

MODULE 2:

SPINAL CORD AS A NEURAL TISSUE AND INJURY TO THE NERVES

(A) Organization of CNS & PNS

To understand the spinal cord injury, we need to understand the structure and function of the cord properly. To do that, we must first understand the organization of the central and peripheral nervous systems.

- The brain and spinal cord together make the central nervous system (CNS).
- Brain gives off cranial nerves and the cord gives off spinal nerves that run everywhere in the body to make the neural network and control the entire body.
- Cranial and spinal nerves along with their branches make the peripheral nervous system (PNS).
- Brain acts as the control and command centre that receives all the sensory information from all over the body and sends out commands to the relevant parts of the body
- Spinal cord acts as the main conduit that carries all this information to and from between the brain and the rest of the body.

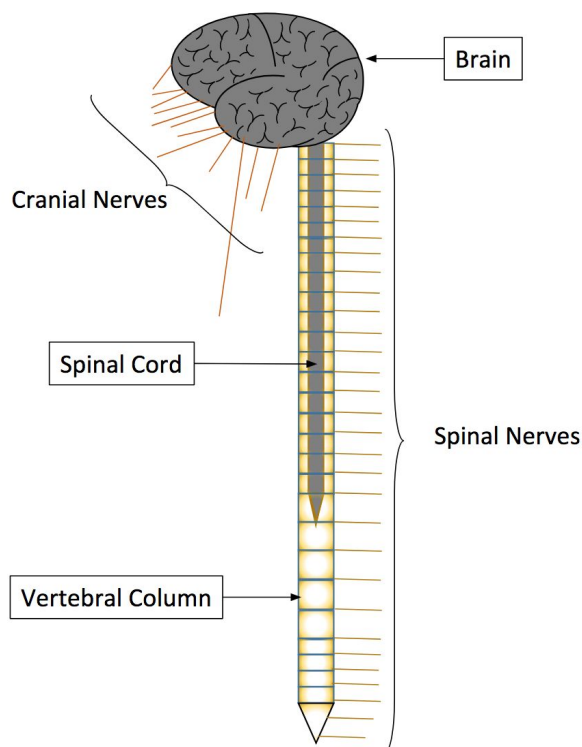


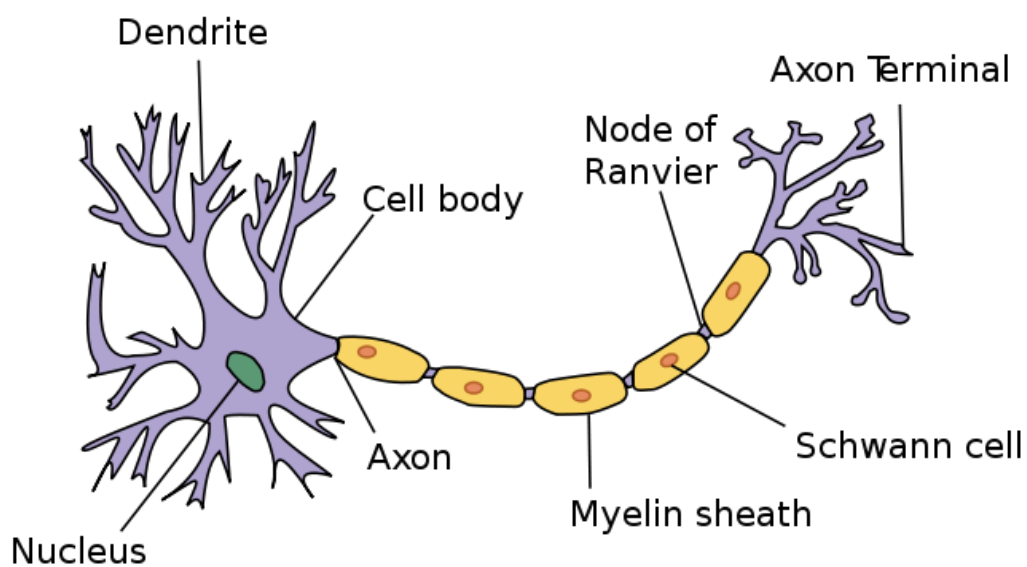
Figure: The central nervous system (CNS)

(B) Body's response to an injured nerve and injured spinal cord

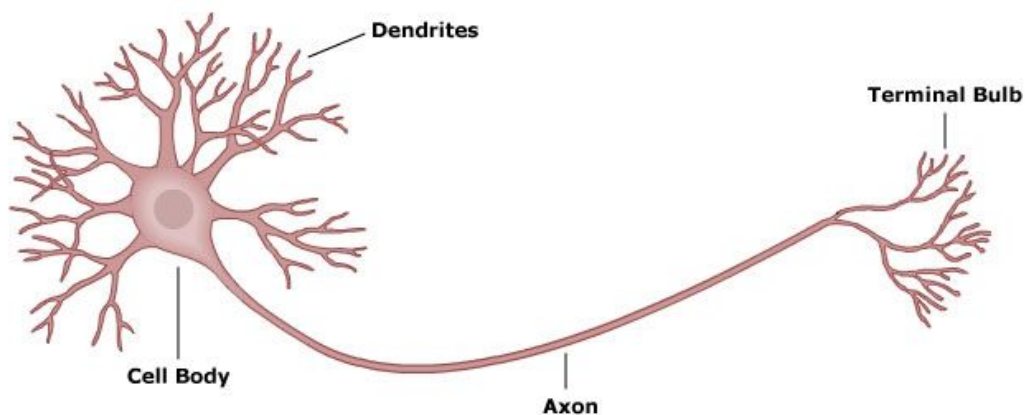
≈ Injury to the nervous system ≈

- The nervous system is made of very specialized cells called neurons.
- In adults, normally when a neuron dies or gets damaged, it cannot be replaced by a new neuron. The loss is rather permanent.
- This is why any injury to the nervous system results in more or less permanent damage.
- However, the body responds differently to an injury to a peripheral nerve as compared to a spinal cord injury.

≈ The Neuron ≈



A Typical Neuron



Figures: Diagrams of neurons

≈ Injury to a peripheral nerve ≈

- A peripheral nerve is made of myelinated axons from the neurons. Hundreds of axons come together to form a bundle that we see as a nerve.
- In case of a peripheral nerve injury, it is in fact these axons that are injured.
- Our bodies can still regrow the damaged axons and regain the function lost with the initial nerve damage, as long as the cell bodies are unharmed.
- The damaged axons are slowly degraded and removed so that the cell body can regrow a new one in its place. The details of this process are covered in Module 9

≈ Injury to spinal cord ≈

- Injury to a spinal cord is much different than injury to a peripheral nerve. Spinal cord contains many axons in the white matter which are enveloped by oligodendrocytes.
- In the core of the spinal cord, the grey matter contains numerous cell bodies which are also damaged and lost in case of a spinal cord injury.
- There are a lot of small and microscopic blood vessels in the cord which rupture and form hematoma (bruising) in an injured cord.
- This leads to continued damage to the spinal cord in an insidious manner, known as secondary damage.