SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF BIOMEDICAL ENGINEERING

19BMB302 - BIOMEDICAL SIGNAL PROCESSING

III YEAR/ V SEMESTER

Unit IV : BIOSIGNALS AND THEIR CHARACTERISTICS

- Source of Bioelectric potential
- Resting and action potential
- Propagation of action potentials in nerves
- Characteristics of biomedical signals
- The ECG-Cardiac electrophysiology
- Relation of ECG components to cardiac events
- Clinical applications

Source of Bioelectric potential

The Origin of Bioelectric Signals

- The source of bioelectric signals is the activity of single *excitable* neural or muscular cell.
- Indeed, the collective electrical activity of a large group of active cells in vicinity changes the properties of the electric field which propagates in the *volume conductor* consisting of the various tissues of the body.
- The changes in this electrical field is then indirectly monitored and measured by electrodes placed on the skin.

The Nerve Cell

- Neural network is the most important information processing mechanism in living biological systems.
- Nerve cells (also known as neurons) are the basic processing units in this system.
- They receive, process and transfer the neural information through electrical and chemical signals.

Source of Bioelectric potential

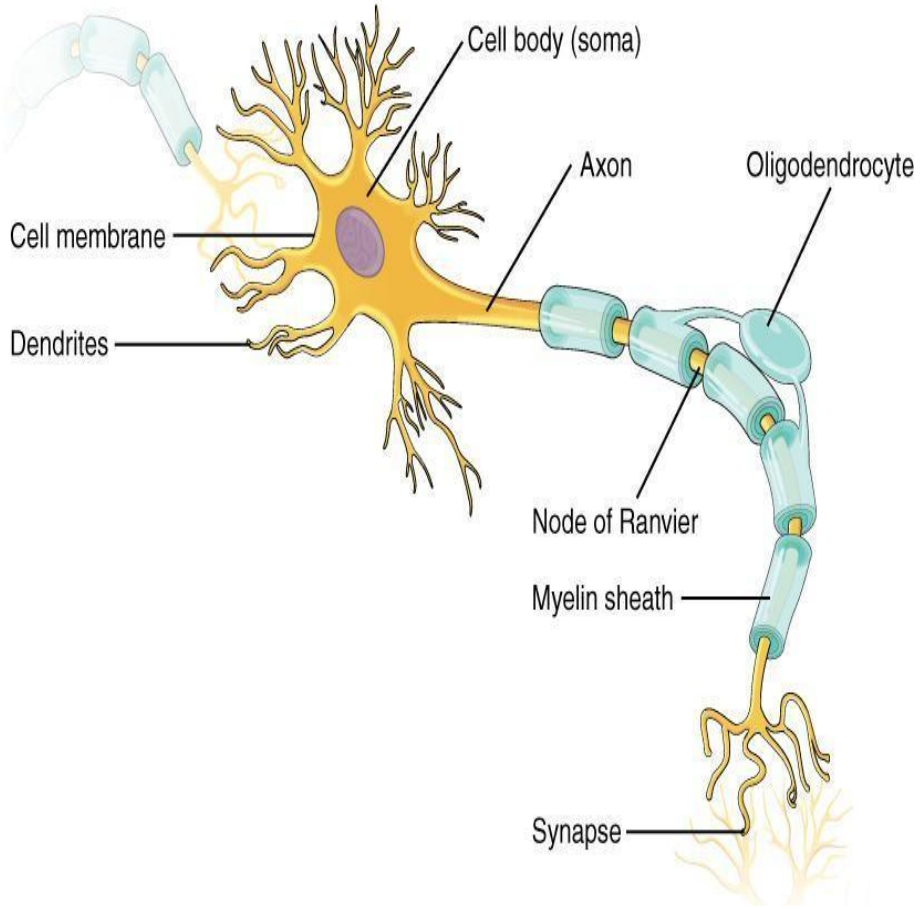
Each neuron has three major parts: soma (cell body), dendrites and axon.

The cell body consists of intracellular fluids and contains the cell nucleus.

It is connected to the dendrites, the root-like structures at one end of the cell through which the information is brought into the neuron.

On the other side, cell body is connected to the axon through which the information propagates and is sent to other neurons.

Through a junction, called synapse, the information is introduced into the neuron from other neurons.



Source of Bioelectric potential

Action potential generation and propagation in excitable cells exhibit certain behaviors

- It is all-or- none. A neuron either fires an action potential or not. There is no fuzzy state in between.
- Since the action potential is regenerated as it propagates along the axon, its amplitude remains unchanged over the length.
- The information carried by the neuron is coded in the inter-spike intervals, not in the shape of the action potential.
- The firing rate of the neuron is correlated with the stimulation such that a neuron can be modeled as a stimulation to frequency convertor.

Thank You!