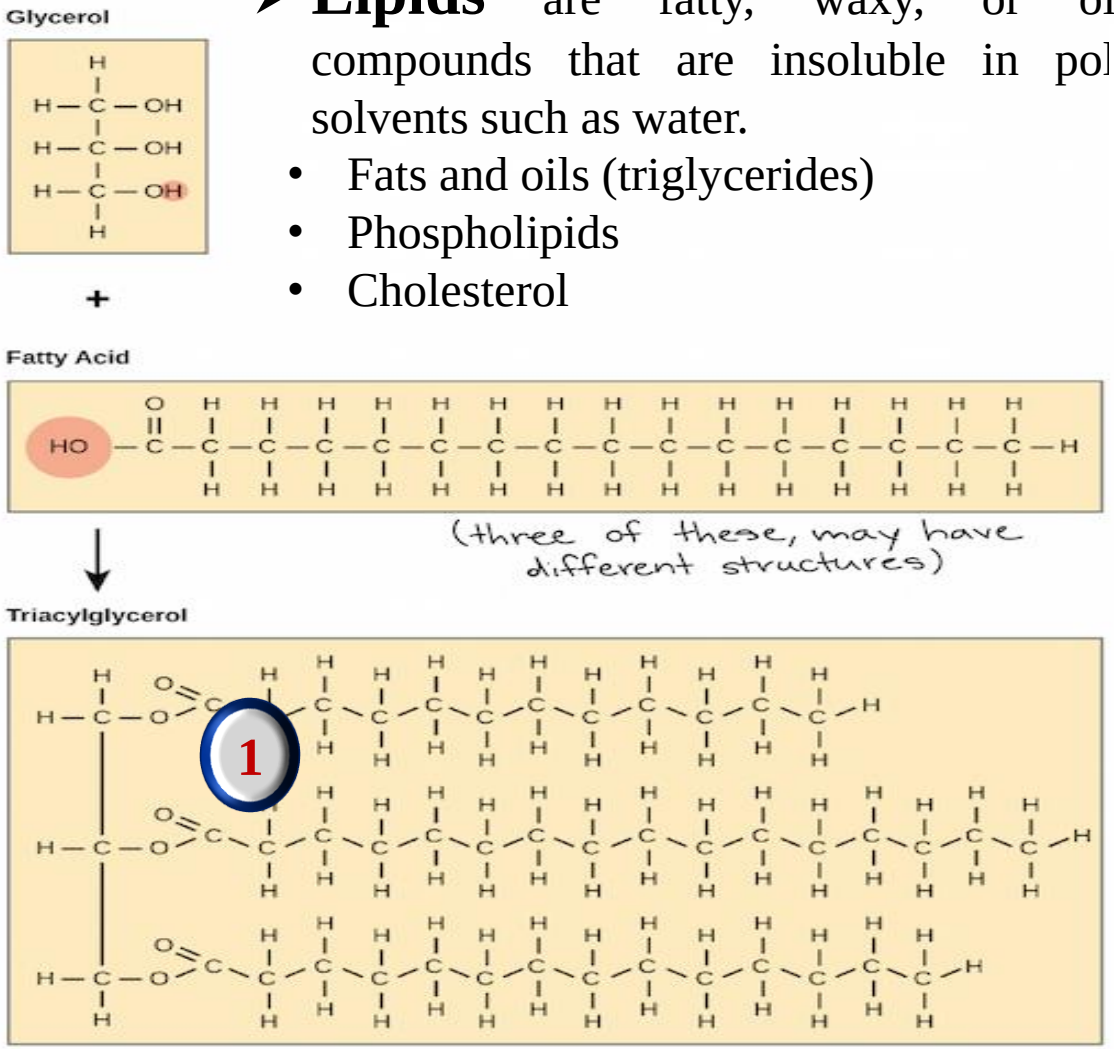
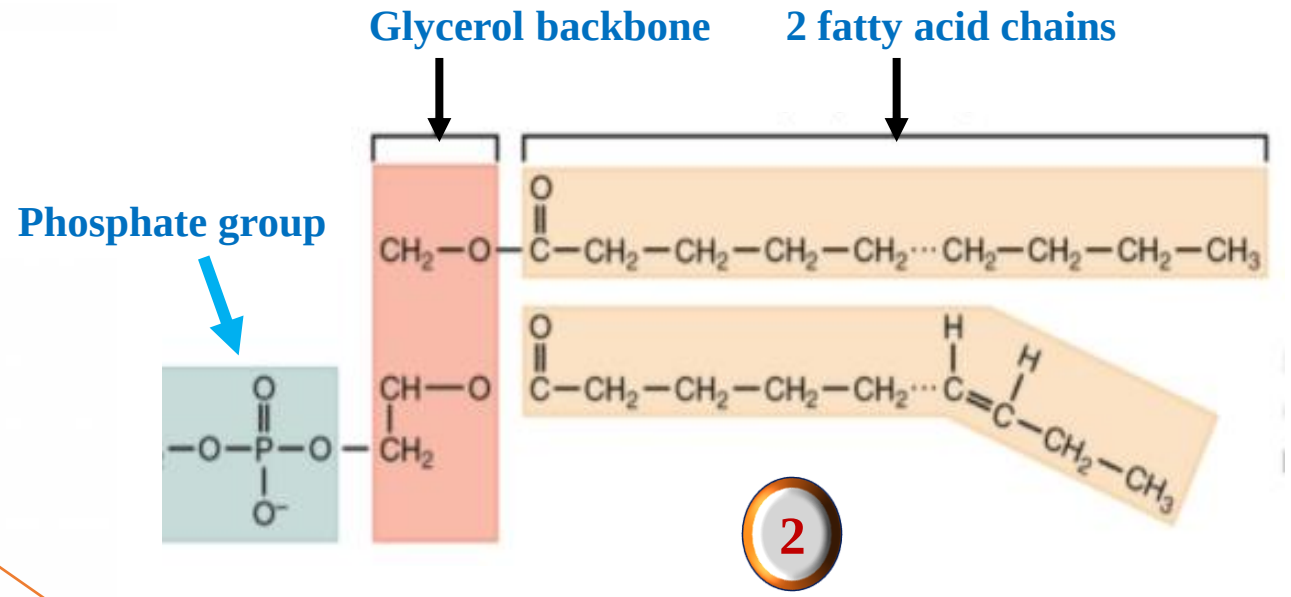
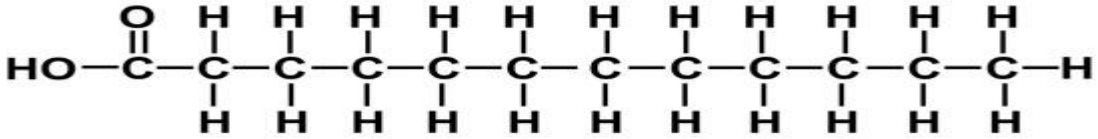
- **Lipids** are fatty, waxy, or oily compounds that are insoluble in pol solvents such as water.
  - Fats and oils (triglycerides)
  - Phospholipids
  - Cholesterol



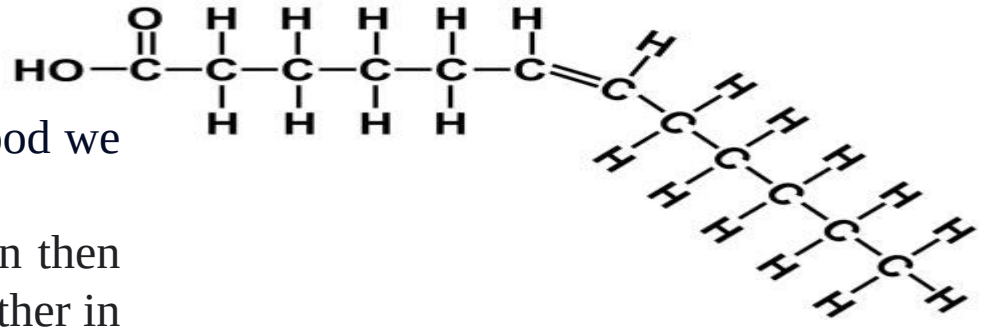


Phospholipid

Saturated Fatty Acid

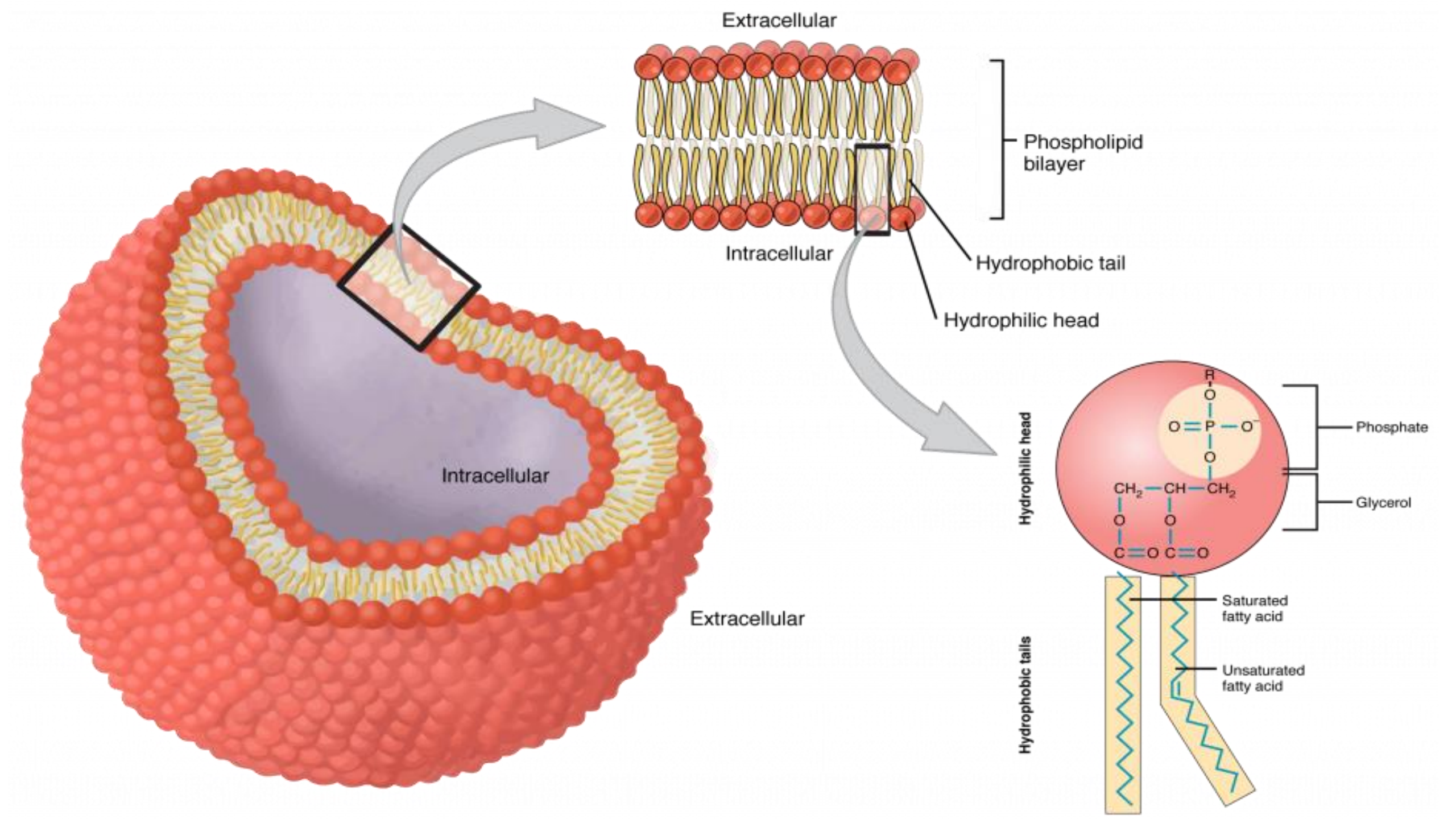


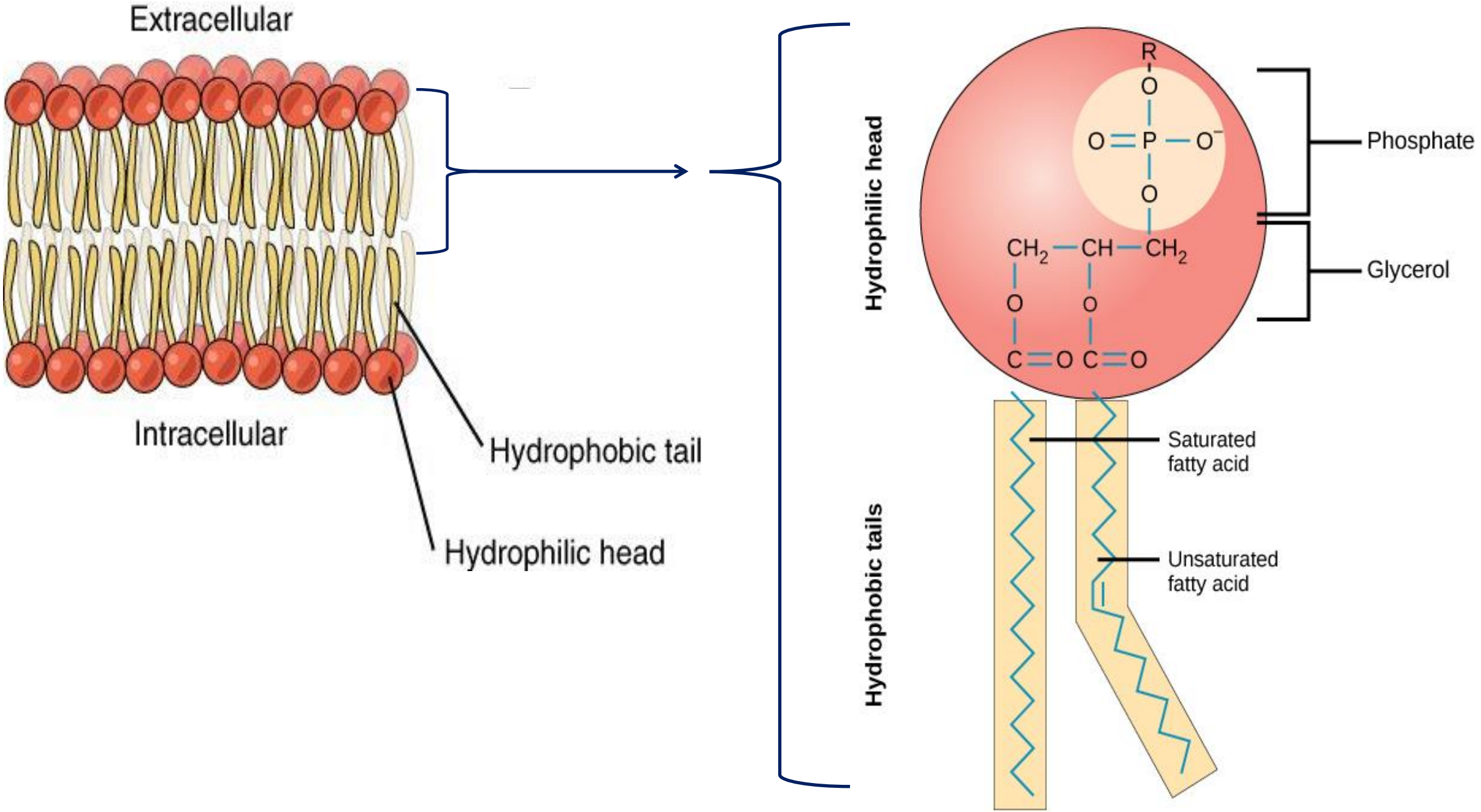
Unsaturated Fatty Acid

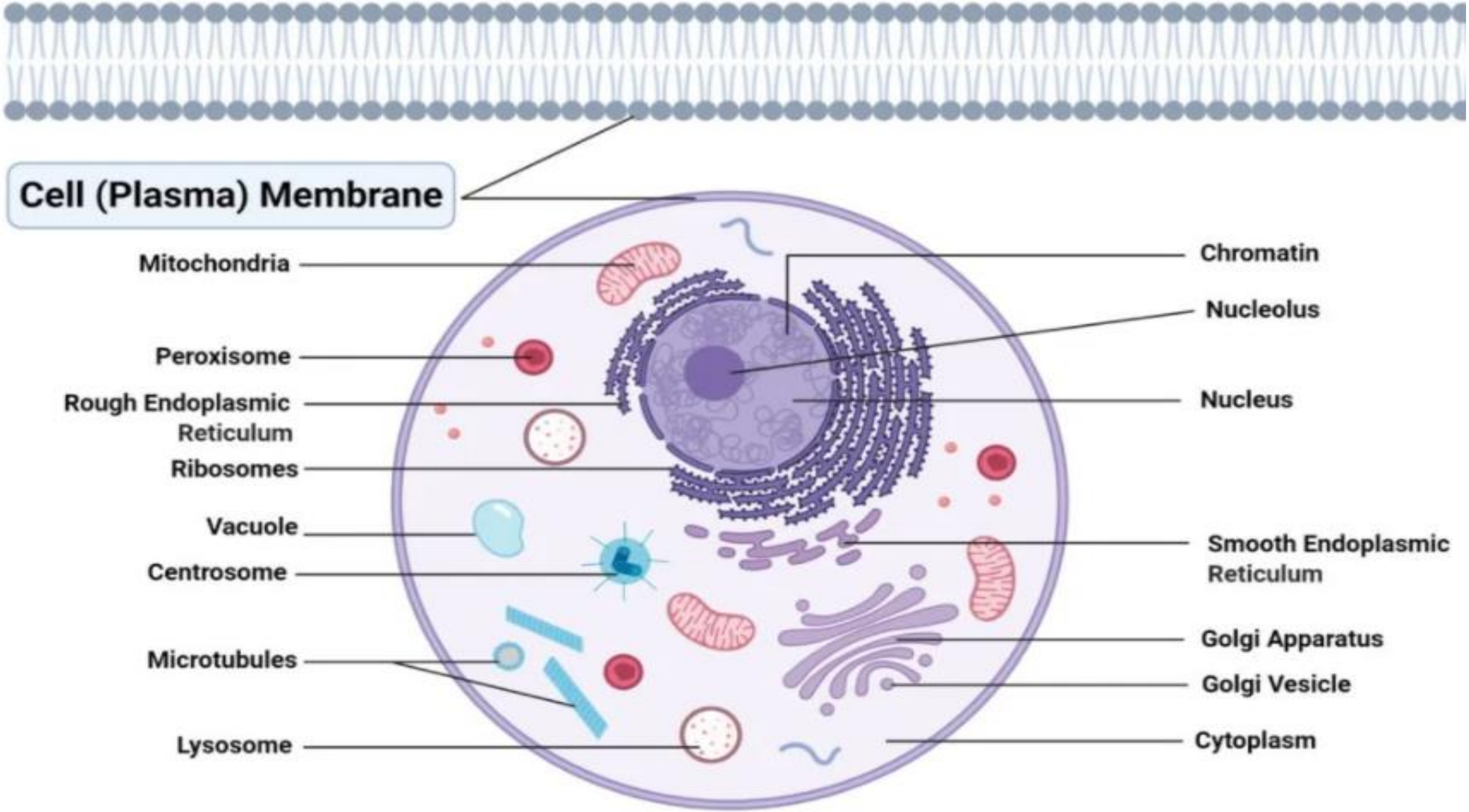


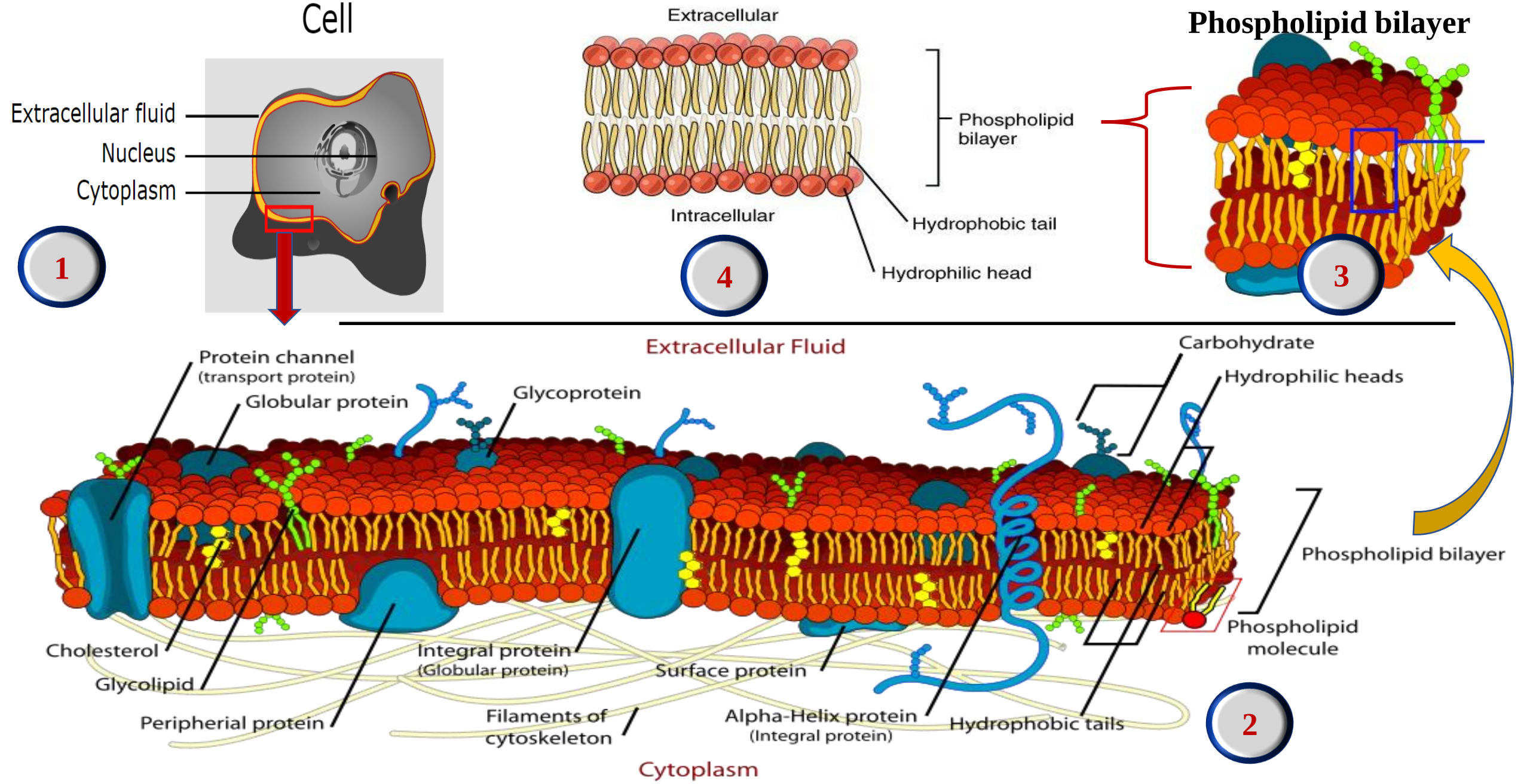
Fatty acids are the building blocks of the fat in our bodies and in the food we eat.

During digestion, the body breaks down fats into fatty acids, which can then be absorbed into the blood. Fatty acid molecules are usually joined together in groups of three, forming a molecule called a triglyceride.


Extracellular
Phospholipid bilayer
Intracellular
Hydrophobic tail
Hydrophilic head
Intracellular
Extracellular
Hydrophilic head
Phosphate
Glycerol
Saturated fatty acid
Unsaturated fatty acid
Hydrophobic tails

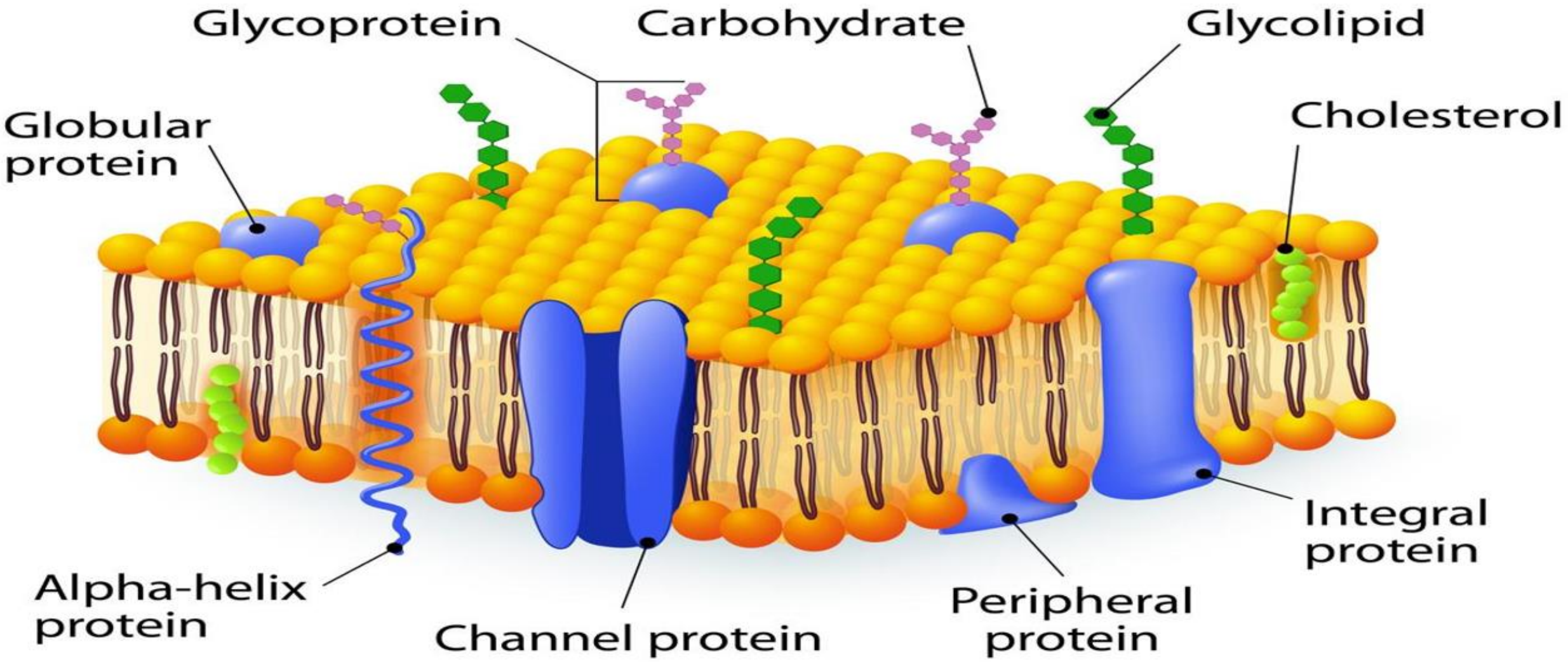

Extracellular
Intracellular
Hydrophobic tail
Hydrophilic head
Hydrophilic head
Hydrophobic tails
R
O
O = P — O⁻
O
CH2 — CH — CH2
O O
C = O C = O
Phosphate
Glycerol
Saturated fatty acid
Unsaturated fatty acid


Cell (Plasma) Membrane
Mitochondria
Peroxisome
Rough Endoplasmic Reticulum
Ribosomes
Vacuole
Centrosome
Microtubules
Lysosome
Chromatin
Nucleolus
Nucleus
Smooth Endoplasmic Reticulum
Golgi Apparatus
Golgi Vesicle
Cytoplasm



- A plasma membrane is composed of lipids and proteins where the composition might fluctuate based on fluidity, external environment, and the different stages of development of the cell.

Plasma Membrane (Cell Membrane/Plasmalemma)

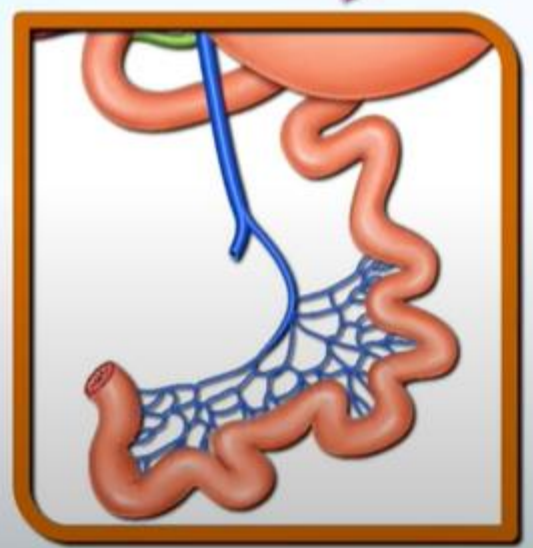


Chemically a cell membrane is composed of four components: (1) Phospholipids (2) Proteins (3) Carbohydrates (4) Cholesterol

Lipoproteins

Introduction

Group of proteins synthesized



Small intestine

Liver

Transport hydrophobic lipids such as cholesterol, triglycerides, and phospholipids throughout the body

Hydrophobic lipids

Cholesterol

Triglycerides

Phospholipids

Lipoproteins — Introduction

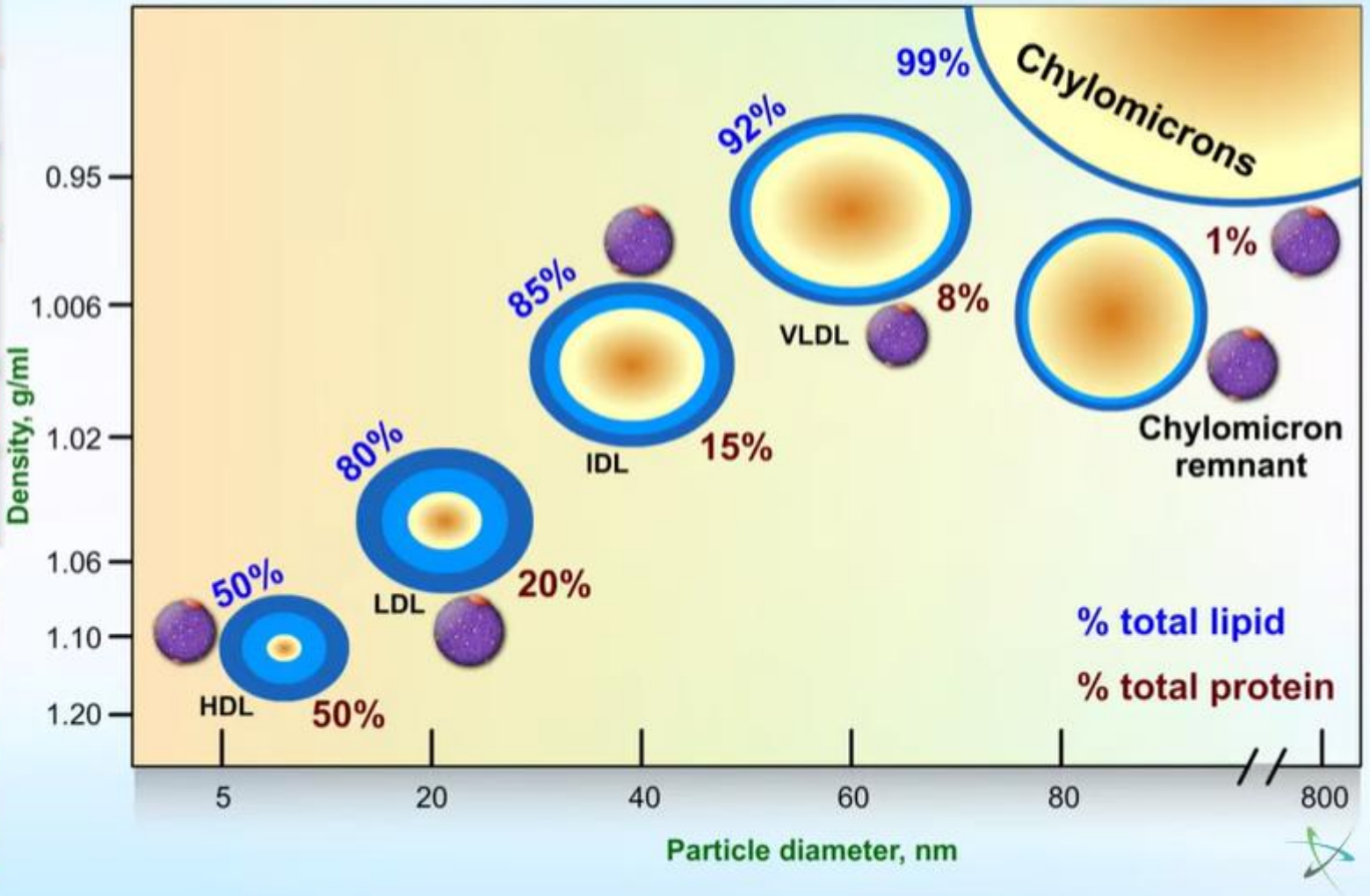
MEDVIZZ

Based on the density of their contents

- Chylomicron
- Chylomicron remnant
- **VLDL** (very low density lipoprotein)
- **VLDL** Remnant / **IDL** (Intermediate density lipoprotein)
- **LDL** (low density lipoprotein)
- **HDL** (high density lipoprotein)

Note :

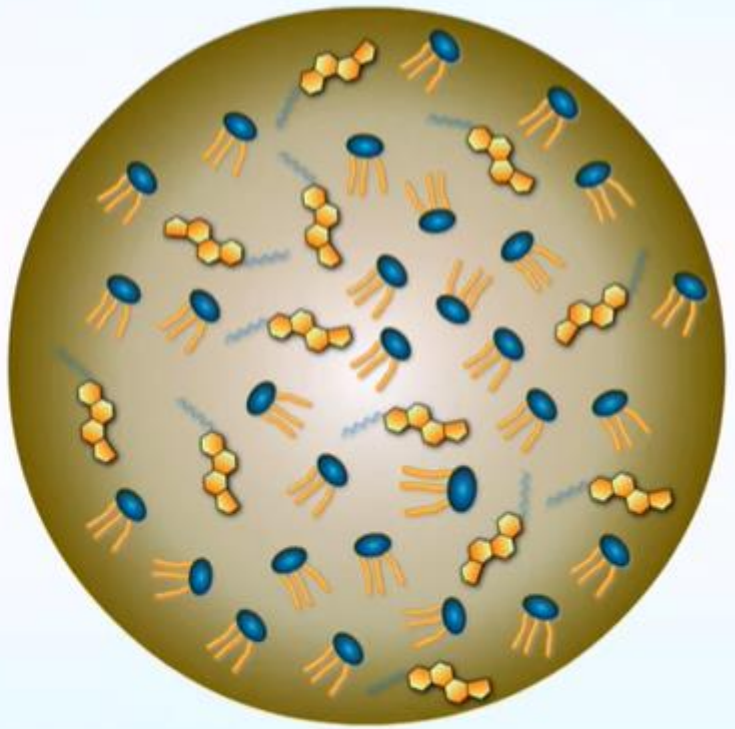
* Chylomicrons least dense
* HDL most dense [Q]



Lipoproteins

Basics of Lipid transport

- Lipids are non-polar substances Q (insoluble in water)
- Transport medium in our body is Blood, which is polar Q
- Lipids are insoluble in a polar medium, so they cannot be transported directly or alone
- Lipoproteins play a crucial role in transportation of lipids by making them polar (soluble in water) with a lipid and protein combination Q

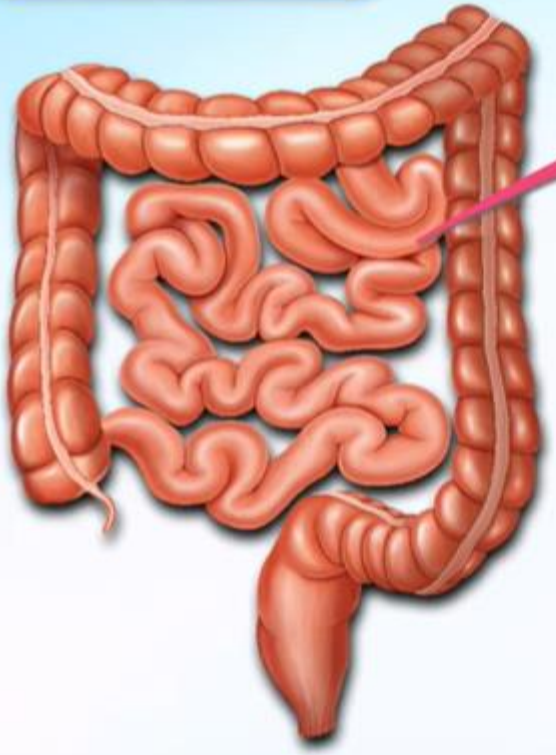


Lipoproteins

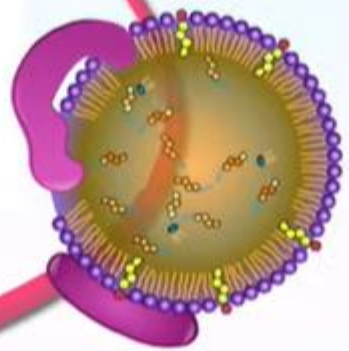
Chylomicrons

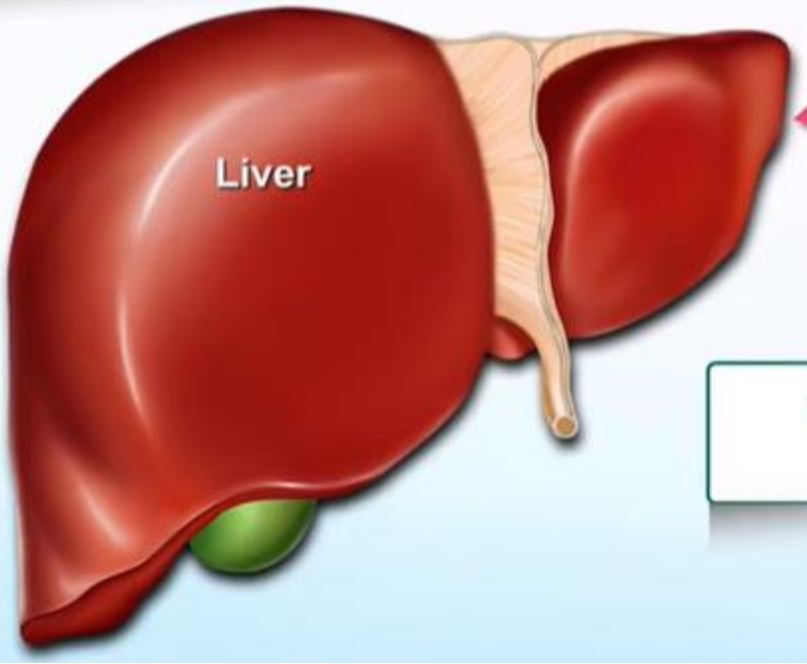
MEDVIZZ

Functions



- Transport dietary triglycerides from the intestine to peripheral tissues Q
- Transport cholesterol to the liver in the form of chylomicron remnants





Chylomicrons that are depleted of triglycerides

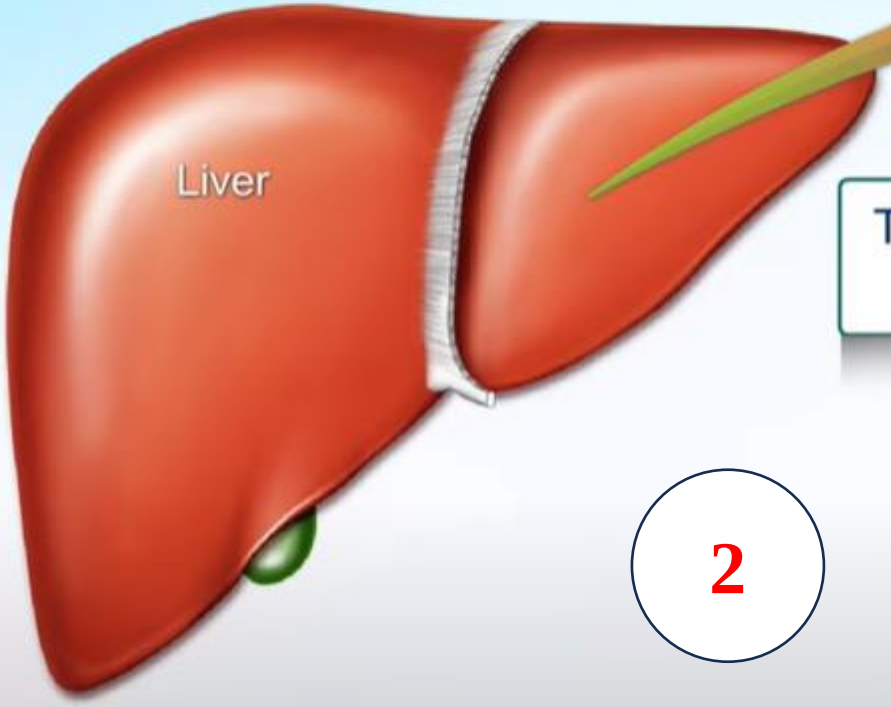
1

Lipoproteins

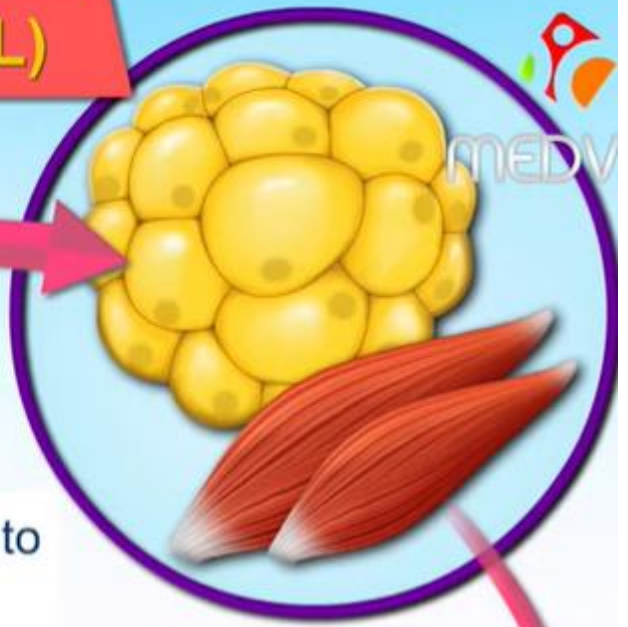
Very-low-density lipoprotein (VLDL)

VLDL

Functions

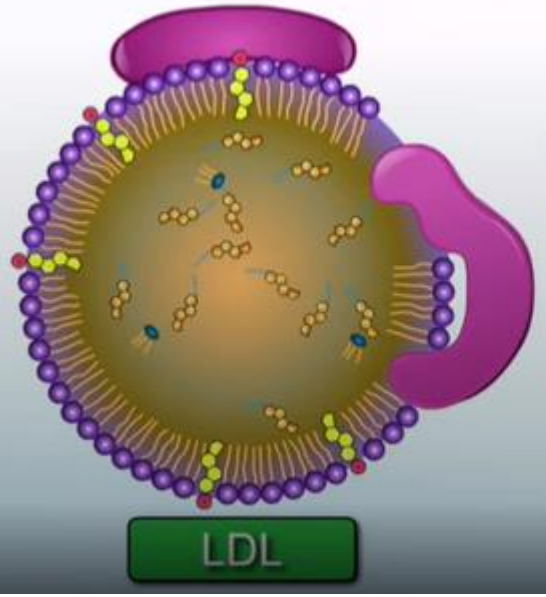


Transports triglycerides from the liver to peripheral tissues Q



2

Converted to LDL by hydrolysis of fatty acids by capillary lipoprotein lipase



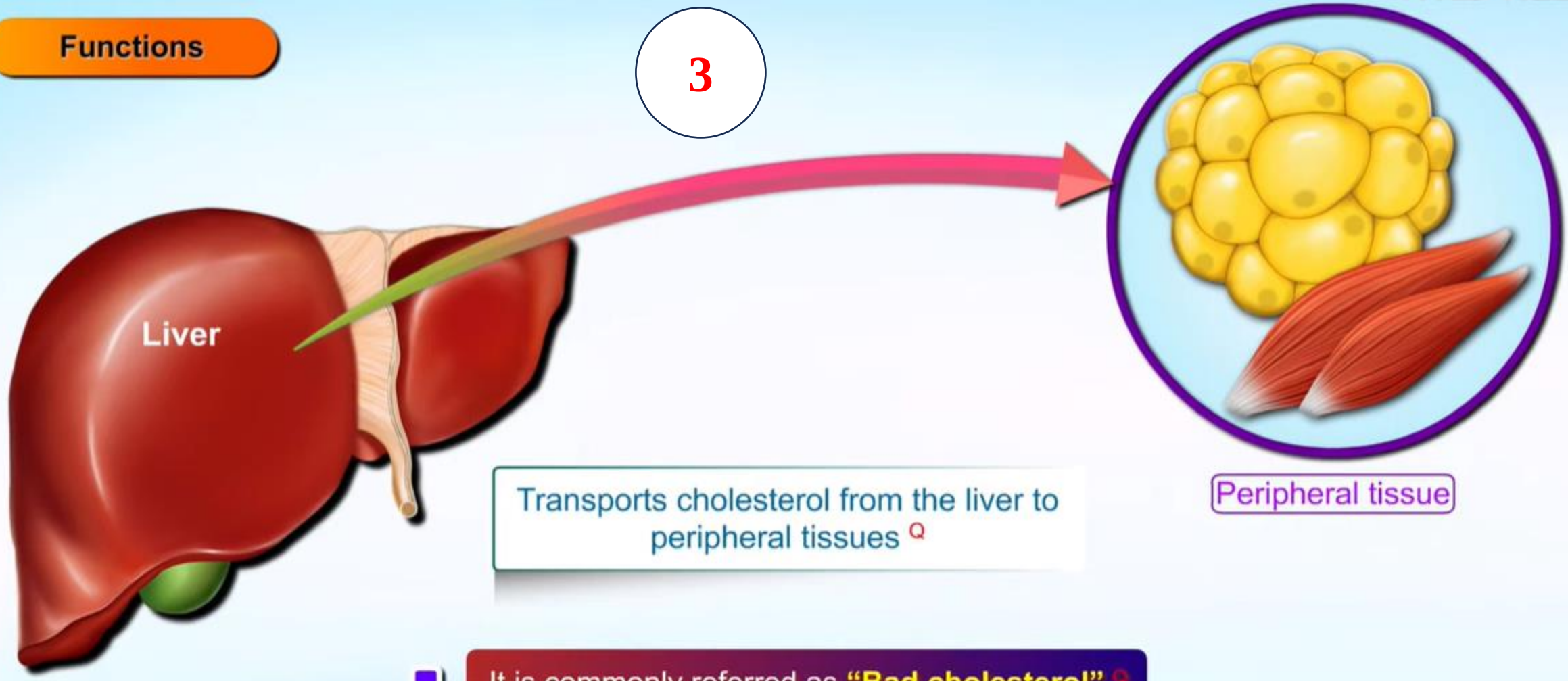
Lipoproteins

Low-density lipoprotein (LDL)

MEDVIZZ

Functions

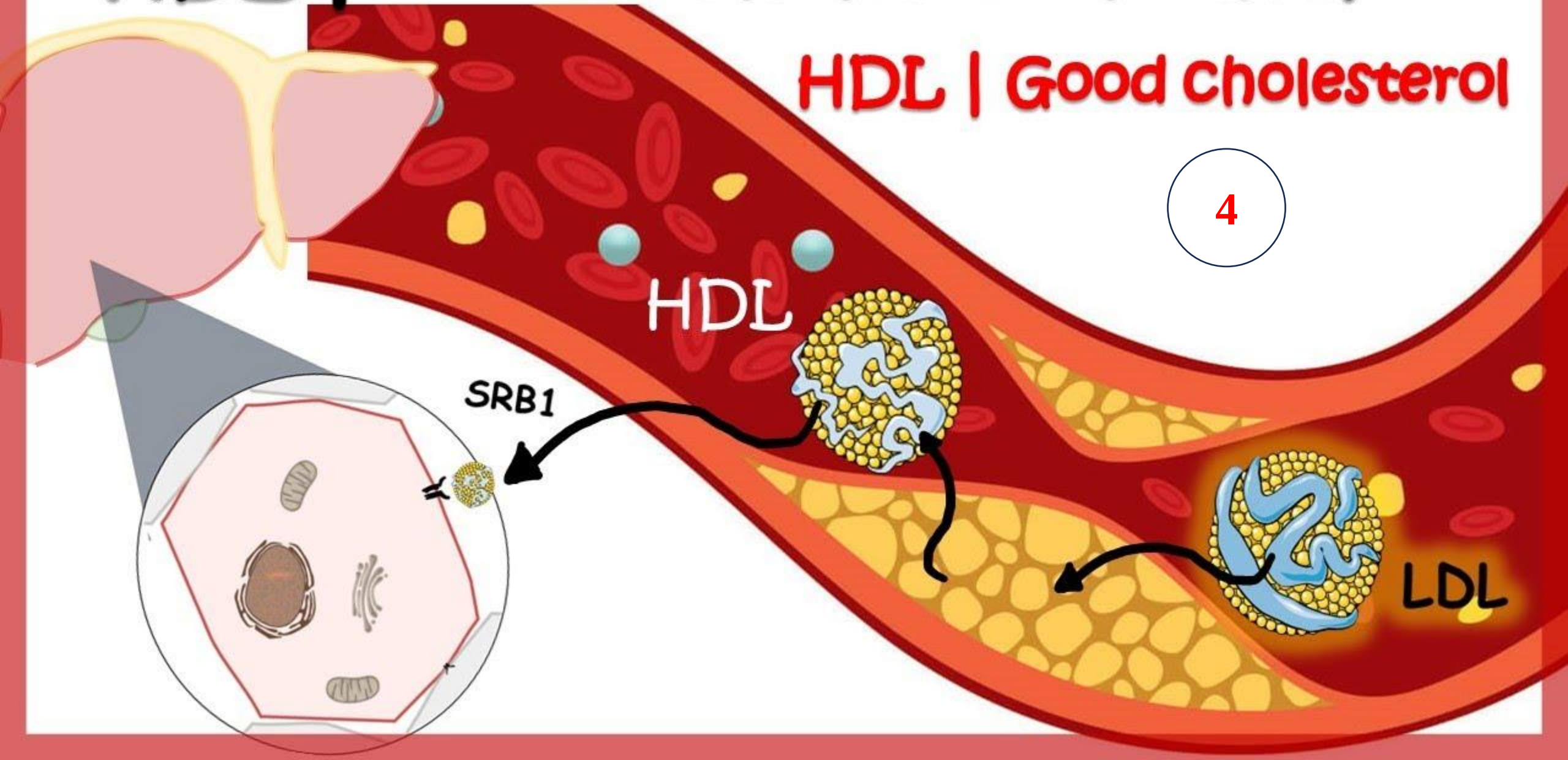
3



- Transports cholesterol from the liver to peripheral tissues Q

- It is commonly referred as **"Bad cholesterol"** Q

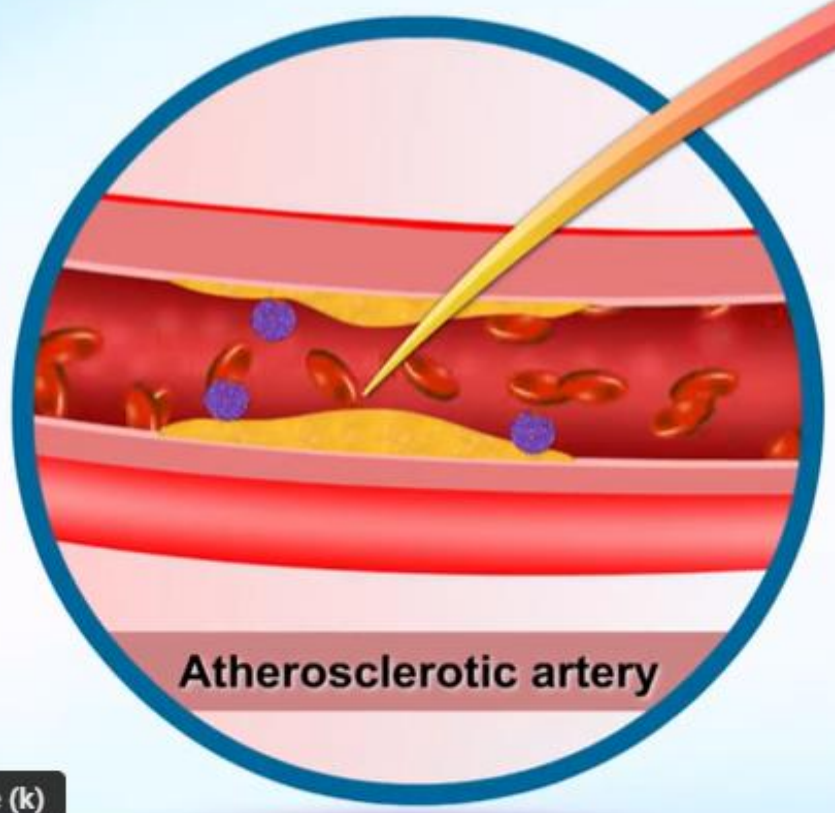
HDL | reverse cholesterol transport



Lipoproteins

High-density lipoprotein (HDL)

Functions



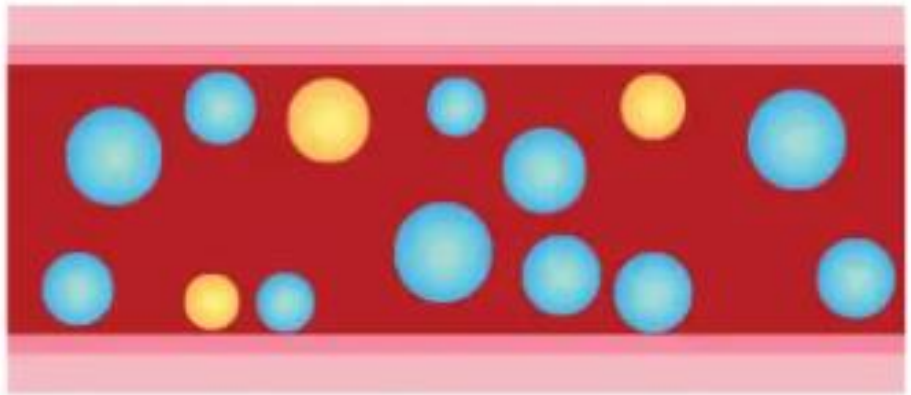
Transports cholesterol from peripheral tissues (atherosclerotic arteries) to the liver (reverse cholesterol transport), where it is excreted via bile Q

ause (k)

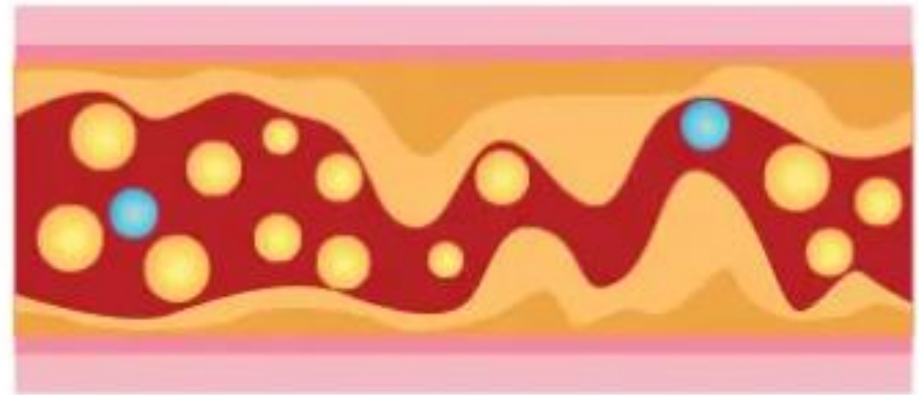
Cholesterol - Arteries

HDL Cholesterol
(Good)

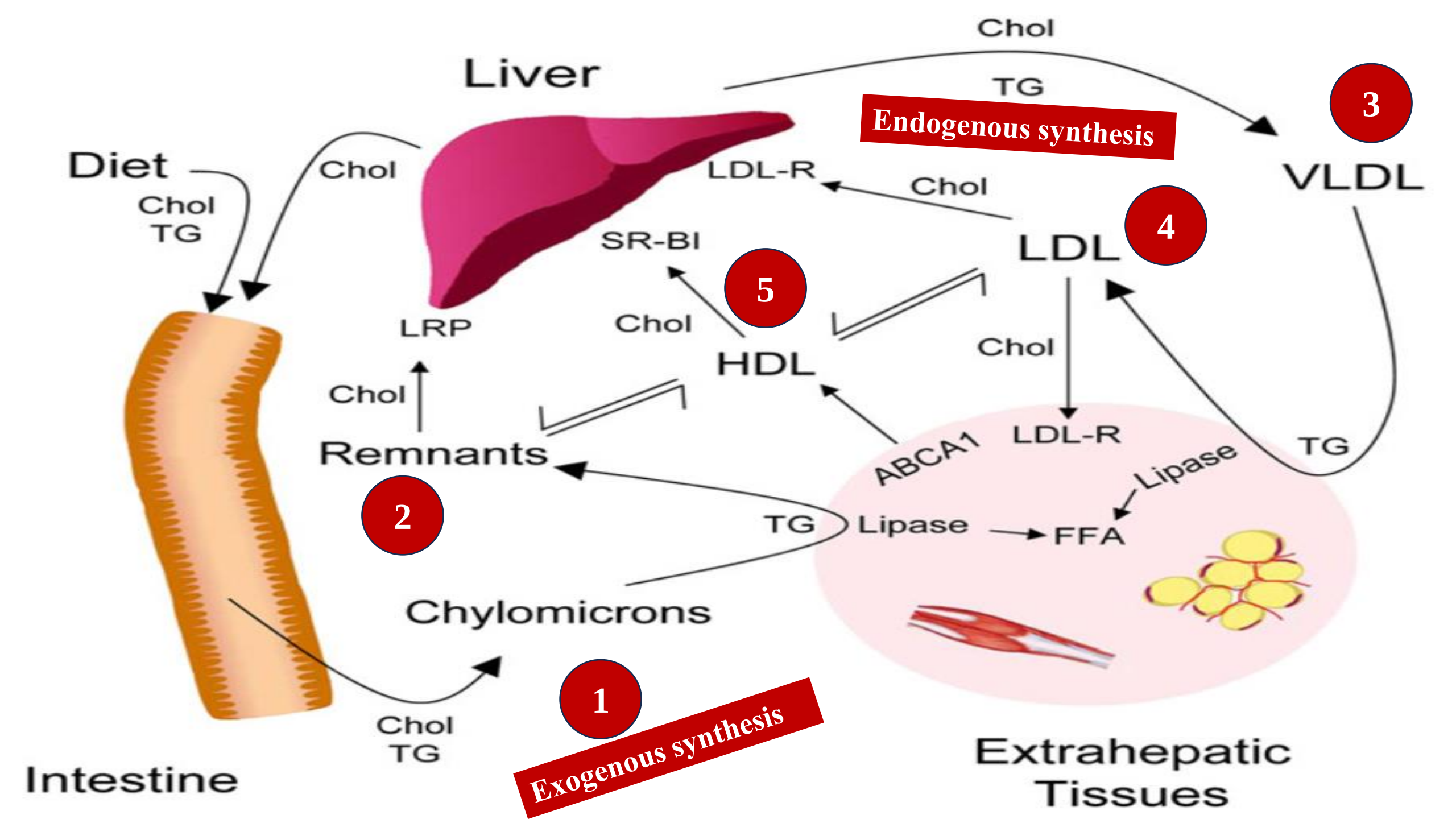
LDL Cholesterol
(Bad)



Normal Artery



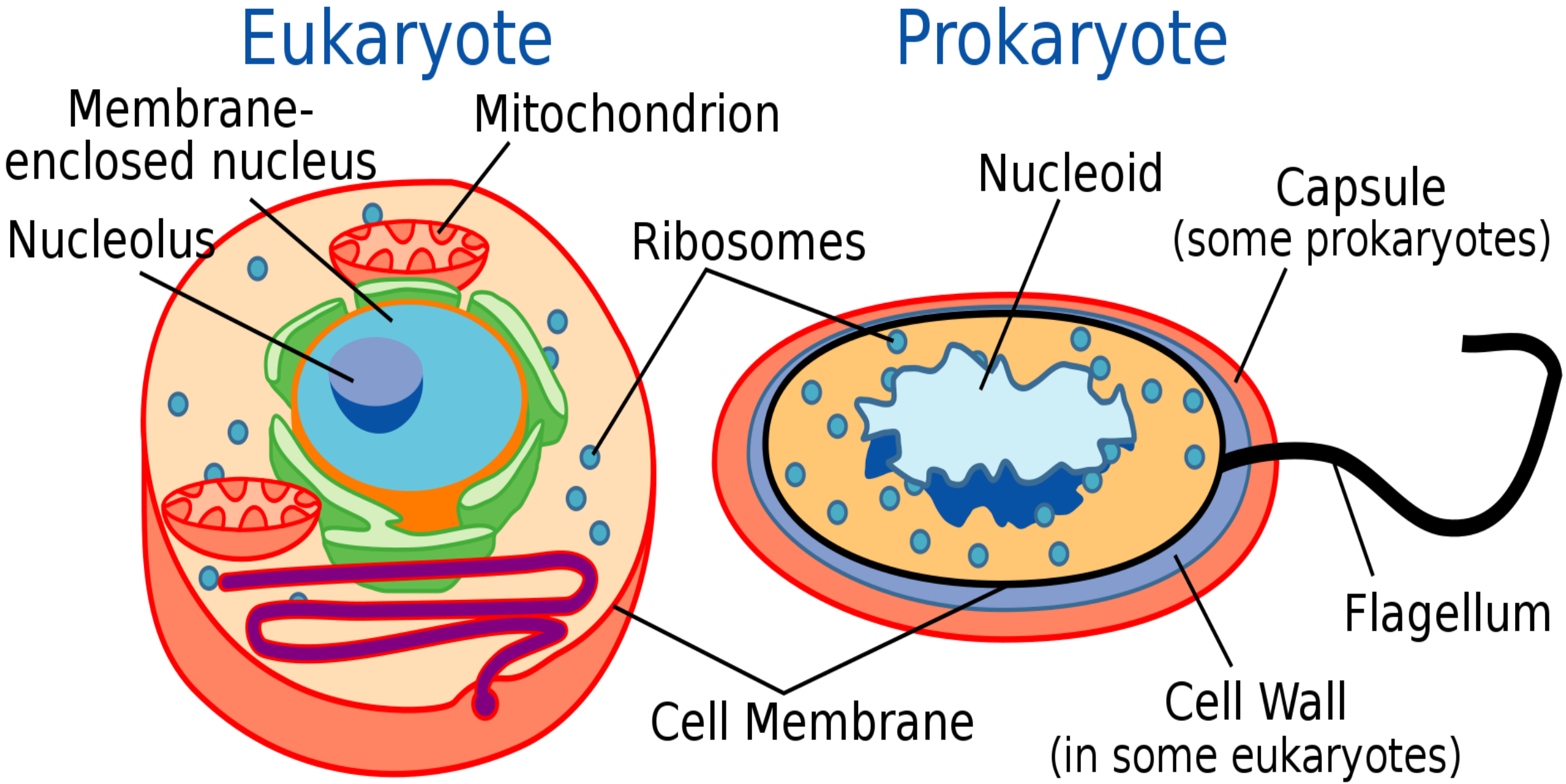
Artery Narrowed


Liver
Chol
TG
Endogenous synthesis
3
VLDL
Diet
Chol
TG
Chol
LDL-R
Chol
4
LDL
SR-BI
5
LRP
Chol
HDL
Chol
Chol
Remnants
2
ABCA1
LDL-R
TG
Lipase
TG
Lipase
FFA
Chylomicrons
Chol
TG
1
Exogenous synthesis
Intestine
Extrahepatic
Tissues

Overview of lipoprotein metabolism.

- Chylomicrons deliver triglycerides derived from the intestine into the blood. Following triglyceride lipolysis to free fatty acids by peripheral tissues, chylomicron remnant particles are cleared by the liver via the LDL receptor.
- The liver uses endogenously synthesized triglyceride and cholesterol as well as lipids derived from chylomicron remnants to synthesize VLDL.
- Triglyceride-rich VLDL is converted by lipolysis to intermediate-density lipoprotein (IDL; not shown) and then cholesterol-rich LDL. Peripheral tissues and the liver take up LDL-derived cholesterol via the LDL receptor.
- HDL accepts cholesterol from peripheral tissue for transport back to the liver.

Cell


Eukaryote
Prokaryote
Membrane-
enclosed nucleus
Mitochondrion
Nucleolus
Ribosomes
Nucleoid
Capsule
(some prokaryotes)
Flagellum
Cell Membrane
Cell Wall
(in some eukaryotes)