Module 3, Lesson 2 Handout:

Nutrients & Food to Improve Cognition

Research is revealing so much when it comes to the neuroprotective effects of food. It's important to understand the role of individual nutrients so we can help clients implement a bigger picture overall healthy diet that promotes brain health and supports cognition. Some of the key players in brain health are omega-3 fatty acids, antioxidants, calcium, fiber, zinc, B6, B12 and folate - the nutrients we're already promoting in living a Nutritious Life. Here's a deeper look at how each of these nutrients can improve brain function, remembering it's more about the diet as a whole than these individual components. one individual nutrient won't be the breadwinner here.

Omega-3 fatty acids boost brain function and communication. One study showed a significant relationship between levels of omega-3 and brain blood flow. The participants in this study who had higher levels of omega-3s showed greater cognitive function and blood flow in the brain.

It's important to note that the omega-3s studied here were EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), the common omega-3s found in fatty fish. There is also another group of omega-3s referred to as ALA (alpha linolenic acid), which are more predominant in plant foods like walnuts, chia seeds, flax seeds and vegetable oils. Though there's nothing wrong with a little plant based fat, we need to convert ALA to DHA and EPA, making plant foods a less efficient source of omega-3s. Research shows we convert about 8 to 21% of ALA to EPA and 0 to 9% to DHA, and it seems like women are better at this than men. Higher concentrations of EPA and DHA omega-3 fatty acids are found in salmon, herring, shrimp, sturgeon, mackerel, tuna and sardines.

Antioxidants help protect cells from oxidative stress and damage by free radicals. This means they prevent unstable molecules from damaging healthy cells which can lead to a variety of complications and diseases including neurodegenerative diseases, cardiovascular diseases, cancer and diabetes. As we age, our brains are exposed to more oxidative stress. Have a conversation about this conversation with your clients who are older and more worried about cognitive decline.

Here's how some specific antioxidants can provide neuroprotective benefits:

> **Beta-carotene** improves memory and thinking skills with long term intake, although more research is needed to fully understand it's effectiveness. Beta-carotene is converted to vitamin A in the liver, and is found in many of the same foods that provide vitamin A.
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> **Vitamin A** has been shown to improve learning and spatial memory and aids in

the production of neurons through interactions with retinoic acid receptors and retinoid receptors in the brain. Retinoic acid and retinoids are compounds derived from vitamin A. D**ark leafy greens, sweet potatoes, carrots, mangos, papayas, winter squash, pumpkin and red bell peppers** are good sources of Vitamin A.

Vitamin C plays a role in neurotransmission as well and is a cofactor in several enzyme reactions that are important for memory and mental health. Higher blood levels of vitamin C are associated with less cognitive impairment. Vitamin C content is high in **broccoli, bell peppers, kale, kiwi, strawberries, oranges, tomatoes and papaya** to name a few.

Vitamin E has been found to help reduce the risk of Alzheimer's disease. Studies show that vitamin E regulates signal transduction enzymes that in turn affect genes that are important in neurotransmission, the communication between neurons. This process of neurotransmission controls things like heart rate, sleep, mental performance and more. **Sunflower seeds, almonds, hazelnuts, avocados, spinach and whole grains** contain a good amount of vitamin E.

Flavonoids include thousands of compounds in its family. Think of flavonoids as the big umbrella term. They help improve brain plasticity and studies show that they may help prevent neurodegenerative decline, depression and inflammatory nerve damage associated with diseases like Alzheimer's and Parkinsons. Flavonoids occur naturally in foods such as **red, blue and purple berries, red and purple grapes, apples, citrus fruits, legumes, onions, scallions, kale, broccoli, green tea and chocolate**.

Lutein has been found to have a role in preserving brain function throughout one's lifetime, from infancy to old age. Researchers are still figuring out the exact mechanism of how lutein helps with cognition aside from its role as an antioxidant, but they believe it enhances communication between neurons and provides anti inflammatory benefits to the brain. **Spinach, kale, squash, broccoli, asparagus, brussels sprouts and corn** are great sources of lutein. Lutein is well-absorbed from **avocados and eggs**.

Lycopene regulates genes that influence brain growth and low levels of lycopene in the blood have been associated with higher risk of dementia and decreased cognitive function. In addition to giving **tomatoes** their red color, lycopene is found in fruits in the same color family like **watermelon, pink grapefruit, pink guava and goji berries**.

Selenium is expressed in the brain in the form of selenoproteins, which are important for

regulating brain function and neural activity. Selenium is found in high amounts in **brazil nuts, tuna, oysters, chicken, whole wheat pasta, shrimp and mushrooms.**

Calcium imbalances have been linked to neurodegenerative diseases, and proper intake levels of calcium are important for brain health. Elevated levels of calcium are associated with poorer cognitive function, and researchers think this is due to the risk of cerebrovascular events (strokes) and heart attacks with excessive calcium intake. In one study, those who were 75 and older, and had higher blood calcium levels, had a greater rate of cognitive decline than younger subjects. Calcium can be found in **dairy products, dark leafy greens, fish with bones (sardines, salmon), peas and beans.**

Fiber is well known as a gut friendly food, and researchers have found that a high fiber diet in the gut can promote gene expression in the brain that can prevent cognitive decline and promote neural plasticity. **Cruciferous vegetables, apples, bananas, raspberries, barley, quinoa, oats, lentils and beans** are good sources of fiber.

Zinc, like calcium, has been linked to poorer cognitive function at elevated levels, specifically in relation to Alzheimer's disease. On the other hand, research shows zinc is essential for brain development. One study found that decreased zinc levels were associated with depressed moods. High levels of zinc are found in **seafood (oysters, crab, lobster), meat, poultry, mushrooms, kale, legumes, nuts and seeds and whole grains**.

B6, B12 and folate improve brain plasticity and prevent brain shrinkage.

Vitamin B6 helps synthesize neurotransmitters such as serotonin and dopamine, and plays a role in the regulation of glucose and inflammatory processes in the brain. High levels of Vitamin B6 are found in **salmon, tuna, chicken, milk, eggs, sweet potatoes, bananas, avocados, and spinach.**

Vitamin B12 and folate are important for DNA synthesis and gene repair to promote neural plasticity. B12 is high in animal sources such as **chicken, trout, salmon, tuna, dairy products and eggs**. Folate is found in **dark leafy greens, nuts, beans, asparagus, brussels sprouts, avocados, broccoli** and many foods are fortified with folic acid (the synthetic form of folate), such as **breads, cereals, rice and pastas**.

That's a lot of nutrients and a lot of foods to remember, but when you think about it and as research suggests, encouraging your client to eat a nutritious diet full of colorful fruits, vegetables, whole grains and healthy fats is a great way to ensure they're getting a variety of neuroprotective benefits. Plus, these foods are great mood boosters too. We'll talk more about the Stress Less and Love More properties of these foods in our Food & Mood lesson.