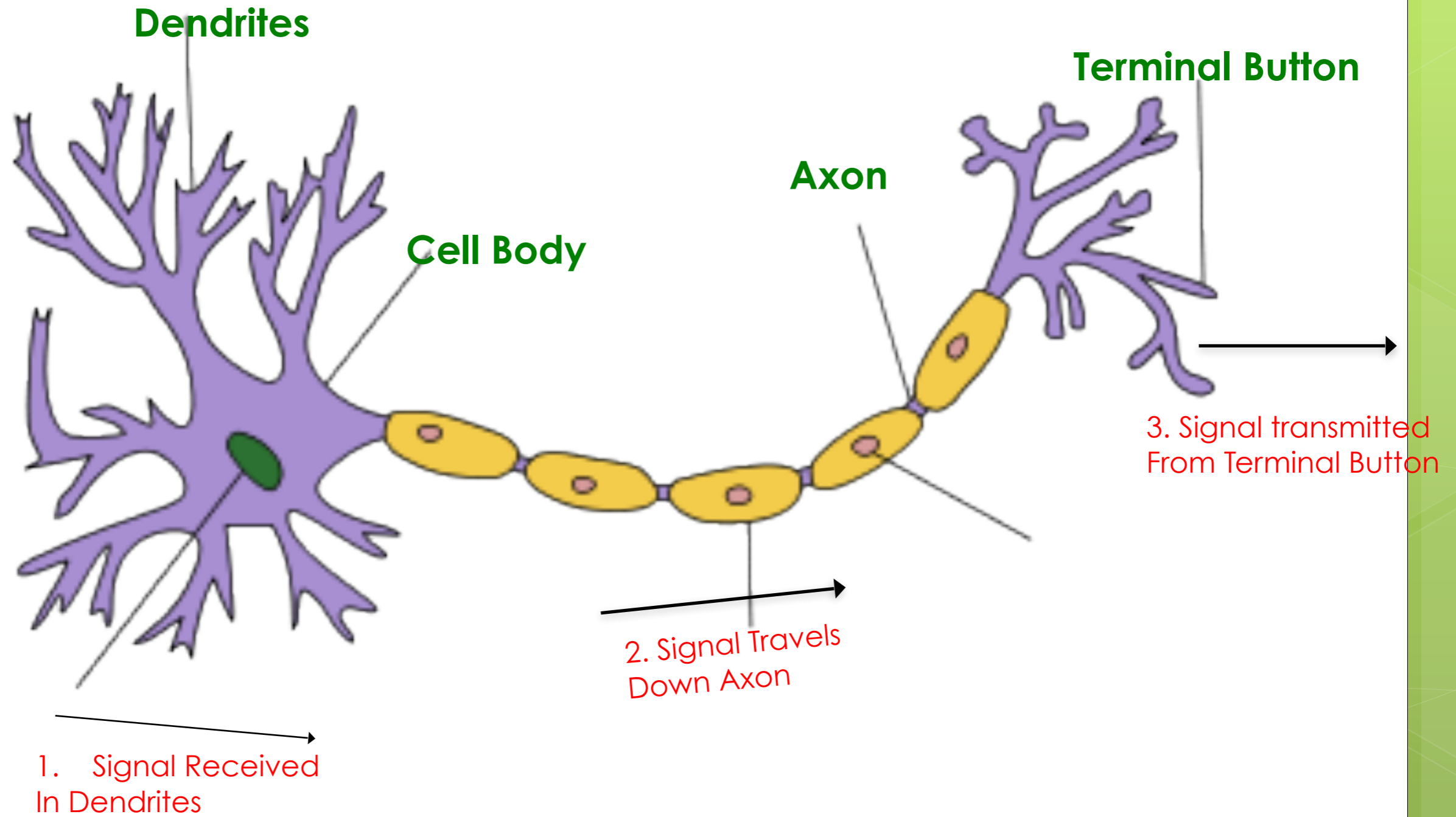




Neurons and Neurotransmitters, Part 2

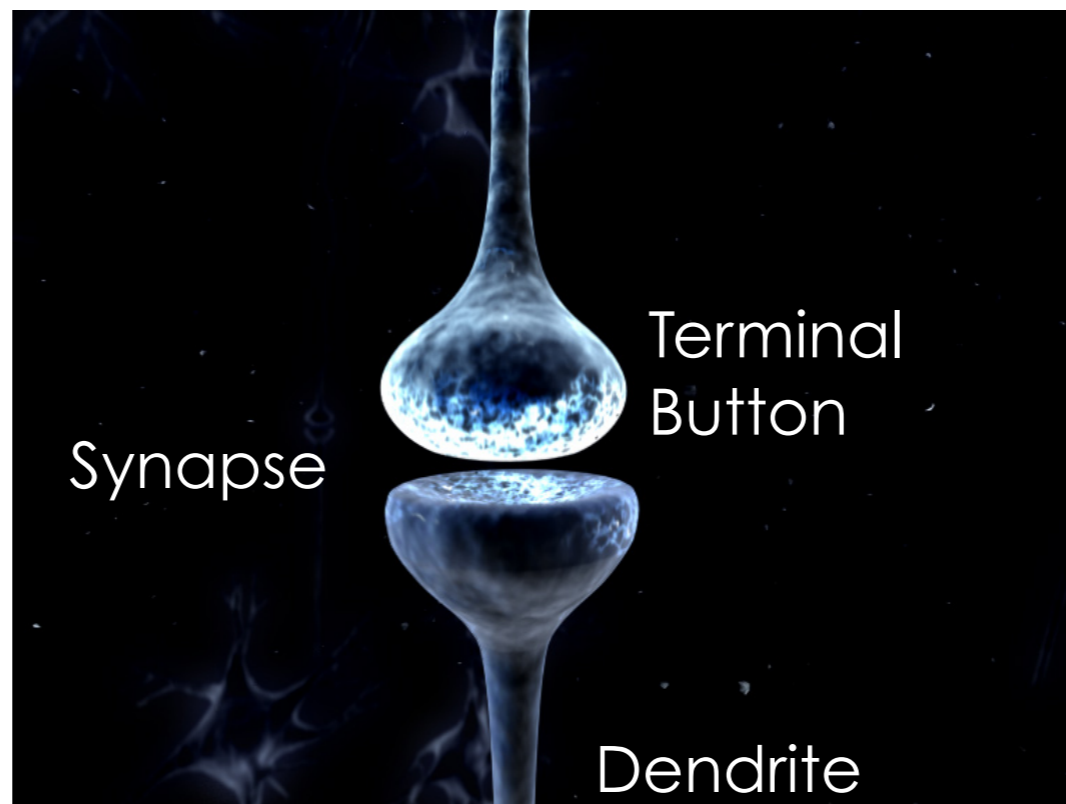
How they work and key studies

Parts of a Neuron



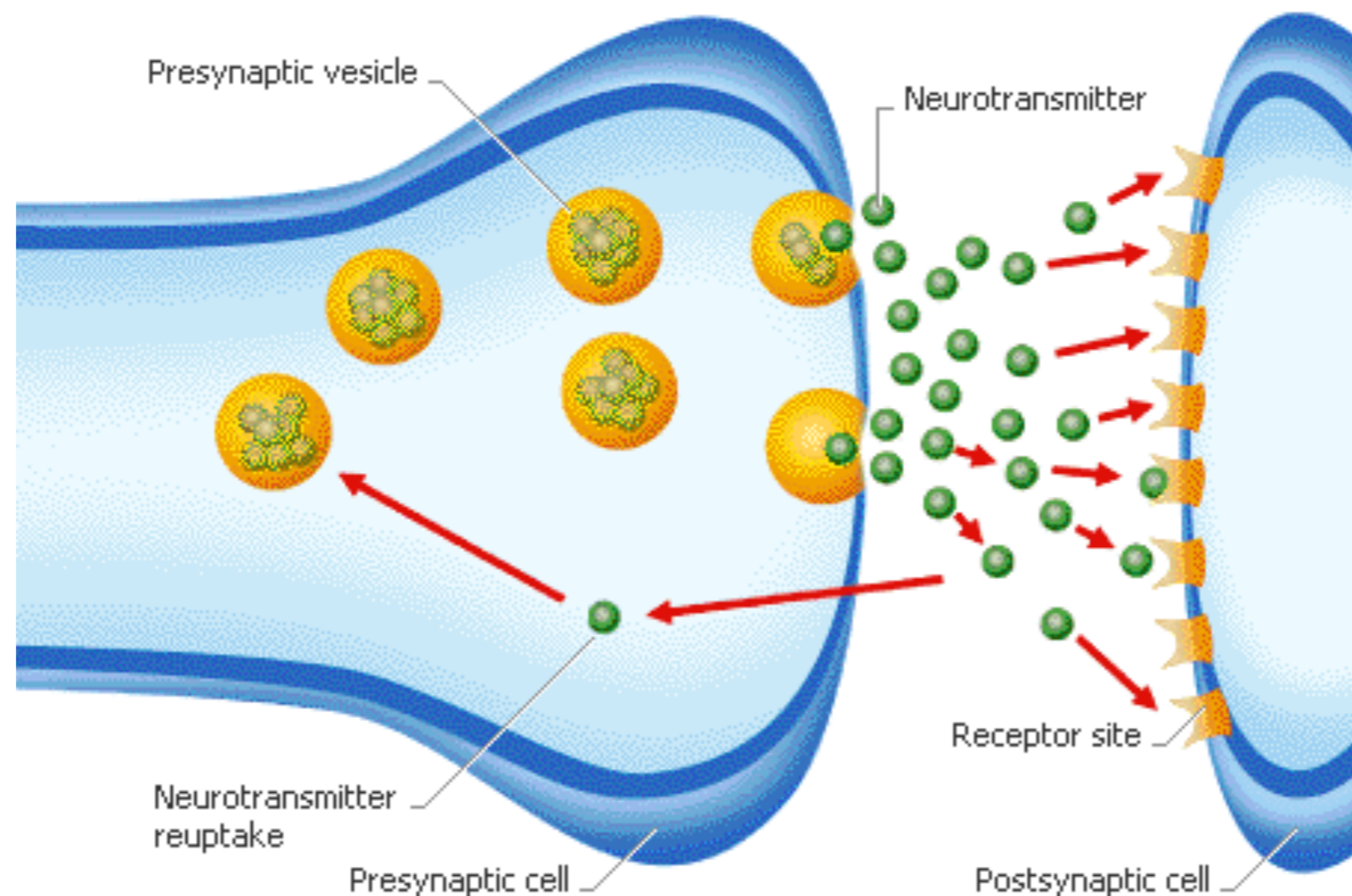
Communication at the Synapse

- **Synapse:** The specialized junction between one neuron and another
- One neuron releases a chemical that either excites or inhibits the next neuron



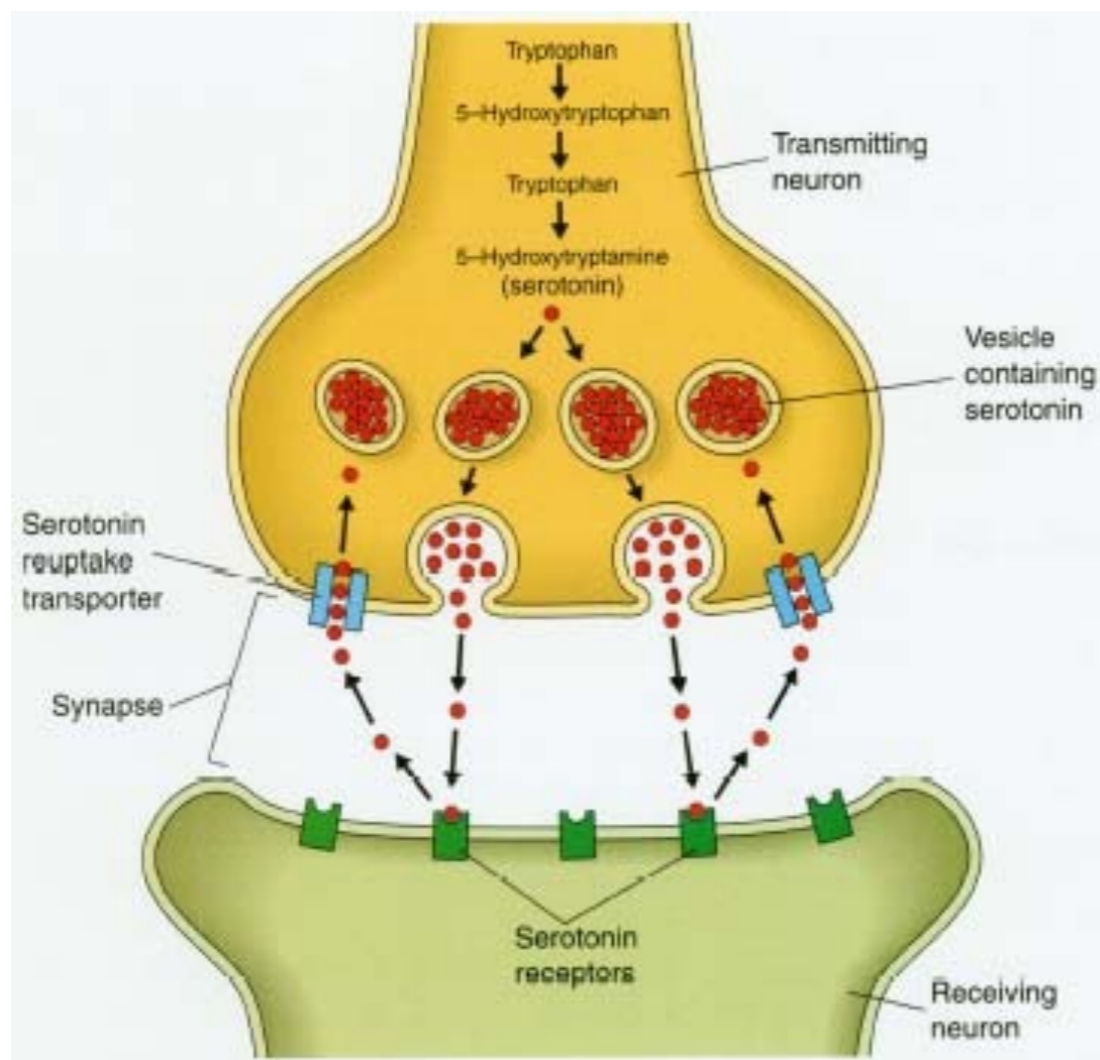
Neurotransmitters

- A chemical that is exchanged between neurons that allows them to communicate



Step 2: Reuptake

- After connecting with the receptors, the neurotransmitters are released, travel back through the synapse and are reabsorbed by the reuptake transporter on the original neuron.



1. Reuptake
2. Dissolved by Enzyme
3. Remains in Synapse

<https://www.youtube.com/watch?v=WhowH0kb7n0>

Types of Neurotransmitters

- **GABA:** Inhibitory - Stops the brain from becoming too overexcited
- **Glutamate:** Excitatory - Associated with learning & memory
- **Serotonin:** Inhibitory - Balances mood, appetite, regulates sleep, and others
- **Epinephrine:** Excitatory (a.k.a. Adrenaline) - heightens mental and physical arousal
- **Dopamine:** Controls voluntary movements and controls reward mechanisms in the brain
- **Acetylcholine:** responsible for stimulating muscles and is associated with learning

Martinez & Kesner (1991)

- Neurotransmitter: Acetylcholine (ACh)
- **Aim:** Investigate the role of ACh in the formation of memories
- **Method:** Trained three groups of rats to run in a maze
 - Group 1: Injected with a chemical that blocks ACh receptor sites = **Less ACh**
 - Group 2: Injected with chemical to block the production of enzymes that eat ACh = **More ACh**
 - Group 3: Control...**normal ACh**



Martinez & Kesner (1991) Cont.

- Findings:
 - **Group 1 (Less ACh)** had problems learning how to run the maze and made more errors
 - **Group 2 (More ACh)** ran quickly through the maze and made fewer mistakes (quicker than control)
- Conclusions: ACh plays a role in the formation of new memories
- Critical thinking?
 - Ethical?
 - Ecological Validity?



Neurotransmission Impact on Depression

- Serotonin: a neurotransmitter that is partially responsible for many psychological and bodily functions.
 - Mood, Appetite, Sexual Desire, among many more
- An imbalance of Serotonin (among other factors) is linked to depression
- Anti-Depressants (SSRIs) are designed to block reuptake of serotonin and keep it in the synapse longer



ESSENTIAL QUESTION:

To what extent are biological functions in the brain responsible for depression in individuals?

VIDEO 1 (4:28): What is depression?

VIDEO 2 (1:25): How do antidepressants work?

VIDEO 3 (3:45): The new science of depression

ARTICLE 4 (U.S. News): A Look at Depression Around the World

ARTICLE 5 (Scientific American): Is Depression Just Bad Chemistry?