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THE NUTRI-SPEC LETTER

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MIGRAINE = Brain Drain

Brain Drain?

Yes, a brain, drained of energy, a brain suffering ---

DEFICIENT ENERGETICS ---

is the common denominator in all migraines.

Brain neuron mitochondria are producing pitifully deficient OXPHOS ATP.

Brain Astrocyte ETC (Electron Transport Chain) function is overwhelmed by ROS & RNS (Reactive Oxygen & Nitrogen Species).

The brain, lost in ---

A METABOLIC MAZE ---

cannot find glucose to burn --- cannot find ketones to spark its mitochondrial fire.

The only way to serve your migraine patients is to understand the fundamental cause of their distress --- with a look at …

THE MIGRAINE-MITOCHONDRIA CONNECTION.

Truly and totally ---

MIGRAINE IS A STORY OF METABOLIC IMBALANCE.

Why are we discussing migraines? So you can treat them more effectively?

NO!!!

We Nutri-Spec Metabolic Therapists do not "treat" migraines. We do not "treat" any disease or condition. Our approach to Metabolic Therapy requires that we largely ignore the symptom --- digging deeply for ways to restore Metabolic Balance. And the two keys to Metabolic Balancing are first, restoring and maximizing cellular mitochondrial energetics, and secondly, controlling the IMFLAM-AGING that ultimately results from deficient energetics.

Migraine is ---

THE PERFECT "POSTER CHILD"
ILLUSTRATING NUTRI-SPEC METABOLIC THERAPY.

Migraine is not a disease entity, but rather the end result of one or more altered metabolic pathways that result in deficient mitochondrial energetics.

The brain starved for energy can be the result of:

- a Glucogenic loss of control of glucose,
- a Ketogenic loss of access to glucose,
- a Dysaerobic ETC overwhelmed by ROS & RNS, or,
- an Anerobic Cytoplasm locked in Glycolysis, unable to feed Pyruvate into the mitochondria.

How absurd is it to throw drugs at a symptom without regard to its cause? How ignorant is it to treat all migraine patients as if they have the same condition, when all they share is the symptomatic end result of one or more entirely different broken metabolic pathways? Your only legitimate approach is to break down the barriers blocking supply of brain energy.

And what about migraine triggers? Allopathic doctors accompany their drug prescriptions with a long list of migraine triggers to avoid. Yes, if drinking red wine triggers a migraine, obviously that individual needs to avoid drinking red

wine. But while trigger avoidance will minimize symptoms, it does nothing to address the underlying cause. Why does red wine trigger a migraine in some migraine patients and not in others? It is because all migraine patients have their own individualized combination of Metabolic Imbalances underlying their migraines. So, yes, do not ignore triggers, but ---

A TRIGGER DEMANDS RIGOR
BUT ENERGETICS IS SO MUCH BIGGER.

As we highlighted in last month's Letter, the brain uses 20% of the total body energy produced from Glucose, even though it is only 2% of body mass.

The brain energy deficit in migraines shows a low Creatine Phosphate to Creatine ratio, and higher concentration of ADP, and decreased ATP. The degree of energy deficit is directly proportional to the severity of migraine.

In the brain, neurons function by oxidative metabolism, whereas astrocytes rely on Glycolysis. Research suggests that Glutamate released by neurons into synapses is taken up by astrocytes, where Glutamate stimulates Glycolysis and the production of Lactate. The Lactate, in turn, can be oxidized in neurons. A barrier to this astrocyte feeding neurons pathway is common in migraines.

Migraine is also associated with lower Glucose in the brain, reflecting brain energy deficit from either hypoglycemia, hypoxia, or impaired glucose transport across the BBB.

Energy deficit driven by mitochondrial impairment is also associated with oxidative stress from ROS over-production.

In essence, any mitochondrial impairment will be associated with an energy deficit, which in turn, can be a migraine trigger.

One study shows the majority of those with migraines have lower levels of Lipoic Acid (Glucogenic or Ketogenic Imbalance, or Inflam-Aging from any Imbalance, or from unhealthy microbiota). Almost half have excess Lipid Peroxides (Dysaerobic Imbalance), and antioxidant capacity is lower.

Many other studies show improvement in migraines with Lipoic Acid supplementation (Rejuvenator, Energetics K & G, Adapto-Max, Oxy-Max). In one study, patients with episodic migraines show improvement of inflammatory and

oxidative conditions and mood disorders in addition to decreasing migraines. Another study shows that 90% of high-frequency migraine patients have significantly low levels of Lipoic Acid. The authors also note concomitant changes in markers of mitochondrial dysfunction and oxidative stress. An abnormally low Lipoic Acid level is observed in serum from the majority of migraine patients.

Countless studies show that migraine prevention can be achieved by a ketogenic diet (low carbohydrate, as needed in a Glucogenic Imbalance), as it stimulates mitochondrial metabolism. The low carb should be accompanied by high saturated fat intake, especially the fat of ruminants, fish (not fish oil!!!), and coconut oil.

Glycolysis is the main process of energy production in the brain, and many studies reveal nutrients important for mitochondrial functions, energy production, and oxidative stress that are related to migraine. Large doses of Riboflavin have become a popular remedy for migraines. The Riboflavin studies confirm the many others showing that migraine is associated with a brain energy deficit.

While many studies show Riboflavin will prevent migraines, there is no evidence that Riboflavin deficiency is associated with migraines. The benefits of Riboflavin can only be explained by its role, when supplied in supra-physiological quantities, to upregulate mitochondrial energy production and/or decrease the ROS or other metabolic byproducts of impaired mitochondrial energetics.

There is much evidence that the target for Riboflavin is Complex I of the ETC. Does Riboflavin promote Complex I activity, or does it decrease neuro-inflammation resulting from impaired Complex I activity? Both. Consideration must also be given to Riboflavin's role played, not only in Complex I of the ETC, but also in the Krebs Cycle, as well as in the energetics of amino acids, fatty acids, and nucleotides.

But here is what is most interesting about all the studies of Riboflavin as a "cure" for migraines. Every single study on the benefits of Riboflavin makes the essentiality of underlying Metabolic Imbalances perfectly clear. What do I mean by that? Not one patient in all these many studies who responds well to Riboflavin "treatment" for migraines showed a Riboflavin deficiency. Not one!

In other words, Riboflavin's "therapeutic benefits" have nothing to do with correcting a vitamin deficiency. They have everything to do with supplying enough Riboflavin to push the Krebs Cycle more efficiently into the ETC, and then the ETC moving smoothly through the OXPHOS process to ATP production.

This is why you see such high quantities of Riboflavin (and even more so Niacinamide, and for the same reason) in your Energetics G & Energetics K supplements. These are the quantities of B vitamins required to push liver cells, adipose cells, muscle cells, and brain cells through the maze of energetic pathways --- to the beneficial result of brain energizing.

[Side Note: Those of you who have been around Nutri-Spec for years are likely surprised at the high quantities of B vitamins in Energetics G & Energetics K. For all these years you have heard me downplay the use of mega doses of vitamins, as likely to exacerbate Metabolic Imbalances as to correct them. But I now stand corrected on that. If it requires hundreds of milligrams of Riboflavin, Niacinamide, or Benfotiamine to push carbohydrate, fat, and protein through the barriers to efficient energetics pathways, then so be it.]

Thiamine, like Riboflavin, is also associated with migraine prevention. But unlike Riboflavin, Thiamine deficiency states correlate with migraines, and with other types of headaches.

CoQ10 (150 MG Daily), a critical component of the ETC, is also shown to reduce the frequency of migraine attacks. CoQ10 decreases both frequency and duration of migraines, but with no decrease in severity. One study shows combined supplementation with CoQ10 and L-Carnitine does decrease the severity, along with the duration and frequency of migraines. That supplementation also decreases serum lactate. (Glucogenic Imbalance and/or Anaerobic Imbalance = Energetics G for your Glucogenic patients, &/or if Anaerobic, then Oxy Tonic, Oxygenic A, & Taurine --- and in all migraine cases, Adapto-Max, with its CoQ-10, Carnitine, and Lipoic Acid.)

Many studies report the efficacy of Magnesium supplementation in migraines. Magnesium inhibits calcium influx in neurons by blocking NMDA receptors that play a role in the initiation and maintenance of central sensitization after nociceptive stimulation. Blocking calcium channels in neurons may contribute to the inhibition of brain pro-inflammatory signaling related to migraines. Magnesium also decreases CGRP, which is a target of developing anti-migraine drugs.

Migraine patients have lower serum Magnesium, and the severity of migraines is proportional to the Magnesium deficit (all individuals in one study had Magnesium concentrations within the physiological range … so again, we are not talking about a "deficiency," but rather, the need for a "barrier buster"). Low

Magnesium is typical in the CSF of migraine patients. Migraine patients consistently show low mitochondrial respiration associated with low levels of Phosphocreatine and Free Magnesium concentrations along with high concentrations of ADP and Inorganic Phosphate.

These findings are reversed by supplementation with CoQ10, and it is the Cytosolic Free Magnesium that improves most significantly in response to CoQ10. That study concludes that low brain Free Magnesium resulting from failure of the ETC, and consequently lower energy, are consistently a part of migraine. These parameters associate with the severity of migraine --- with the lowest concentration of Magnesium found in migraine stroke, and the least deficient Magnesium in milder migraine without aura. The study shows that supplementation with a combination of Magnesium, Riboflavin, and CoQ10 is effective and well tolerated.

Taurine studies showed decades ago its benefit for migraines. It potentiates many effects of Magnesium, including its action as a calcium blocker. Taurine is also critical in controlling brain fluid pressure.

L-Carnitine (Energetics G, Rejuvenator, Adapto-Max, Formula ES, Oxygenic A) is shown in several studies to benefit migraines. Carnitine in combination with CoQ10 relieves migraines and also decreases serum Lactate.

Several studies show a correlation between serum homocysteine and frequency of migraine attacks. Elevated homocysteine is known to be associated with disturbances in mitochondrial function and energy production in the central nervous system. Homocysteine is a marker of what Nutri-Spec terms "Endogenous Inflam-Aging," showing a need for Rejuvenator and Immuno-Synbiotic.

Do you get it? Migraines are not a disease --- they are a brain crying for healthy energetics. They are a sign that brain mitochondria desperately need a metabolic push through the barriers constraining energy pathways.

August Extra Special Special = Energetics G, Energetics K, Adapto-Max, and Taurine, 1 **FREE** with every 5 you purchase.

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