



جامعة المستقبل
AL MUSTAQBAL UNIVERSITY



First lecture

NEURON AND THE PHYSIOLOGY OF NERVE IMPULSE

Prof.Dr.Nihad A. Salih

Fourth Stage

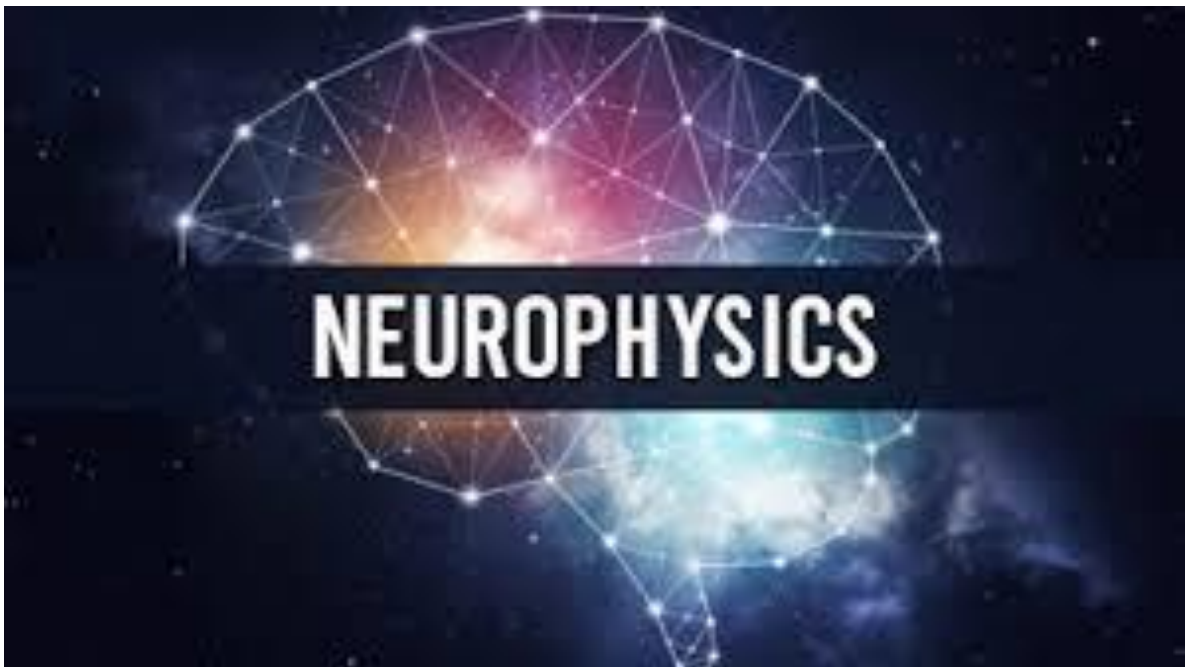
Department of Medical physics sciences Al-

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NEURON AND THE PHYSIOLOGY OF NERVE IMPULSE

Neurophysics is a branch that falls under biophysics and deals with the study of the human nervous system.



The nervous system:

The nervous system can be divided into two parts:

1. Central nervous system (CNS)

That consists of:

- a- Brain
- b- Spinal cord
- c- Peripheral nervous or (nerve fiber)

2. Autonomic nervous system

Control various internal organs such as the heart.

- A number of our modern concepts of electrical activity in the body date back many years.
- Luigi Galvani made the first contribution in this field in 1786 when he discovered animal electricity in a frog's leg.
- Basic research in this area is called *neurophysiology*

Neurology

Neurology is the scientific study of the nervous system .which deals with anatomy, functioning, of the nervous system. Neurological practice relies heavily on the field of neuroscience. It includes about the diagnostic techniques, tools, and cure for diseases involving the central and peripheral nervous system. Understanding and functioning of the nervous system at the cellular or tissue level, and identifying specific genes and proteins involve in neurological diseases. Neurology research is aimed at developing and refining cures for neurological disorders. Neurological disorders are diseases of the brain, spine and the nerves that connect them. There are more than thousand diseases related to nervous system, such as brain tumors, epilepsy, and stroke front temporal dementia. The most common neurological disorders are Parkinsons disease and Alzheimers disease

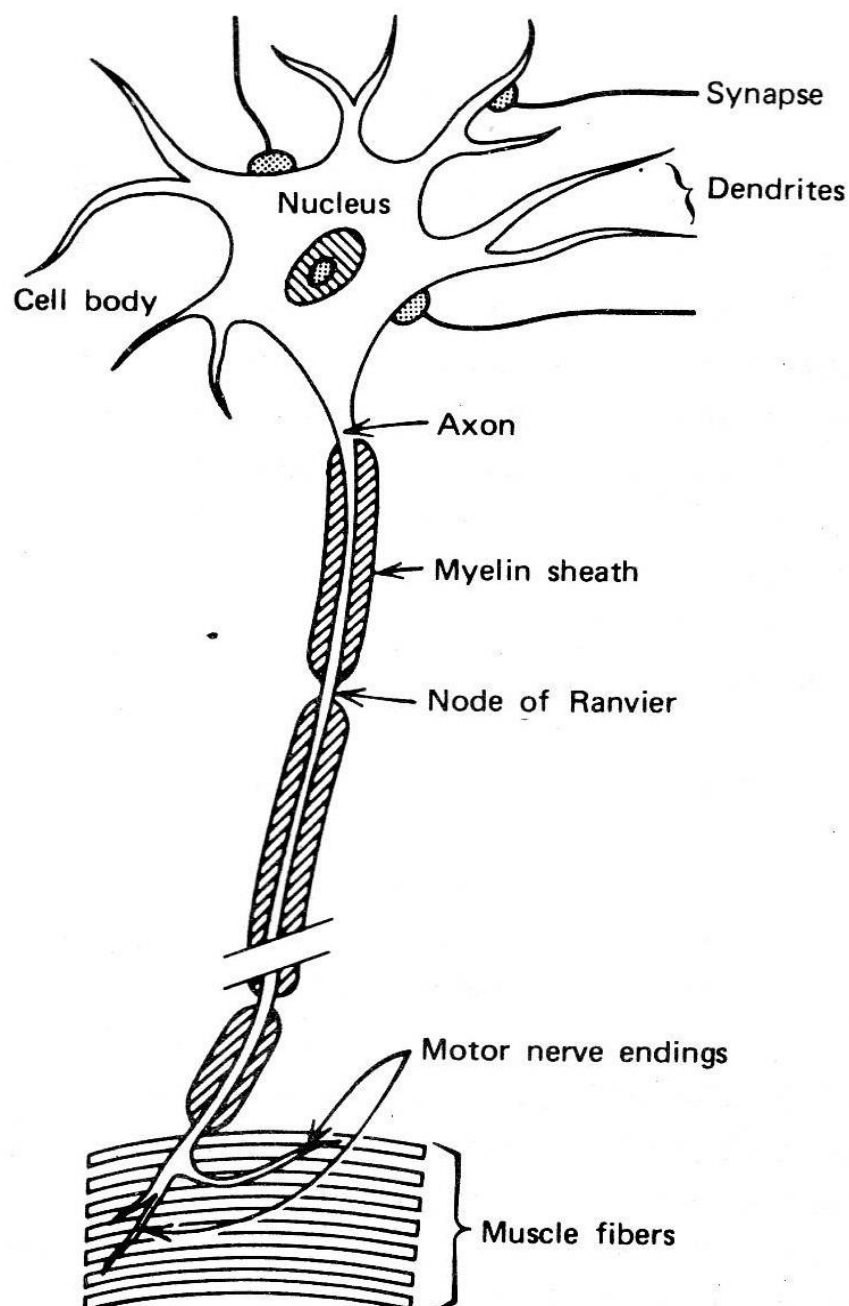
1-Alzheimers disease-it is the more common type of the neurological disorder in which death of the brain cells, cognitive decline, and loss of memory. Where it involves the formation of plaques and tangles in the brain, Amyloid-beta is a key component of the brain plaques found during extent of Alzheimers disease for treated use (Donepezil, galantamine and rivastigmine)

2-Parkinsonism is a neurological syndrome characterized by rigidity, tremor, hyperkinesia, postural instability. A person with Parkinsons disease has untypically low dopamine levels dopaminergic neurons (types of nerve cells) in the substantianigra part of the brain will died (Dopamine-generating cells) , for treated use (Carbidopa ,levodopa)

The Neuron:

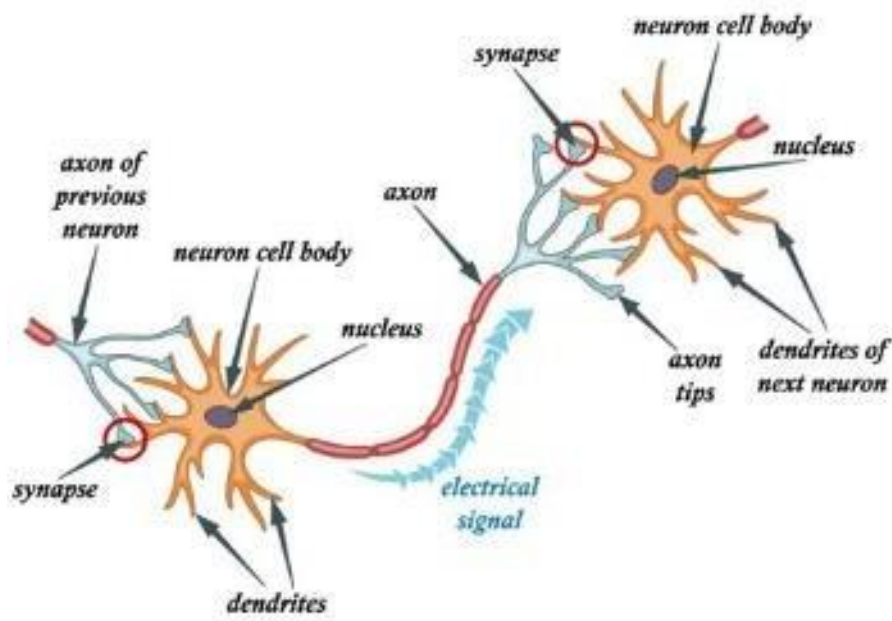
1. It's the basic structural unit of nervous system.
2. Its specialized cell for reception, interpretation, and transmission of electrical messages.

The neuron structure is shown in the fig.1



How Neurons Communicate :

- 1- Electrical signal that travels on the membrane of a neuron .
- 2- Based on movements of ions between the outside and inside of the cell .



Factors Effecting on Electrical Activity of A Neuron :

- 1- **Electrical potential** : there is difference in electrical potential between the inside and outside the membrane .
- 2- **Excitability** : the ability to respond to any stimulus by generating action potential .
- 3- **Conductivity** : the ability to propagate action potential from point of generation to resting point .

Electrical Properties of Neurons (Nerve Cells) :

1. In neurons, information is carried from one part of the cell to another in the form of action potentials—large and rapidly reversible fluctuations in electrical voltage across the plasma membrane that propagate along the axon .
2. Different neurons exhibit different patterns of action potential firing .
3. Some neurons are normally silent .
4. The membrane potential remains at the resting potential unless the firing of action potentials is triggered by some external stimulus .
5. The electrical properties of a neuron are subject to modulation by input from the environment, including sensory information from the outside world, hormones released from other parts of the organism, and chemical and electrical signals from other neurons to which the neuron is functionally connected .

Questions

Q₁..... is a branch that falls under biophysics and deals with the study of the human nervous system.

- A. Neurophysics B. Radiophysics C. Healthphysics
D. Medicalphysics E. Clinicalphysics

Q₂ The more common type of the neurological disorder in which death of the brain cells, cognitive decline, and loss of memory is.....

- A. Parkinsonism B. Kennedy's disease C. PMA
D. Alzheimers disease E. Post-polio syndrome

Q₃ It is a neurological syndrome characterized by rigidity, tremor, hyperkinesia, postural instability. A person withdisease has untypically low dopamine levels dopaminergic neurons.

- A. Parkinsonism B. Kennedy's disease C. PMA
D. Alzheimers disease E. Post-polio syndrome

Q₄the ability to propagate action potential from point of generation to resting point .

- A. Electrical potential B. Excitability C. Conductivity
D. Membrane potential E. Reception

Q₅ It is the ability to respond to any stimulus by generating action potential that

- A. Electrical potential B. Excitability C. Conductivity
D. Membrane potential E. Reception