



Different types of action potential.

Sherif W. Mansour

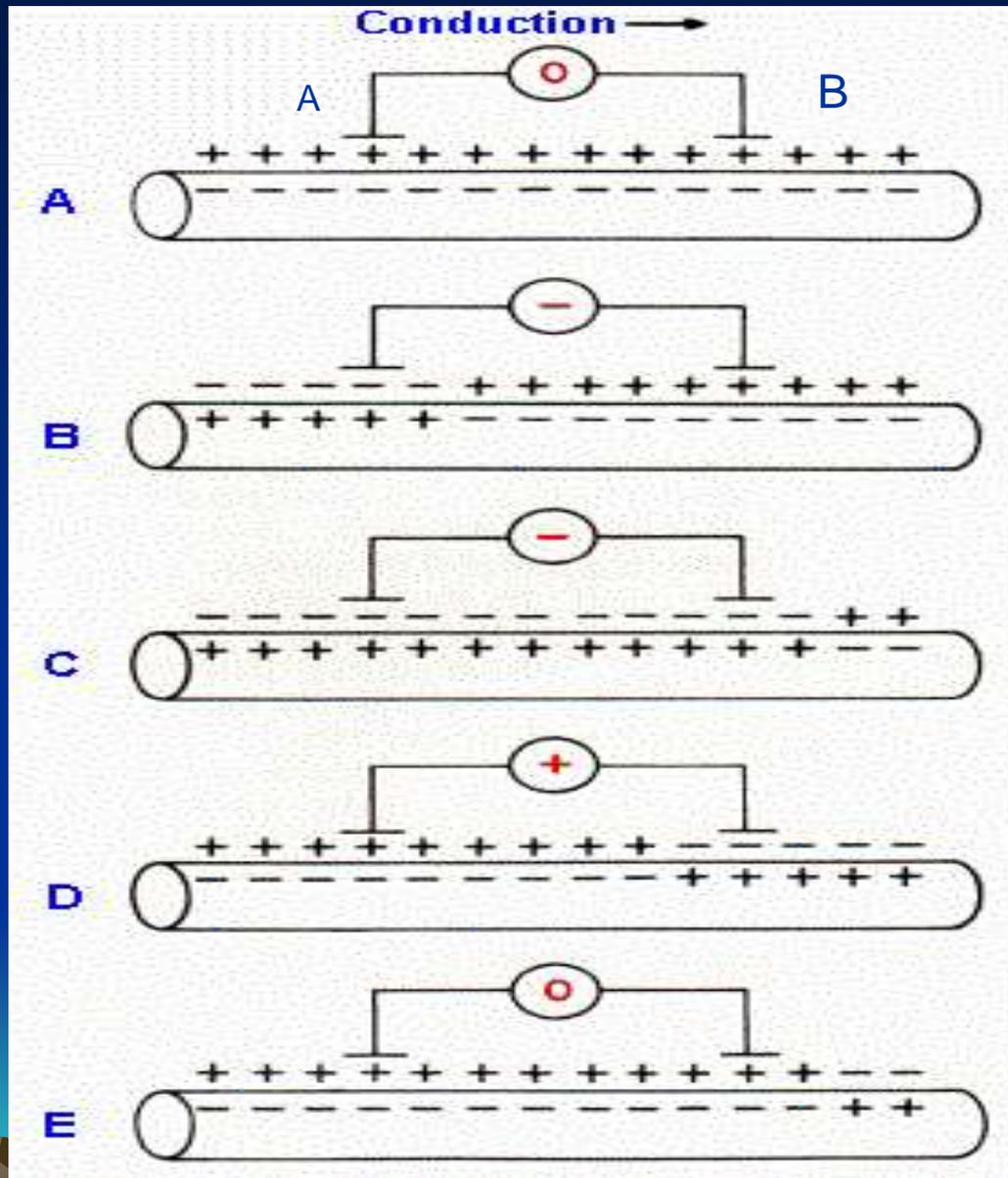
Prof. of physiology

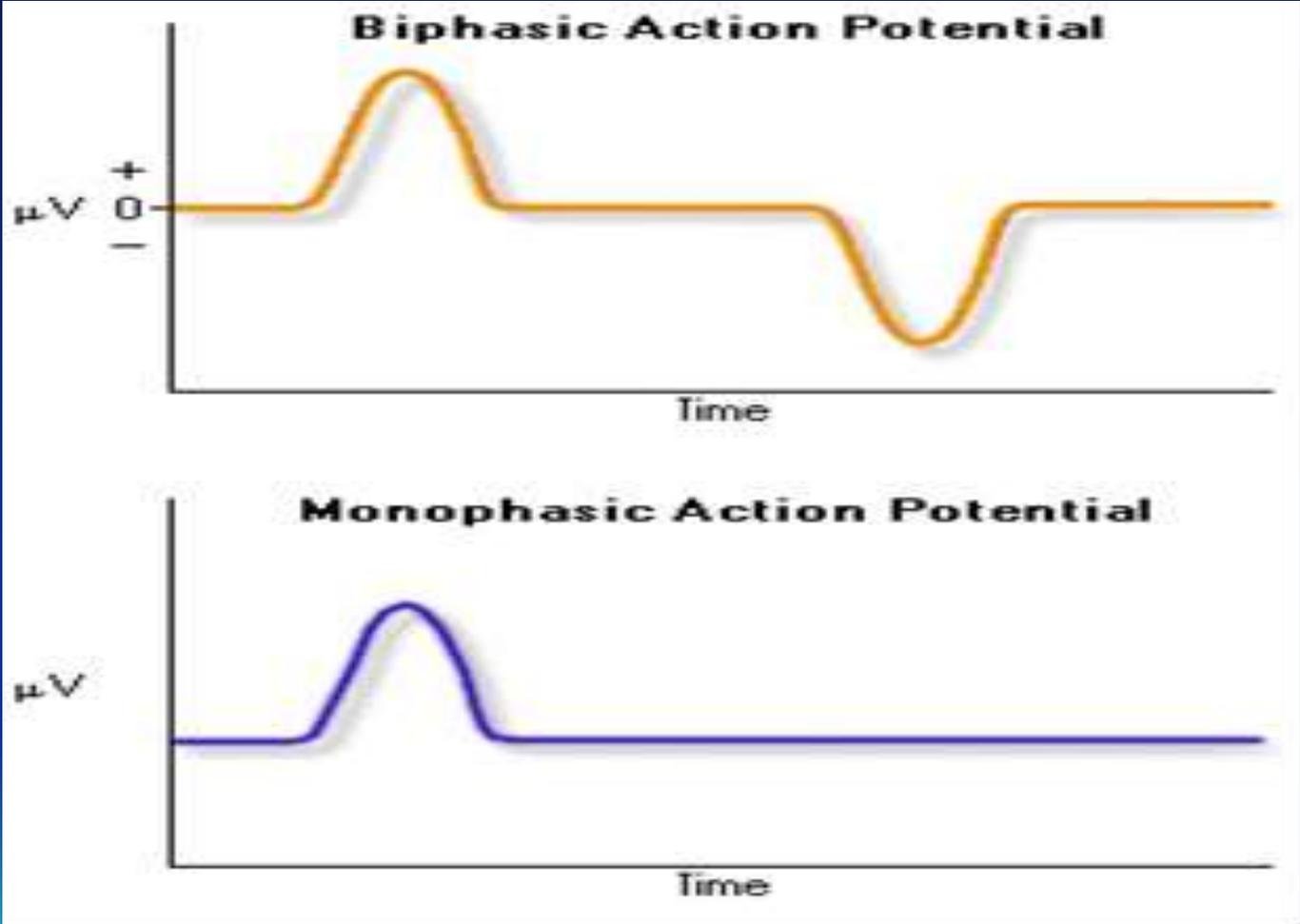
Mu'tah School of medicine.

Types of action potential

1. Biphasic action potential: It is the potential changes between 2 areas (A & B) on the outer surface of the nerve fiber membrane by using 2 microelectrodes connected to galvanometer or Cathode Ray Oscilloscope (CRO).

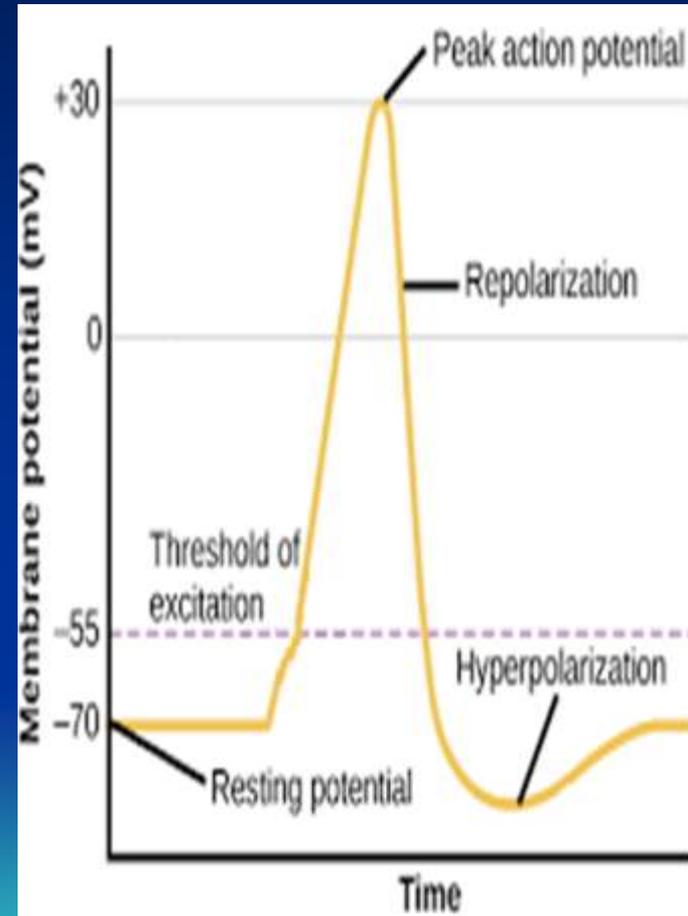
- The stimulus is applied near the A point.
- It consists of the following phases:
 1. At first, there is no potential difference between A & B because both are +ve.
 2. When the depolarization wave reaches (A) it becomes (-ve) relative to B (+ve) and deflection is recorded.
 3. When the depolarization wave leaves (A) it repolarizes to (+ve) so no pot. difference between A & B. (isoelectric)
 4. When the depolarization wave reach (B) it becomes (-ve) in relative to (A) → deflection in the opposite direction.
 5. When the depolarization wave leaves (B) it repolarizes and A & B becomes again isoelectric (both +ve) → no deflection.





2. Monophasic action potential

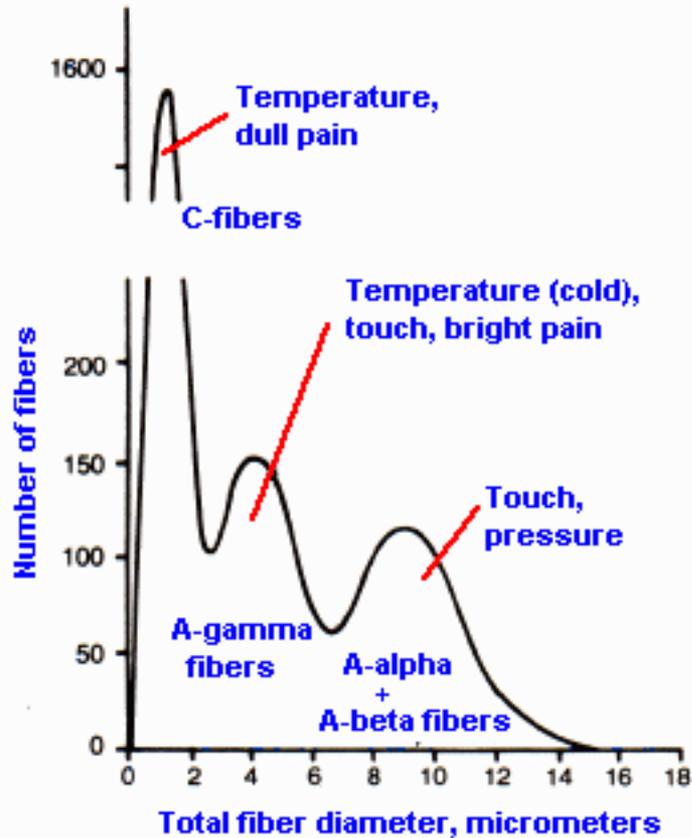
It is the recording of potential difference between inside and outside the nerve fiber membrane. Also it occurs in Demarcation potential in which the two electrodes are put on the outer surface of the membrane but the membrane under one point is damaged by acid or alkali. So, the impulse stops at this damaged point with monophasic action potential.



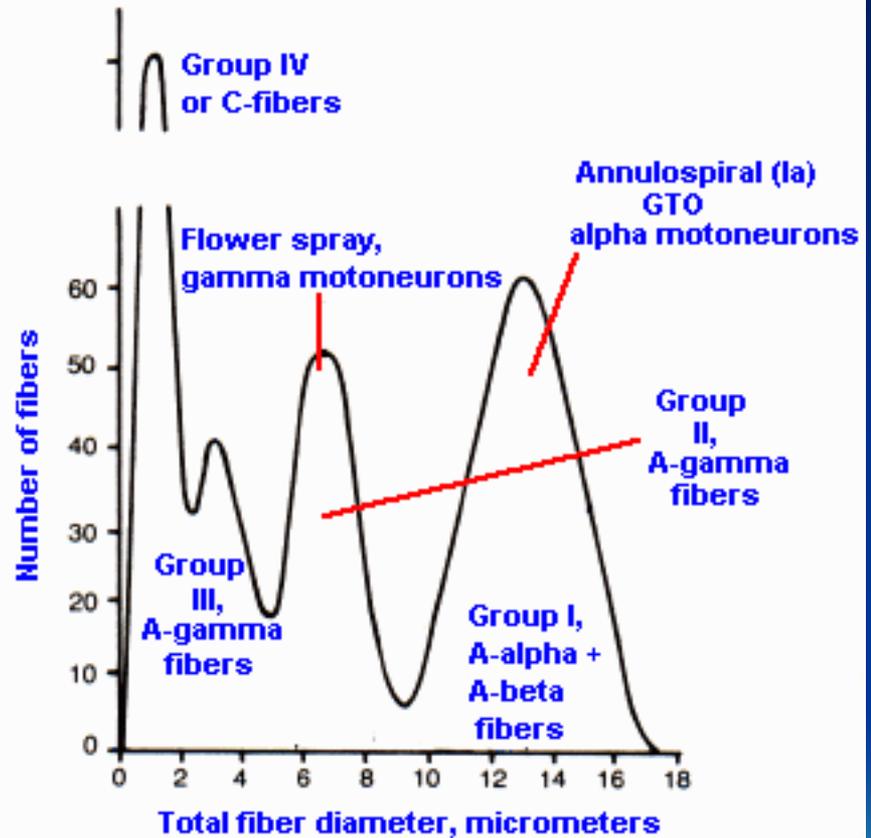
- **3- Compound action potential:**

If a mixed nerve is stimulated → multiple peaks of action potentials as the threshold of stimulus, distance from electrode and speed of conduction vary from one fiber to another according to its **thickness**, till the maximal stimuli is reached, **all nerve fibers** are excited giving maximal response.

A. Cutaneous nerve



B. Muscle nerve



4- Graded potential as (receptor potential) :

-It is local ,non propagated and can be summated (increased with increase amplitude and intensity of the stimulus) as it doesn't obey all or none law.

-It occurs in the sensory receptors, postsynaptic neuron, in sub-threshold stimulus and in compound action potential.

Comparison of Graded Potentials and Action Potentials

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.

Thank You