



LYME DISEASE
ASSOCIATION OF AUSTRALIA
For Lyme Disease Awareness & Action

Ask The Doctor: A Six Part Series on lifestyle recommendations to look after your nervous system.

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PART 3: Dietary Fat Choices.

In our ongoing journey to seek brain health and to reduce neuro-inflammation, this article will explore the essence of what the nerves are made of - fat.

You may remember that in part one of this series, we introduced the concepts that the gut can be thought of as the second brain and that our dietary choices serves us far beyond digestion alone. Just to jog your memory.... we discussed how our carbohydrate choices can influence:

- 1) Insulin and thus inflammation,
- 2) Gut bacteria thus metabolism,
- 3) Gut permeability thus mucosal function,
- 4) Nutrient density thus nutrient status and
- 5) Epigenetics thus your entire cellular expression and function.

That's a lot of mileage just from choosing the right carbohydrates!

Choosing the right dietary fats is important because in doing so, you alter the specific metabolic and structural needs of the nervous system. Like the mileage we get from choosing the right carbohydrates, choosing the right dietary fats is no small feat too!

A major complaint from sufferers of chronic infections and fatigue is brain fog and poor cognitive function. This can sometimes be related to gut dysbiosis (imbalance of microorganisms) which



is due to the 'metabolic noise' that the brain picks up from the gut-brain-axis. However, brain fog can also be simply due to a lack of metabolic energy. The brain is only 2% of our body weight but, it utilises up 25% of our body glucose. Tendencies toward hypoglycaemia due to poor diets and irregular eating will subject the nervous system to suboptimal function which can often lead to nervousness, depression, fatigue, lack of concentration and poor endurance. Considering that all our physical strength and conscious mental activity relies on intact autonomic nervous functioning, we need to do our utmost to care for it. When this part of the involuntary nervous system struggles, the many simple aspects of our physiology that we take for granted, can start to become a problem. A good example of such problems is in the presentation of a condition called 'POTS'- Postural Orthostatic Tachycardic Syndrome. In POTS, the heart is unable to cope with being physically upright; it is unable to produce a good enough blood pressure to perfuse all the vital

organs plus deal with any exertion or cognitive processing. Other symptoms include poor temperature control, poor vision due to difficulty focusing, poor bladder control and poor circulation.

Managing hypoglycaemia primarily requires choosing the right dietary carbohydrates and secondarily, buffering it with good fats. Carbohydrates supply immediate fuel but fats supply enduring fuel and it builds the structures of neurological tissue.

Let's look firstly at the structures....The Nervous system (i.e. the brain, spinal cord and peripheral nerves) is made of tissues which are very high in fat. The layer around the nerves are called myelin sheaths and these are what allows the nerves to conduct an electrical signal down the length of a neurone. The dry mass of myelin in the whole nervous system comprises of 70-80% lipid and the rest are proteins (which make up membrane proteins). Not only is myelin a crucial membrane structure for conducting electrical signals, it is also active in its own metabolism and ion transport across the membrane. Complete loss of the sheath is called demyelination (a diseased state of the neurons). However, even before demyelination occurs, the myelin layer surrounding nerves can function poorly.

The lipids in myelin and all the other cell membranes are comprised largely of cholesterol, phosphatidyl choline, phosphatidyl serine, Sphingomyelin and other phospholipids (or saturated fats). Omega 3 fatty acids are not part of the solid structure of the cell membrane but, these serve to act as modulators of cellular signals from within the phospholipids. In combination with omega 6 fatty acids, these unsaturated fatty acids give some flexibility to the stable solid phospholipids and a balance needs to be achieved. If we do not eat a diet that provides the right fats and instead, provides too many of the wrong fats, the structure of our cell membranes, including the nerve membranes and myelin sheaths will suffer. Nerve membrane

fluidity, conductive and messenger properties will suffer and can be impaired.

A lack of omega polyunsaturated fatty acids affects neuro-transmissions but excessive amounts can make the membrane unstable. An excess of trans-fat in the nerve cell membrane also means it cannot receive messages from neurotransmitters efficiently.

Eicosanoids (derived from the omega-6 fatty acid arachidonic acid or AA and the omega-3 fatty acid eicosapentaenoic acid or EPA), are potent chemical messengers that play critical roles in immune and inflammatory responses. In its signaling function, these omega unsaturated fatty acids are potent anti-inflammatories but, it must also be noted that they should be taken into tissues which have enough antioxidants within them. It is therefore unwise to take high dose fish oils and seed oils without ensuring sufficient antioxidants in the diet.

Let us now consider the metabolic needs of the nervous system. The brain mostly uses glucose for energy but, at times of low glucose such as low carbohydrate intakes, fasting and exercise, the brain will use ketones. The brain cannot use fats (as these have long chains which cannot cross the blood brain barrier) but medium chain fatty acids which can cross the blood brain barrier can be used as fuel.

If we have a diet that is too high in processed starch, carbohydrates and simple sugars, we will be at risk of having blood sugar swings. After a carbohydrate rich meal, the blood glucose spikes up to provide a quick fix of energy but will shortly fall again, leading to a detrimental cycle of blood sugar swings. People commonly resort to another carbohydrate meal or snack to deal with low blood sugar but this perpetuates the cycle. When this is severe, people will notice that they have to eat very frequently and cannot tolerate being late for a meal.

Hypoglycaemia can lead to foggy thinking, mood swings, irritability and poor exertional tolerance. In the short term, providing the brain with carbs (therefore glucose) does help at the time but, in the

longer term the problems with insulin, inflammation and dysbiosis will ensue. To give the brain energy which can last more than a few hours, it is important to consider switching a sugar burning metabolism into a fat burning one. By doing this, you effectively provide plenty of ketone bodies for the brain to use....

For more information on this important concept, please view this article and video explaining the impact of leptin.

It also provides more information on how to eat in a way that will burn fat.
<http://articles.mercola.com/sites/articles/archive/2014/01/05/dr-johnson-leptin-resistance.aspx>

Lastly, not only does the brain require intensive energy to function well but, the high energy demand of the brain also requires the mitochondria (the cell's power producers) in the neurons to work constantly to produce ATP (an energy containing molecule). The mitochondria use glucose to make energy (as ATP) but, they also need a host of nutrients to do this. All neurological diseases and neurological damage are known to have underlying mitochondrial dysfunction (even if the causes are unknown). As part of feeding and regenerating brain function, one needs to strongly support the mitochondria.

I recommend watching this TEDx talk by Dr Terry Wahls on how to look after the mitochondria. You may also wish to read her book and get examples of her nutritional support solution. I would often recommend a number of the nutrients she mentions, such as iodine, co Q 10 and L- carnitine.
<https://m.youtube.com/watch?v=KLjgBLwH3Wc>

Nourishing your brain this way is a foundational part of dealing with neurological diseases and inflammation.



Good Fats

- Saturated fats from grass fed dairy, grass fed animals, coconut oil, palm oil, cocoa butter.
- Mono-unsaturated fats from olive oil, avocado oil, tree nuts (almonds, walnuts, macadamia, hazel & brazil) and whole seeds (sesame, sunflower, pumpkin, flax & chia)
- Poly-unsaturated fats from wild fish and seafood for omega 3
- Cold pressed unhydrogenated and unheated plant oils such as evening primrose, flaxseed, sunflower for omega 6's and 9's

Bad Fats

- Deep fried oils and reused oils to cook/fry
- High heated plant and seed oils -trans oils such as soybean oil, corn oil, canola oil.
- Generic vegetable oils, margarine, vegetable shortening