

Neurons 4 Dumees

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What is a Neuron?

Neurons are cells specialized in relaying information to and from different parts of the body.



Neuron Anatomy

Neurons have different parts, including the **cell body** (typical cell characteristics, ex. nucleus).

- **Axons:** cable like tails that conduct electrical impulses and transmits to next cell
- **Dendrites:** Protrusions from cell bodies, contains receptors which pick up signals from axons of other neurons

Neurotransmitters

Neurotransmitters are chemicals that allow signals to be transmitted between axons and dendrites. This is a multi-part process discussed in the following slide.



Signalling Process

1. The electric signal runs down axon until it reaches the tip, called the **axon terminal**
2. Previously formed membrane sacs, **synaptic vesicles**, release neurotransmitters to the space between the axon and dendrites of next cell. This space is called the **synapse** or **synaptic cleft**.
3. Transmitters then move across to the dendrite of the next cell and bind to its receptors. This action generates an electric signal, relaying information onwards through the cell.

Signalling Process (Continued)

Transmitters then unbind from receptors and re-enter the synaptic cleft where they are reabsorbed or broken down by the original axon. This breakdown is performed by MAOs (monoamine oxidases) which are proteins.

Types of Neurotransmitters' Effects

(These are not every single kind of neurotransmitter, rather some more common kinds)

- Adrenaline - heart beats faster, bronchial tubes expand to take in more oxygen for your muscles. You become more alert and self confident.
- Dopamine - stimulates “reward center” of brain, causing pleasure. Found in areas of brain involved in thought processes and memory. Plays a role in bodily movements.
- Serotonin - Influences mood, learning abilities and memory. Involved in sleep-wake rhythm, appetite and the regulation of body temperature.

More Types of Neurotransmitters

- Gaba - has calming, pain-reducing effect by inhibiting processes that trigger other neurotransmitters.
- Substance P - carries pain to the brain.
- Endorphins - Eases pain and stimulates reward center.
- Anandamide - Involved in memory function, coordination and homeostasis.

Drug Influence

Drugs work by “influencing actions of one or more types of neurotransmitters in any of six ways”. They are brought to the brain through blood and the effects will depend upon the neurons they influence, where those are located in the brain and the functions of those brain areas.

Ways Drugs Influence Neurotransmitters

1. The release of the transmitters can be either intensified or diminished, causing different amounts than usual to enter the synapses.
2. MAOs are interfered with, causing transmitters to remain in synapses.
3. The return to the axon is interfered with, causing transmitters to remain in synapses.
4. The transmitters are mimicked so the drug will bind to the same receptors.
5. This can cause the receptor to get blocked and prevent more signals from being transmitted.
6. Different parts of the receptor than usual can become binded, changing the function of the receptor.

Homeostasis

Homeostasis is a process of balance within a system, that the system is constantly striving for. Neurons are the perfect cells to use as an example of homeostasis, as they relay information from the entire body, which is necessary for balance. For instance, let's say you burn your hand. If Substance P were not released and understood by neurons aka your nerves and brain, you would not experience pain. If this were the case, you could go on burning your hand until it melted off, and this lack of checks and balances aka homeostasis would destroy our systems/bodies!

Sources

"Drugs and the Brain." *Test Kit Plus*, testkitplus.com/drug-info/drugs-and-the-brain. This is a harm reduction website around the use of drugs with preventative information and home-use drug test kits.

Neuron Picture.

www.google.com/search?q=neurons&safe=active&rlz=1CAPPDO_enUS812&source=lnms&tbm=isch&sa=X&ved=0ahUKEwin5pDKkd3fAhUpOFkKHXLzAWQQ_AUIDigB#imgrc=qXy74_c-EWH1wM:

neurotransmitter picture.

www.google.com/search?q=neurotransmitters&safe=active&rlz=1CAPPDO_enUS812&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjSsKSNk93fAhVtuVkKHUbyA0gQ_AUIDigB&biw=1366&bih=641#imgrc=WJjuy_-B5LOsYM: