TENSEGRITY #8: WHERE DID FISH OIL COME FROM?

READERS SUMMARY:

1. WHERE DID DHA COME FROM ON EARTH?
2. HOW DOES MOLYBDENUM TIE TO SULFUR, NITROGEN, OXYGEN AND GLUCOSE?
3. SHOULD WE CONTINUE TO BIO-HACK THE PERIODIC TABLE?
4. HOW DOES BECKER'S DC CURRENT LINK PLANTS AND ANIMALS?
5. HOW DID CO_2 and O_2 FIRST COME TO LINK PLANTS TO ANIMALS?

So you might be wondering if DHA is so critical to humans how did it show up on Earth initially?

In this series we have been bio-hacking the periodic table of elements. Today we will hit the atom that has the largest atomic mass of any metal life requires. It has 4 specific uses but each one is tied to mitochondrial functioning at some deep level.

The crucial presence of DHA in eukaryote cell membranes begs this next big question, does it not? What was the precursor to DHA in the 2 prokaryotic kingdoms? Is that remnant atom still in us? Might it be in our mitochondria?

The short answer is before DHA we had another "electron sink" because of a transition metal called molybdenum (Mo).

Molybdenum is the 54th most abundant element in the Earth's crust and the 25th most abundant element in its oceans, with an average of 10 parts per billion; it is the 42nd most abundant element in the Universe.

Few people are aware that molybdenum is an essential element for life. In fact, it is the metal with the highest atomic number (42) that is required for some key biological processes. It also has a very bizarre electric arc in the solar spectrum. Mo is considered a 3 d transition metal, and what makes it special is that it makes other forms of matter highly reactive in the spectrum of visible sunlight. It has incredible photocatalytic ability. It does not require any partial or special frequency of sunlight to work. It works ideal with the visible spectrum of light. Before DHA was created on earth, this made Molybdenum a rock star element for bacteria and archea who

used the sun for energy. I have spoken about how important DHA is to all eukaryotes, but molybdenum was the key element in the oceans before oxygen showed up in our oceans and atmosphere. DHA can't be made without oxygen. This means that molybdenum was the "place setting element" in DHA construction in our marine chains. Why? Molybdenum has a very special photocatalytic relationship with sulfur and with nitrogen because of the periodic table.

Ariel Anbar, from Arizona State University believes the limiting factor for marine photosynthesis was the aqueous concentration of molybdenum in the oceans. As evidence, he showed in his research that during the euxinic period on Earth when sulfur filled our seas, aqueous molybdenum concentrations were simultaneously very low in sea water. Things changed in the sea, when at the beginning of Stage 4 of the euxinic period, their was a major acute rise in oxygen concentration, that also coincided with an increase of aqueous molybdenum to nearly 300 ppm in the sea. Oceanic anoxic events with euxinic (i.e. sulfidic) conditions have been linked to extreme episodes of volcanic outgassing. Geologic records have confirmed that prior to the Cambrian explosion, volcanism was dominant on Earth, and affected the ocean's chemistry. Sulfur and molybdenum were likely massively released by the Earth during this time.
The scientific argument made by Dr. Anbar has been made that as a result of the high aquatic concentration of molybdenum, prokaryotic and archea organisms in the primordial oceans developed the highly efficient molybdenum-containing co-enzyme, called nitrogenase. This enzyme gave the first 2 kingdoms of life a means of fixing atmospheric nitrogen for the first time in evolutionary history. Nitrogen was known to be the dominant gas in the atmosphere before eukaryotes exploded on Earth. Nitrogen happens to be the major element found in all amino acids. Molybdenum in the oceans allowed for a more rapid synthesis of amino acids in the first 2 kingdoms of life. This gave photosynthetic organisms the ability to reproduce at a more rapid rate quickly. Evolution is all about and equilibrium of our genes with the environment to stabilize reproduction. This was a huge driver to future eukaryotic development. **WHY?**
Prokaryotes and Archea waste products are oxygen. The more facile their reproduction abilities became, the more oxygen showed up in oceans directly. Eventually, this significantly boosted oxygen production in the seas and in the atmosphere and this fueled the Cambrian explosion. This condition of existence set the stage for DHA to show up in the early marine food chains. All eukaryotes use DHA in their cell membranes. It is the only lipid that has never been replaced one time in all eukaryotic history. When oxygen became plentiful in the oceans, it allowed life to become more complex than it was in the first two kingdoms of life, because it had the ability to finally collect sunlight and use it to make the DC electric current. Once you gain the ability to change sunlight into electrons and electric currents, you can build massive complexity in cells. All plants and animals have been shown to use the DC electric current at some level.

So you did you know that plants also use the DC current that Dr. Robert O. Becker found?

Today, we know all animals use electrical impulses for internal communications, but I bet you did not know plants do as well. Solid state physics is the language of life. Electrical communications are transmitted via the pholem where water chemistry becomes the key to making an atmosphere filled with oxygen.

Have a look at this hyperlink.

When you read the link it becomes clear plants propagate electrical signals in response to artificial wounding just as animals do. However, little is known about the electrophysiological responses of the phloem to wounding, and whether natural damaging stimuli induce propagating electrical signals in this tissue.
The research above in the hyperlink clearly shows that living aphids use the direct current (DC) during caterpillar wounding when feeding on plants.

Electrical penetration graphing (EPG) has now been applied as a novel approach to plant electrophysiology allows cell-specific, robust, real-time monitoring of early electrophysiological responses in plant cells to damage. EPG show the electrical changes in a plants leaves once an animal has bitten into it. This shows us the electrical interaction of how species interact. Moreover, it is potentially applicable to a fairly broad range of plant–herbivore interactions that occur. This link between plant and herbivore is important for "paleo diet proponents" to fully understand. Rarely do 'these folks' even mention how plants and DHA show up in herbivore tissues for human cell membrane benefit. I find this ironic. Moreover, this research cements how congruent Becker's work on the DC current in regeneration in mammals and amphibians. It is also been proven in plant biology. It seems electric current is how life regenerates from an injury. Furthermore, it explains why mammals have retained this regenerative ability using the DC current in their own tissues for regeneration throughout evolution.

What else does it link in life's coupled systems? It ties how plant's photosynthetic ability and efficiencies were subsequently coupled to their oxygen production that animals need to live via their oxidative phosphorylation in mitochondria. This links eukaryotes directly to the other two kingdom's in life through their respiratory gases.

SUMMARY

Why do we rally behind and advocate an ancestral diet? Because grass fed meats are higher in DHA. That is the main biologic and evolutionary reason. What is lost on most people who follow this dietary template is the fact that the marine food chain provides significantly more DHA in comparison. So if you happen to be a specific eukaryotic mammals with 3 pounds of DHA in the cell membranes of your CNS and PNS it should be no mystery why DHA is linked

to disease reversal. DHA is the key evolutionary Rx for all eukaryotes, and should be optimized within dietary templates. Check out this youtube video that shows you the real paleolithic data that some want buried. www.youtube.com/watch?v=XwLE4jB4xvs

To get to DHA in the marine food chains, we needed a ***bridge loan*** from molybdenum in our past. This relationship remains cemented in our mitochondria today, that use 4 key enzymes that require molybdenum as a cofactor. In addition, the unique chemistry of molybdenum enabled the development of other enzymes in organisms allowing for the assimilation and reduction of the toxic nitrate ion by electrons. Even today, in all eukaryotic life forms, Molybdenum enzymes are within their mitochondrial membranes. Without them mitochondria would not be able to depolarize correctly. It would be wise to remember that your mitochondria came from a prokaryote during endosymbiosis, at this juncture in the blog. Molybdenum is the key to handling high nitrogen and sulfate biochemistries in the circulatory system. This should make you realize why the recent TENSEGRITY 7 blog is now more important in this evolutionary story as it continues to unfold.
Eukaryotes need sulfates to make glucose and oxygen transport safe in blood plasma during summer and spring. Conversely, we use nitrogen based transport for the safe transport of glucose and oxygen in autumn and winter. Molybdenum is key in making the biochemistry of glucose and oxygen transport safe in modern eukaryotes, like humans. This links us back to our oceanic evolutionary past. It is a remnant of how we handled sulfur and nitrogen before to innovate solutions in our past.
Molybdenum (VI) special chmistry allows it to be reduced (addition of electrons) to the +5 and +4 oxidation states quite readily, and so its biological role seems to be that of an electron ‘sink’ in redox processes. And electron sink is exactly what DHA has become in eukaryotes. It replaced molybdenum once DHA was innovated 600 million years ago. In addition, molybdenum, like many of the high atomic number transition metals, has a predilection for bonding to sulfur and to sulfur-containing molecules as it does in nitrogenase and other enzyme systems.
Why does molybdenum play key biological roles in plants and animals?

The most thermodynamically stable form of molybdenum under oxidizing and neutral conditions is the molybdate ion, [MoO4]2-. This ion has a high aqueous solubility, making it easily transportable in biological systems. Life is all about atoms interacting with water chemistry. In fact, it can be argued that the molybdate ion is transported through cells by the same mechanism as the sulfate ion in our blood today.
To any inorganic chemist, it comes as no surprise that molybdenum (VI) and sulfur (VI) chemistry are fundamentally related on a quantum basis. Remember the periodic table is a quantum based document. One of the lesser-known periodic table quantum links between sulfur and molybdenum when coupled, they have the highest oxidation state. This quantum math links an element in Group (n) with an element in Group (n+10). Molybdenum and sulfur have this specific linkage in that molybdenum is in Group 6 while sulfur is in Group

16.
Today, Molybdenum is needed for at least 4 known mitochondrial enzymes in every eukaryotic organism on this planet. What links them all together? Molybdenum links sulfur and nitrogen chemistry today in mitochondrial photocatalytic actions. This allows glucose and oxygen safe delivery possible during all four seasons found on Earth. Sulfite oxidase catalyses the oxidation of sulfite to sulfate, necessary for metabolism of sulfur amino acids like cysteine. Sulfite oxidase deficiency or absence leads to key neurological symptoms and early death in all eukaryotes. Xanthine oxidase catalyses oxidative hydroxylation of purines and pyridines including conversion of hypoxanthine to xanthine and xanthine to uric acid. This is critical in nucleic acid synthesis in eukaryotes. Aldehyde oxidase oxidizes purines, pyrimidines, pteridines and is involved in nicotinic acid metabolism in eukaryotes. These pathways are critical in all eukaryotes. If any are defective it is **a lethal defect**. Low dietary molybdenum leads to low urinary and serum uric acid concentrations and excessive xanthine excretion. Fructose is known to lower molybdenum concentrations in all eukaryotes. Molybdenum is linked to fat metabolism for this reason.

The liver cytosol of various mammals also exhibits a significant reductase activity toward nitro, sulfoxide, N-oxide and other moieties, catalyzed by aldehyde oxidase. Be sure, there is considerable variability of aldehyde oxidase activity in liver cytosol of mammals: for example, humans show the highest activity, rats and mice show low activity, and dogs have no detectable activity. This yet another reason studying mice remains an epic blunder for modern scientists.

The mitochondrial amidoxime reducing component mARC is the fourth found mammalian molybdenum enzyme. The protein is capable of reducing N-oxygenated structures, but requires cytochrome b5 and cytochrome b5 reductase for electron transfer to catalyze such reactions. Why did I mention this?

All proteins of the N-reductive system in mitochondria seem to be regulated by fasting and then its activity decreases. Anytime we have a fasting state, we have free fatty acids being broken down in mitochondria to reduce oxygen and create water in mitochondria, and this links all molybdenum enzymes in mammals to lipid metabolism at a very fundamental level.
In this blog, it shows you that this transition metal, is critically linked to DHA production for the entire eukaryotic kingdom. Once again we have more evidence that ketosis and DHA are linked fundamentally by evolution prior to the Cambrian explosion. These relationships have remained steadfast until this very day in our kingdom.

Want more quantum magic in Mo?

Molybdenum disulfide has recently been found to be a Carbon-Free Nanomaterial. Maybe you are beginning to see why mother nature sprinkled a bit of this stuff on your inner mitochondrial membrane?

Molybdenum disulfide (MoS_2) is a two-dimensional (2D) nanostructured material that has been used for many years as an industrial lubricant in its bulk form. The 2D form of the material was not discovered until 2011, when scientists succeeded in producing a transistor made from this new material. A transistor is a solid state ability of a semiconducting metal.

For years, researchers have been struggling with the technical challenges of building electronic circuits from graphene, but with molybdenum disulfide researchers have already been able to develop a wide range of electronic components. Molybdenum disulfide in its 2D form could help development of futuristic products such as flat panel lighting covering entire walls, clothing embedded with electronics, and contact lenses with built in head-up displays.

Might your mitochondria all be laced with this “semiconductor like atom” to interact with the light a mitochondria releases?

<u>The properties of molybdenum disulfide are:</u>

It is thin and transparent.
It is capable of being deposited on other materials and allows **for flexibility development in transistors**. (clue)
It is capable of retaining huge amounts of elastic strain. Electron tunneling happens only below 14 Angstroms.
It is naturally semiconducting – unlike graphene, the bandgap does not need to be physically induced.
The bandgap varies with the strain on the material, allowing configurable electronic properties

<u>Molybdenum disulfide finds use in the following applications:</u>

It has a bandgap that allows easy usage of molybdenum disulfide to build transistors.
A wide range of basic electronic components can be fabricated *on this* material.
It could be used for high-efficiency solar cells, as varying the strain across an MoS2 sheet would vary the bandgap, allowing different parts of the cell **to absorb different frequencies of light. (big clue)**
It can be used as a transparent electrode in large-screen displays such as computer monitors and television sets.
It can be used along with other 2D or thin-film materials to form *flat light-emitting devices*.
It can be used to produce displays on windows and eyeglasses. (might we use it in cells with a lot of mitochondria to do the same?)

Molybdenum is an essential trace element for virtually all life forms. It functions as a cofactor for a number of enzymes that catalyze important chemical transformations in the global carbon, nitrogen, and sulfur cycles.

Thus, molybdenum-dependent enzymes are not only required for human health, but also for the health of our ecosystem on this planet.

Grass fed animal products, fruits, and many vegetables are generally low in molybdenum. If your dietary template does not have a deep supply of DHA you might try to add higher levels of molybdenum to offset the loss of DHA's electronic sink. Be careful, because too high Molybdenum intake can cause havoc with copper metabolism.. Excessive dietary intake of molybdenum induces a secondary copper deficiency. This risk is 10 fold increased in grass fed ruminants. Molybdenum concentrations in plants increase tremendously in the fall. Molybdenum exposure may reduce phospholipid synthesis in nervous tissue, resulting in demyelination and neurologic disorders clinically. This is often why bean eating vegans develop MS like symptoms. DHA replacement is a far better option because it is safer for humans.

Ancestral health goes back 10,000 years for "their story" of events, but my biohacking decade has taken the story back even further to show you why The Epi-Paleo Rx is the key to the entire eukaryotic kingdom's optimal health story. We need to carefully bio-hack the periodic table when we understand how it was used to innovate humans by Lady Evolution from the Cambrian event 600 million years ago. DHA is our only key dietary element in humans, but we could have never used it if we did not use molybdenum first as an electron sink to photocatalyze reactions in the ancient seas.

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