

# Biochemistry Exam #2

## Lecture 9: Membrane Structure and Function (continued)

### Membrane fluidity

*Temperature changes* = produce heat = kinks in membrane

- Temp at which you go from gel-like to fluid-like = Phase transition. Temp at which this happens =  $T_m$  = depends on length of HC chain
- Longer chain = higher  $T_m$  because of more bonds = more rigidity

### Cholesterol

#### Composition

- Bending at cis double bond
- Decrease  $T_m$  because of unsaturation
- Kinks caused by double bonds = favors packing = increases fluid state

### Permeability of Lipid Bilayers

High permeability = small hydrophobic molecules, small uncharged polar molecules

Low permeability = larger uncharged polar molecules, ions

- Pores across membrane help transport ions, amino acids, vitamins, etc.

Lipophilic = lipid-loving

Ex: Digoxin, Oxycodone = highly lipophilic, stay in body longer

### Proteins and Membrane Processes

Proteins mediate membrane function

Examples:

Lipoproteins

Integral proteins = provide channels, pores

Transporters

Enzymes = kinase, protease, lipase, etc.

\*all important for signal transduction pathways

In lipid bilayer, proteins and ion channels sit across the membrane to transport otherwise impermeable molecules into the cytosol

Notes

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## Lecture 10: Cell Signaling (continued)

- PMCA activated by CaM → on cell wall, pumps Ca<sup>++</sup> out of cell using ATP = muscle contraction and relaxation
- CREB forms your memory

### \*\*cAMP dependent activation pathway\*\*

Relevant in cardiac function/skeletal muscle

Special GPCRs in <3 = beta receptors

AC = adenylyl cyclase = converts ATP to cAMP

cAMP activates PKA = protein kinase A

PKA activates ryanodine receptors to release Ca<sup>++</sup> which activates CAM

CAM activates TNN which causes contraction

To turn off:

PDE cleaves ester group on cAMP → now 5'-AMP

Without cAMP = no functions = relaxation

\*important = phosphorylase inhibitors (caffeine)\*

### PKA

Regulatory domain and catalytic domain

Known as Ser/Thr kinase

C + R bound = not activated

cAMP binds to R domain, then C domain gets detached, both go to activate different pathways

### **After GPCRs are activated:**

- Adrenergic receptor: fight or flight - <3 rate
- Histamine receptor: immune rxn - gastric acid release
- Muscarinic receptor: rest&digest - muscle contract - salivation
- Serotonin antagonist: neurotransmitter release
  - Activator: Prozac

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