

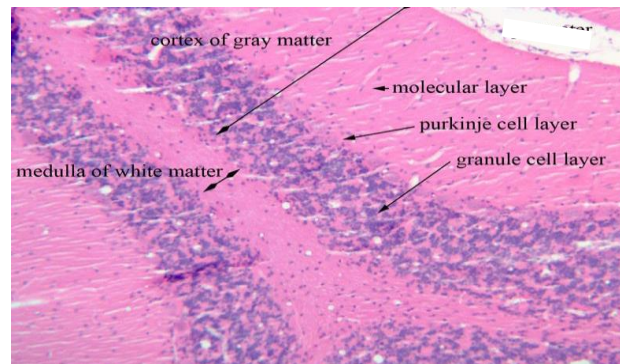
Central Nervous System

The central nervous system consists of the brain and spinal cord located in the cranial cavity and in the vertebral canal respectively. The brain is further subdivided into the cerebrum, cerebellum, and brain stem, which connects with the spinal cord.

Cerebellum

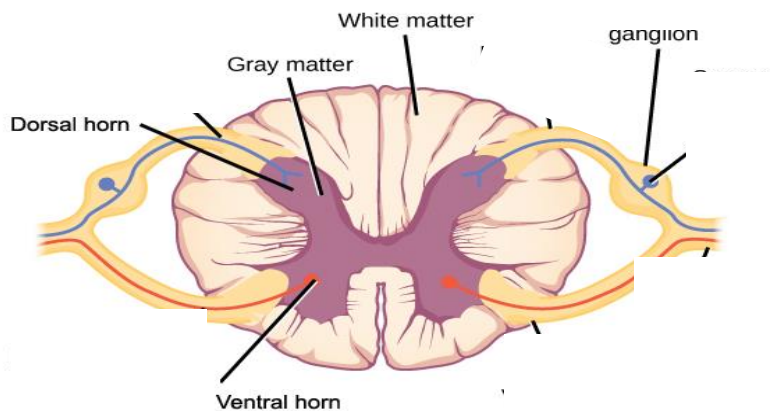
Consist of an outer gray matter (cerebellar cortex) and inner white matter. Cerebellar cortex is composed of three layer of cellular structure

1. Outer molecular layer
2. Intermediate purkinje layer
3. Inner granular layer



Spinal cord

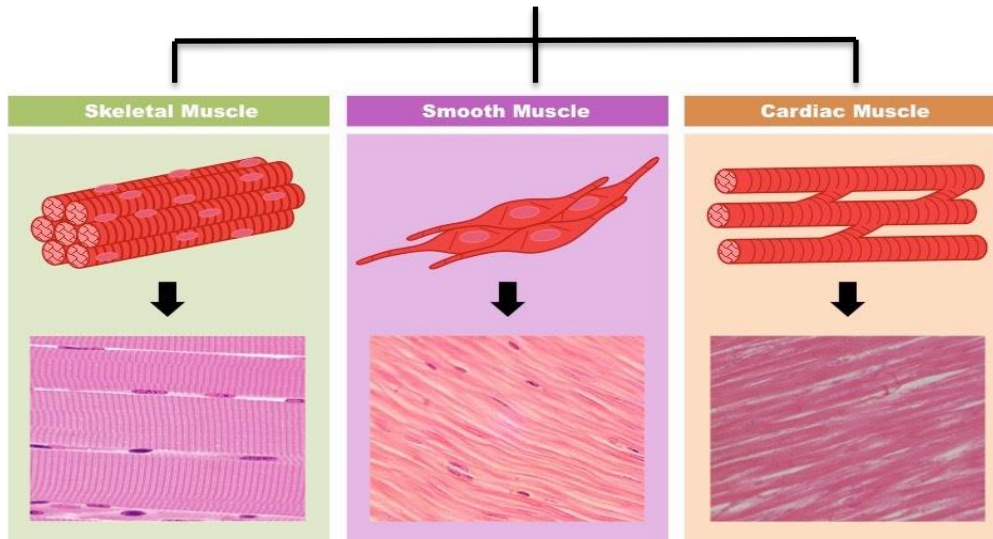
Consist of outer white matter and inner gray matter. The white matter is composed of nerve fibers while the gray matter contains cell bodies, is located in the center of the cord and is easily identified by its color and butterfly shape. The central canal lies in the center of the cord.



Muscle Tissue

Muscle tissue is made up of cells that are structurally and functionally specialized for contraction. Muscle cells are called muscle fibers, cytoplasm is sarcoplasm, cell membrane is sarcolemma, mitochondria are sarcosomes and endoplasmic reticulum is sarcoplasmic reticulum. Each muscle fiber contains numerous myofibrils which themselves are bundles of contractile proteins filaments called actin and myosin.

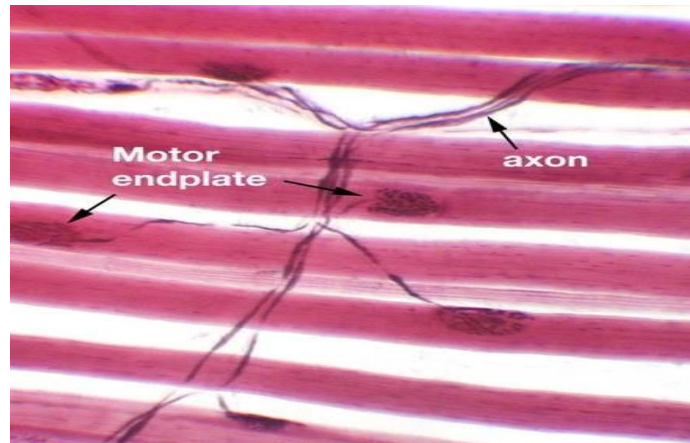
Muscle Tissue Types



Skeletal Muscle (Striated and Voluntary)

Skeletal muscle fibers are long, multinucleated cells with peripheral nuclei. In their sarcoplasm the arrangement of the myofilaments (actin and myosin) are very regular. As a result, these filaments form distinct cross-striation patterns, which are seen under a microscope as light **I** bands and dark **A** bands in each muscle fiber. Because of these cross-striations, skeletal muscle is also called striated muscle.

- A band has a narrow lighter area at its middle which forms H-zone.
- I band is equally divided by a line called Z-line.
- Sarcomere: is the basic contractile unit of muscle fiber. Each sarcomere is composed of two main protein filaments actin and myosin which are the active structures responsible for muscular contraction and is the area found between two Z-line of the myofibril
- The neuromuscular junction (NMJ) is the site where the central nervous system CNS interacts with muscle fibers and causes them to contract.



Smooth Muscle (Non-striated and Involuntary)

Smooth muscle fibers are spindle-shaped (fusiform), have a single oval centrally located nucleus, no visible striations and are under involuntary control seen in musculature of blood vessels and visceral organ.