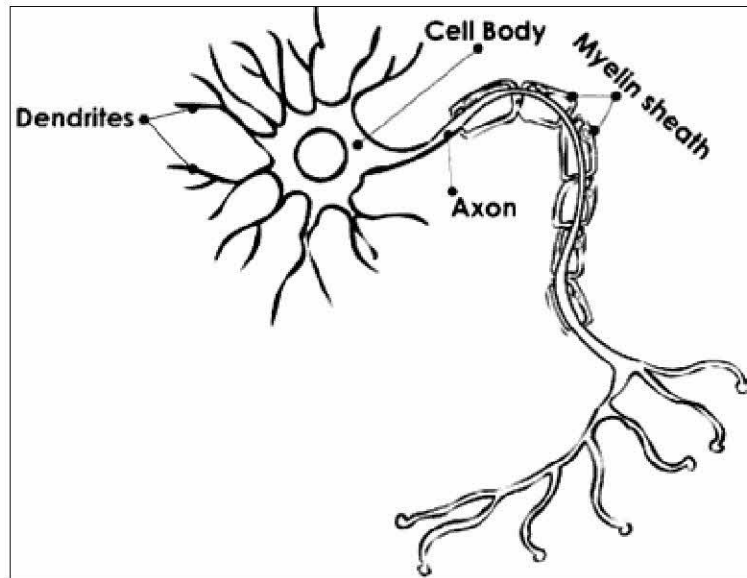


Nervous System function, simplified. By Jacob Mirman, MD

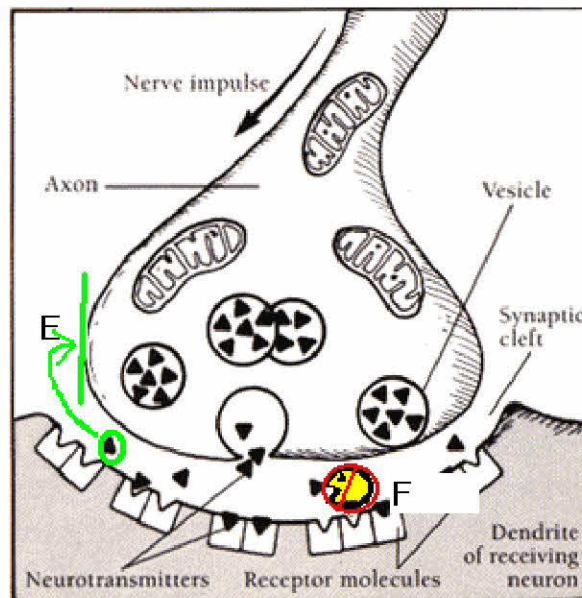
Nervous System (NS) is involved in control of most body functions. Its structure and function is a bit like internet. Like the internet, which is made up of billions of computers connected by wires, the NS is



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.

