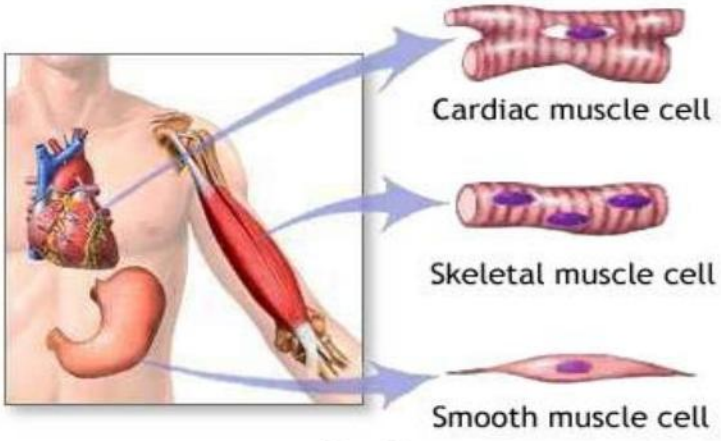
EXPERIMENT NO.: 4 **DATE:**

AIM: TO STUDY AND INTRODUCTION OF MUSCULAR AND NERVOUS TISSUE.

3. MUSCULAR TISSUE:

- Muscles cells consist fibers that are beautifully constructed and generate force for constriction.
- As a result of constriction power it provides motion, maintains posture and generates heat.



- Based on location, function and structure it is **divided in to three types**:

1) Skeletal muscles tissue:

- Its name shows its location means attached to bone.
- It is strait in nature, fiber contain light and dark band which is known as striation which are visible in microscope.
- A single skeletal muscles fiber is very long, roughly cylindrical in shape and has more than one nuclei which are periphery of the cells.
- Skeletal muscles are voluntary in nature because it can be contracted and relaxed below the conscious level.

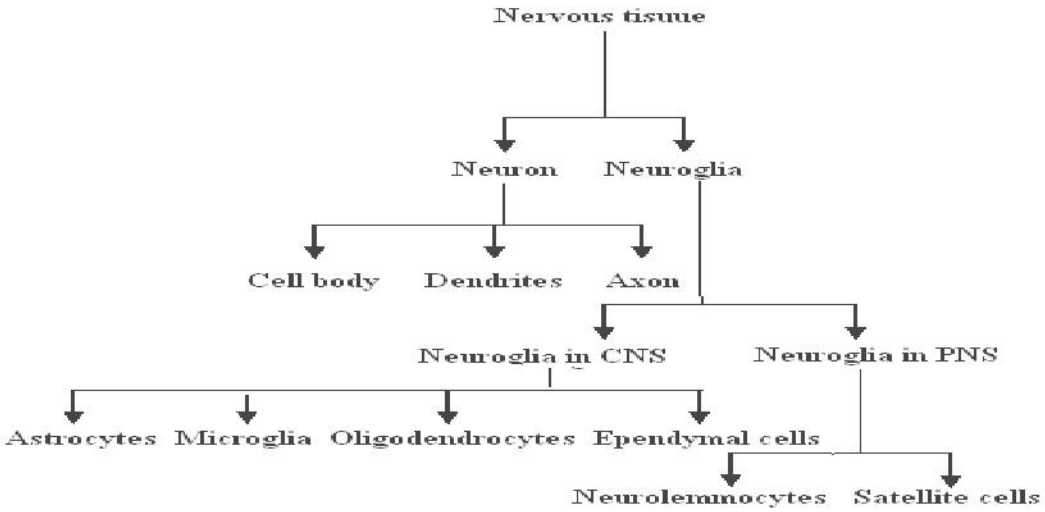
2) Cardiac muscles tissue:

- They are in bulk form and produce wall of the heart.
- Like skeletal muscles it is striated but it is involuntary in nature means constriction in not under the control of conscious level.
- The fibers are branched and cross sections are squares in shape.
- Centrally it contain one nuclei and cardiac muscles fibers attached end to end by one another and the joint is known as intercalated disc which form welding like spot between cells.

3) Smooth muscles tissue:

- It is located in the wall of hollow internal structures such as blood vessels, air ways to the lungs, intestines, gallbladders and urinary bladders.
- It provides help in breakdown of foods, elimination of wastage and move fluid and food throughout body.
- It is involuntary in control.

4. NERVOUS TISSUE



➢ **It consist of the two principle kinds of cells**

1) Neurons:

✓ The neurons consists of **three basic portion :**

a) Cell body:

- Cell body contains a nucleolus surrounded by cytoplasm that includes typical organelles such as lysosomes, mitochondria and Golgi complex.
- In the cytoplasm it also contains the **Chromatophilic substance (Nissl bodies)** which is ordinary arrangement of endoplasmic reticulum, the site of protein synthesis and it also contain **neurofibrils** which forms the cytoskeleton and provide the support and shape of the cells.

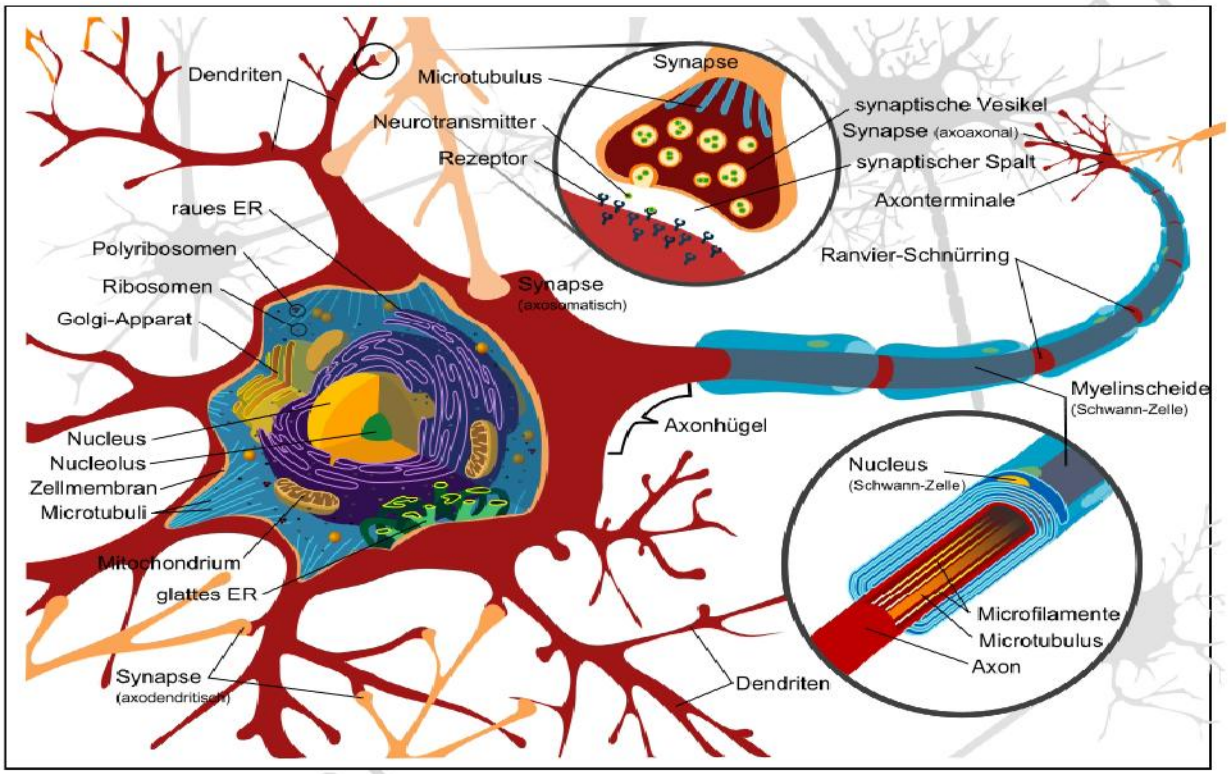
b) Dendrites:

- Dendrites are the receiving or input portion of the neurons.
- They are usually short, tapering and highly branched.
- Usually dendrites are not mylinated.
- Their cytoplasm contains chromatophilic substance, mitochondria and other organelles.

c) Axon:

- It is a long, thin and cylindrical in shape.
- It is joined with cell body by axon hillock.
- The first portion of axon is known as initial segment where the nerves impulse are arise.

- It also contains mitochondria, microtubules and neurofbrils but no rough endoplasmic reticulum so it does not synthesize protein.
- Its cytoplasm known as axoplasm which is surrounded by membrane known as axolema.
- The side branch of axon is known as axon collaterals.
- At the end of axon it divides branch like structure known as axon terminals.
- The tip of some axon terminals swell in to bulb shaped known as synaptic end bulbs.



➢ Classification of neurons:

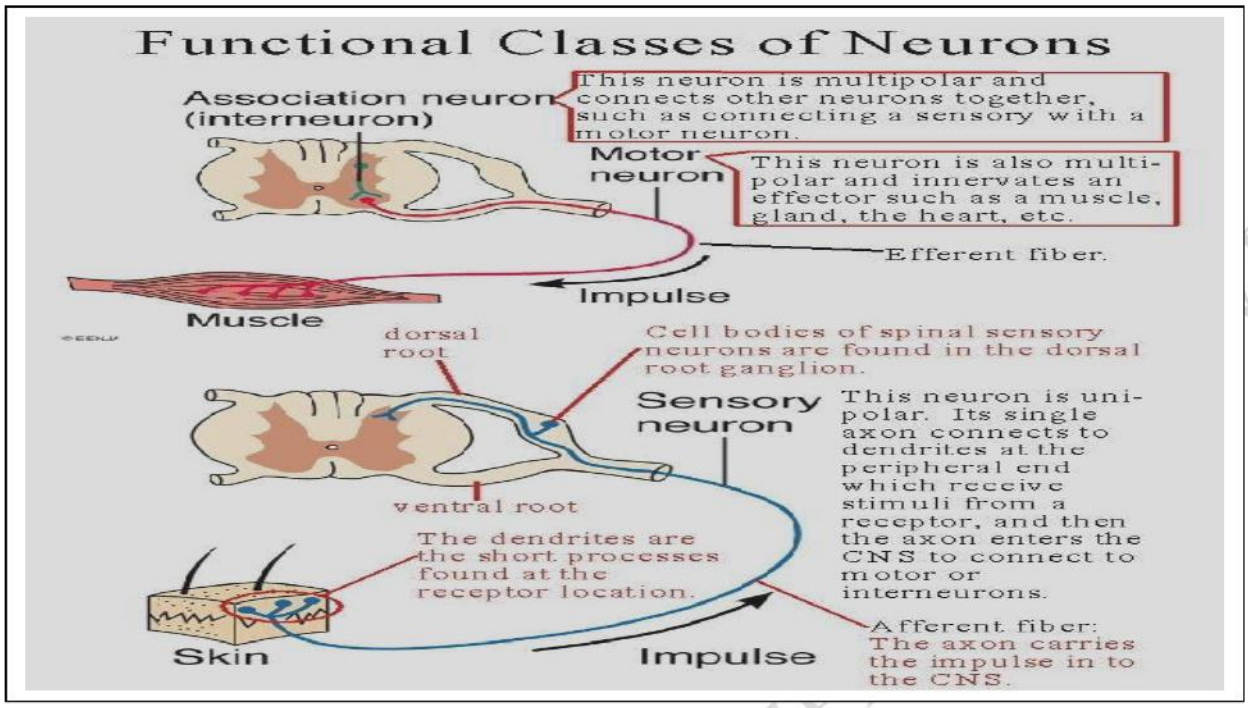
✓ According to functional classification it is divided in to:

i) Sensory neurons or afferent neurons:

- It transmits nerve impulse from receptors of skin, sense organ, muscles, and joints into the CNS.

ii) Motor or Efferent Neurons:

- It conveys motor nerve impulse from the CNS to the effectors which may be either muscles or glands.



✓ According to structural it can be classified in to:

i) Multi polar neurons:

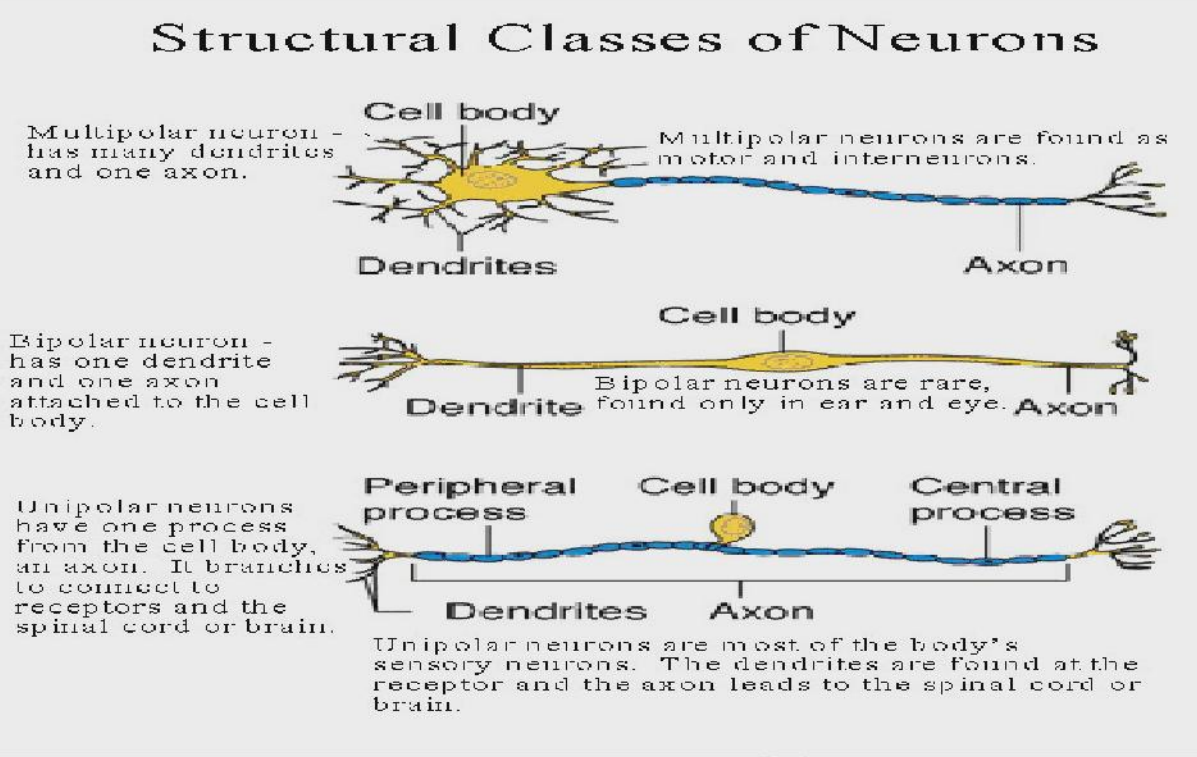
- It has several dendrites and one axon.
- Most neurons of brain and spinal cord are of this type.

ii) Bipolar neurons:

- It has one main dendrites and one axon.
- It is found in the eye, inner ear and olfactory areas of the brain.

iii) Unipolar neurons:

- It's originated as bipolar neurons in the embryo but during the development axon and body get fuse into a single process that divides in to two branch and consist one cell body.
- It is always sensory neurons.



2) Neuralgia:

- Neuroglia or glia fills about half of the CNS.
- Its have the glue like characteristics so it held nervous tissue together.
- Neuroglias are generally smaller than neurons.
- Neuroglia can multiply and divide in the mature nervous systems.

➢ **Classification of Neuroglia:**

- There are mainly six types of Neuroglia in which four astrocytes, olegodendrocytes, microglia and ependymal cells are **found in the CNS.**
- While neurolemmocytes (schwann cells) and satellite cells **found in peripheral nervous system.**

a) Neuroglia found in CNS:

i) Astrocytes:

- They are star shaped.
- It produces the metabolism of neurotransmitters, maintain the proper balance of K^+ for generation of nerves impulse, and participate in brain development.
- It forms the blood brain barrier which regulates entry of substance in to the brain.

ii) Olegodendrocytes:

- It is the most common glial Cells in the CNS.
- It is smaller than astrocytes.

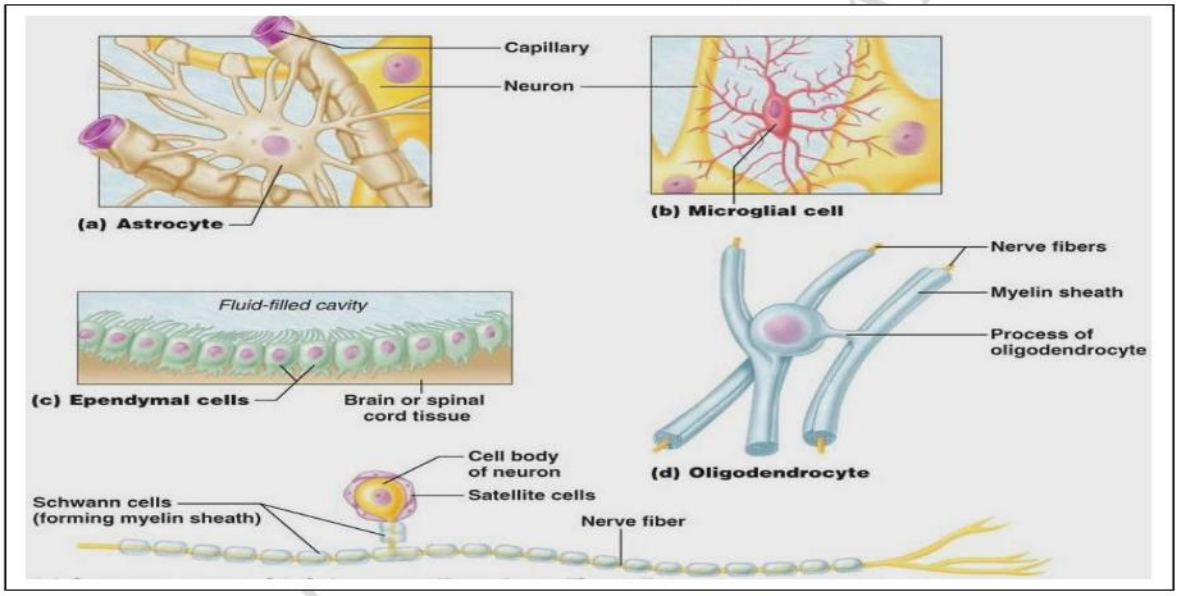
- They coil around neurons and produce supporting structure to the neurons.
- It produces protein and lipid covering known as myelin sheath.

iii) Microglia:

- It is the small and phagocytic Neuroglia derived from monocytes.
- They protect the CNS from the disease by engulfing invading microbes and clearing away debris from dead cells.

iv) Ependymal:

- It is the epithelial cells.
- The cells have different shaped from cuboidal to columnar and many are ciliated.
- Ependymal cells line the fluid filled ventricles, cavity within the brain and central canal means a narrow passage from spinal cord.
- It forms the fluid which is known as cerebrospinal fluids.



b) Neuroglia found in peripheral nervous system:

i) Neurolemmocytes (schwann cells):

- Each cell produces myelin sheath around PNS Neurons.

ii) Satellite cells:

- Which supports neurons in ganglia in PNS.

Myelination:

- The axons of most mammalian neurons are surrounded by a multilayered lipids and proteins of Neuroglia and this covering is known as myelin sheath and the axon with such a covering are said to be a myelinated.
- Whereas those without covering are known as unmyelinated axon.

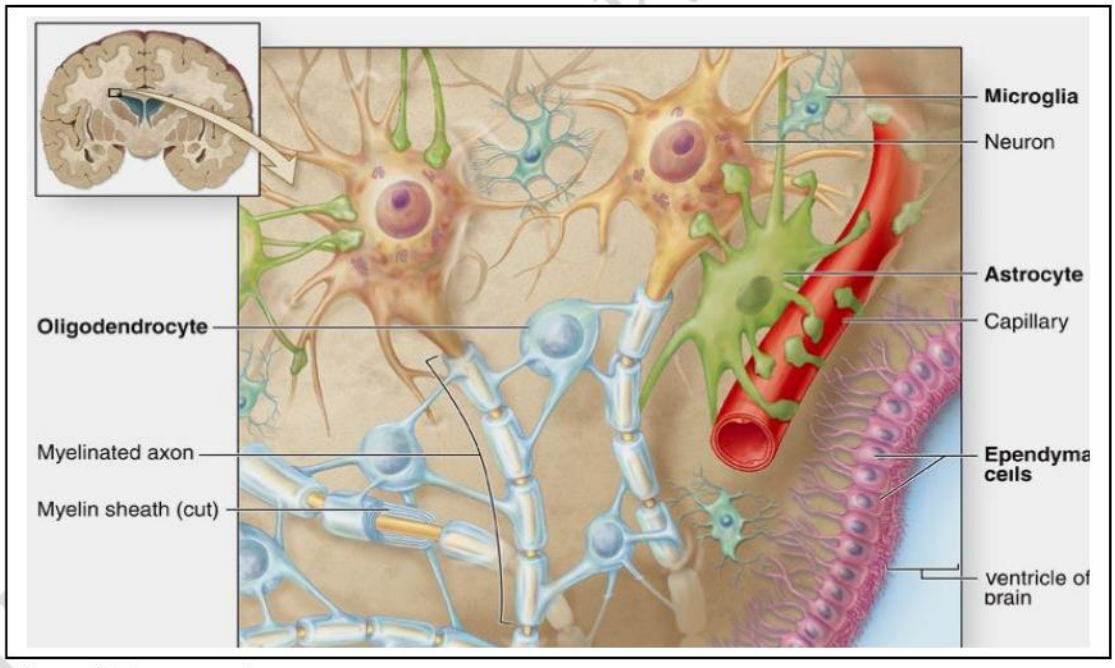
- The sheath electrically insulates the axon of neurons and increases the speed of nerve impulse conduction.

Two types of Neuroglia produce myelin sheath:

a) **Neurolemmocytes in PNS.**

b) **Olgodendrocytes in CNS.**

- Myelination and unmyelination produce Grey matter and white matter in brain and spinal cord.
- White matter refers to aggregations of myelinated process from many neurons. The whites colour of myelin gives white matter.
- The grey matters of nervous system contain either neuron cell bodies, dendrites and axon terminals or bundles of unmyelinated axons and Neuroglia.
- In spinal cord the white matter surrounds inner core of gray matter shaped like a butterfly or the letter H.
- In the brain grey matter surrounds the outer region while white matter surround inner region of brain exactly opposite to spinal cord.



➢ **Function of Nervous tissue:**

a) Sensory function:

- It sense certain changes both within body (the internal environment) such as stretching of your stomach or increase the acidity and outside the body (the external environment) such as rain drop landing on your arm or the aroma of rose.

b) Integrative Function:

- It analyzes the sensory information, store some aspect and make some decision regarding appropriate behavior.

c) Motor function:

- It may respond to stimuli by initiating muscular contraction or glandular secretion.

SIGNATURE OF TEACHER