

MSG, your GUT, and your BRAIN, Post-Trauma

READERS SUMMARY:

1. How does MSG and aspartame affect you and your brain and your fat loss?
2. What do artificial sweeteners do to a human?
3. How does neuronal injury from diet, trauma, and energy depletion all tie together?
4. What about young humans?
5. What about young humans with injured brains?

In part 2 of this series, we will explore how excitatory amino acids in foods and introduced to our GI tract could cause us some problems with normal functioning causing weight plateaus. We will discuss how MSG and aspartame (NutraSweet), could wreak havoc with the human brain. This is especially true if that brain already has been concussed many times or is afflicted with some neurodegenerative disorder or is connected to an already leaky gut (low HDL level).

Many people don't seem to understand how MSG and artificial sweeteners cause damage to neurons. The experimental data on this area is documented quite well by Dr. John Olney. His work began in 1969. He studied the endocrine effects of MSG on the hypothalamus. Most of my blog readers know that leptin signaling in the hypothalamus is critical for developing obesity and controlling weight among other things. You might be surprised to also find out that MSG and aspartame destroys the neurons in the hypothalamus that use the leptin receptor in the arcuate nucleus and in the hypocretin neuron bundle. The arcuate nucleus has the job in the hypothalamus of regulating the amount of hormone releasing factors secreted by the hypothalamus and pituitary. So if these neurons become damaged or rendered non functional your hormones will never be

optimal with diet alone. This will cause you to remain fat and/or hypothyroid even if you are doing everything totally primal or paleo. It can also destroy the secretion of growth hormone that effects your body composition and the sex steroid hormones that control bone density and energy levels and radically can effect your HDL levels. This is a cause of "primary pregnenolone steal syndrome" because it is knocking out the "main pharmacy" in your brain. Many cases of primary amenorrhea are due to toxic insidious damage to this part of the brain.

Many women often notice weight gain after menopause. Often this is caused by a real loss of prolactin secretion in the hypothalamus, which controls the releasing hormone proteins. This simultaneously occurs as a woman is losing two of her main brain antioxidants (protectors), namely estrogen and progesterone. The loss of these protective hormones makes the brain even more susceptible to excitotoxic damage at the leptin receptor by MSG and aspartame. These chemicals create cell damage slowly over time by increasing free radical damage and using up the main antioxidants of the brain. This is often why menopausal women with big stalls will respond tremendously to low dose prolactin analogue drugs. These must be given under a physicians care. This offsets the loss of prolactin and norepinephrine (NE) secretion that regulates the releasing proteins that dictates ultimate brain hormonal balance and the circadian rythmns. MSG, aspartame, BPA, phenylalanine are just a few of these endocrine blockers. Acute BPA toxicity actually can be seen directly on an MRI scan by causing swelling of the pituitary gland. So if you are using these products knowingly or unknowingly, you might want to stop them if you are trying to lose weight or recover from a neurodegenerative disease. MSG has multiple "slick nicknames" designed to confuse you. Hydrolyzed vegetable protein is by far the most common. Here is a list of the others.

We already know that Alzheimer's disease (AD) is a brain

disease that cause energy depletion in the brain too. Diabetic patients have a 147 fold increased risk of developing AD because diabetes contributes to an energy deficient state in neurons and depletes magnesium. Magnesium is used as a co-factor in ATP generation for energy. We saw in the last blog, that neurons become much more susceptible to excitotoxin damage when they are magnesium or energy depleted. This clearly explains why T2D's become demented by AD so often. Nutrasweet and aspartame are very commonly used in low carb and diabetic foods and are known excitotoxin drugs that cause hypothalamic damage as well. These drugs are even advocated by the American Diabetic Association for weight loss (ADA). On the surface this seems to make no sense when one considers the science behind them. But when you look in this deeper, you find that the ADA is given millions of dollars a year by the manufactures of these products. It becomes crystal clear why this is a national policy to the their members. I tell all my diabetic patients to avoid all products with MSG, artificial sweeteners and BPA for this reason. If you are going to use a sweetener, I think using liquid Stevia without maltodextrin in it is best and safest based upon what we know now. If you feed a mouse MSG right after its born, it has loss of hormonal control, low prolactin levels, high leptin levels, with neuron death in the hypothalamus as a result. All theses mice grow up obese, small, and have reproductive difficulties. This syndrome parallels the human clinical syndrome of PCOS quite well. In PCOS women secrete higher levels of LH and this stimulates earlier onset of puberty and higher levels of testosterone that throw off the balance of oocyte maturation and causes menstrual irregularities. This effect has also been shown to effect the developing mouse because MSG and aspartame readily cross the placenta. This unfortunately is also true in humans as well. In fact the placenta in humans is even more permeable to these chemicals than mice and human brains concentrate the chemicals more readily in areas where the brain is not protected by a blood brain barrier. When you read the data on animals and realize that our species is 5-7 times

more likely than a mouse to be sensitized to these effects it makes you stop and wonder what these chemicals are doing to kid's epigenetic switches of their hypothalamus.

It may also help explain some of the amazing new epidemiological trends for obesity that have shown up over the last 50 years. I am referring to the cumulative effect wheat, grains, PUFA's, high fructose corn syrup, BPA, MSG and aspartame use. I don't think any one in particular is a smoking gun. I think each one compounds one another in our western diet and creates the massive effects we see in neolithic diseases.

What about young kids and adults with injured brains from various causes? Well, as a species you maybe unnerved to learn that humans absorb MSG and aspartame 5-7 times more aggressively than any species ever tested. This effect is more dramatic when the human is younger with a developing immune system in the gut. The younger the the gut and brain are, the more aggressive is the uptake and the more sensitive the developing nervous system is to its cumulative effects. MSG manufactures always do studies that show effects within 48 hrs for human safety. Since these drugs collect around neurons and disable its clearance the effects are long term. This is why the data on these drugs are so tough to interpret sometimes. They are not when you know the biochemistry around a neuron. In adults, the effect is not as significant unless you have a leaky gut (low HDL level) or have a damaged brain blood barrier. This means that the younger you are the more at risk you are for excitotoxic damage from trauma or concussions. This has huge implications for HS and college athletes.

Low levels of HDL occurs in many pathologies and signals lowered endotoxin clearance in the portal circulation. This commonly occurs in infection, trauma, migraines, concussions, neurodegenerative diseases, and especially strokes. In all these people, I advocate complete avoidance of these food additives. It has been shown in many animal studies that MSG

and aspartame concentrate in neurons that are energy depleted or damaged in parts of the brain with no adequate blood brain barrier. Moreover, in humans the effect of these drugs is not always immediate and takes 72 hours to 144 hours to render its effect. The most worrisome issue to me as a neurosurgeon is the cumulative concentrating effects of these additives over a life time. I believe this is a major causative factor in the increasing incidence of ALS, brain tumors, obesity, and neurodegenerative diseases. The injured brain is even more at risk over time to these chemicals because of constant free radical generation in the brain. The developing brain is more adversely impacted because its wiring and neurotransmitter connections are not mature during early life. My belief is that this is also true of adults who are recovering from trauma and concussions as well. I believe their brains are more at risk than normal and I advise strict avoidance in these cases.

After reading the latest concussion data results if your child plays sports you need to have a plan in place to combat neuron cell death. If you're a professional client you better make sure your team doctor and your agent have a plan for you outside the regular medical panel. Your cognition and life span might depend upon it. There are many things we can do to suggest to you to offset the excitotoxic damage. The choice is yours as it always is. the next part of the series will focus on CTE and athletes.

CITES:

1. Gay et al. "N-methyl-D-L-aspartate elicits hypothalamic gonadotrophin releasing hormone in prepubertal male rhesus monkeys" *Endocrinology* 120 (1987) 2289-96.
2. Dawson et al. "Age related and dose dependent effects of neonatal MSG administration to female rats." *Neurotoxicology and Teratology* 2(1989): 331-337
3. Stegink L.D. Et al. "Glutamic Acid: Advances in Biochemistry Physiology." NY: raven Press, 1979.

4. Stegink, L.D. Et al. "Comparative Metabolism of glutamate in mouse and Man." In Glutamic Acid: Advances in biochemistry and physiology." Edited by L.J. Filner, et al. 85-112. Raven press: NY, 1979.
5. Olney, J. W. "Excitatory Neurotoxins as food additives: an Evaluation of the risk." Neurotox. 2(1980): 163-192