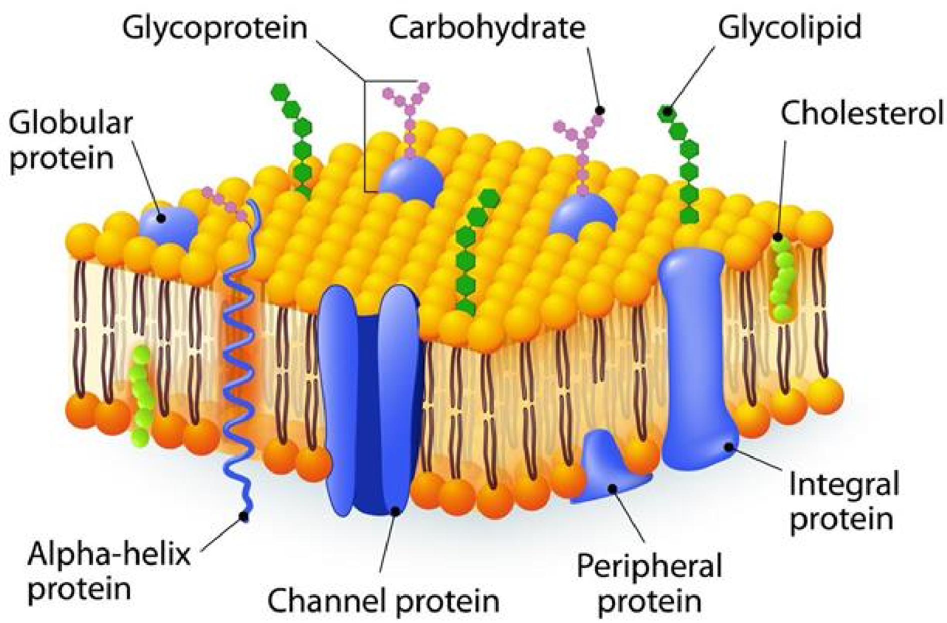
Day 16 - Biology - 9-19-24 to 9-20-24

WARMUP (10 min) Unit 2

NO CELL PHONES, EARBUDS, HEADPHONES – Submit after completing.



1) What is the role of **cholesterol** in the phospholipid bilayer?

2) Compare the structure/function of the **channel proteins** vs the **integral proteins**.

Submit WarmUp to Schoology as soon as completed.

NOTES:

Cholesterol plays a crucial role in maintaining the fluidity and stability of the phospholipid bilayer, which forms the foundation of cellular membranes. It is embedded between the phospholipid molecules, particularly in the hydrophobic core of the bilayer. Cholesterol acts as a fluidity buffer, preventing the membrane from becoming too rigid in cold temperatures by disrupting the packing of phospholipids, which would otherwise crystallize. Conversely, in warmer conditions, cholesterol limits excessive fluidity by stabilizing the fatty acid chains of the phospholipids, keeping them from moving too freely.

Additionally, cholesterol contributes to membrane stability by making it less permeable to small, water-soluble molecules. Its rigid structure helps create a more ordered packing of the phospholipids, reducing the likelihood of unwanted substances passing through the membrane. This balance between fluidity and rigidity ensures that the membrane remains functional, allowing for controlled transport of molecules, signal transduction, and cell communication. Thus, cholesterol is integral in maintaining both the structural integrity and functionality of cellular membranes.

Channel proteins and integral proteins both play essential roles in the cell membrane, but they differ in structure and function. Channel proteins are a specific type of integral membrane protein that form pores or channels through the lipid bilayer, allowing specific molecules (typically ions or water) to pass in and out of the cell. Their structure usually includes a hydrophilic interior that accommodates polar or charged molecules, while the exterior part of the protein interacts with the hydrophobic lipid bilayer. The channels can be either gated (opening and closing in response to stimuli such as voltage or ligand binding) or non-gated, allowing constant flow. Their main function is to facilitate passive transport, moving substances down their concentration gradient without the need for energy.

In contrast, integral proteins represent a broader category that includes all proteins permanently embedded in the membrane, not just channel proteins. These proteins often have one or more hydrophobic regions that anchor them into the lipid bilayer. While some integral proteins function as channels, others serve different roles, such as receptors, transporters, or enzymes. Their function is not limited to passive transport; many also participate in active transport, signaling, or structural support. For example, some integral proteins actively move molecules against their concentration gradient using energy from ATP. Thus, while channel proteins are specialized for facilitating selective transport, integral proteins have a wider range of roles in maintaining cell function and communication.