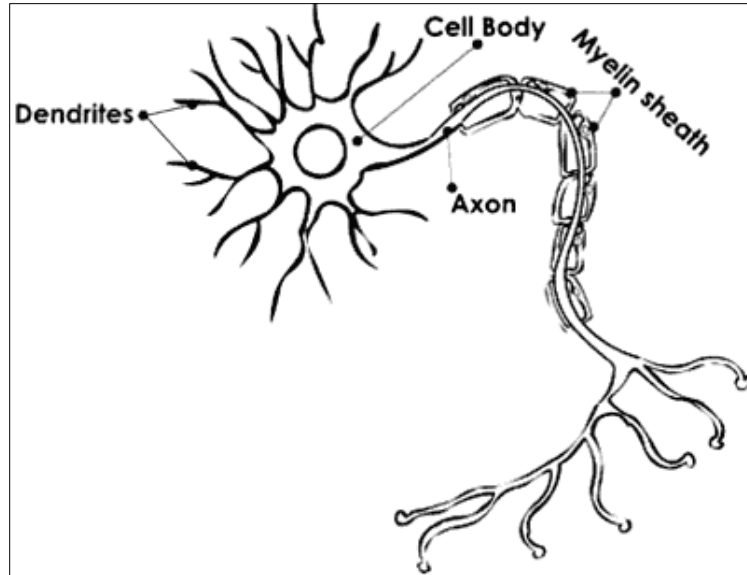


Nervous System function, simplified. By Jacob Mirman, MD

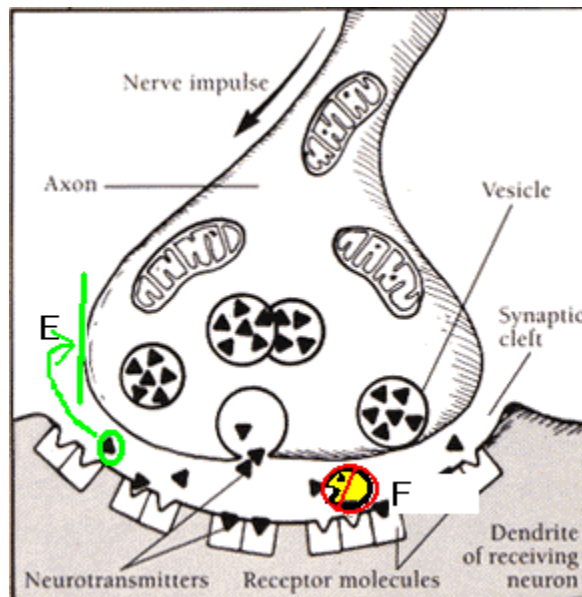
Nervous System (NS) is involved in control of most body functions. Its structure and function is a bit like internet. Like the internet, which is made up of billions of computers connected by wires, the NS is made up of neurons, the nerve cells, which function a bit like computers, connected by wire-like



tentacles called axons.

The axons have myelin sheath wrapped around them, just like electrical wires have insulation, and electricity is passed through them in a fashion similar to electrical wires.

The neuron produces a bit of information and passes it to other neurons in the web. The information travels over the axon in form of electricity, then gets transmitted to a dendrite of the receiving cell at



the end of the axon. Here we have a synapse, the connection between two nerve cells. The nerve impulse comes to the end of the axon in form of electricity. Electricity can't jump across the synapse, so

the transmitting (presynaptic) cell makes neurotransmitter molecules and releases them into the synaptic cleft (the space between the cells), where they attach on the receptor molecules on the other side, the postsynaptic cell membrane. The neurotransmitter molecules work like keys opening doors (receptor molecules), which allows certain other processes to take place, eventually resulting in transmission of information. Once the transmission has taken place, the presynaptic cell collects the remaining neurotransmitter molecules back into the cell for recycling and reuse. The structure responsible for this function is called Reuptake Pump. Our body does not like waste! Just in case some of the remaining neurotransmitter molecules weren't taken back into the presynaptic cell for recycling, the synaptic janitor comes in and takes them out to garbage pile. This is accomplished by an enzyme called MAO (mono-amino-oxidase).

The cells we are interested in for the purpose of this article work on neurotransmitters Serotonin and catecholamines (Dopamine, Norepinephrine and Epinephrine). These two systems are in balance. Serotonin is a calming down influence and catecholamines are excitatory. These cells control our mood, attention, appetite and many other things. When they don't work right, we develop a host of different conditions:

- Depression
- Anxiety
- ADD/ADHD
- Fibromyalgia
- OCD
- Migraines
- Parkinson's disease
- Gut disorders like irritable bowel disease and colitis
- Allergies
- Excessive hunger and obesity leading to a host of problems
- Many other conditions

The whole system is quite complicated, but luckily most of its components work quite well, which is why we don't hear much about them. The synapse appears to be the weak link. When something in the system malfunctions, it is usually the synapse. For some reason in some of us the information does not get transmitted properly in some of our synapses. This most likely has to do with impaired function of receptors on the postsynaptic membrane. Either they are not sensitive enough, or there are not enough of them. When synapses malfunction, we develop symptoms from the group of cells so affected. We don't really know the real cause of this malfunction. However, we do know how to get the system to work again, even if we don't fix it permanently.

The analogy we can use here is of an old car motor, which may run rough, but we can make it run smoother by adding better oil. It turns out that if we increase the amount of neurotransmitter molecules in the synapse, it starts working better, resulting in relief of symptoms.

There are two ways to achieve this end:

We can block the recycling process. The presynaptic cell will not be able to take back the neurotransmitter molecules remaining in the synapse after transmitting its information, so when the next impulse comes in and it releases neurotransmitter molecules into the synaptic cleft, more of them will be there, because some were already there to begin with. This is what drugs do. SSRIs (Selective Serotonin Reuptake Inhibitors), SNRIs (Selective Norepinephrine/Dopamine Reuptake Inhibitors) and dual action drugs block recycling of the neurotransmitter(s) they are designed to block. In theory it should work, but in practice these medications work only about 7-10% better than placebo, or sugar pill. They also have significant side effects. But what's worse, they cause overall depletion of neurotransmitter molecules. Think of it. They block recycling but release continues as before. The presynaptic cells are not designed to make more of these molecules from the same amount of source material they have in them. In the meantime, don't forget about the janitor (MAO)! He comes in regularly and removes what he sees as garbage, and our unrecycled neurotransmitter molecules unfortunately end up in the garbage heap. No wonder that, give this treatment a few months, and even if it did work for you, it may stop working. The depleted cell is no longer putting out enough of fresh neurotransmitter molecules, the old ones have been removed by the janitor, and the amount of neurotransmitter molecules in the synapse is down. The drug is still there, ready to block recycling of the neurotransmitter molecules in the synapse, but due to the overall depletion of neurotransmitter molecules, this blocking no longer has much effect. The usual answer is to increase the drug dose, which may work a bit better for some time, or change to another drug and eventually deplete something else.

We do have a better solution. What if we can make more neurotransmitter molecules? This can be done by loading the presynaptic cell with building blocks used in production of these molecules. These are basically certain components of food, which we can't get from our diet in adequate amounts. Amino acids tryptophane, its derivative 5HTP (5-hydroxy-tryptophane) and L-Tyrosine are converted by the body into Serotonin and catecholamines, respectively. Some vitamins are also needed in this process. Once the amounts of neurotransmitter molecules in our neurons are increased by this process, synapses start working better and symptoms go away. If the person is on the medications mentioned above, the medications start working better, because now they have something to block for a change. Of course, in most cases after adequate supplementation is done, the drug doses can be slowly reduced and eventually stopped, because we now have plenty of neurotransmitter molecules in our synapses, and blocking recycling is no longer needed. This method does not cure the underlying lazy receptor problem, but it appears to be a very good way to get around it. Many a patient in my clinic and many other clinics around the country have experienced much improved state of health, and their depression, anxiety, fibromyalgia, ADD, etc, improved significantly.

Dr. Martin Hinz of NeuroResearch Clinic in Duluth, MN must be credited for development of this method. He continues his research and updates the method on a regular basis, and personally trains the practitioners. CHK Nutrition produces the supplements containing the necessary components and distributes them to doctors trained in their use.