

# DIFFERENCE B/W ACTION POTENTIAL OF Neurons, Skeletal, Smooth and Cardiac cells

RMP:

Neurons:

-90mV

Skeletal Muscles:

-80mV to -90mV

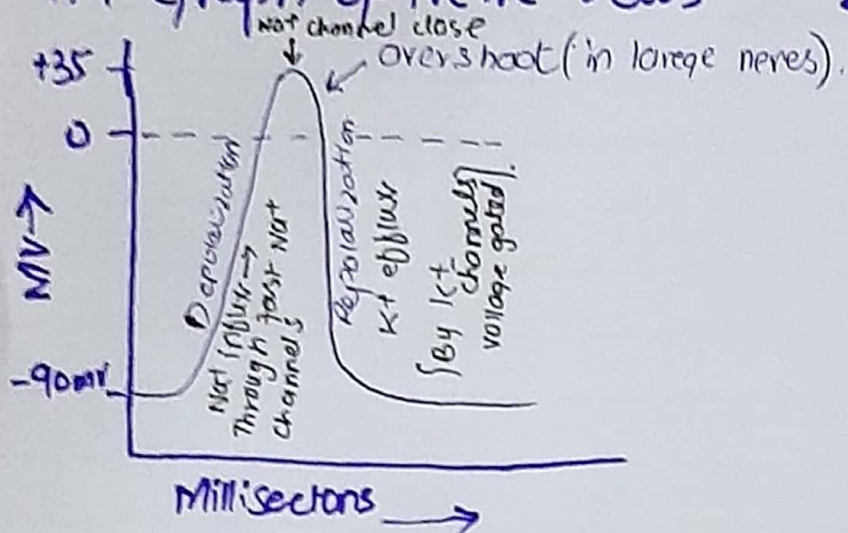
Smooth Muscles:

-50 to -60mV

Cardiac cells:

-85mV

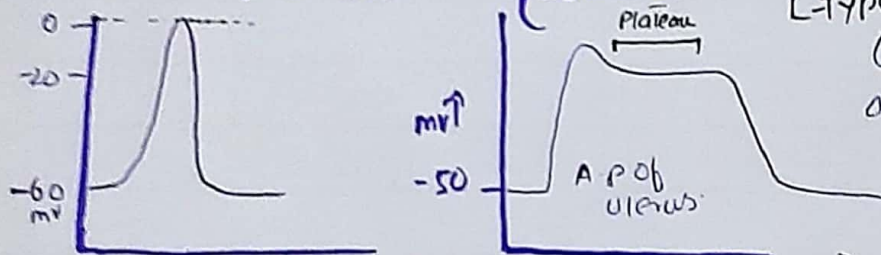
## A.P Graph of nerve cells



## & Muscle cells

Same as that of nerves contraction occurs by the help of  $Ca^{2+}$  ion derived from intracellular sarcoplasmic reticulum.

## A.P IN Smooth Muscles:-



$\therefore$   $Na^{+}$  channel are fast acting L-Type  $\therefore$   $Ca^{2+}$  channels/ $Ca^{2+}$ - $Na^{+}$  channels (as they allow some of  $Na^{+}$  ions also to pass through them) are slow opener however remain open for long time More common in cardiac and smooth muscles

0 - Smooth Muscles have:  $\downarrow$   $Na^{+}$  channel (fast)

$\uparrow$   $Ca^{2+}$  channels (slow)

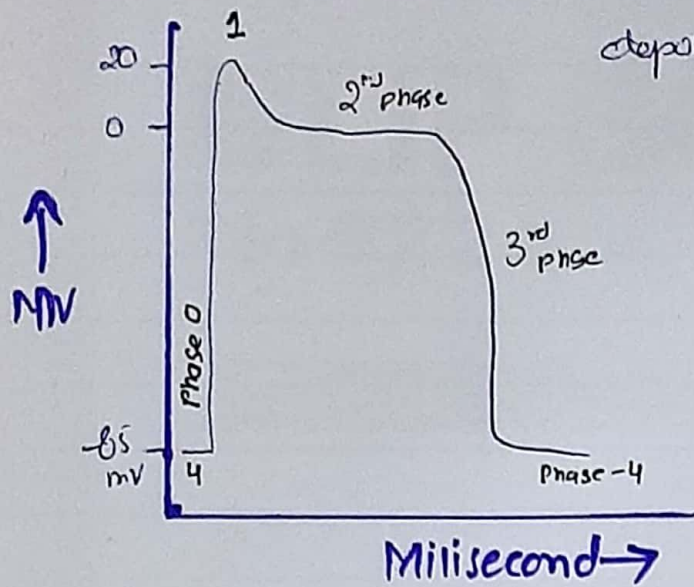
They get open slowly and remain open for large duration  $\Rightarrow$  (1) prolong plateau of sm. A.P

(2)  $Ca^{2+}$  act directly on smooth

eg s.m contraction tasks of ureters & uterus at once

Muscle contractile Mechanism to cause contraction

# ACTION POTENTIAL AND ECG OF CARDIAC CELLS



depolar. phase 0 = Fast  $\text{Na}^+$  channel open

Phase 1 (initial repolar) = F.S.C closes &  $\text{K}^+$  leaves the cell through F.P. channel.

Phase 2 (plateau) =  $\text{Ca}^{2+}$  Ch. open & F.P.C closes,  $\text{Ca}^{2+}$  Ch. open during phase 0 & 1 but now due to rise  $\text{Ca}^{2+}$  &  $\downarrow \text{K}^+$  A.P. reaches plateau phase.

Phase = 3 = C.C. closes & slow Polas.

Channel opens, plateau end & membr. reaches to resting phase  
phase 4 (RMP) = RMP averages about  $-90\text{mV}$

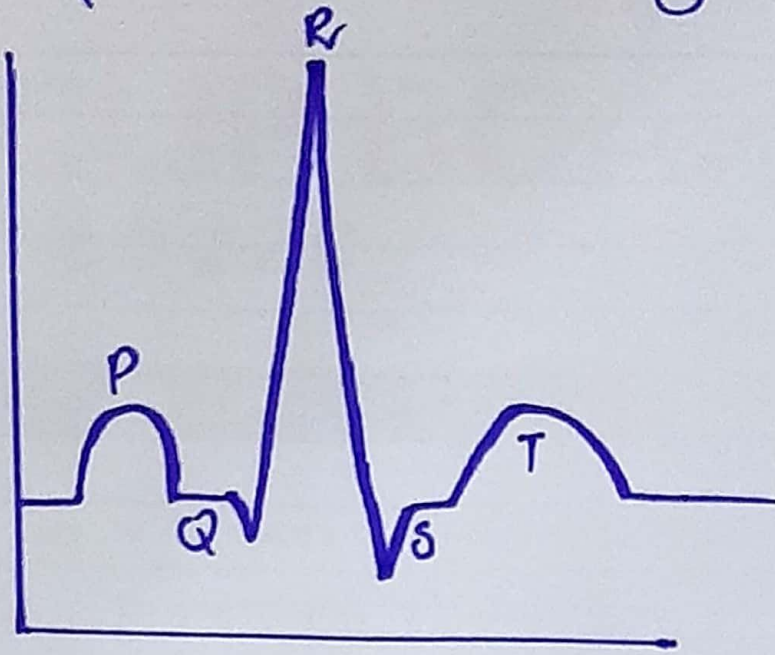
Refractory period: during which a Normal cardiac impulse can't re-excite an already excited area of cardiac muscle

\*- Duration:  $0.25 - 0.30\text{sec}$ , R.P. of atria is shorter than ventricles

Relative Refractory period:- during which muscle is more difficult to excite than normal but nevertheless can be excited by very strong excitatory signals

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# ECG: Electrocardiogram



P-wave = Atrial depolarization, followed by atrial contraction

P-Q = Signal transfer from SA-Node to AV-node

QRS = ventricular depolarization

↳ Q → depolarization of inter-ventricular septum

R → depolar. of main mass of ventricles

S → Last phase of depolar. at the base of heart.

S-T = plateau in myocardial action potential (ventricle contract & pump blood) / systole.

T-wave = ventricular repolarization immediately before ventricular relaxation / diastole

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