor is how much is absorbed by your blood cells. This is a fact that many scientific studies on fish and fish oil miss leading to confusion about the benefits of fish/fish oil.

Consistently measuring your Omega-3 Index is the only way to maintain optimal levels. An Omega-3 Index over 8% is associated with improved memory, attention, learning, mood stability, faster recovery from concussions, as well as lower anxiety, depression, and inflammation.

Tracking your index over time is one of the most important ways to help prevent Alzheimer's Disease, cognitive decline, and cardiovascular disease.



YOUR MINIMAL WELLNESS REQUIREMENT (MWR) OMEGA-3 EPA/DHA

The below are calculated amounts based on your omega-3 Index score only and are only an estimate. It is critical to re-test every 2 months until above 8.9% then every 6-12 months to ensure optimal health & resilience.

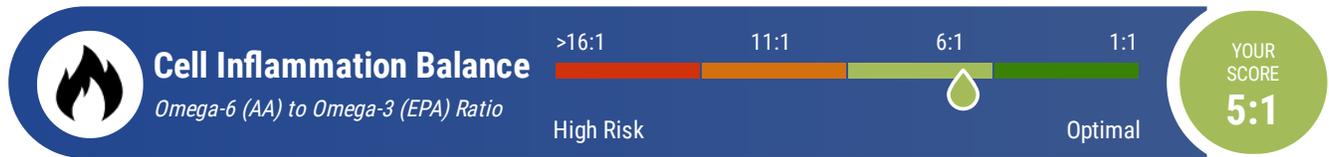


Your current estimated EPA & DHA requirement for general wellness only is 1,500 milligrams of combined EPA & DHA per day

The above recommended amount is only for general health and wellness and does not take into account many other factors that may warrant a higher dosage of one or both of the Omega-3s, EPA and DHA. This includes specific social, family or genetic risk factors for chronic diseases, the need to alleviate specific symptoms of illnesses such as pain, depression or arthritis, or the need to prevent the progression of some pre-existing chronic diseases. Other reasons this estimate could be inaccurate include other variables that affect how much EPA/DHA gets into your cells. These include factors such as your size, the health of your overall diet, and the health of your microbiome (the GI Tract). The quality and purity of available fish oils in the market is also a major concern. Use the chart at the end of this report for seafood recommendations as a source of EPA/DHA.

For more precise recommendations on your required amount, visit the [BrainSpan Omega-3 EPA/DHA Calculator](#) or ask your practitioner to help you enter the additional information to help improve the accuracy and reliability of this estimate. Finally, know when to re-test so you can be sure you improve and keep your cells healthy. The goal is to correct any

deficiency within 4 months which means a re-test should be performed at month 2 (to ensure you are improving) and month 4 to ensure the change is remaining). Then, because our requirements also change with age, it is highly recommended to re-test every 6-12 months to ensure your cells stay living in the green (above 8.9%). This will provide the most optimal cell state of biological cell health and resilience to aging, stress, and disease.



YOUR CELL INFLAMMATION BALANCE:

Due to the way we eat and grow our food, the majority of us in the U.S. have significant deficiencies of important Omega-3 like EPA and DHA (which come from fish) in our diets. This is worsened by having an excess of specific Omega-6s (which come from corn, soy, vegetable oils, and processed foods) in our diets.

The fatty acids in your cell membrane are a reflection of the average fatty acids in your diet over the last 90 days. However, Omega-6s (specifically one called "AA") tend to increase inflammation and clotting, whereas Omega-3s such as EPA tend to decrease inflammation and increase blood flow. Balancing these fatty acids is foundational to properly regulating your body's inflammatory response.

Tracking your dietary balance of AA to EPA is a more comprehensive way to understand your dietary needs/modifications, building on and going beyond the Omega-3 Index. A ratio of 5 or less AA to every 1 EPA is essential to properly balancing inflammation, modulating pain receptors, and regulating immune system function.

RESEARCH & ASSOCIATED CONDITIONS:

The graph below shows how your AA (Omega-6) to EPA (Omega-3) Ratio compares to current research studies.



RECOMMENDATIONS:

To improve your Cell Inflammation Balance within 3 months, you will need to do the following:



Nutritional supplements like boswellia serrata and curcumin inhibit Omega-6 inflammatory pathways and help balance inflammation.



Processed foods are high in pro-inflammatory Omega-6s. Reducing these foods will help balance your inflammation ratio.



Grass fed meat is higher in Omega-3s. Grain fed meat is high in Omega-6s. Eating grass fed meat will improve your ratio.



Replace commonly used vegetable oils with healthier alternatives such as olive, macadamia nut, or hi-oleic sunflower oils.



Cardiometabolic Index

Cellular Palmitic Acid Level

29%

25%

21%

17%

High Risk

Optimal

YOUR SCORE
19%

YOUR CARDIOMETABOLIC INDEX:

Excessive palmitic acid (usually from a diet high in simple carbohydrates) is associated with fatty acid alterations within the cell that can suppress hormones that are critical to proper cell-to-cell signaling.

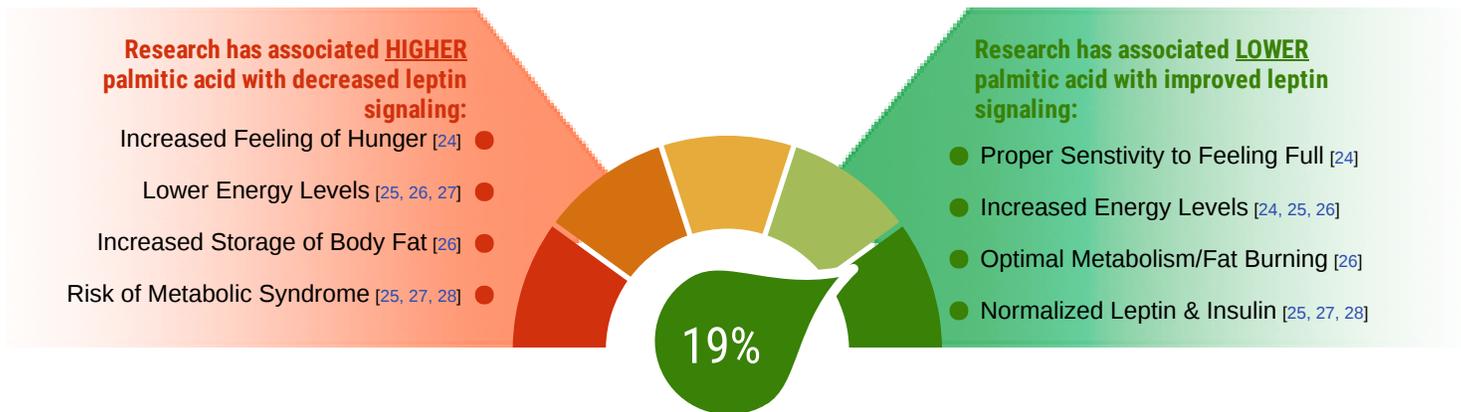
Maintaining optimal palmitic acid levels helps normalize leptin and insulin signaling, which helps regulate your metabolism, increases your energy, and improves neurotransmitter communication.

Your brain communicates with your fat cells throughout your body using leptin signaling. Similar to how a thermostat turns the air on and off to keep the temperature stable, leptin communicates to your cells to burn or store fat.

When proper leptin signaling occurs, the brain properly stimulates a feeling of "full," increases energy, and starts burning body fat. When leptin signaling is suppressed, the brain stays in "hungry" mode, lowering energy output and storing body fat.

RESEARCH & ASSOCIATED CONDITIONS:

The graph below shows how your palmitic acid level may be affecting your leptin signaling.



RECOMMENDATIONS:

To Improve your Cell Toxicity Index within 3 months, you will need to do the following:



Supplements such as coenzyme Q10 & chromium encourage healthy blood sugar by improving carbohydrate metabolism



Reduce your consumption of simple carbs (sugars) so they don't convert to palmitic acid and store up in your cells.



Eat smaller, low glycemic, high protein meals more frequently throughout the day to stabilize your blood sugar production.

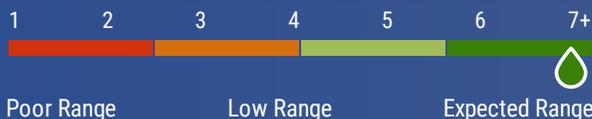


Increase exercise so that your body uses more calories and does not convert as much glucose to palmitic acid for storage.



Memory Capacity

Working & Recognition Memory Tests



YOUR SCORE
7

What This Score Means to You

Working memory is the process whereby your brain is able to temporarily store information in the moment and recall it when you need it.

Poor working memory may be associated with nutritional deficits in the cells of the hippocampus -- the part of the brain that stores memories.

Poor working memory scores may suggest brain cell nutrient deficiencies, inflammation, insufficient neuronal connections, or poor quality sleep.

How to Improve Your Memory Capacity

- ✓ Getting all three of your blood cell biomarkers into the green zone can optimize your working memory.
- ✓ Phosphatidylserine has been shown to enhance memory for words, faces, names, and numbers, and supports brain health across the lifespan.
- ✓ Quality sleep is necessary to consolidate memories so that they can be recalled in the future.
- ✓ Vitamin D research shows that memory declines up to 300% faster in individuals with low levels of vitamin D. Only use a quality supplement with high cellular absorption.
- ✓ Aerobic exercise has been shown to boost the size of the hippocampus, the brain area involved in memory.
- ✓ Sage is excellent for better brain functioning and boosting memory recall.



Sustained Attention

Sustained Attention Tests



YOUR SCORE
6.5

What This Score Means to You

To efficiently sustain your attention and 'tune out' competing distractions, your brain must produce specific neurotransmitters. However, your brain requires adequate nutrients to create these neurotransmitters.

Attentional problems may be associated with deficiencies in the pre-frontal region of the brain, which controls selective attention, impulsivity, and motivation. These impairments may be caused from nutrient deficiencies, stress, or inflammation.

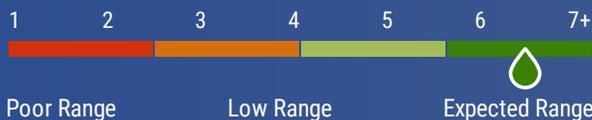
How to Improve Your Sustained Attention

- ✓ Getting all three of your blood cell biomarkers into the green zone can optimize your sustained attention.
- ✓ Consume a good amount of protein each day. Proteins contain the amino acids that your brain needs in order to create dopamine and improve attention.
- ✓ Vitamin B6 with Magnesium supports attention by helping your brain cells to produce key neurotransmitters vital to sustaining attention.
- ✓ Sleep quality and quantity is essential to sustained attention.
- ✓ Zinc provides the brain with antioxidant protection and helps produce the sleep hormone melatonin. Zinc has consistently enhanced attention and behavior in clinical trials.
- ✓ Cinnamon has been shown to help attention and it helps regulate blood sugar.



Cognitive Flexibility

Switching of Attention Test



YOUR
SCORE
6.5

What This Score Means to You

Cognitive flexibility is your capacity to rapidly adapt your thinking based on new information and not get stuck in compulsive behavior. Your brain must be able to reorganize itself by forming new neural connections.

Poor cognitive flexibility scores may be due to a decreased production of the neurotransmitters serotonin and GABA.

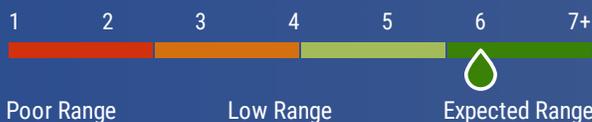
How to Improve Cognitive Flexibility

- ✓ Getting all three of your blood cell biomarkers into the green zone can optimize your cognitive flexibility.
- ✓ Meditation research has shown that mindfulness meditation can significantly enhance cognitive flexibility.
- ✓ Probiotics support gut microbiome function and optimize the production of neurotransmitters Serotonin and GABA, which help support cognitive flexibility.
- ✓ 5-HIP is a metabolite naturally made in the brain, is converted to serotonin as needed to promote positive mood, relaxation, and quality sleep.
- ✓ Vitamin B12 with Folate is essential for structural integrity of the brain and spinal cord. They produce neurotransmitters and key enzymes that improve overall cognitive skills.



Processing Speed

Choice Reaction Speed Test



YOUR
SCORE
6

What This Score Means to You

Processing speed is the pace at which you take in information, make sense of it and begin to respond. It has nothing to do with how smart you are -- just how fast you can take in and use information.

Slow processing speed is associated with inefficient connections in the brain's gray matter. These weak connections may be due to nutrient deficiencies in brain cells, limited production of vital neurotransmitters, chronic stress, lack of quality sleep, and toxins in your diet (such as refined sugars and processed foods).

How to Improve Processing Speed

- ✓ Getting all three of your blood cell biomarkers into the green zone can optimize your processing speed.
- ✓ Curcumin (Turmeric) keeps your brain sharp under pressure. It has also been shown to decrease plaques in the brain linked to Alzheimer's Disease.
- ✓ Ginkgo Biloba & Acetyl-L-Carnitine have been shown to enhance cognition in healthy individuals as well as those with age related cognitive impairment.
- ✓ L-Tyrosine can increase the production of neurotransmitters that are essential for the brain's functions such as processing speed, problem solving, and making decisions.
- ✓ A recent study showed that one particular type of brain exercise - called "speed training" can increase processing speed and even significantly reduce the risk of developing dementia.

It is critical to follow a specific protocol of testing and re-testing to know for sure your body's tissues are optimized and that specific metrics can serve as a valuable benchmark for future needs. The best approach is a baseline and 2 re-tests every 2 months, or 3 tests. During the first 2 month phase, the focus is on correcting problematic areas. The second 2 months is about establishing cell balance and determining what the new maintenance requirements are for maximal resilience and health potential. By the third and final test, cognitive function gains are noticeable and a new baseline established for cell nutritional and functional optimization. A new baseline is extremely important to detect premature declines with age as it is vital to repeat testing every 6-12 months beyond this initial protocol.

Summary of Results & Nutritional Recommendations

Test/Description	Score History	Current Score	Recommendations
 <p>Omega-3 Index % EPA/DHA in Cell Membrane - Memory/Focus/Mood</p>	09/10/2018 03/24/2020 05/10/2020 	9.2% OPTIMAL	<p>Tuna Omega-3 Oil or Calamari Oil Consider adding Olprima™ EPA as directed if a high inflammatory state or poor vascular health is clinically apparent.</p>
 <p>Cell Inflammation Balance Omega-6 to Omega-3 Ratio - Inflammatory Response - Immune Function</p>		5:1 LOW RISK	<p>Boswellia Complex 1 Tab(s): _____/day Provide antioxidant activity.*</p> <p>Turmeric Forte Cap(s): _____/day Supports a healthy inflammation response.*</p>
 <p>Cardiometabolic Index Excess Palmitic Acid Levels - Energy/Metabolism - Fat Burning Management - Risk of Metabolic Syndrome</p>		19% OPTIMAL	<p>Veg-E Complete Pro™ Serv(s): _____/day Replace high carb processed foods with a low-glycemic protein meal replacement.*</p> <p>Diaplex® Cap(s): _____/day Encourages healthy blood sugar with essential nutrients involved in carbohydrate metabolism.*</p>
 <p>Memory Capacity On the memory capacity test, you scored a 7.00 out of 7.00 based on your age and gender.</p>		7 EXPECTED	<p>Cataplex® D Tab(s): _____/day Research shows that memory declines two to three times faster in individuals with low levels.*</p> <p>OPC Synergy® Cap(s): _____/day OPC's have substantial antioxidant activity that cross the blood-brain barrier & improve oxygenation.*</p>
 <p>Sustained Attention On the sustained attention test, you scored a 6.50 out of 7.00 based on your age and gender.</p>		6.5 EXPECTED	<p>Magnesium with B6 Cap(s): _____/day Supports brain cells in producing vital neurotransmitters needed for sustaining attention.*</p> <p>Zinc Tab(s): _____/day Provides antioxidant protection and has consistently enhanced attention in clinical trials.*</p>
 <p>Cognitive Flexibility On the cognitive flexibility test, you scored a 6.50 out of 7.00 based on your age and gender.</p>		6.5 EXPECTED	<p>ProSynbiotic Cap(s): _____/day Supports gut microbiome function which optimizes the production of Serotonin and GABA.*</p> <p>Cataplex® G Tab(s)/day: _____ with meal Provides a calmative effect on the nervous system by supporting parasympathetic functioning.*</p>
 <p>Processing Speed On the processing speed test, you scored a 6.00 out of 7.00 based on your age and gender.</p>		6 EXPECTED	<p>L-Tyrosine Tab(s): _____/day Increases production of neurotransmitters essential for the brain's processing functions.*</p> <p>Vitamin B12 with Folate Tab(s): _____/day Essential for structural integrity of the brain and spinal cord as well as improving overall cognitive skills.*</p>

*This statement has not been evaluated by the FDA. This product is not intended to diagnose, treat, cure, or prevent any disease.

CLINICAL SUMMARY

Below is a summary of how your current cell health may be affecting your life. It is based on biomarkers from your blood test as well as your functional cognitive assessment. This summary represents research-based correlations that are significantly associated with your assessment results. Each of these biomarkers can be improved by you, through nutritional and lifestyle changes.

Brain-Body Coherence



This reflects overall quality of the brain-body integration. Cell membranes must have healthy levels of DHA to communicate & regulate organ functions.

Cardiovascular Health



This derives from your overall "cell climate" and vascular health. EPA, an Omega-3, is critical here. Associated conditions: heart disease, chronic pain, immune system & metabolic disorders.

Mood & Metabolic Health



Mood and appetite are tightly controlled by a hormone called leptin and an Omega-3, EPA. Palmitic acid interferes with leptin signaling. Optimal EPA levels improves mood, satiety, and lessens impulsivity.

Neuro-development & Dementia



Studies suggest you may improve motor and verbal development in youth (age 3+) and lower the risk of dementia (age 50+) by improving DHA status and seafood consumption.

Resilience to Concussion



Studies suggest the level of cell resilience and fluidity prior to injury (largely determined by levels of EPA and DHA) significantly influences how much nerve damage is done. It also affects how fast you recover.

Risk of Stroke



Large, prospective studies suggest you maybe able to lower your risk of a future stroke by improving your overall vascular health largely affected by the Omega-3 Index, especially EPA.

REFERENCES

1. Higher level of certain fatty acid associated with lower dementia risk. Schaefer et al. *JAMA Neurology*, 2006;63:1527- 1528
2. Red Blood Cell Omega-3 Fatty Acid Levels and Markers of Accelerated Brain Aging. Tan ZS, Harris WS, Beiser AS, et al. *Neurology* 2012;78:658-664.
3. Zhang J, Sasaki S, Amano K, Kesteloot H. Fish consumption and mortality from all causes, ischemic heart disease, and stroke: an ecological study. *Prev Med* 1999;28:520-9.
4. Higher Omega-3 Index score is associated with a larger volume of grey matter in the memory region of the brain. Pottala et al. *Neurology* 2014 Jan; 10.1212/WNL
5. Increased cell levels of EPA/DHA improved memory scores in healthy young adults. Stonehouse et al. *American J. of Clinical Nutrition*,2013;97:1134-1143
6. The level of DHA in children's blood cells significantly predicts their ability to concentrate & learn at school. Montgomery et al. *PLoS ONE*, 2013; 8:e66697
7. Low Omega-3 fatty acids in red blood cells associated with aggressive and ADHD behaviors. Meyer et al. *PLoS ONE*, 2015;10(6)
8. Association between Blood Omega-3 Index and Cognition in Typically Developing Dutch Adolescents. Van der Wurff IS, von Schacky C, Berge K, Zeegers MP, Kirschner PA, de Groot RH; *Nutrients*. 2016 Jan 2;8(1). pii: E13.
9. Omega-3 DHA and EPA for cognition, behavior and mood: Clinical findings and structural-functional synergies with cell membrane phospholipids. Kidd, P. M. *Alternative Medicine Review*, 2007;12, 207-227
10. A meta-analytic review of double-blind, placebo-controlled trials of antidepressant efficacy of omega-3 fatty acids. Lin PY1, Su KP., *J Clin Psychiatry*. 2007 Jul;68(7):1056-61
11. Are omega-3 fatty acids antidepressants or just moodimproving agents? The effect depends upon diagnosis, supplement preparation, and severity of depression. Lin PY, Mischoulon D, Freeman MP, Matsuoka Y, Hibbeln J, Belmaker RH, Su KP. *Molecular Psychiatry*. 2012 Dec;17(12):1161-3
12. Omega-3 fatty acids improve recovery, whereas omega-6 fatty acids worsen outcome, after spinal cord injury in the adult rat. King VR1, Huang WL, Dyall SC, Curran OE, Priestley JV, Michael-Titus AT. *Journal of Neuroscience*, 2006;26(17):4672- 80.
13. The effect of fatty or lean fish intake on inflammatory gene expression in peripheral blood mononuclear cells of patients with coronary heart disease. De Mello VD, Erkkilä AT, Schwab US, et al. *Eur J Nutr*. 2009 Dec;48(8):447-55.
14. The omega-6/omega-3 fatty acid ratio, genetic variation, and cardiovascular disease. Simopoulos AP. *Asia Pac J Clin Nutr*. 2008;17 Suppl 1:131-4.
15. Promotion of prostatic metastatic migration towards human bone marrow stroma by Omega 6 and its inhibition by Omega 3 PUFAs. M D Brown1, C A Hart1, E Gazi1, S Bagley2 and N W Clarke. *British Journal of Cancer* (2006) 94, 842-853.
16. A high Omega-3 Index may provide effective pain relief for people with chronic musculoskeletal pain. Cleland et al. *Nutrition & Dietetics*. 2009;66;4-6
17. Higher Omega-3 levels could reduce the incidence of neck and back pain and reduce the need for medication. Lembke et al. *J Sports Sci Med*. 2014 Jan;13(1):151-156
18. Omega-3 Fatty Acids in Inflammation and Autoimmune Diseases. Simopoulos AP. *J Am Coll Nutr*. 2002 Dec;21(6):495-505.
19. Bailes JE1, Mills JD. Docosahexaenoic acid reduces traumatic axonal injury in a rodent head injury model. *Journal of Neurotrauma*. 2010 Sep;27(9):1617-24.
20. Mills JD1, Hadley K, Bailes JE. Dietary supplementation with the omega-3 fatty acid docosahexaenoic acid in traumatic brain injury. *Neurosurgery*. 2011 Feb;68(2):474-81; discussion 481.
21. Omega-3 fatty acids in health and disease and in growth and development. Simopoulos AP. *Am J Clin Nutr*. 1991 Sep;54(3):438-63.
22. The importance of the omega-6/omega-3 fatty acid ratio in cardiovascular disease and other chronic diseases. Simopoulos AP. *Exp Biol Med (Maywood)*. 2008 Jun;233(6):674-88. doi: 10.3181/0711-MR-311. Epub 2008 Apr 11.
23. University of Maryland Medical Center. <http://www.umm.edu/health/medical/altmed/supplement/omega-3-fatty-acids>
24. Connecting leptin signaling to biological function. MB Allison, MG Myers. Departments of Internal Medicine, and Molecular and Integrative Physiology, University of Michigan. *J Endocrinol*. 10/1/14; 223 T25-T35.
25. Palmitic acid mediates hypothalamic insulin resistance by altering PKC-θ subcellular localization in rodents. Benoit et al. *J Clin Invest*. 2009;119(9):2577-2589. doi:10.1172/JCI36714.
26. Nutritional and insulin regulation of fatty acid synthetase and leptin gene expression through ADD1/SREBP1. Kim et al. *J Clin Invest*. 1998 Jan 1; 101(1): 1-9.
27. Effects of Step-Wise Increases in Dietary Carbohydrate on Circulating Saturated Fatty Acids and Palmitoleic Acid in Adults with Metabolic Syndrome. Brittanie et al. *PLoS One*. 2014; 9(11): e113605.
28. Should dietary SFA be exchanged for linoleic acid? Frits AJ Muskiet. *Am J Clin Nutr*. doi: 10.3945/ajcn.112.044990 October 2012 vol. 96 no. 4 944-945

How to Choose the Right Omega-3

There are three main types of Omega-3 fatty acids. The two most important to brain health are EPA and DHA, which are found primarily in "oily" fish. The third type of Omega-3 is called ALA (alpha-linolenic acid), which comes mainly from plants, oils, and seeds. The human body generally uses ALA for energy and only converts trace amounts into EPA and DHA. ALA is not an effective substitute for improving brain health and will have little effect on your Omega-3 Index Score.

EPA

Repairs tissue, reduces inflammation, and EPA supports mood & focus.



DHA

Most abundant fatty acid in the brain. It is essential for development, DHA cellular structure, and function.

Brain & Body Health



Should I Take Omega-3 Supplements?

Although we encourage you to eat fish high in EPA and DHA, there are concerns about the level of environmental toxins, such as mercury, in our fish supplies. Additionally, many people (especially children) dislike the taste of "oily" fish and supplements may be a helpful option.

When it comes to Omega-3s, the most important factor is how much EPA and DHA is ending up in your blood cells. How it gets there (fish or supplements) really doesn't matter as long as it is absorbed into your cells. This is why it is so important to track your Omega-3 Index over time and know what is working and what is not. The following steps are extremely important in selecting the right Omega-3 supplements.

- **SOURCE:** Only choose Omega-3 supplements with both EPA & DHA (primarily from fish). Omega-3 supplements with ALA (from flax seeds & nuts) are not critical to brain health and will have little effect on your Omega-3 Index score.
- **POTENCY:** : Don't be fooled by a label that says "1,000 mg of fish oil". What matters is the amount of EPA & DHA. Example: 700 mg of EPA and 500 mg of DHA would equal 1,200 mg toward your recommended daily total.
- **QUALITY & FRESHNESS:** Fish oils are highly susceptible to oxidation, which can make them rancid. Oxidized fish oil loses its effectiveness and will not improve your Omega-3 Index Score. When shopping for fish oil supplements, choose a quality company over simply finding the lowest price. The freshest fish oils will have little to no fishy odor and not usually produce fish burps. Additionally, be sure to keep fish oil supplements in the refrigerator to help protect them from oxidation.

Commonly Consumed Types of Seafood

milligrams of EPA/DHA per 3 oz or 85 g serving size

Seafood	EPA	DHA	EPA+DHA
Pacific Herring	1,056	751	1,807
Atlantic Salmon (wild)	349	1,215	1,564
Bluefin Tuna	309	970	1,279
Mackerel (canned)	369	677	1,046
Sardines (canned)	402	433	835
Swordfish	108	656	764
Rainbow Trout	220	524	744
Albacore or Tuna (canned)	198	535	733
Shark (raw)	269	448	717
Sea Bass	175	473	648
King Crab	251	100	351
Shrimp	115	120	235
Catfish (wild)	85	116	201
Halibut	68	132	200
Scallops	61	88	149
Cod	3	131	134
Mahi-Mahi	22	96	118
Tilapia	4	110	114
Yellowfin Tuna	13	89	102

Table adapted from Harris et al. Current Atherosclerosis Reports 2008;10:503-509. Values based on USDA Nutrient Data Lab values and are for fish cooked with dry heat unless otherwise noted.

Research Supports a High Omega-3 Index Throughout All Stages of Life

Maternal dietary consumption of Omega-3 fatty acids during pregnancy improved children's IQ

In a randomized and double-blinded study from the University of Oslo, children's mental processing scores at 4 years of age correlated significantly with maternal intake of Omega-3 EPA and DHA during pregnancy. In a multiple regression model, maternal intake of EPA/DHA during pregnancy was the only variable of statistical significance for the children's improved mental processing scores.

Helland et al. Pediatrics, 2003; 111:e39-44



Higher blood Omega-3 DHA levels in babies are linked with better motor neuron development

A research team from the University Medical Center Groningen compared red blood cell DHA levels and movement scores in 112, 3-month old breast-fed babies from the Netherlands and Tanzania. The higher the DHA level, the better the scores. This suggests a link between healthy nervous system development and DHA status early in life.

Luxwolda et al. Nutritional Neuroscience, 2014;17:97-103

Children's Omega-3 DHA level significantly predicts their ability to concentrate and learn at school

An Oxford University study involving nearly 500 school-children found that blood levels of Omega-3 fatty acids significantly predicted a child's behavior and ability to learn. Higher levels of Omega-3, DHA in particular, were associated with better reading and memory, as well as with fewer behavior problems as rated by parents and teachers.

Montgomery et al. PLoS ONE, 2013; 8:e66697



Increased Omega-3 Index Scores improved both memory and reaction time in healthy young adults

A research team from Massey University in Auckland, New Zealand gave DHA supplements or a placebo to 176 young adults for 6 months. They reported that DHA raised the Omega3 Index from 5.9% to 8.7% and that this was associated with improvements in memory scores.

Stonehouse et al. American J. of Clinical Nutrition, 2013;97:1134-1143

Low Omega-3 Index Scores associated with accelerated brain aging and lower cognitive abilities

Framingham Heart Study researchers from Boston University reported that participants with Omega-3 Index levels in the lowest quartile, when compared to the others, had lower total brain volumes. Additionally, they had lower scores on tests of visual memory, executive function, and abstract thinking.

Tan et al. Neurology, 2012;78:658-664



Low dietary Omega-3 consumption responsible for up to 96,000 preventable deaths each year

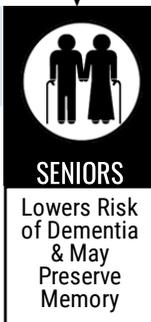
A recent study by Harvard School of Public Health revealed that Omega-3 fatty acid deficiency is the sixth biggest killer of Americans - even more deadly than excess trans fat intake. The study utilized 2005 data from the US National Health Center for Health Statistics and revealed there are between 72,000 and 96,000 preventable deaths each year due to Omega-3 deficiency.

PLoS Med, 2009 April; 6(4)

Increased blood Omega-3 levels associated with improved memory in age-related cognitive decline

In a randomized, double-blind, placebo-controlled, clinical trial conducted at 19 US centers a total of 485 healthy subjects over age 55 were supplemented with either 900 mg of DHA per day or a placebo for 24 weeks. DHA supplementation raised blood DHA levels and significantly improved several tests of learning and memory.

Yurko-Mauro et al. Alzheimers & Dementia, 2010;6:456-64



Individuals with higher blood Omega-3 DHA may significantly lower their risk of developing dementia

Tufts University researchers studied the relationship between blood DHA levels and the development of dementia and/or Alzheimer's disease in about 900 healthy men and women from the Framingham Heart study. The group averaged 76 years of age at the beginning. Those people who had the highest DHA levels had a 47% lower risk of developing dementia than those with lower DHA levels.

Schaefer et al. JAMA Neurology, 2006;63:1527-1528