

Properly functioning cell membranes are vital for the proper functioning of the human, and animal, body. The cell membranes are made up of three factors: these include phospholipids, glycolipids, and cholesterol. Phospholipids are the largest component of the three. Phospholipids are made up of saturated and unsaturated fat, and the balance of these is what is important to the functioning of the body. A large part of the human body is lipids, and many neurodegenerative diseases are lipid, also known as fat, related. Hence, the balance of unsaturated, especially essential fatty acids, and saturated lipids is critical to human and animal health.

Nutrition is the best way to insure that the cell membranes will stay healthy. One should avoid processed fats. One should also supplement his or her diet with phospholipids. Lecithin is the most common source of phospholipids, and soybeans are great sources of lecithin.

Anyone who has a neurodegenerative disorder, this includes Autism, Multiple Sclerosis, Diabetes, Optic Neuritis, Irritable Bowel Syndrome, Fibromyalgia, Alzheimers, Parkinson's Disease, ALS, Manic Depression, Chronic Fatigue Syndrome is most likely lacking in "good fats" and overloaded in "bad fats". The differences between "good" and "bad" fats will be discussed later on in this paper. In horses, EPM, Infertility, Botulism, Cushing's Disease, and Hypothyroidism, metabolic disorders, and Insulin Resistance may be fat balance related. Balancing and building "good fat", while burning and avoiding "bad fat" is crucial (Moore).

Cell membranes are vitally important because they separate the cells in the body from their outside world ("Membrane"). Hence, fat, or lipids, is critical because it surrounds all of the cell membranes. Lipids allow for the exchange of nutrients. It is necessary for these membranes to be in top working condition, in order for the brain to be at its maximum functioning potential.

Membranes surround every human and animal cell in the body. All membranes include lipids and protein ("Membrane"). The principle fat in membranes is called a phospholipid. Each membrane is made up of millions of phospholipids that are all lined up. Each phospholipid has one head and two tails. One tail is straight, and the other is wavy. Cholesterol is wedged in between in between these two tails. Another part of the membrane is the glycolipid. Glycolipids are basically tiny sugar molecules that protect, insulate, and exchange nutrients within the cell membrane.

The number one component of every cell membrane is the phospholipid. This molecule has a head and two tails, as mentioned earlier in this paper. The head is polar, and it is connected to two hydrocarbon tails ("Membrane"). The head and tails of the phospholipid act like a magnet. The head has a positive charge, and tail has a negative charge. This magnet-like component attracts and repels, which allows nutrients to go into the cell, and the cells waste products to exit out of the cell's membrane.

The straight tail of the phospholipid is a straight chain fatty acid, better known as a saturated fat. The crooked tail is an unsaturated fat, because of a cis double bond ("Membrane"). The saturated (straight) tail is rigid and solid, and seldom moves. However, the crooked tail (unsaturated) tail vibrates, it moves particles in and out of the membrane. The balance of the two tails is what is the most important thing. It takes a balance of both saturated, and unsaturated fats to compose, and properly maintain, the structure of phospholipids, which are the main component of cell membranes (Moore).

Processed fats also play a big role in cell membrane function. However, they play a negative role to the phospholipids' positive role. Processed fats are man-altered fats, such as hydrogenated or partially hydrogenated fat. They are frequently mutated or "jumbled up". Processed fats are killers; unfortunately, they are mainstays of the typical American's diet (Moore). These processed fats are in most bread, crackers, cookies, margarine, and cooking oils, just to name a few. They are all too prevalent in horse and pet foods, as well. Such "renegade" fats displace the saturated and unsaturated fat that makes up the tails of the phospholipid. This makes the membrane much less permeable, and are effectively solid. Then the membrane cannot vibrate or transmit nutrients into the cell, and its wastes cannot get out of the cell (Moore). So effectively, the good cannot get into the cell to keep it healthy. The bad cannot get out of the cell, which makes it sicker. So basically, the cell membrane is "clogged up". This is what causes many neurodegenerative diseases. The nerves cannot properly transmit and receive the signals from their stimuli because processed fats prevent the transmission of electrical impulses within the body. In addition, the nerve cells themselves are dying because they cannot get the nutrients they need, and the waste out (Moore).

Cholesterol is another part of the structure of cell membranes. All membranes need cholesterol, though the amount of cholesterol in the membrane will vary with the type of membrane that it is. Cholesterol gives the membrane structure. Basically, the cholesterol is in between the tails of the phospholipid, and it has the same orientation as the phospholipids ("Membrane"). Although cholesterol is critical to health, excess cholesterol may find its way into vessels, such as arteries or veins. Problems can arise if it breaks loose from the walls of the vessels. This could cause a stroke or heart attack (Moore). Nevertheless, cholesterol is very important to the cells, and therefore to the whole body.

Finally, glycolipids are the final part of cell membranes. Glycolipids have been studied extensively, however, little is known about them even now. What is known is that these are very simple sugars (Moore). They protect, insulate, and help in the exchange of nutrients within the cell membrane and the "outside world" of the cell ("Membrane"). Some studies are showing that glycolipids may help modulate or regulate the immune system. Examples of glycolipids include mannose, oligosaccharides, and agrabinogalactan (Moore).

One might ask, "How do I insure that my cell membranes stay healthy? I realize that my brain and body functions will decrease if my cell membranes are not in tip-top shape, and I also know that poor cell membrane condition can lead to some neurodegenerative disorders. What can I do?"

Well, here are some ideas.

Anti-oxidants stabilize fats. They prevent fats from going rancid, which is very dangerous to the body. Oxidation can be described as rusting. So "anti oxidation" helps prevent rusting. This is how antioxidants work. There is a perpetual war going on within the body. Fats within the body want to become rancid, and antioxidants stabilize the fats, and thereby do not allow them to become bad (Moore). Antioxidants are critical for long-term healthy fat within the body. F.Y.I.: Chronic oxidative stress, i.e. rusting oxidation, and aging make a person more at risk for a neurodegenerative disorder. The use of antioxidants is a very promising strategy for preventing brain damage (Desrumaux).

Another thing a person can do is avoid processed foods. Remember, processed foods interfere with the cell membrane's function. If a food has hydrogenated, refined, or processed on its label, don't eat it. An essential fatty acid supplement should also be considered.

When considering a fatty acid supplement, do not take just fish oil or flax. It is not enough. Fish oil and flax are Omega 3 Fatty Acids, but Omega 6 and Omega 9 are also especially useful to the body. Coconut oil is an excellent source of Omega 9. DHA is highly effective in heart health. It is an Omega 3 (Patton).

While one is taking fatty acids he/she should also consider supplementing his diet with phospholipids. An excellent source of both phospholipid and omega fatty acids is crude, unrefined soybeans. In addition to phospholipids and Omega fatty acids, soybeans also contain vitamins E, A, K, and some of the B vitamins. They are also rich in unsaturated fatty acids, which includes lecithin. Most people who wish to supplement their diets with such nutrients take soybean lecithin (Lucas). Soybean lecithin contains a combination of carbohydrates, small amounts of fatty acids, sphingolipids, and glycolipids, and most importantly phospholipids ("About").

Lecithin is used in treating Alzheimer's disease, dementia, gall bladder disease, liver disease, manic-depressive illness, improving memory, and anxiety, just to name a few (Jelin). Think along these lines: lecithin is a phospholipid. It is used in treating the above diseases. Therefore, phospholipids positively affect the above-mentioned diseases. This also means that cell membrane function affects these diseases, as well.

One can purchase lecithin from any health food store, or an herb firm. Many herbalists recommend soybean lecithin as a dietary supplement, because it helps regulate the metabolism, reduces cholesterol, supplies nutrients to the brain, and nerves. The general guidelines for taking soybean lecithin as a dietary supplement are as follows: generally one tablespoonful of granular soybean is taken twice daily, or two tablespoonfuls of soybean oil (this also contains lecithin) are taken daily (Lucas). It is perfectly acceptable to take larger amounts, and certainly may even be beneficial in the treatment of neurodegenerative diseases. (Moore). Lecithin granules can be spread over cereals, stirred in juices, or put in vegetable or meat dishes. One can use also soybean oil as a cooking oil. Lecithin is also available in capsules and liquid form.

Healthy cell membranes have a huge impact on the lives of people and animals. By understanding the way cell membranes work, people should be better equipped to be healthy. People need to know to avoid processed and hydrogenated fats, as well as to supplement their diets with antioxidants and phospholipids, such as lecithin. And on the road to better health, perhaps they will not be at as high of a risk for neurodegenerative disorders.

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