An Interview with Nils Hoem, PhD

Interview by Sheldon Baker

Nils Hoem, PhD, *is an authorized pharmacist with master's and doctoral degrees in pharmacology from the University of Oslo. He has several years of experience in the pharmaceutical/biotechnology industry as well as academic institutions. He was a member of the Norwegian novel drug approval board (final approval of new medicines) from 1991 to 1996. Dr. Hoem has also been a member of the Laboratory of Applied Pharmacokinetics at the University of Southern California in Los Angeles from 1995-2005. He was associate professor of pharmacology at the University of Oslo from 1989-2002, and was European director for pharmacokinetic modelling, statistics, and data handling at MDS Pharma Services Hamburg, Germany from 2004 to 2007.*

Since January 2008, Dr. Hoem has been employed as a researcher with Aker BioMarine, and for the last 10 years as head of research with broad responsibility for all relevant parts of the company's research and development work. (*Altern Ther Health Med.* 2024;30(5):62-64).

Sheldon Baker *is an InnoVision contributing editor. His freelance editorial content can also be found in several lifestyle publications, and as CEO of Baker Dillon Group LLC, he has created numerous brand marketing communications and public relations campaigns for health and wellness organizations. Contact him at Sheldon@NutraInk.com.*

***Alternative Therapies in Health and Medicine* (*ATHM*):** Your career spans several years of omega research.

Nils Hoem, PhD: I was recruited by Aker BioMarine when it was mostly a fishery operation. The company had decided early in 2005 that fishing for krill could make sense because it is a huge, unused resource that is way down in the food chain. At that time, Aker developed new fishing technologies for krill, and it just grew. The first paper ever written about fishing krill was called *Whales, Plankton and Man* from January 1958 in *Scientific American*. Willis E. Pequegnat suggests that fishing for krill, instead of whaling, was a much better idea. The Soviet Union, now Russia, had been doing this between the 1960s and 1980s.

We harvest krill in Antarctica, and we are the krill oil leader. In order to operate as efficiently and sustainably as possible, we invest in big-data methodologies such as AI-based mathematical modelling. We now have floating drones that move around sending us, by radio signals and by satellite, sonic images of what's happening in the ocean in a much wider area than what can be achieved from the fishing vessel itself. We also provide information to the regulatory authority (CCAMLR) to help improve the resource management of krill. Such efforts can assist us in how to operate with minimum environmental impact.

***ATHM*:** Technology has helped change the fishing industry a lot. Let's look at FloraMarine™, Aker's new DHA omega-3 product.

Dr. Hoem: It has been on our agenda for quite a while. We've been asked many times, to just collect algae in Antarctica. You can scoop the Antarctic water into your hand, and even at the height of its bloom you can't see anything. And the Antarctic micro algae are too small to be efficiently harvested. In a way, catching krill is indirectly catching algae because the main source of energy in the Antarctic is the microalgae that produce EPA and DHA, and many other fatty acids. It's been there teasing us for years. When new technologies came around for growing algae on an industrial scale, there were two ways of doing that. You could do it phototropic which means you have algae that promote photosynthesis. Then there are other algae that are not photosynthetic, and must be fermented, exactly the way beer, bread, or certain medicines are made.

***ATHM*:** Fermentation is used a lot in the supplement industry.

Dr. Hoem: Fermentation is a major and mature technique. It's an industry unto itself. There are ways of doing this at scale, and that makes sense. Phototropic algae production is coming. But the heterotrophic algae that we are using today really gives the product its high value.

***ATHM*:** How accurate is nature in unlocking the potential of microalgae as it relates to omega-3?

Dr. Hoem: The first thing you need is the right kind of algae that naturally produces a lot of different fatty acids. One interesting aspect of nature is that only algae in the ocean, or

marine algae, will produce long chain omega-3 fatty acids, and only marine algae will produce EPA, DHA and DPA which is kind of a conundrum, because land-based animals are dependent on long chain fatty acids. Our bodies are not good at making long chain fatty acids, therefore, I find it fascinating that we mammals depend on the millions and actually billions of little creatures living in the ocean.

***ATHM*:** How does the extraction process fit in?

Dr. Home: In regard to FloraMarine™, the extraction is done by our crude oil partner. Our Houston manufacturing facility is where we refine the oil. From a commercial point of view, we know how to develop a new ingredient and build a market for it. It fits beautifully into our company's commitment to clinical trials and science, and the more technical side about how to preserve it.

***ATHM*:** Is there a specific technology to create FloraMarine™?

Dr. Hoem: The specific technology is based on the selection of the algae. It is finding the algae that gives us the fatty acid profiles we seek. I think it is fair to say that the oil we have today has the highest natural concentration of DHA of any creature. There is no other organism that produces DHA in quantities above 60%. Furthermore, it is not GMO. At the end of the day, it all comes down to strain selection, development, and processing.

***ATHM*:** What does the science have to say about the ingredient?

Dr. Hoem: The science is based on the science of fish oils and long chain omega-3s. Triglyceride algae oils are as such very similar to what you would find in natural fish oil.

***ATHM*:** How do you look at this from an absorbability standpoint?

Dr. Hoem: It comes down to how it might influence the biological effects. We've also seen this with krill oil. There are interesting aspects of this that has to do with what happens to the fatty acid after you've eaten it. Where does it go? To the heart, the liver, the brain or into the skin? There seems to be a difference between the two forms. The triglycerides and the algae oil have specific distributions as to how it's distributed. Distribution into the liver is interesting.

***ATHM*:** Is there a different technology used to create marine versus a plant-based omega-3 ingredient?

Dr. Hoem: The real secret is in the strain of algae that you grow. The algae here is grown by one of the oldest technologies humankind has ever known and that is fermentation. It gives us a very pure, high quality crude oil that only requires gentle processing. During the refining we mix it with a special kind of clay that absorbs color and a few other substances. It's a process that is known very well in the fish oil (and even vegetable oil) industry.

We have opportunities in our Houston factory to use a chromatographic system where we can theoretically separate out different parts of the oil. But the oil in the algae produces an oil that is almost exclusively DHA, with some DPA and very little EPA. It's really a DHA oil at this stage. It resembles tuna oil in that it's even more exclusively DHA. The DHA concentration in the oil is approximately 60%. There isn't that much other fat in it. It's relatively straightforward.

***ATHM*:** Straightforward if you know what you're doing.

Dr. Hoem: Indeed.

***ATHM*:** Aker BioMarine by far and away is the krill catch leader.

Dr. Hoem: Today, we catch approximately 70% of all krill with our three vessels. Being the krill oil leader comes down to many things beyond just the market share. For the last 20 years, we have invested significantly in science, research and development, as well as intellectual property to understand the nutritional value and potential health benefits of krill oil nutrients (phospholipids, omega-3 EPA and DHA, choline and astaxanthin). Aker BioMarine has contributed to more than 200 articles and more than 50 studies related to krill oil benefits for human health published in world renowned top tier journals, highlighting the credibility, relevance, and strength of the study outcomes. The focus of our science ranges from general health and wellness to condition specific health areas such as heart and liver health, cognitive health, joints, muscles, sports performance, skin health, eye health and PMS.

On the sustainability front, we are continually growing and improving our efforts to ensure the health of the biomass. And innovation is an area that is of great importance to us.

***ATHM*:** It's my understanding the aquaculture industry has been under pressure to protect fish stock from a supply standpoint and safety issue. Thus, marine omega offers an advantage.

Dr. Hoem: The aquaculture industry is in real need of marine fats because salmon for example, get sick and can even die from a heart condition if they do not get the minimum of required marine fats. Therefore, the aquaculture industry has been driving the marine ingredient demand with a growing supply gap due to limited wild catch. We know that fish oil alone cannot cover the total need of omega-3s for the world, and the recent challenges around the Peruvian anchovy supply have put great emphasis on the need for having multiple and sustainable omega-3 options available for both aquaculture and human health.

***ATHM*:** I understand insects are good food for fish.

Dr. Hoem: The aquaculture industry is quite inventive. They've started not to grow, but farm cockroaches, believe it or not. They're really looking at it because they are very dependent on wheat and soy proteins which are not necessarily good for the fish. Aker BioMarine sells krill meal into the aquaculture market as we understand the challenges of how difficult it is to feed fish correctly. We know krill meal is a quality ingredient that has many benefits for fish. If you ask me, it's really smart. It's utilizing waste food very efficiently. But that's what you will find in new experimental feeds for salmon.

The aquaculture feed industry is fairly advanced and has a lot of research. But you can't feed fish solely on it. You could feed them krill because that's on the trophic level. It's far down the food channel and that does make sense.

***ATHM*:** Cockroaches aside, major advantages of marine omega is it's cleaner and healthier than fish oil.

Dr. Hoem: There are many omega-3 options on the market and it's important to know the differences. Our FloraMarine™ ingredient is really clean.

***ATHM*:** Do the health benefits of marine omega-3 differ from fish oil and is other marine omega just as effective?

Dr. Hoem: It's the fatty acid that matters. There are many marine forms in the U.S. The highest concentration of EPA and DHA are found in marine animals.

With respect to people who are vegans, they will not eat any EPA/DHA that comes from animal sources, therefore, algae becomes an ideal alternative for vegans and vegetarians.

***ATHM*:** From a potency standpoint FloraMarine™ is better than fish oil?

Dr. Hoem: Yes. It is as a DHA source. A tiny little capsule of 500 milligrams contains more than 250 to 300 milligrams of DHA. You will have to eat a serious tuna meal to reach that number.

***ATHM*:** We hear a lot about sustainability. How does that relate to FloraMarine™

Dr. Hoem: You can't do it better than this. At Aker BioMarine, our business was built on sustainability and I'm very satisfied with how we harvest krill at the second tropic level and within the existing system where we can secure that we do not diminish the population of anything that depends on krill. In this respect, we consider ourselves in a league of our own. FloraMarine offers the health halo combination of plant-based product benefits, paired with environmentally friendly and sustainable practices with no impact on marine resources.

Furthermore, fermentation is very efficient when it comes to land and water use, which are scarce resources. Also, the closed loop system allows us to have full control over everything that comes into the process to eliminate contamination, pollution, and heavy metals.

***ATHM*:** Aker offers FloraMarine™ in different concentration grades. What's the difference between those grades.

Dr. Hoem: Simply the content, which is the amount of DHA in the product. In addition to our current offering, we will most likely develop more products with lower DHA levels. We can do this by mixing in other sources that contain EPA.

We are working on a larger portfolio and looking into an interesting combination and line of products mixing FloraMarine™ with krill oil to get the benefit of the krill oil phospholipids as well. Today, what is on the market in Asia and in the U.S. will be launched in Europe, and the first product is a highly concentrated one.

***ATHM*:** Any final words about FloraMarine™?

Dr. Hoem: FloraMarine™ is a product that I have high hopes for, and I believe it is a very good addition to our portfolio. While krill oil remains the most important ingredient, we recognized the need for a high-quality plant-based omega-3 source that delivers valuable DHA. With FloraMarine™, we can offer a sustainable, unique, and stable solution to anyone looking to add an algae-based product to their portfolio.