Chapter 2

Bioelectric Potential

Introduction

Every portion of body (even in cellular level) provides information about its functioning

Information comes as signal

Biochemical processes creates ions

Ion gradient produces ionic voltage

Ionic voltage is converted to electric potential by electrodes

Potential: Electrochemical activity

Cells

Basic building block

different shapes, sizes (0.5nm to 20 μm) and functions

about 75 Trillion, 25 T RBC

Tissue: multiple cells (may be different types) performing same work

Organ: multiple tissues and/or cells for specific objective

Cells have **nucleus** (genetic coding) and **cytoplasm**

General Characteristics

Organization

Irritability

Nutrition

Metabolism

Respiration

Excretion

Body fluid: 55%

Ionic Characteristics

Intracellular fluid: K^+, Mg^+, PO_4^-
Extracellular fluid: Na^+, Cl^-, HCO^-, O_2, CO_2, acids, fats

Responsible ions: K^+, Na^+, Cl^-

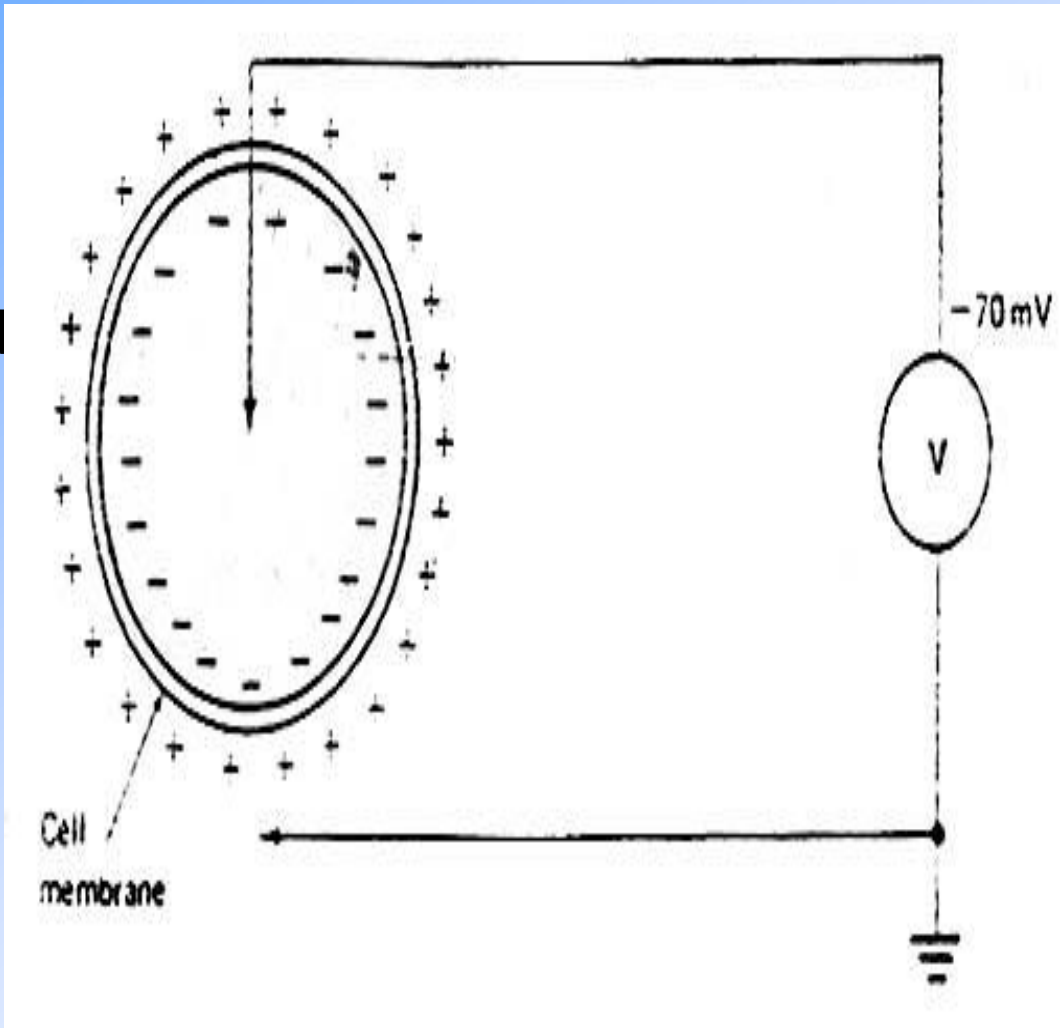
Cell membrane is semi-permeable: selective flow of ions depending on cell condition; selectivity depends on

- **ion size**
- **charge amount**
- **other factors**

Cell at Rest

Na^+ is blocked
Cl^- influxes and K^+ outfluxes
Inside is negative wrt outside
Resting potential (RP) created
Cell is **polarized**
RP is -60 to -100 mV
Nominal value is **-70 mV**

$RP = \pm 61 \log(C_o/C_i)$



Cell in action

Na^+ is allowed

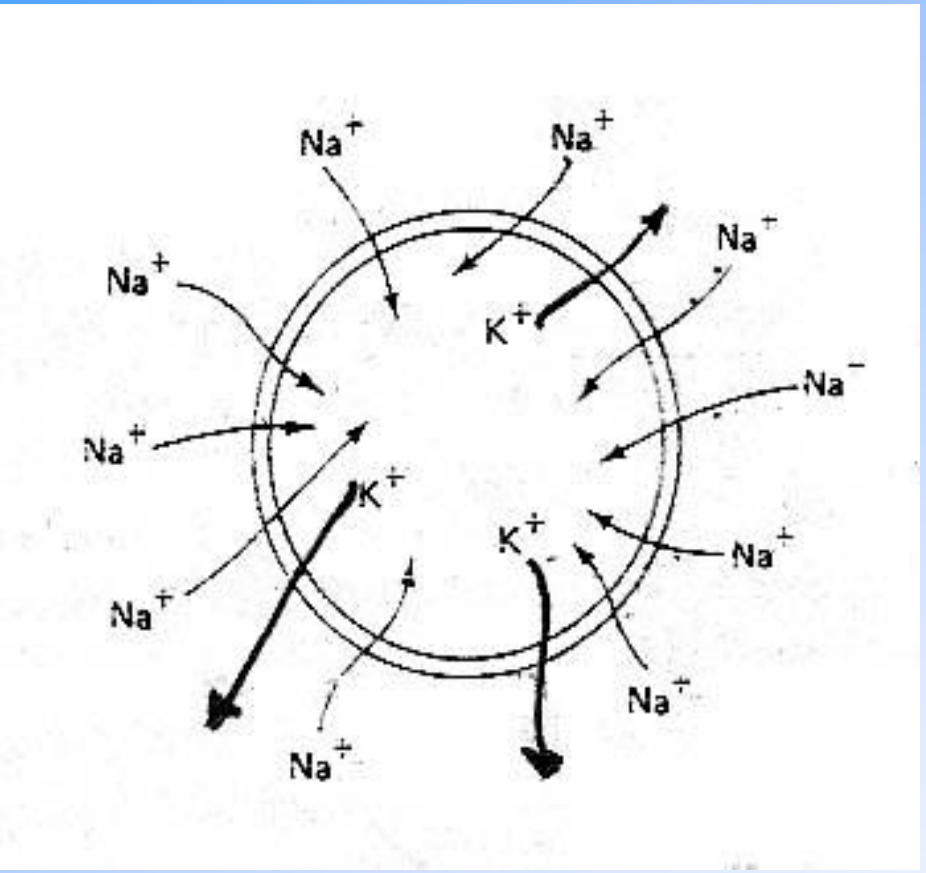
Rate of Na^+ flow ≈ 2 to 5× flow of K^+

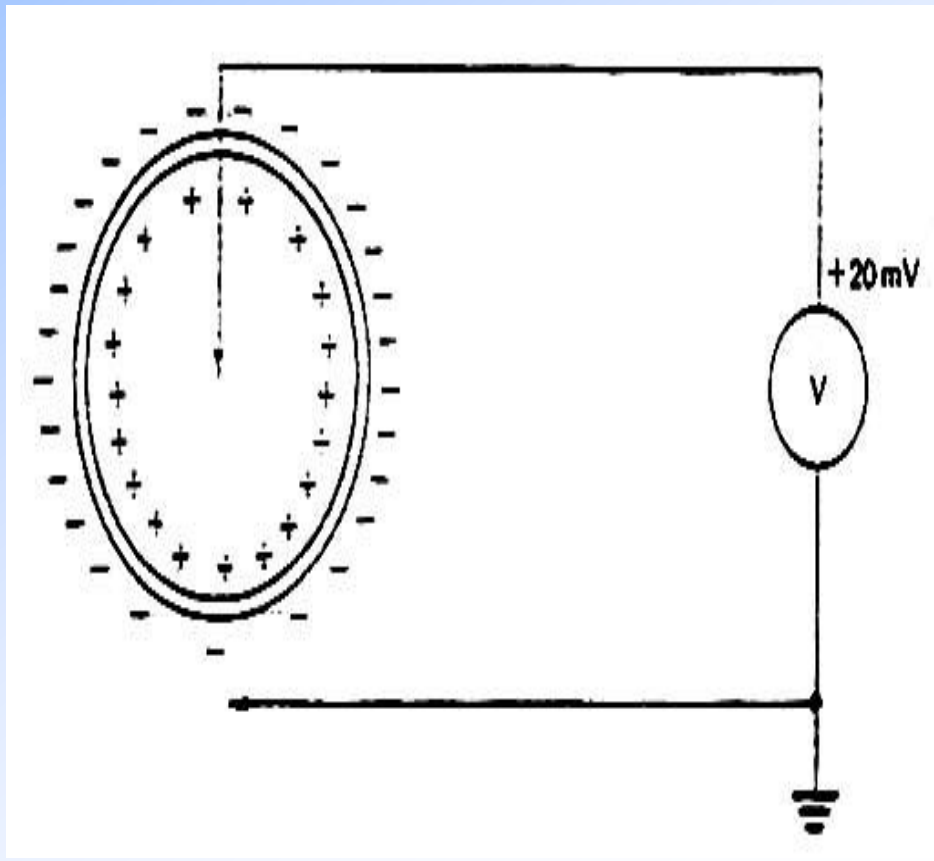
Outside is positive wrt inside

Cell in action

Action potential (AP) of around 20 mV is produced

Cell is **depolarized**

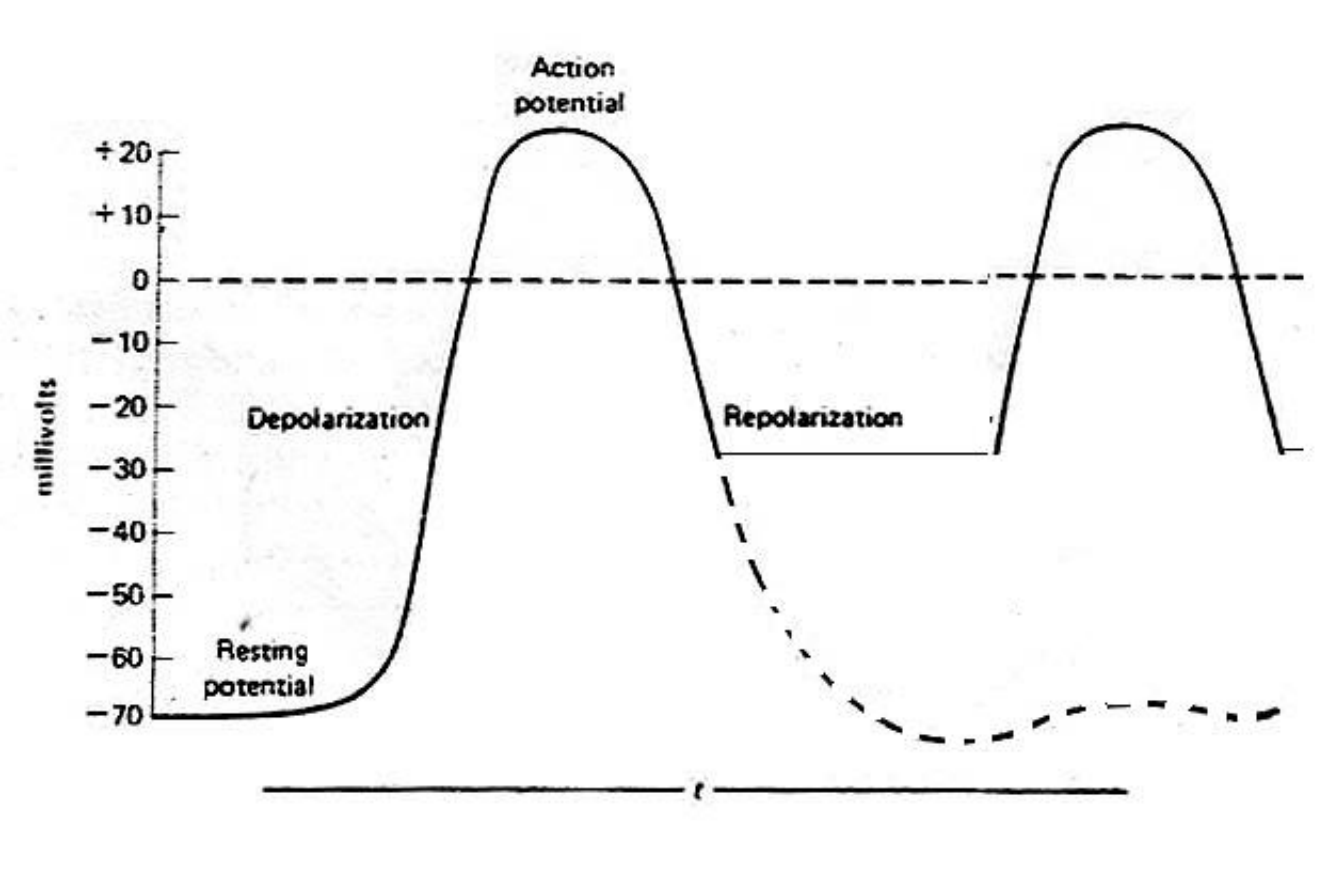




Total cycle

RP
AP
TP
Refractory period

Each has own
significance



Questions?
Comments!

Thank You !!!