The Value of Plant-Based Omega-3 ALA for Sustainable Nutrition: A conversation with Dr. Richard Bazinet, University of Toronto

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Omega-3s found in nutritious plant and seafood sources have long been celebrated for their role in human health with evidence linking them to heart health, cognitive function, reduced inflammation, prenatal health, and more.

However, in the context of nutritious eating patterns that will sustain a healthy population, we can't ignore the global challenges we face when it comes to meeting increased demands for food and rising climate concerns. According to the Food and Agriculture Organization (FAO), by 2050 we will need to produce 60% more food to feed a world population of more than 9 billion.[1]

The concept of sustainable nutrition is noteworthy as we look to the future. According to the FAO and World Health Organization (WHO), sustainable eating patterns are those that promote all dimensions of health and wellbeing; are safe, accessible, affordable, and culturally relevant; and also preserve biodiversity and planetary health.[2]

As a company who cares about human health and the health of our farmers, we at Seeds of Wellness® and our parent company Benexia®, have a direct responsibility to care for our planet.

We sat down with Dr. Richard Bazinet, Professor and Canada Research Chair in Brain Lipid Metabolism at the University of Toronto and a leading researcher in omega-3s and cognition, to discuss the role of plant-based omega-3 ALA, from foods like chia, in meeting omega-3 intake recommendations and supporting sustainable nutrition.

Question: Tell us about your background and how you became interested in omega-3s.

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[1] Graziano da Silva, J. United Nations. (2012, June). Feeding the World Sustainably. https://www.un.org/en/chronicle/article/feeding-worldsustainably#:~:text=According%20to%20estimates%20compiled%20by,toll%20on%20our%20natural%20resources.

[2] FAO and WHO. 2019. Sustainable healthy diets – Guiding principles. Rome. https://www.who.int/publications/i/item/9789241516648

Dr. Bazinet: *As a young student, I was interested in both nutrition and exercise. When I entered university, I was surprised to learn that these are separate fields, so I had to pick one and I picked nutrition. As I got further into my studies, I decided to pursue a masters and PhD in biochemistry and metabolism. Along the way, I started researching omega-3s and inflammation in the body. Through my research and that of others, I realized the omega-3 DHA (docosahexaenoic acid) was playing a key role in various bodily processes AND that we have a lot of it in the brain. My career hit a turning point when I was presenting at a conference and met someone who was looking for a post-doc in brain metabolism. I joined their team and then returned years later to set up a research program that, to this day, looks at nutrition in the brain and its metabolism. One of the first studies I did after setting up the program was a preclinical animal study that looked at the inflammatory response of mice with high and low DHA levels in the brain. I've been intrigued by the brain and omega-3s since starting the program almost 20 years ago.*

Question: A plant-based eating pattern is recommended for the health of people and our planet. What role do sources of omega-3 ALA, like chia, play in this?

Dr. Bazinet: ***I believe that ALA can supply a significant amount of DHA needed by the brain. There's still a lot more research needed to confirm this hypothesis, but this is where plant-based omega-3 foods like chia can play an important role in meeting omega-3 needs while supporting the health of our planet.***

The impact of certain foods on the planet and its resources is a complex issue. I don't claim to be an expert in this area, but it is something I am very passionate about. Based on current evidence and estimates, it seems that, on average, plant foods have a lower environmental impact compared to animal-based foods. Of course, this is not always straightforward, and we must recognize the complexity of the issue. But coupled with this general understanding is a growing movement of eating more plant-based foods, and it's a trend that is here to stay.

My research is focused on omega-3s, particularly DHA since this is the type of omega-3 that is found in our brain and it's an important molecule for human health. You can get DHA from primarily marine sources like fatty fish (i.e., salmon, tuna, and mackerel) as well as supplements like krill oil. DHA can also come from the conversion of ALA omega-3 through a process that converts ALA to EPA and then to DHA.

What my current research is looking at is 1) how much DHA is in certain parts of the body – the brain, heart, immune cells, etc.; 2) how much we need every day to replace it, and; 3) how much we can get from a variety of food sources both plant- and marine-based. Based on current evidence, I believe that ALA can supply a significant amount of DHA needed by the brain. There's still a lot more research to be done but this is where plant-based omega-3 foods like chia can play an important role in meeting omega-3 needs in a plant-based eating pattern.

Question: We often hear that omega-3 ALA has a low conversion rate to the other omega-3s EPA and DHA. Is there any new evidence related to this conversion rate?

Dr. Bazinet: ***Before we call something "low," we need to know how much EPA and DHA we need in different parts of the body, and based on emerging evidence, it seems that even a "low" rate of conversion may be enough to meet requirements.***

When it comes to the brain, adults maintain about 4 grams of DHA at any given time. Research also has shown that the DHA in your brain right now likely arrived there a couple years ago.

A study done by researchers at the NIH found that about 4 milligrams—4/1000 of a gram—of DHA enters the brain daily.[3] This means that of the DHA in the brain, we use a little bit, and then we replace some each day to maintain its supply. This turnover is relatively small which in part caused me to re-think the "low" conversion rate we often speak of in relation to ALA and its conversion to DHA.[4]

I like to use an analogy to conceptualize this. If I give you $100 and you give me $1 back, that's a low rate of return, right? It's a 1% return. But, if I only need to buy a gumball, then I have enough money to do so. Perhaps we've been unnecessarily saying that the conversion of ALA to DHA is low because until we know how much DHA we need, it's insensible to use terms like "low conversion rate."

And spoiler, we actually don't know how much DHA we need each day for maintaining health and that's something my team is working on. What we know about the brain's turnover rate is a helpful start. It tells us that the DHA requirement of the brain seems to be low, and I hypothesize that a low conversion rate of ALA to DHA could supply the low amount of DHA needed by the brain. More research is needed to confirm this, but these are the new research questions we are exploring as it relates to conversion rates.

Question: You mentioned that DHA is the omega-3 found in the brain. What role does ALA play in brain health?

Dr. Bazinet: ***Emerging evidence suggests that consuming ALA, from foods like chia, may help to maintain DHA levels in the brain despite the long-held belief that ALA has a low conversion rate to DHA.***

We often hear people say that the brain is rich in omega-3s, but this requires a clarification: There's really only one type of omega-3 in the brain and that is DHA. It may originate from other forms of omega-3, but the brain's omega-3 is DHA. My lab has done research comparing levels of DHA in the brains of mice after consuming sources of DHA and ALA. When it comes to the brain, what we've found is that levels of DHA in the brain are about the same whether the mice consume DHA or ALA. What we believe, and what we are continuing to research, is somewhere along the line ALA is being converted to DHA, it's entering the brain, and it's helping to maintain the consistent DHA levels in the brain.

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[3] Umhau, J. C., Zhou, W., Carson, R. E., Rapoport, S. I., Polozova, A., Demar, J., Hussein, N., Bhattacharjee, A. K., Ma, K., Esposito, G., Majchrzak, S., Herscovitch, P., Eckelman, W. C., Kurdziel, K. A., & Salem, N., Jr (2009). Imaging incorporation of circulating docosahexaenoic acid into the human brain using positron emission tomography. *Journal of lipid research*, *50*(7), 1259–1268. https://doi.org/10.1194/jlr.M800530-JLR200.

[4] Domenichiello, A. F., Kitson, A. P., & Bazinet, R. P. (2015). Is docosahexaenoic acid synthesis from α-linolenic acid sufficient to supply the adult brain?. *Progress in lipid research*, *59*, 54–66. https://doi.org/10.1016/j.plipres.2015.04.002

Question: Why is most of your research in animals? Do you do research in humans?

Dr. Bazinet: ***Studying the make-up of the human brain can only be done post-mortem which presents an obvious challenge, but new tools and technologies are presenting new opportunities for research in living populations.***

It's difficult to study the brain, generally, but even more difficult to study the lipids found in the brain. One of the only ways to do this is with post-mortem samples, and what makes this particularly difficult is we can't go back and ask a person after they've passed, what they ate. This is why we must rely heavily on animal research to study the actual brain composition.

There are some new tools we are using to study fats in the brain and body which are helping to overcome some of the barriers associated with this research. One is looking at the peripheral metabolism of fats—through isotopes for example--as a marker of what's in the brain. What we can do is give someone an omega-3 with special carbons, often called a label, and because we know their weight and composition, we can use mass spectrometry to measure and track where it goes in the body. For instance, we can give someone a plant or seafood source of omega-3 fats and then look at the DHA in the body and know whether it came from that source. There's also new imaging technology that allows us to watch fats entering the brain of a living person.

Question: Is there a role for chia oil – a concentrated source of ALA – in nutrition research?

Dr. Bazinet: ***Chia oil can be an important tool for studying ALA and its metabolism.***
Foods are a complex matrix of different nutrients making it difficult to study just one nutrient that might be having an effect. For instance, studying EPA and DHA was historically challenging because fish oil typically contains both EPA and DHA and possibly some other lipids and other compounds, too. Now there are concentrated sources of EPA and DHA which allow us to distinguish between the two. And, with the newer development of chia oil, we now have a concentrated source of ALA which will be a really important tool for my and others´ research.

Question: What are your thoughts on the balance of omega-3s and omega-6s in the diet?

Dr. Bazinet: ***Some evidence suggests that as the content of omega-6 linoleic acid (LA) goes up, the process of converting ALA to DHA seems to be hindered.***
I'm not sure it stops the synthesis of DHA, but my hypothesis is it creates an environment where the DHA has nowhere to go because the places it could be taken up in the body and in the cell membranes are being taken up by omega-6 LA. This is something my lab is researching to better understand.

Question: Do you recommend omega-3s from seafood or plants? What is the best choice?

Dr. Bazinet: ***It's never either/or – it's both.*** *We should be eating a variety of omega-3 sources. They all serve a different purpose in our diet in terms of how we cook and eat and all can be beneficial. I'm not going to put salmon on my yogurt in the morning. It just doesn't work for me and I'm not going to do certain things with chia or other seeds in the evenings with my dinner. They have different roles in cooking perhaps, but there's no rule saying you have to consume just one or the other. Both have their place in a healthy diet.*