



## Neuronal Structures

### Axons and Related Structures

Psychology 372

Physiological Psychology

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### Axons

- Axons are structures that send information to other neurons or muscle cells.
- Also can receive information
- Are composed of a lipid bilayer
- Outside of Axon called axolemma

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### Have Many Structures

- Similar to the soma
  - Mitochondria
  - Voltage Gated Channels
  - Passive Channels
  - Neurofilaments
  - Neurotubules
  - NaK Pumps
  - Others

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### Axon Hillock

- Located at the base of the axon
- Is the place where action potentials begin

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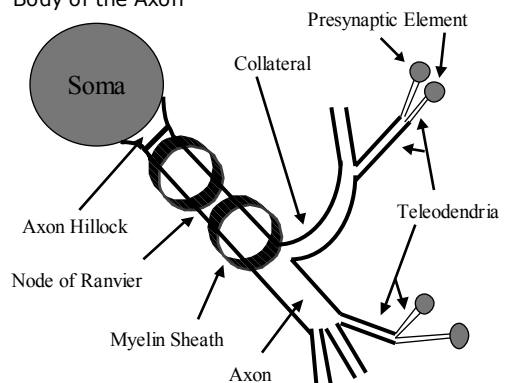
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### Body of the Axon

- This structure can branch (collateral)
  - End branching continues into smaller and smaller branches called Teleodendria (end feet)
- Contains microtubules
  - Transports material from the soma to presynaptic element

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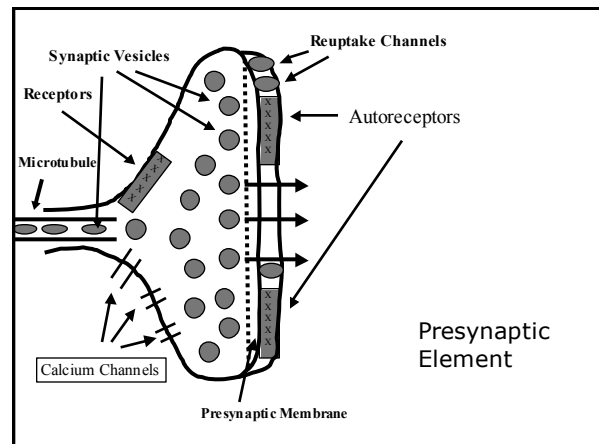
### Body of the Axon



### Presynaptic Element

- Also called terminal buttons, terminal boutons, and other names.
- Also contains the structures in the lipid bilayer
- Contains many other structures
  - Synaptic Vesicles
  - Channels
    - Na, K, Ca
  - Receptor sites from other axons
  - Presynaptic Membrane
  - Autoreceptors
  - Reuptake channels
  - Others

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### Synaptic Vesicles

- Are sacks of neurotransmitters or neuropeptides
- Package NT in the soma by Golgi Bodies
- Are sent from the soma via axonal transport in Microtubules
- Need  $Ca^{++}$  for release (exocytosis)

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### Ion Channels

- Have many types
  - Sodium (Na)
  - Potassium (K)
  - Calcium (Ca)
- Are different from channels associated with receptors (e.g., GABA).
- Are important for action potentials and neurotransmitter release.

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### Autoreceptors

- Are receptors located in the presynaptic membrane
- Are designed to monitor the amount of NT in the synaptic cleft.
- Help in the process of up and down regulation (discussed later)

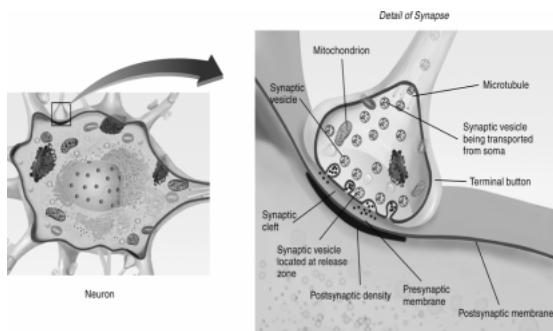
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### Other Receptors

- E.g., Gaba
- Are located in the presynaptic element
- Called an Axoaxonic synapse
- Helps shut down the action potential
- Stops NT release

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## Overview of the Synapse



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## Axons can be one of two types

- Myelinated
  - Myelin is a fatty covering over the axon
  - Helps to increase the speed of the action potential
  - The more myelin there is, the faster the speed of the action potential
- Spaces between myelin are called Nodes of Ranvier

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## Non-Myelinated Axons

- Many axons do not have myelin
- Are slower than myelinated axons
- However, the fatter the axon is, the faster the action potential will go.

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