

Exam 4

Measure of voltage gradient-

- Difference from inside the cell to somewhere outside the cell. Gradient across the membrane, what is happening from the one side to the other
- V_m = voltage across membrane (# that equals our membrane potential)
 - At rest, most cells V_m = -70 mV (little negative on inside)- outlet is standard of 120 Volts, so SMALL charge here
 - Due to all charge components (FIGURE 6-8)
 - V_m = sum of E_x of all ions
 - E_x = equilibrium potential
 - $V_m = E_{Na^+} + E_{K^+} + E_{Cl^-} + E_{Ca^{2+}} + \dots$
 - osmolarity will change as result, eq potential, will change
 - V at which electron and concentration, Gs for a component are balanced

Alter PM permeability - FIGURE 6-15 (ligand-gated channel)

- Increase perm \rightarrow ions move (biggest impact) \rightarrow change V_m = graded potential
 - When we change membrane potential = graded potential
 - Whether were going -70 to -60, or -70 to -80
 - diffusing through - distance problem
 - ex: window open near - feel cold air in hot room, but as move away from window, going to feel no change and still warm
 - **local** changes of when we change the permeability - near to where we are, less further away, to where we get points on our membrane that doesn't change
 - **local** change in ion flow- small points on a membrane where we are doing this on a cell
 - could have voltage or mechanically gated channels besides ligand.
 - change in V_m isn't going to effect mechanically gated channels

- Voltage gated channel, change charge,- when we get right V_m , our voltage channels may open up
- **Graded Potentials (GPs)**
 - o Terms changes from rest = equates to steady state- 70mV (aka polarized)
 - o Cells at rest are polarized
 - o start of with polarized cell
 - o mV = units of measurement → representation of membrane potential = V_m
 - o depolarized= less negative = stimulus
 - become less polarized b/c 0= no polarization, decreased polarization : MAKE cell less polarized
 - stimulatory stimulus- KEY , when depolarize we stimulate cell -
 - o hyperpolarized = more polarized then when its at rest= more negative = inhibitory stimulus
 - o repolarization= to rest - returning to polarization -FIGURE 6-14
 - o *** be able to tell which is which based on chart/graph/ in general FIGURE 6-16
 - o Characteristics
 - cells regular mechanisms take it back to -70 , back to steady state/resting point
 - stronger stimulus→ increase size (so signal)
 - bigger change in V_m
 - Bigger distance→ decrease size (so signa)

- As go further away from stimulus, response by the cell goes down = PROBLEM
 - **Have to find some other way to work with electrical things that aren't based on graded potential
 - What if GP occurs near V-gated channels?
 - IF we get right Vm around V-gated channels , can open
- **Action Potentials (APs)**
 - In excitable cells, GP can cause:
 - Quick, large changes in Vm
FIGURE 6-19
 - when we get right GP in special cells nearby= neurons are one of these special cells
 - All - or nothing event , not like GP where there is more variability
 - Either looks like this or nothing at all
 - EX: pregnancy , either pregnant or not, cannot be in between
 - Components needed:
 - Graded potential near voltage gated channels
 - 1. Voltage gated Na⁺ channels with inactivator —FIGURE 6-19
 - 2. Voltage gated K⁺ channels