Webinar Highlights

- Your brain is not static or hardwired, as mistakenly believed less than 20 years ago. It's a dynamic organ that is constantly re-organizing itself in response to our experiences.
- The ability of the brain to change and adapt is called **neuroplasticity**.
- What is transformative is understanding that you can mold your brain at any age using **modifiable risk factors**, like diet and exercise.
- In fact, the biggest drivers of neuroplasticity are our very own behaviors.
- **Neurogenesis** is the production of new neurons and the formation of new, neural networks.
- **Neurotrophins** are nerve growth factors that allow fragile new neurons made from stem cells to survive, thrive and form strong neural networks. These are the foundation of memory and learning.
- **Brain derived neurotrophic factor (BDNF)** is the star of the show when it comes to neurogenesis. High levels of BDNF are associated with decreased risk of dementia and depression (and vice versa).
- BDNF exerts its effects in a structure of the brain called the **hippocampus**.
- In addition, BDNF also regulates energy metabolism and glucose homeostasis in the hypothalamus, which is why it's often called a "metabotrophin" - because it influences both energy metabolism and glucose homeostasis, as well as neurogenesis, playing multiple, pivotal roles in the body.
- While we are all capable of neurogenesis, rates of neurogenesis vary among individuals, and are based on diet and lifestyle.
- This opens a whole host of exciting possibilities where neurogenesis and BDNF may be used as **therapeutic targets** (through diet and lifestyle) to modulate cognitive function.
- Owing to high polyunsaturated fatty acids (PUFA) content, the brain is particularly vulnerable to oxidative stress, which in turn reduces BDNF levels. Thus, the data shows that foods with antioxidant potential can restore BDNF levels and counteract the ill effects of oxidative stress on the body.
- Dietary factors that have been shown to impact BDNF levels positively include the omega-3 fatty acid DHA, turmeric, folate, polyphenols, Vitamin E, IF and calorie restriction.
- In addition, certain hormones which have receptors in the hippocampus have been shown to influence **synaptic plasticity**.
- It should be noted that while preclinical studies in animals have shown a favorable impact of specific nutrients on cognitive function and epidemiological studies have shown a positive co-relation

between certain dietary patterns and cognitive health, randomized controlled trials (RCTs) have yielded mixed results. Interventions with single dietary nutrients have been less promising, whereas mixed-nutrients have yielded more encouraging results.

- Emerging research from epidemiological studies show that **adherence to dietary patterns**, rather than single nutrients may be the most effective tool against cognitive decline. While RCTs are the gold standard for drugs, they may not be practical for dietary components as the impact of a single nutrient on cognitive function in populations may take years, if not decades to occur and thus following up on participants for decades may not be logistically feasible.
- **Mediterranean, whole foods and DASH dietary patterns** have been shown to have positive effects on cognitive function.
- The typical **Western diet** - low in nutrient density and high in saturated fat and added sugars - decreases BDNF levels and shrinks the hippocampus.
- In addition to diet and exercise, **becoming a lifelong learner** by learning new skills and constantly challenging your brain stimulates neurogenesis. Meditation and adequate sleep correlate positively with BDNF levels as well.
- Although the mechanisms are not yet clear, gut bacteria have the metabolic capacity to influence the **bi-directional gut brain axis.** This has down-stream implications for not just the classic gut-brain disorders such as IBS and IBD, but also for neurological disorders such as Parkinson's (PD) and Alzheimer's disease (AD), as well as behavioral and mood disorders. Of note, gut bacterial-derived short-chain fatty acids (SCFAs) such as butyrate have been linked with epigenetic changes that could influence the course of neurological disorders.
- We are living in an increasingly neurotoxic world where depression rates continue to climb, and Alzheimer's is expected to triple by 2050. The limited efficacy of pharmaceutical interventions for dementia has prompted an increase in research focusing on alternative modalities. To this end, there is an increasing body of literature linking nutrients and cognitive function. There are currently professional knowledge gaps and hence it is incumbent upon RDs to try to close this gap and leverage the research to get their patients to eat healthfully.