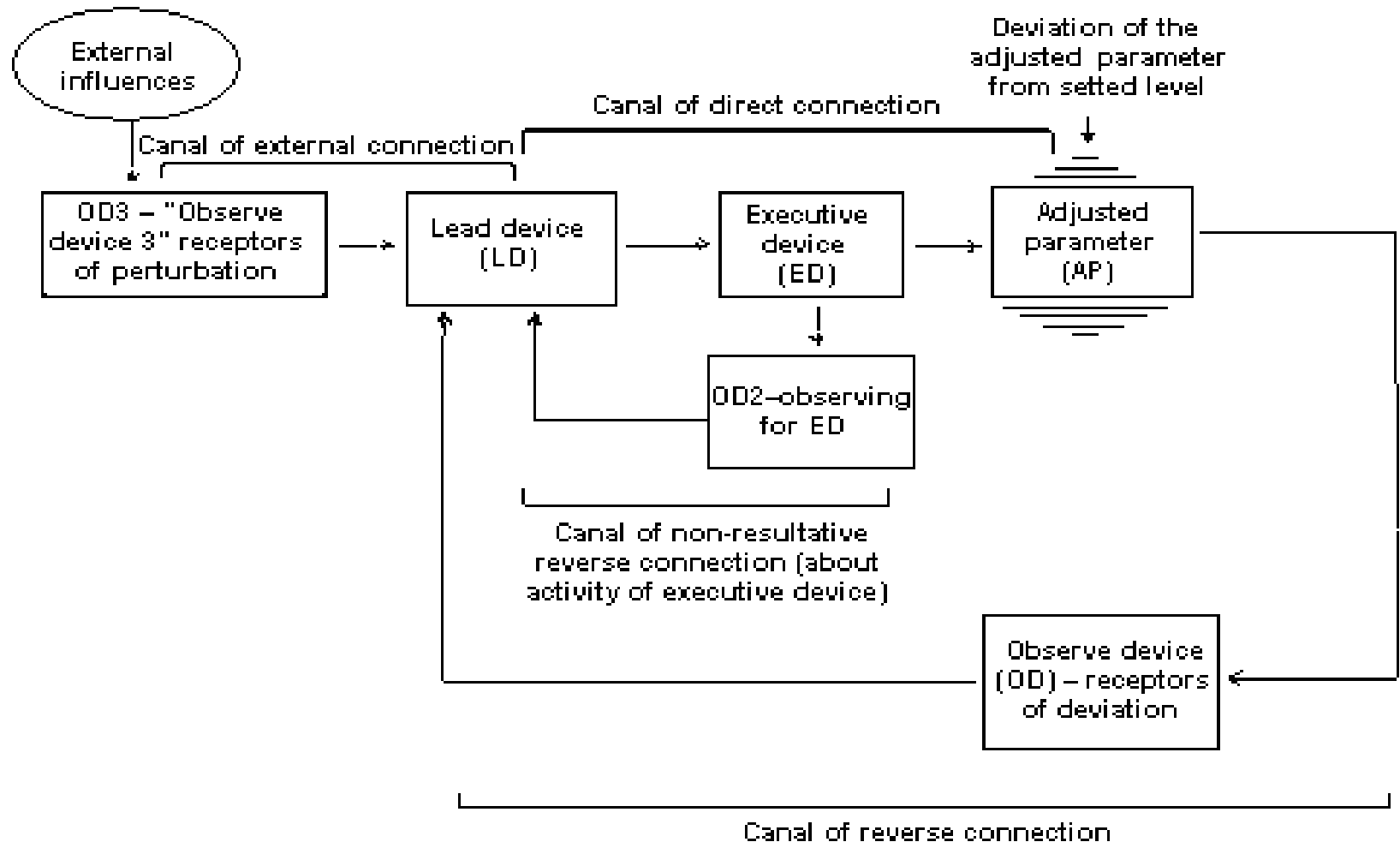


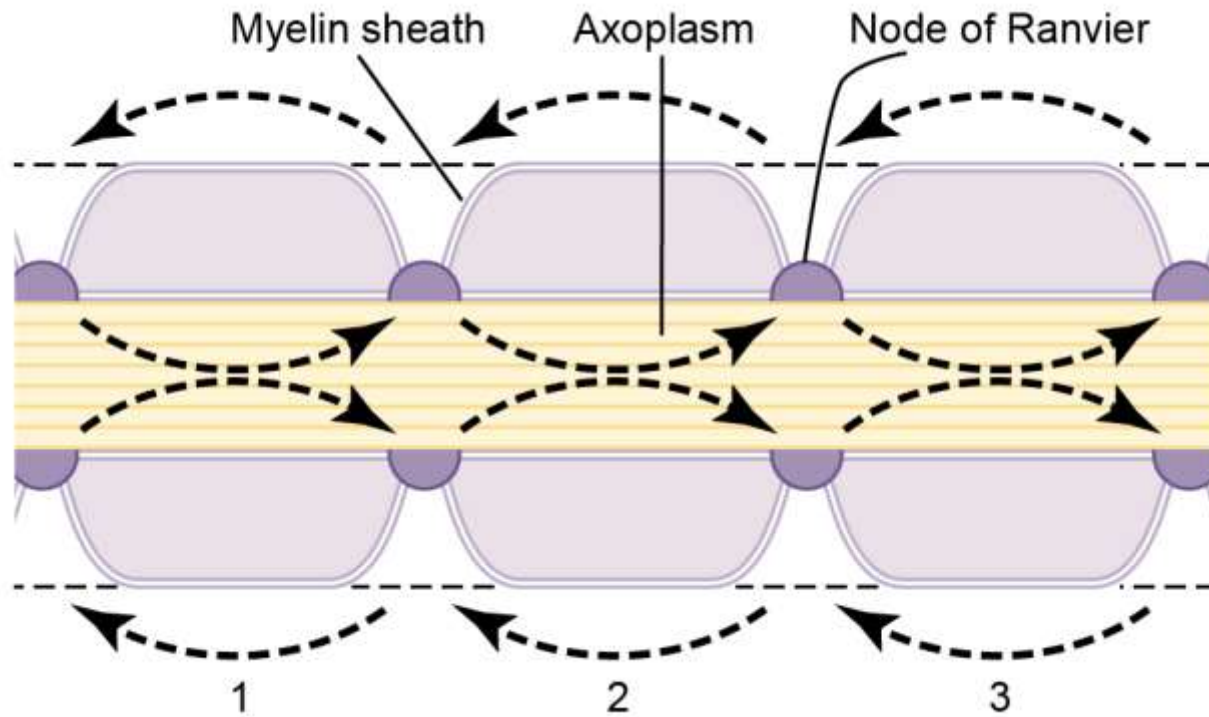
Lecture 3. Biological regulation, loops of biological regulation. Reflector principle of central nervous system activity. Synapses in central nervous system. Excitation and inhibition in nervous system

Biological regulation is a set of processes in the body that ensure the unity of its structures as a whole system and the interaction of the organism with the environment, which has an adaptive nature.

The contour of the biological regulation



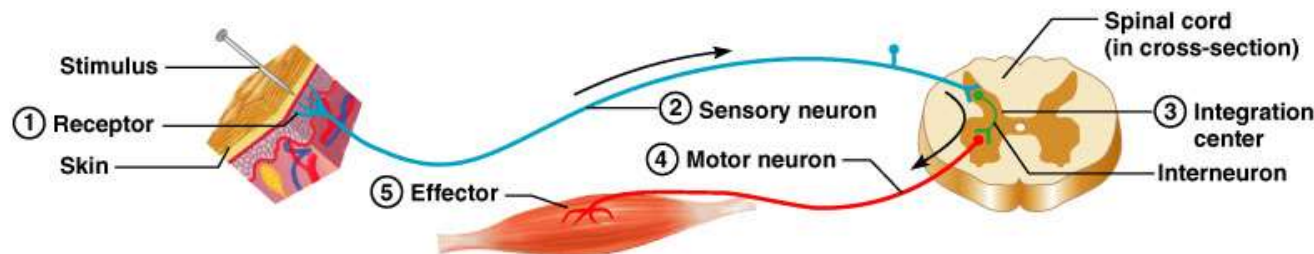
Saltatory conduction along a myelinated axon. node



Classification of nervous fibers on Erlanger - Gasser:

Type of fibers	function (selectively)	Average Diameter, mcm	Average conducting speed, m/s
A α	Primary afferents of muscle spindles, motor fibers of skeletal muscles	15	100 (70-120)
A γ	Motor fibers of muscles spindles	5	20 (15-30)
A δ	Dermal afferents of temperature and pain	< 3	15 (12-30)
B	Sympathetic preganglionic fibers	3	7 (3-15)
C	Dermal afferents of a pain Sympathetic postganglionic fibers	1 (unmyelinated)	1 (0,5-2)

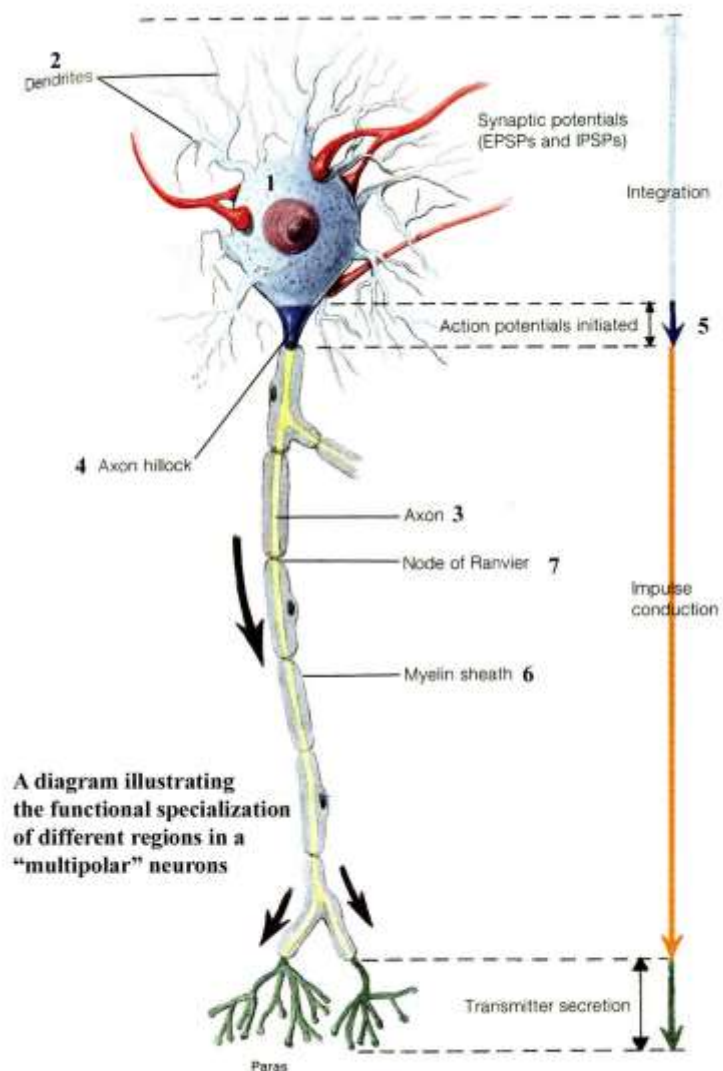
REFLEX is a regular reaction of the organism to a change in it's external or internal environment, effected through the CNS in response to the stimulation of receptors.



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NEURON STRUCTURE

1. Soma (body)
2. Dendrites
3. Axon
4. Axon hillock
5. Initial segment
6. Myelin sheath
7. Node of Ranvier

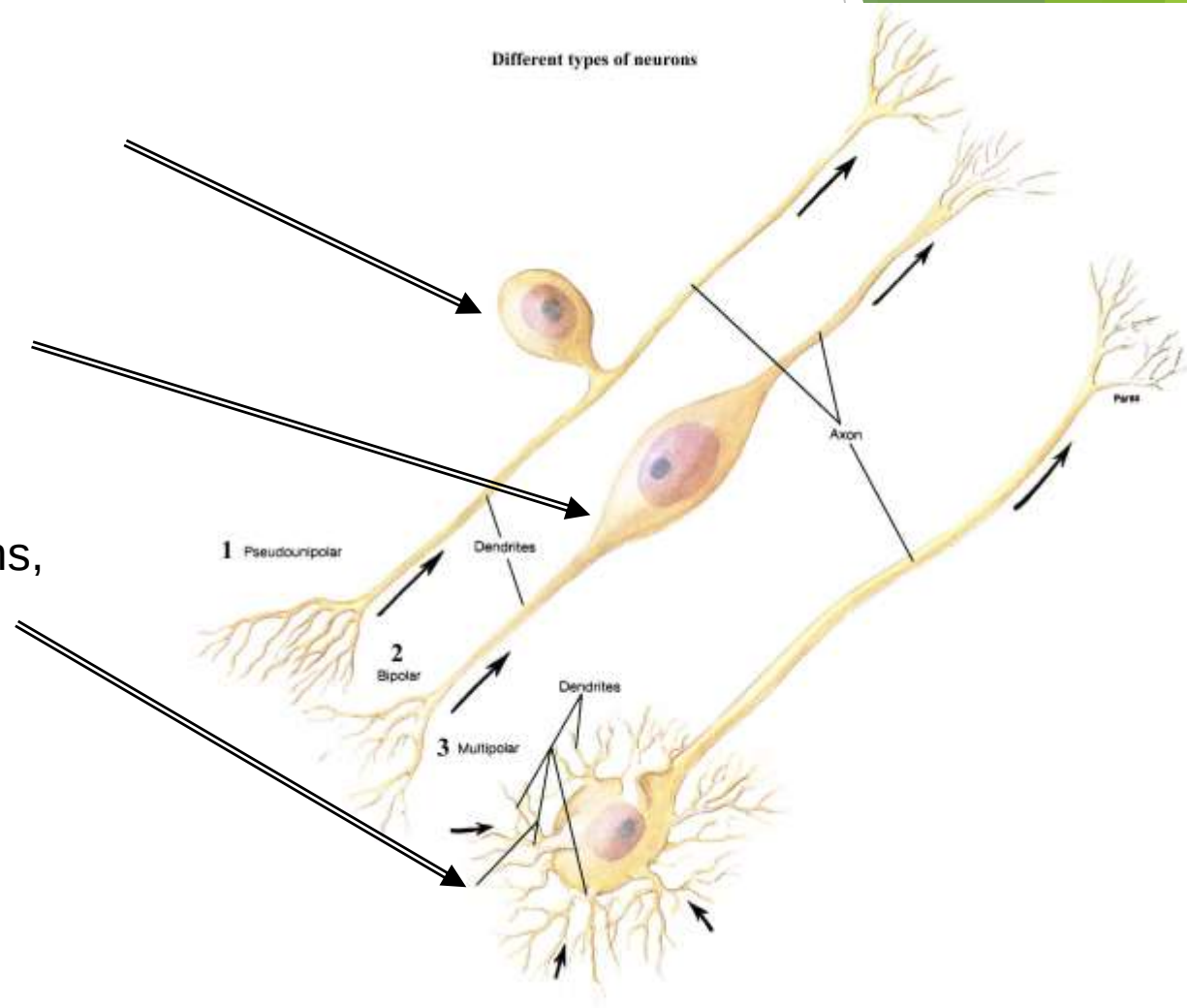


STRUCTURAL CLASSIFICATION OF NEURONS

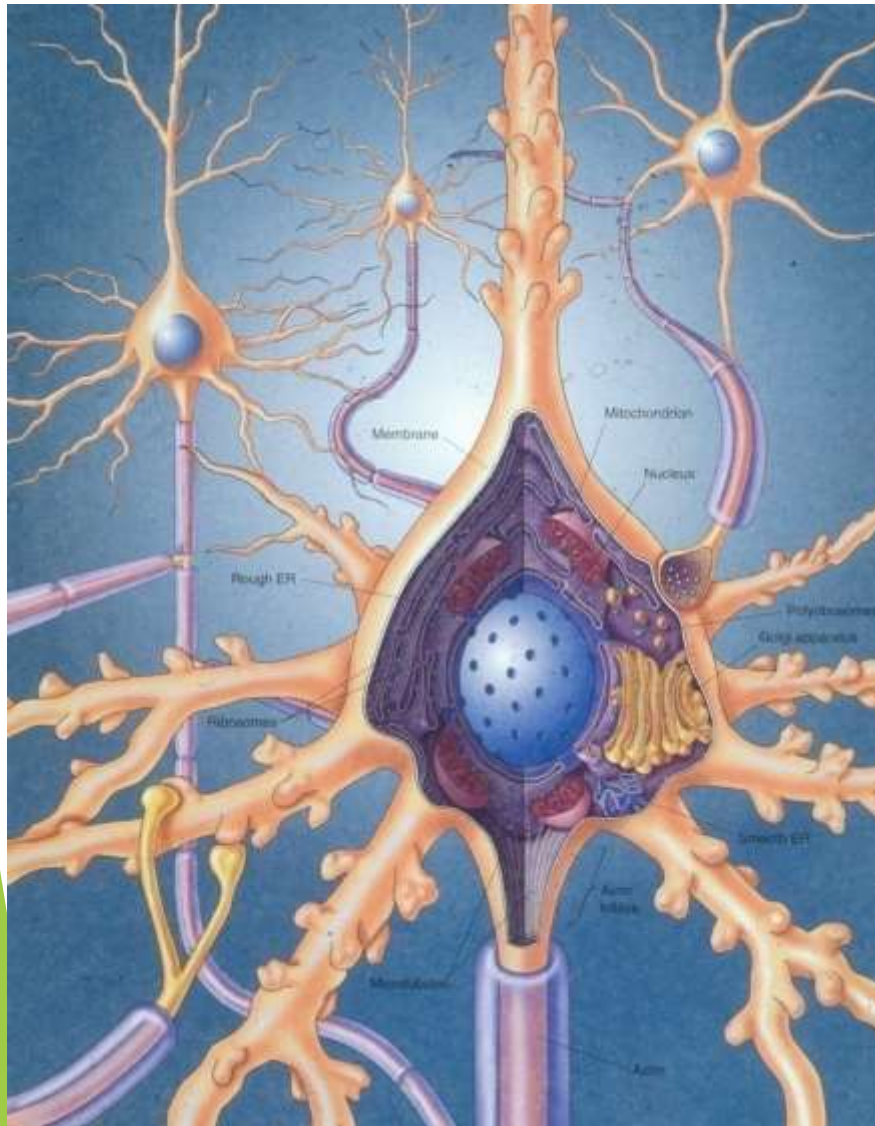
1. Pseudounipolar
(in the sensory ganglia)

2. Bipolar (optic,
auditory, vestibular)

3. Multipolar (motoneurons,
contact neurons)



Functions of neurons



1. Neuronal reception
(receive information)
2. Integration of signals
(excitation end inhibition)
3. Conduction
4. Regulation of effector
5. Trophic
6. Neurosecretory
7. Memory

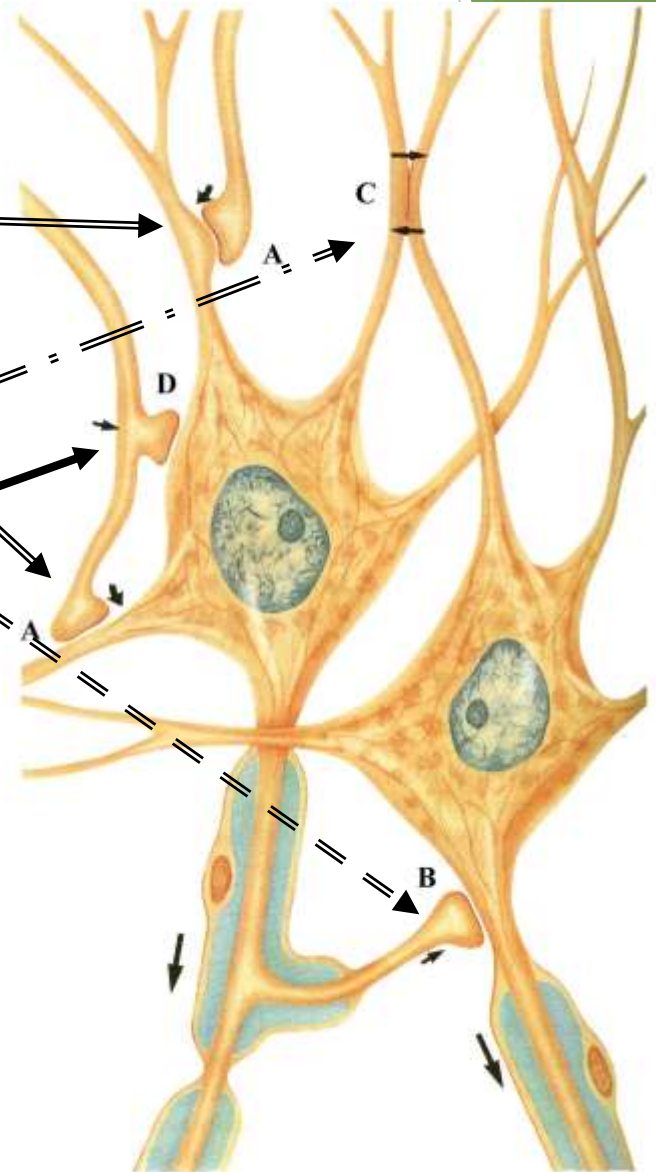
HISTOLOGICAL TYPES OF SYNAPSES

A. Axo - dendritic

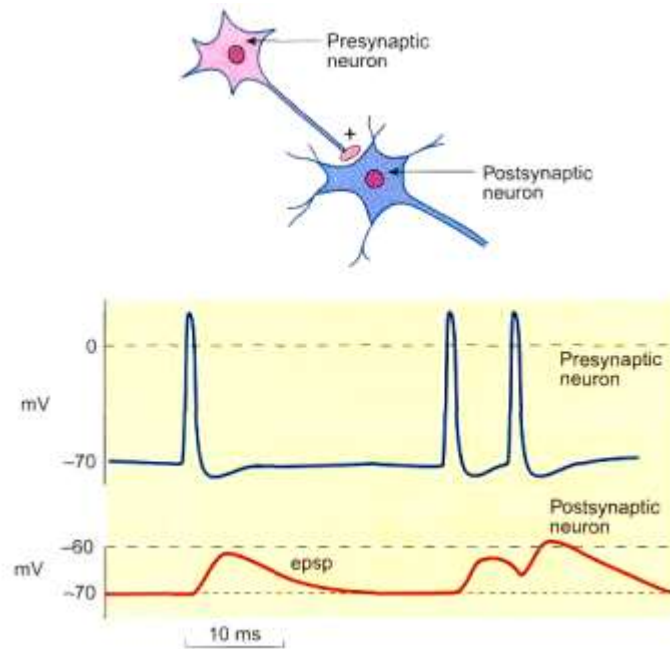
B. Axo - axonic

C. Dendro - dendritic

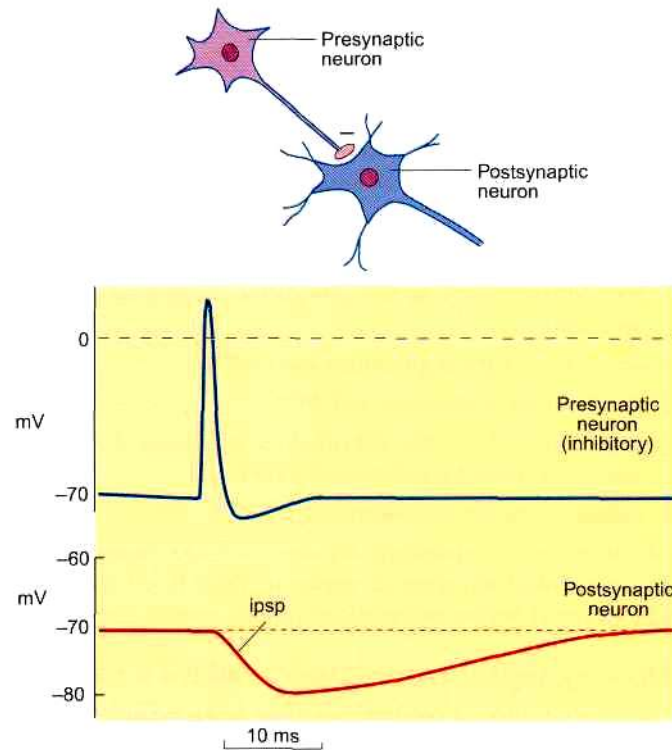
D. Axo - somatic



Excitatory postsynaptic potentials (EPSP)



Inhibitory postsynaptic potential (IPSP)



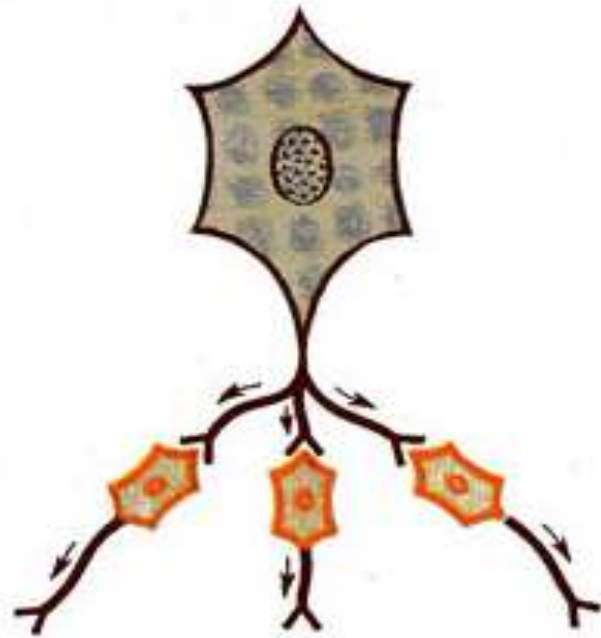
Type	Excitatory postsynaptic potentials (EPSP)	Inhibitory postsynaptic potentials (IPSP)
Charge	Depolarisation	Hyperpolarisation
For channels	Na ⁺ and K ⁺	Cl ⁻ or K ⁻ channels
Neurotransmitters	Ach, norepinephrine, epinephrine, dopamine, glutamate, serotonin.	γ aminobutyric acid (GABA) and glycine.

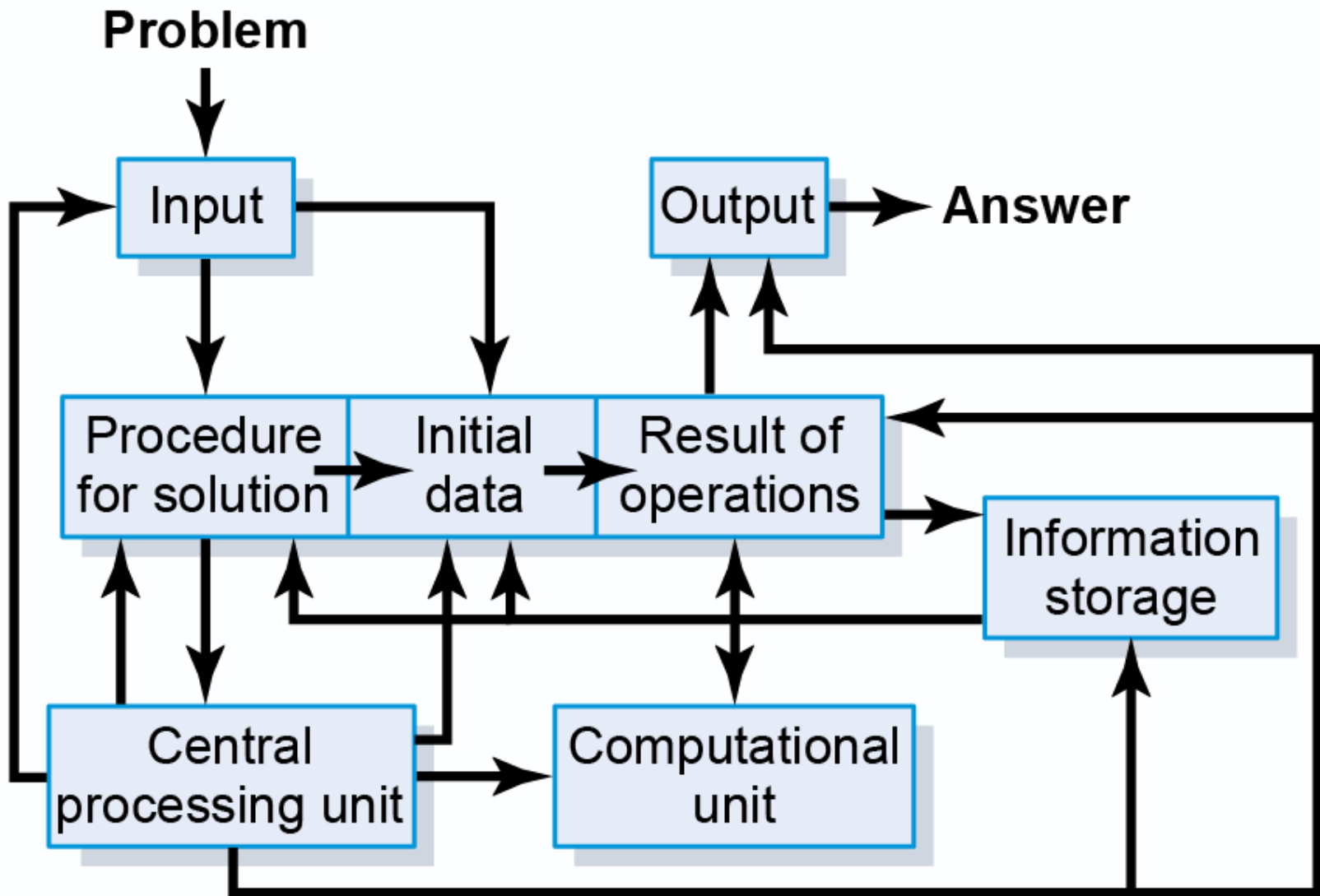
Principles of spreading excitation in CNS

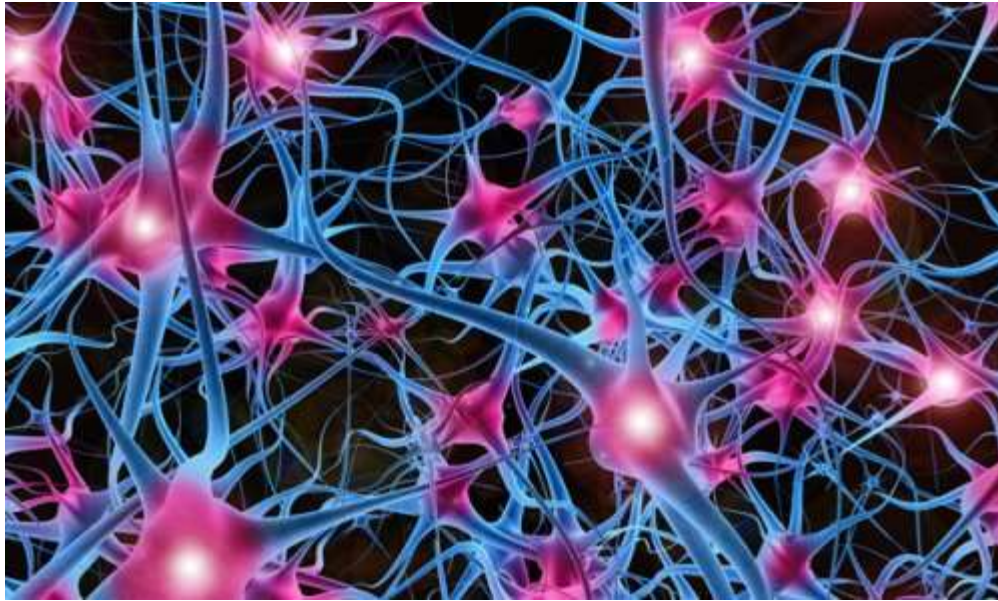
Convergence



Divergence





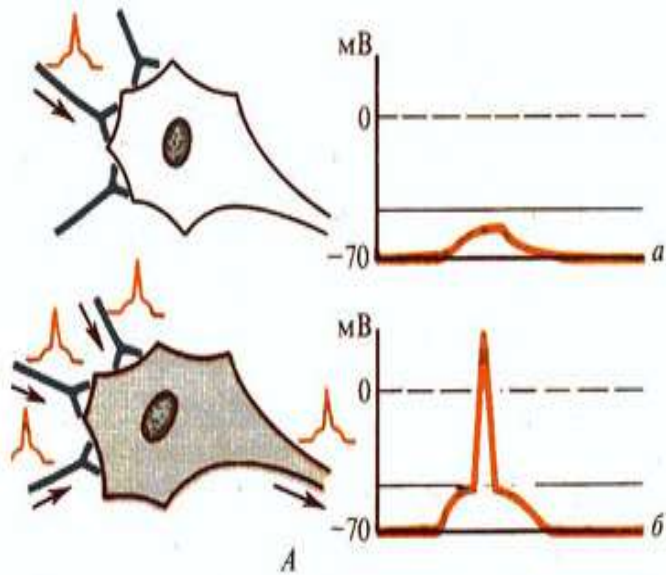


Neural center it's functional affiliation of neurones which provide realisation of one function.

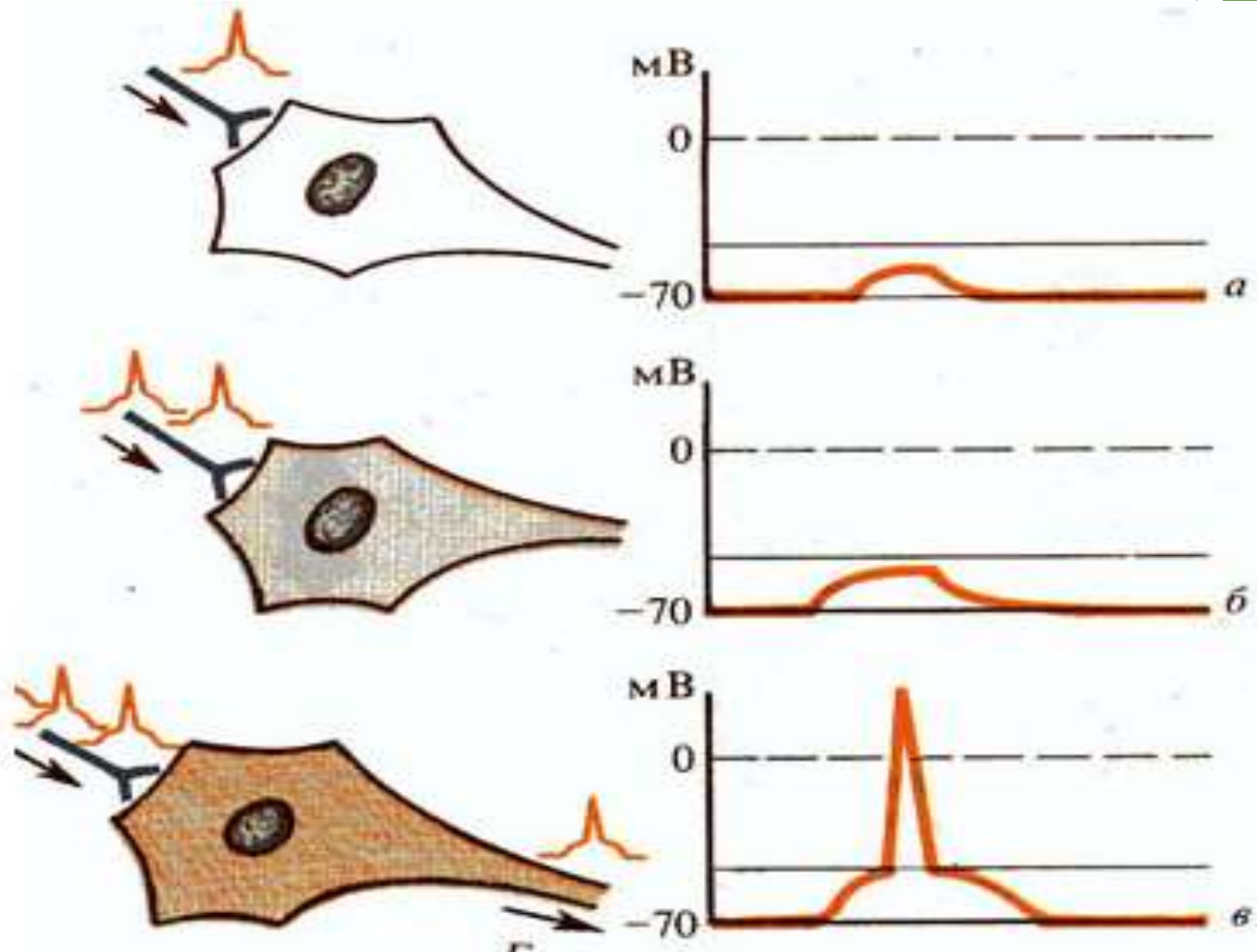
TYPES OF SUMMATION

- ▶ Spatial summation - summation of effects, caused by stimuli, applied simultaneously, but at different spots
- ▶ Temporal summation - summation of effects, caused by stimuli, applied at one spot, but sufficiently quickly

SPATIAL SUMMATION



TEMPORAL SUMMATION

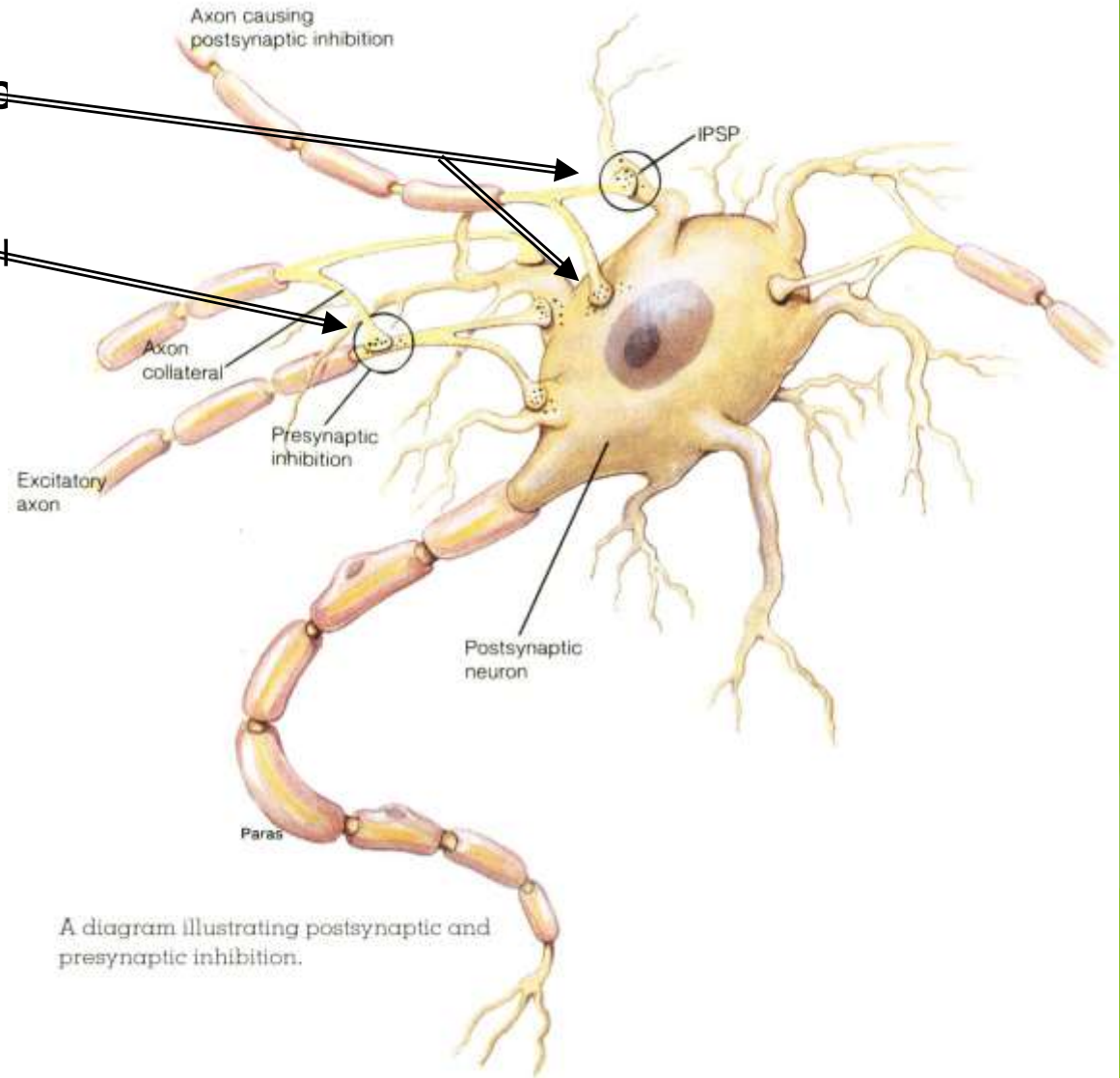


Inhibition– it's active process, witch result is arrest or weakening of excitation.

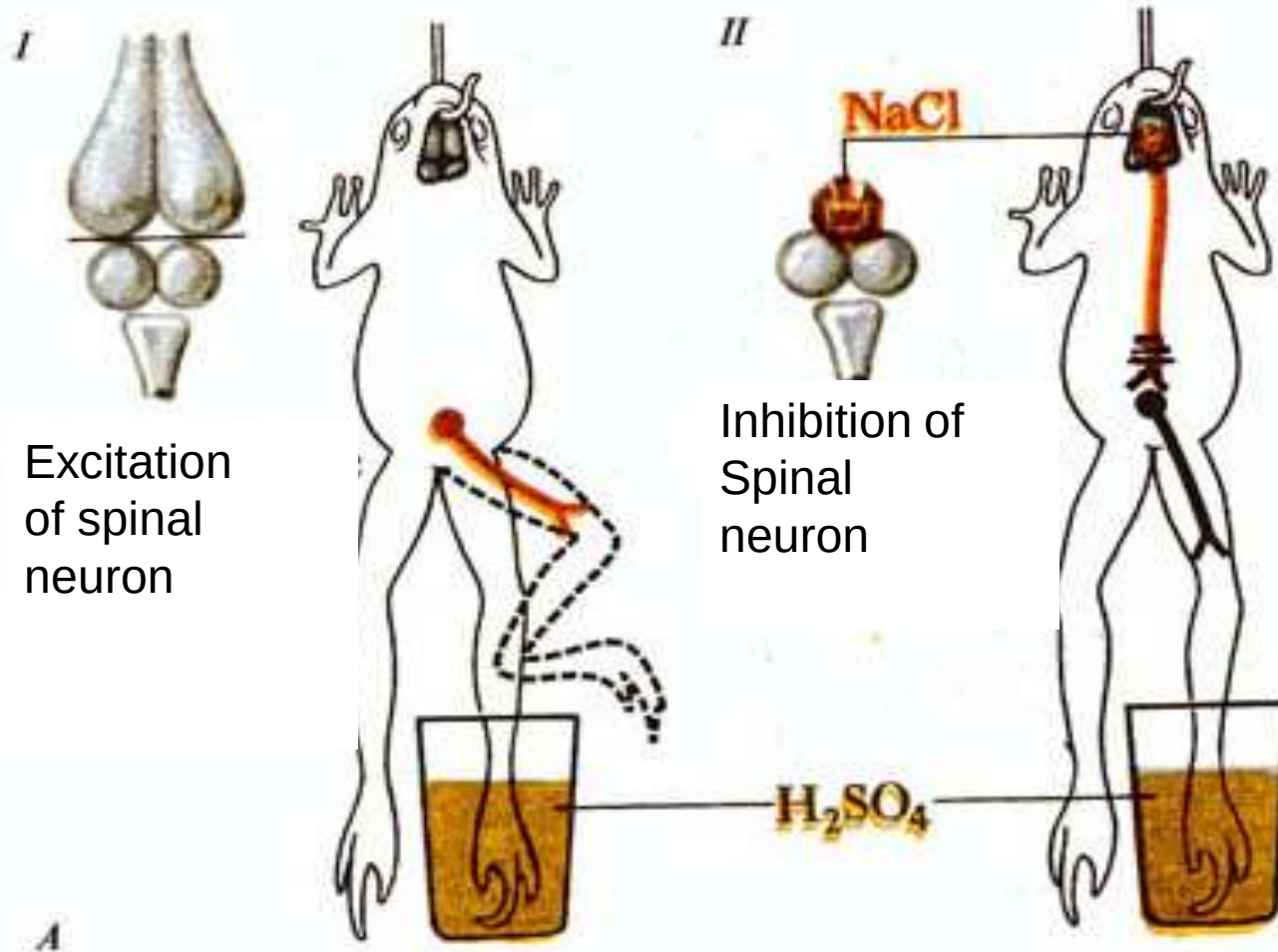
TYPES OF INHIBITION

1. Postsynaptic inhibition

2. Presynaptic inhibition



Scheme of Sechenov experiment (central inhibition)



ROLE OF INHIBITION IN CNS

- ▶ Coordination of movements (reciprocal inhibition)
- ▶ Protects neuron from redundant excitation (“feed-back” inhibition)
- ▶ Analysis of sensory information (presynaptic & lateral inhibition)