

lecture (4) of physiology

the autonomic nervous system

sympathetic
(fight or flight)
(increased alertness and
metabolic activities)

preganglionic

postganglionic

parasympathetic
(rest and digest)
(conserves energy)

preganglionic

postganglionic

they work in different ways but
for the same function which is
maintaining homeostasis

the neurons

cholinergic neurons
(release acetylcholine ACh as a neurotransmitter
and it's stored in synaptic vesicles)

1. all sympathetic and parasympathetic
preganglionic neurons .

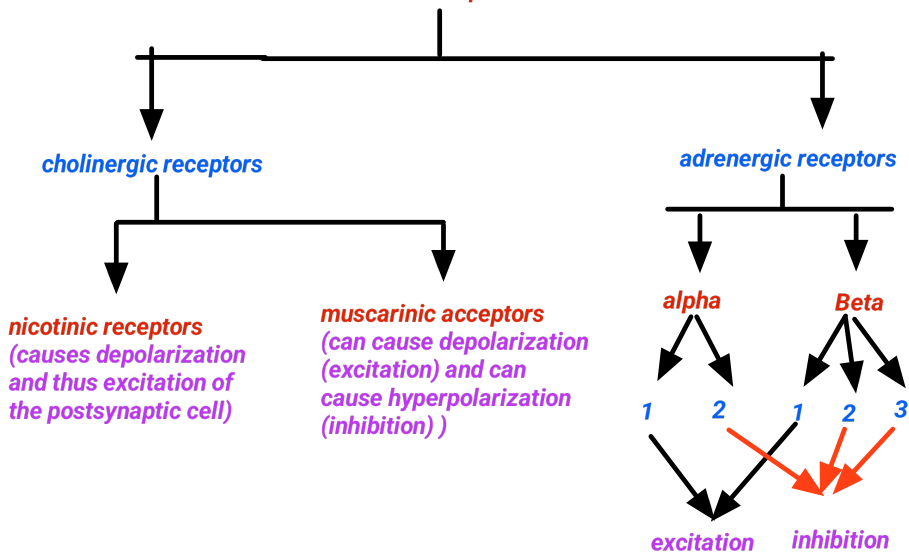
2. all parasympathetic postganglionic
neurons .

3. sympathetic postganglionic neuron that
innervate the sweat glands

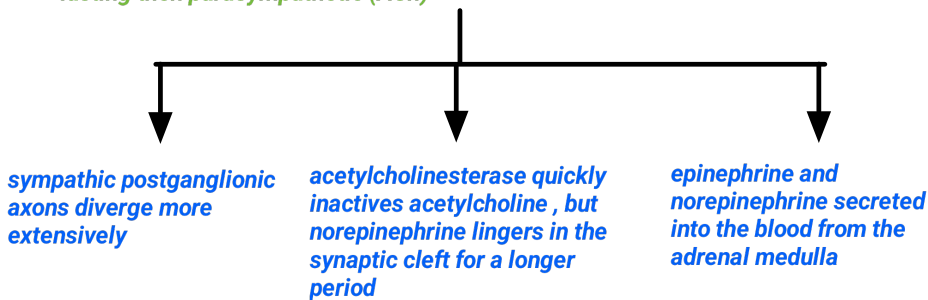
adrenergic insurance
(release epinephrine or
norepinephrine which is known
as noradrenaline as a
neurotransmitter and it's stored
in a synaptic vesicles)

most sympathetic
postganglionic neurons except
the one that innervate the
sweat glands

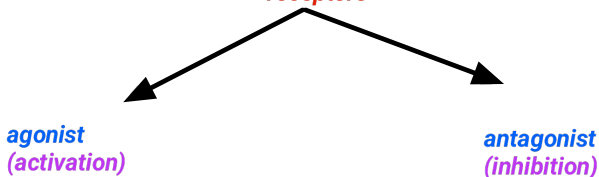
The receptors



reasons that sympathetic stimulation (epinephrine norepinephrine) are longer lasting then parasympathetic (ACh)



receptors



the responses

sympathetic response

1. increase HR
2. increase RR
3. increase metabolic rate
4. increase glycogen and fats breakdown
5. pupillary dilation
6. smooth muscle vasoconstriction
7. skeletal and cardiac muscle vasodilation
8. decrease GI activities
9. bronchial relaxation

parasympathetic response

increase(SLUDD)

(S) salivation
(L) lacrimation
(U) urination
(D) digestion
(D) defecation

decrease

1. HR
2. diameter of airway
(bronchoconstriction)
3. diameter of pupils

myelination (to speed up)

oligodendrocytes in CNS

Schwann cells in PNS

Comparison of Graded Potentials and Action Potentials

هون مقارنة بين graded potential and action potential

Graded Potential

1. Stimulus does not reach threshold level.
2. Stimulus causes local change in membrane potential e.g. -70 to -60mv
3. It dies down over short distance.
4. Can be summated.
5. Does not obey all or none law.

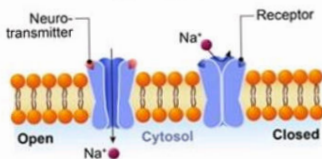
Action Potential

1. Stimulus reaches threshold level therefore causes AP.
2. Stimulus causes depolarization to threshold level.
3. It is propagated.
4. Can not be summated.
5. Obeys all or none law.

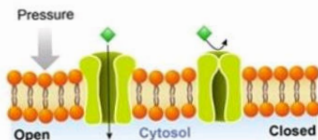
ION CHANNEL

هون انواع القنوات

Ligand-gated

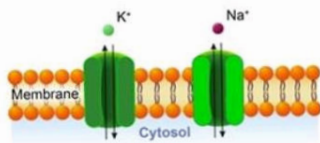


Mechanically-gated

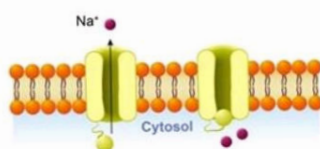


leak channel

Always open



Voltage-gated



*factors contribute to the
resting membrane potential*

*unequal distribution of ions
between ECF and cytosol*

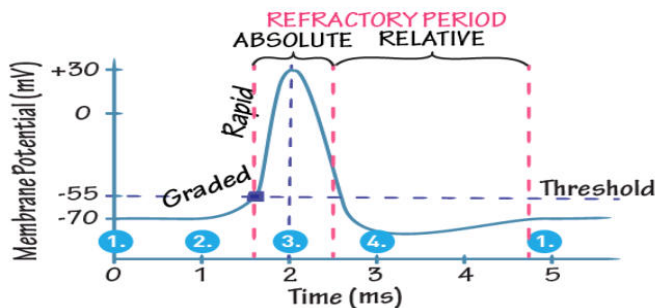
*inability of most anions to
leave the cell*

*electrogenic nature of the
Na-K ions ATPases*

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- *the resting membrane potential is -70*
 - *once it changed and become -60 for example that means we have a graded potential*
 - *once it arrives -55 that's called threshold and the graded potential becomes an action potential*
 - *then from -55 to +30 this called depolarization*
 - *from +30 to -70 again that's called repolarization or hyperpolarization*
 - *sometimes the channel still opened which make it from -70 to -90 and this called after hyperpolarization but it goes back to -70 because of the leak channels which are always open*
 - *refractory period is a period of time after an action potential begins and the cell cannot regenerate an another action potential in this period*
 - *the last one means that there is no refractory period for the graded potential which is between -70 to -55*

هاي ممكن تساعدك على انك
تفهم النقاط السابقه

Action Potentials



1. Resting state - All gated ion channels closed
2. Depolarization - Na^+ channels open, K^+ channels closed
3. Repolarization - Na^+ channels inactivated, K^+ channels open
4. Hyperpolarization - Na^+ channels reset and closed, K^+ channels still open