

# Physiology L9

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computer = central NS  
CNS

wire = ~~nerve~~ sensory neurons

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## Sensory neuron function

\* the function of sensory neurons:

→ 3 important terminology

- signal transduction
- signal coding
- signal processing

\* sensory neurons → signal transmission (transduction) → reverse to

signals receive the CNS



the signals receive as

~~coding~~ coding  
تشفير / تشفير

these codes are translated by the CNS "representation"

so change in the analogue ⇒ digital  
غير رقمي / رقمي

\* All this process → From coding to reach the screen

is called Processing

فترية / Filtration

تصفية / تصفية  
مع الإشارة / مع الإشارة

\* How the sensory signals are transduced and then coded and then processed?!

To reach the stimulation there should be a threshold

we ~~should~~ should have receptor for the stimulation

so when the AP for the membrane change ⇒ signal transduction

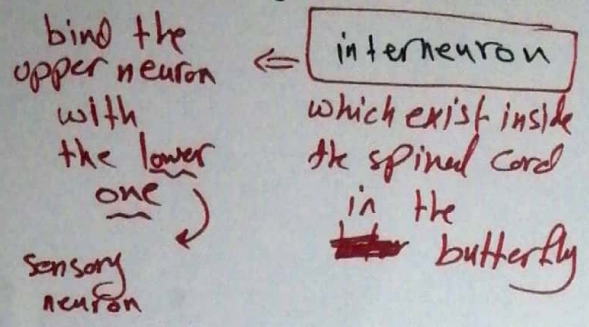
the signal transport through the sensory neurons

\* receive a sensation ⇒ then transport it to the CNS or the spinal cord.



When the signals reach the spinal cord

go along with specific neurons



sensory neuron also called afferent neuron => signal transduction from the Lower (organ) to the upper (CNS)

or ~~ascending neuron~~ Ascending neuron

or descending efferent

=> then the signal transport from the interneuron to the motor neuron

responsible for the movement

"the final response"

receptor for the sensory neuron

sensory pathways

\* The receptor

very simple

very complex

=> according to the function

① chemoreceptor => specialized in chemicals => any change in the chemicals in the body

the chemoreceptor is responsible for it

② mechanoreceptors => reverse for movement => Like: vibration اهتزاز

③ photoreceptors =>

④ Thermo receptor => sensation of temperature

⑤ Nociceptor => responsible for the pain

Law of specific nerve energies

the first code that the brain receive

are it has to be recognized in the brain

chemo / mechanical



\* The types of the sensory Receptors in the body:  
3 types

1 simple shape (receptor) => the morphology is very simple (Free nerve ending)  
capsulated or ~~not~~ by ~~some~~ CT  
layered.

example => thermoreceptor (Naso receptor) exist on the skin  
free nerve ending ~~on~~ unmyelinated axon

2 complex shape => the head is composed of layers of the C.T  
have very specific function  
" myelinated receptor

3 special receptor => in capsulated head => large axon (myelinated)  
The shape of the receptor differ according to its function

The first pathway is having receptor => ~~more~~ description in the brain

the first coding reach the brain is modality then location then intensity  
then duration

1 Stimulus modality => sensation (temperature, pain, ...)

Cerebral cortex لا يميز بين انواع الحواس

" الحاسة واحدة " لانهم ياتي بالحواس كالحس

اي كل حاسة لها  
receptor  
اسماء  
labeled line or  
coding  
تسمى  
الخط

what kind of stimuli  
temperature  
high low

pain -> have a specific line to reach the cortex to specific location.

have specific receptor to transport through it



2 stimulus location:

on the cerebral cortex => specific location to the specific type of this neuropathway

on the cortex => (the outer layer of the brain) => specific location

body organ

every one specific to

Anatomical topography => how every organ is represented on the cerebral cortex "Location"

\* the stimulation is ~~code~~ coded according to which group of neuron is active

- The number of receptors that exist on the organ affect the area or the size of the area on the cerebral cortex

- As the number of the receptors on specific organ increase ↑ the area on the cerebra is larger

Number of group of neuron (receptor, sensation) that exist on the ~~organ~~ Lips more than that exist in the sholder then the area on the cerebral cortex for lips is larger than the area for the sholder

why? because it need more coding





2) ASD

\* The Auditory and the olfactory doesn't have specific location on the cerebral cortex

→ I need little time to recognise, the sound and the taste the source of

special sense ⇒ topographic maps ← \*   
 ? (36, 50)

The brain have irresponse

when I have a pain in the ~~right hand~~ right side of the left arm the sensation goes to the contralateral

the presentation ipsilateral or contralateral?

the anatomy of the out flow of the neuron that's comming ~~to the function~~. have ~~an~~ overlap. have synapsis so it's reflected.

3) Stimulus Intensity ⇒ the relation is not linear correlation ship.

~~the relation~~   
 ~~Proportion~~

that's mean no linear Relation ~~ship~~ between the number of stimulus and the action potential

the action potential increase as the stimulus strength increase until reaching a specific point the action potential will not increase after it

population coding → related to the number of receptors more activation for the receptors gives more action potential till it reach a point

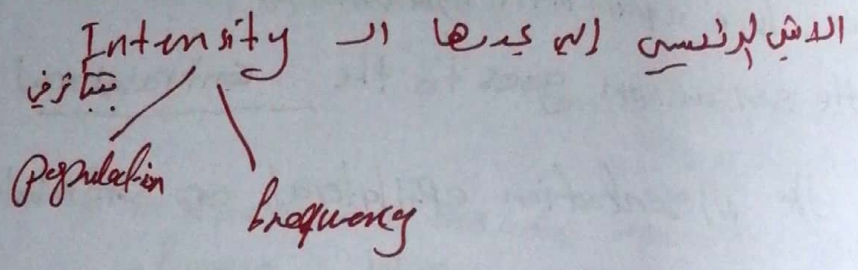




① More activation for receptor  $\rightarrow$  more action potential

② the frequency of action potential  $\Rightarrow$  As the ratio of the stimulus strength to the membrane potential effected.

the number of the motor unit that recruitment  $\times$



\* sensation of very small area  $\Rightarrow$  goes to the cerebral cortex "small" the number of receptor and the strength

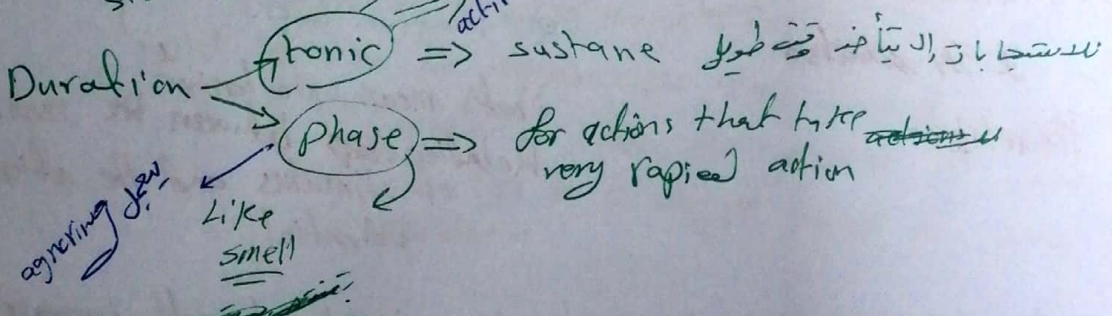
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Locations

بين كل stimulation

بتحتاج وقت slow adaptation

التي تعود الى النشاط activity



بين كل stimulation

بتحتاج وقت

slow adaptation

التي تعود الى النشاط

activity

بين كل stimulation

بتحتاج وقت

slow adaptation

التي تعود الى النشاط

activity



Lateral inhibition  $\Rightarrow$  the brain can consider the exact region  
of the pain



Inhibit the adjacent neurons  $\Rightarrow$  one neuron is activated  
so the brain can recognize  
the exact place of  
the pain