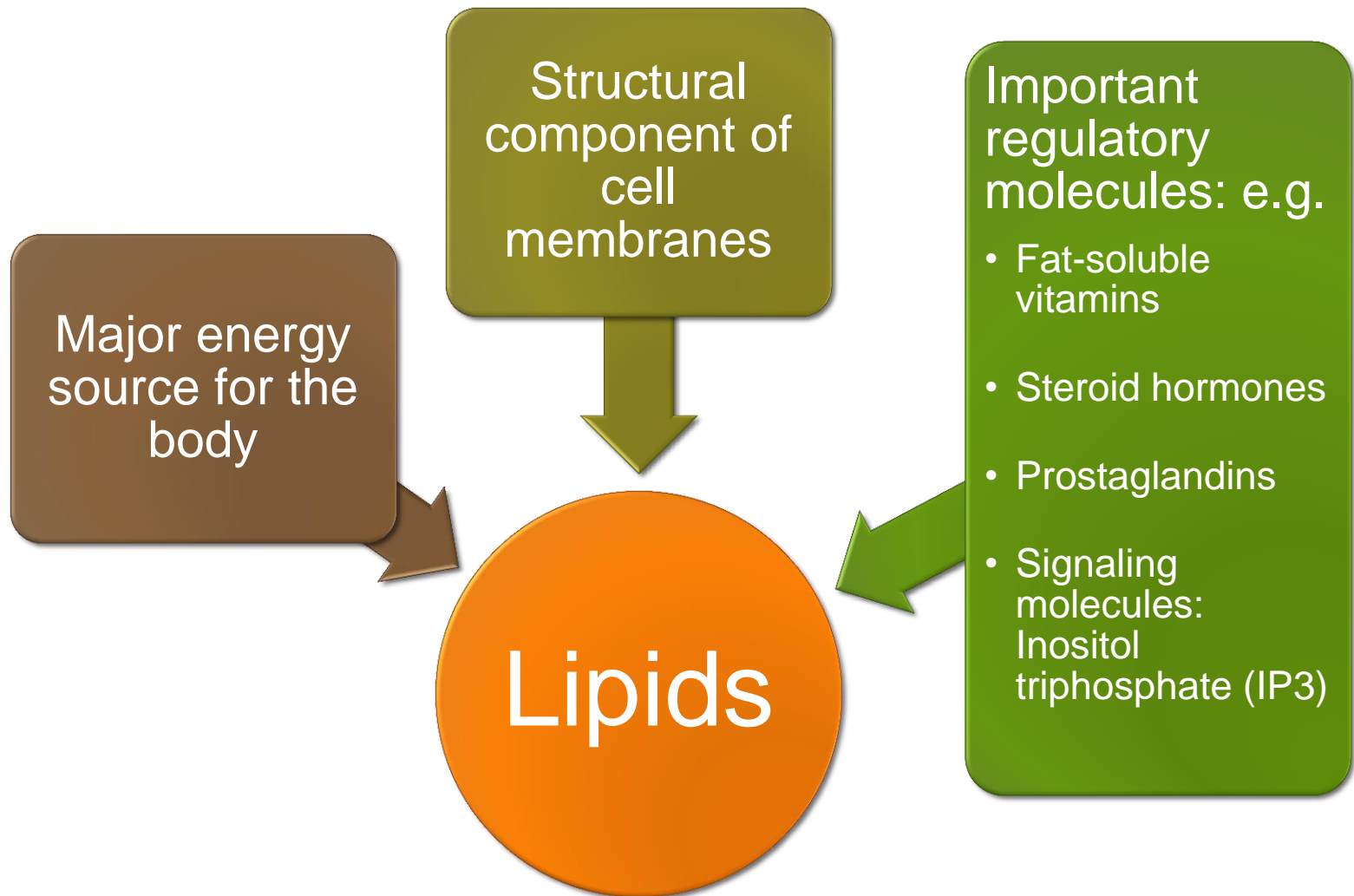


LIPID COMPOUNDS

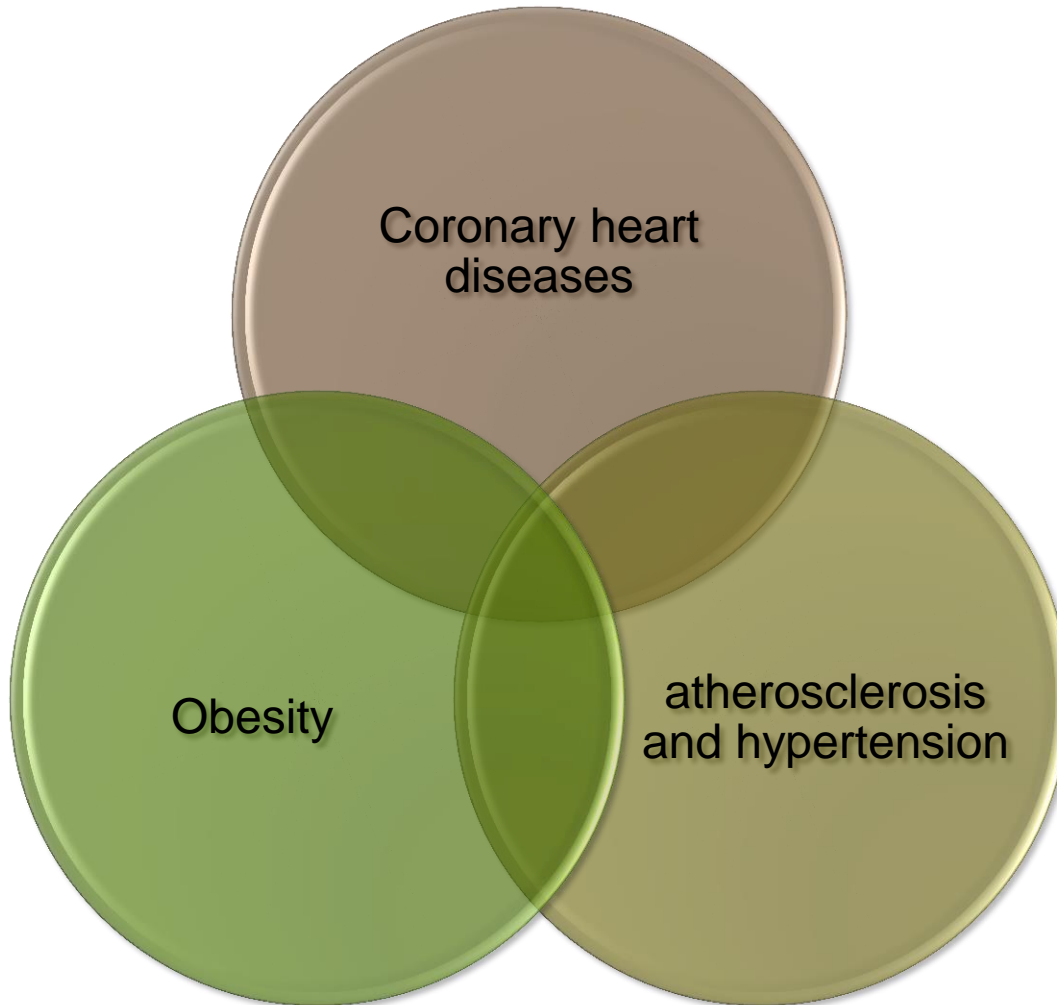
Color index:
Red: important.
Green: Further
explanation.
Orange: Notes.

- ❖ Functions of lipid compounds.
- ❖ Clinical problems.
- ❖ Lipid compounds of physiological importance.
- ❖ Complex lipids. ❖ Phospholipids, glycolipids and lipoproteins.

Functions of Lipids:



Lipids and clinical problems:



Note:

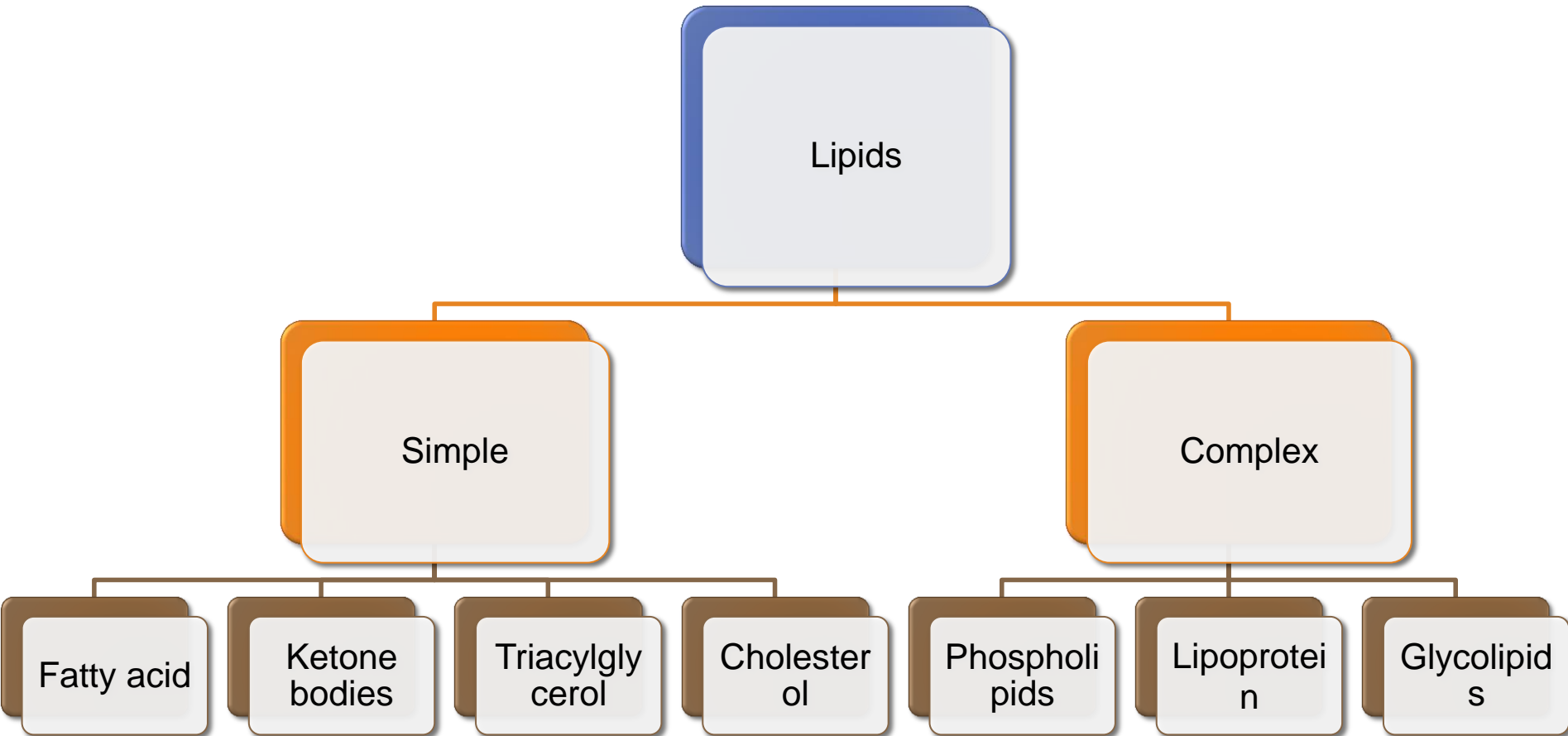
Obesity: maybe genetic, endocrine stimulate.

Note:

Atherosclerosis: is elastic fiber becomes rigid

Lipids:

- ❖ **Heterogeneous** (various) group.
 - ❖ Relatively **water-insoluble** (Exception ketone bodies).
 - ❖ **Soluble in non-polar** solvents.
- Note: Main characteristic for lipid is fats are **insoluble in water**.
But some fats are **soluble** or **part of soluble** in water



Simple:

- Fatty acids:
- **Amphipathic**: Both hydrophobic & hydrophilic parts.
- Fatty acids are classified by:

- 1) Chain length:

- **Short, medium, long, very long**

- Long chain like: **Palmitic acid** 16:0 (16 refers to carbon number and 0 refers to double bond).
- Very long chain like: **Nervonic acid** 24:1 (24 refers to carbon number and 1 refers to double bond).

Note:

Short (4-10)

Long (10-18)

Very long (more than 20)

- 2. Degree of saturation
 - ✓ **Saturated**: no double bond
 - ✓ **Unsaturated**: mono- (one double bond) or poly- (more than one double bond)
- 3. Essential fatty acid:
 - ✓ **Linoleic acid**, 18:2 (18 carbon atom and 2 double bonds)
 - ✓ **Linolenic acid**, 18:3 (18 carbon atom and 3 double bonds)
 - * The precursor of prostaglandins, arachidonic acid 20:4, is **also considered essential fatty acid** if linoleic acid is deficient from diet.
- 4. Plasma of fatty acid:
 - ✓ **Esterified form (~90%)**: in triacylglycerol, cholesterol ester, phospholipids (as part of lipoproteins)
 - ✓ **Free-form (unesterified)**: Transported in association with **albumin**.

Note:

- Essential lipids: the body can't synthesize or synthesize with small amount.
- Arachidonic is semi-essential fatty acid.

Note:

- Free form is the active form.
- Esterified form is for transforming.

- **Triacylglycerols:**

1. Storage form in **adipose tissue**
2. ~ 90% of dietary lipids
3. Contain from **Glycerol + 3 fatty acids**
4. Blood transport: **Chylomicrons** and **VLDL**.

Note:

Triacylglycerol is the storage form in human body.

- **Ketone bodies:**

- **Water-soluble.**
- **Diabetic ketoacidosis:** results from a **shortage of insulin**; in response the body switches to burning fatty acids and producing acidic ketone bodies.
- **Examples of Ketone bodies:**
 1. **Acetone**
 2. **Acetoacetate**
 3. **β -Hydroxybutyrate**

Note:

Ketone bodies are the only lipid soluble in water (Lipid alone) because phospholipid and lipoprotein kind of soluble in water.

- **Cholesterol:**

- ✓ **Major sterol** of animal tissues.
- ✓ Component of cell membranes.
- ✓ Precursor for:
 - **Bile acids & salts.**
 - **Vitamin D.**
 - **Hypercholesterolemia**(increase cholesterol level in blood): causes
 - **Atherosclerosis & CAD** (cardiac artery disease)
- **Steroid hormones:**
 1. **Mineralocorticoids** (**Aldosterone**)
 2. **Glucocorticoids** (**Cortisol**)
 3. **Sex hormones** (**Testosterone, Estrogen and Progesterone**)

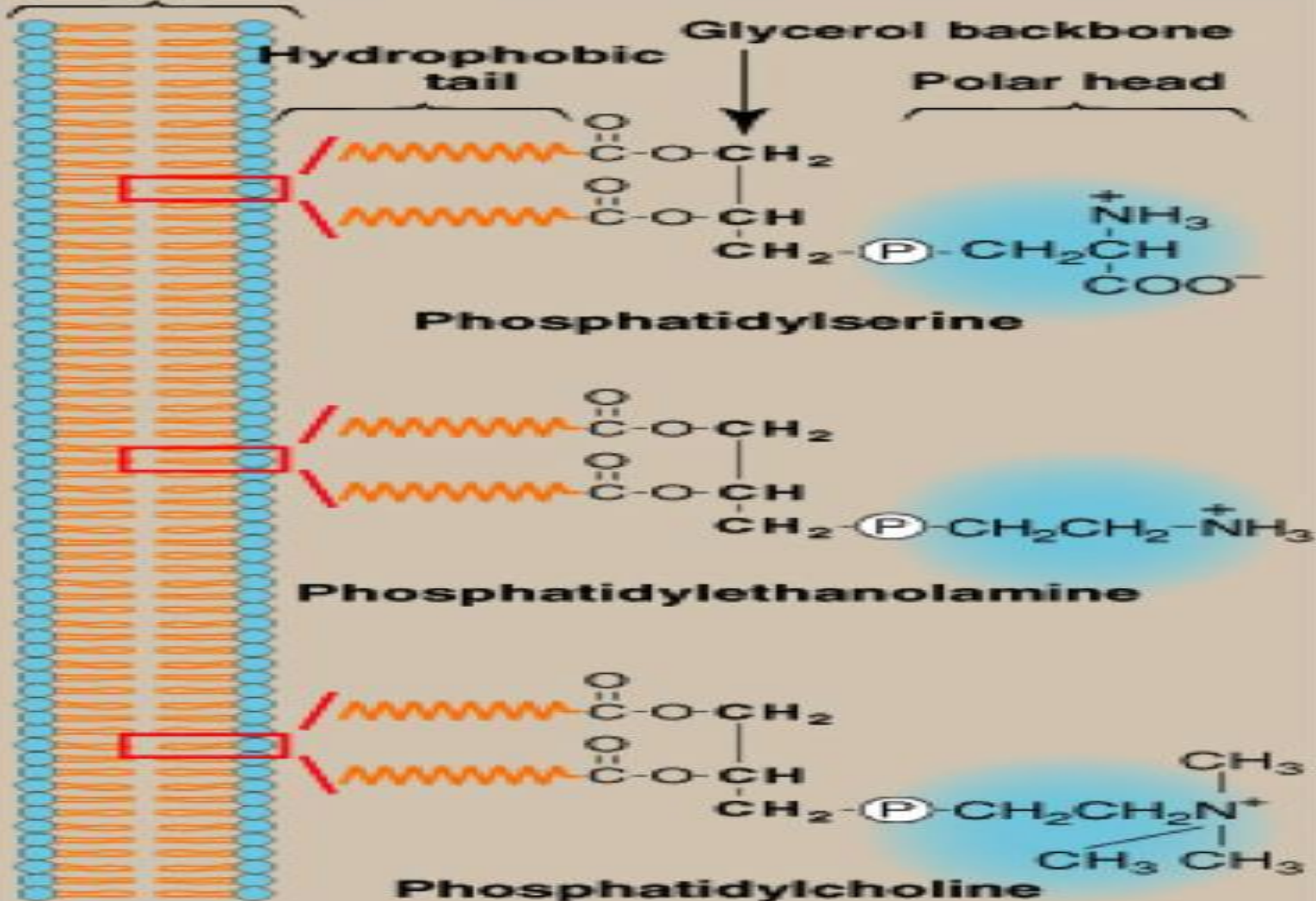
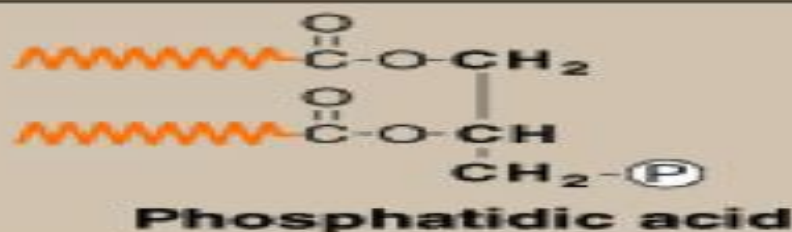
Complex:

Phospholipid	1)Glycerophospholipids	Glycerol-containing phospholipids: <ul style="list-style-type: none">☐ Phosphatidylcholine (Lecithin) e.g., Surfactant (Dipalmitoylecithin)☐ Phosphatidyl inositol (signaling molecule)☐ In membrane: Parent compound is Phosphatidic acid (it exists in every molecules in membrane)
	2)Sphingo-phospholipids	Sphingosine-containing phospholipids. e.g., sphingomyelin (Myelin sheath)
Lipoprotein	1)Protein part	is called Apoproteins (it is called apolipoproteins too). Its functions: Structural, transport, Enzymatic function and Ligands for receptors
	2)Lipid part	the type of lipids depend on the type of lipoproteins. Different lipid components in various combinations

A

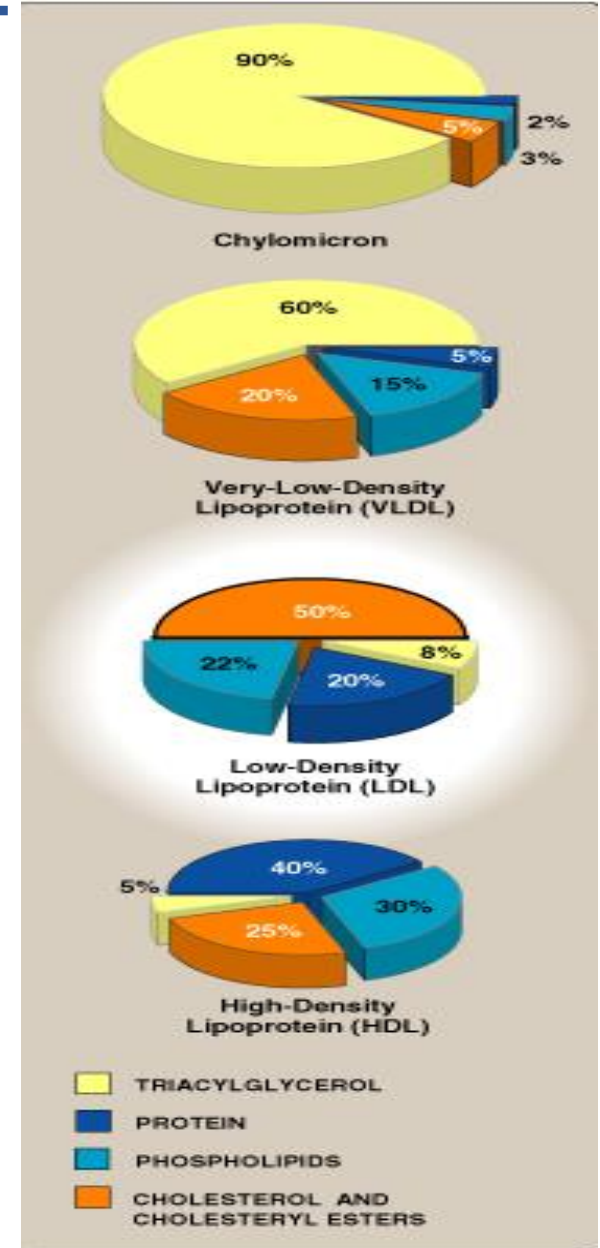
MEMBRANE

EXTRACELLULAR SPACE

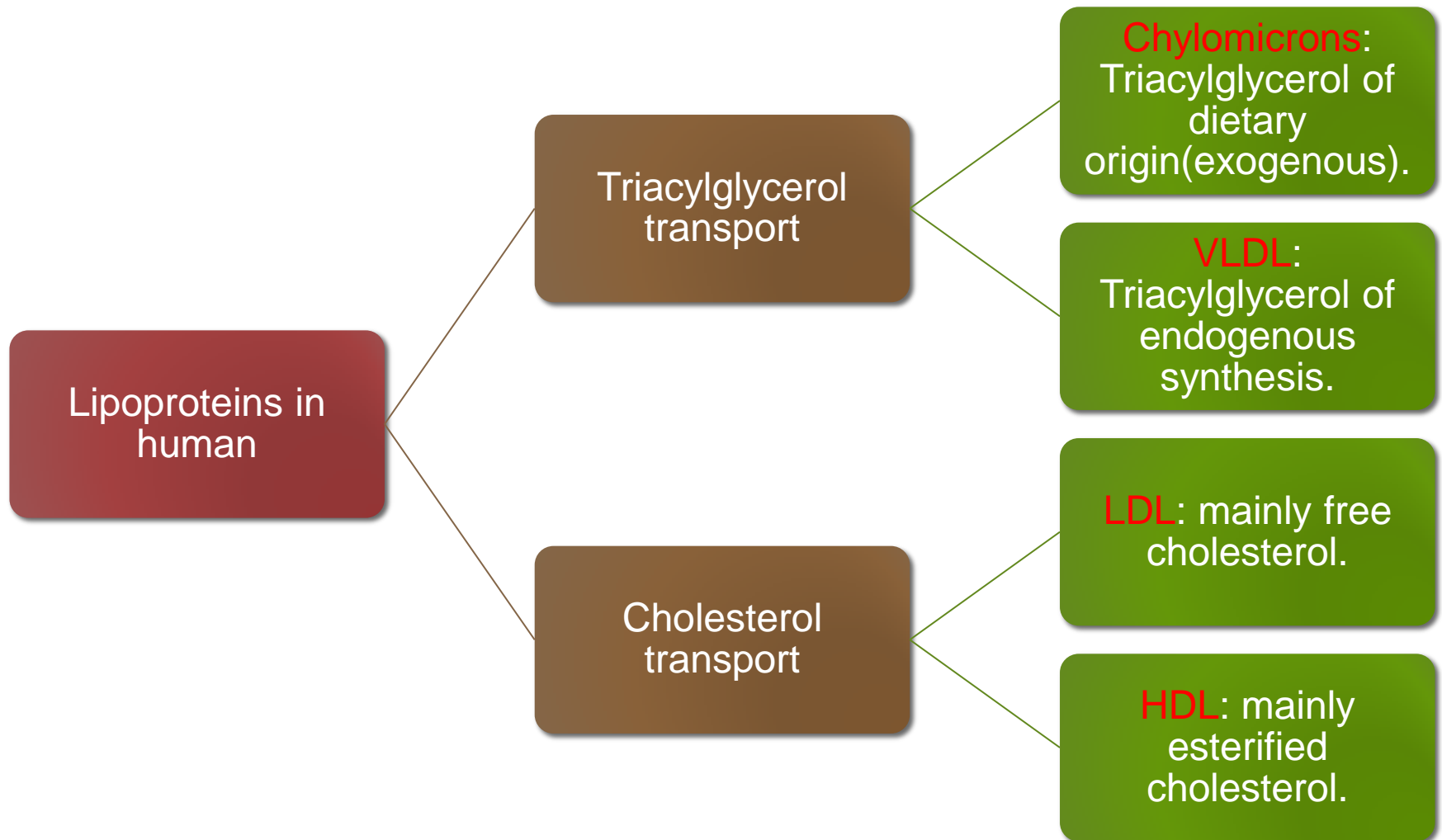
**B**

Composition of Lipoprotein:

Chylomicron	
VLDL	Very low density Lipoprotein
LDL	Low density Lipoprotein
HDL	High density Lipoprotein



Lipoproteins in human



- QUIZ:

<http://www.onlinequizcreator.com/lipid-compounds/quiz-42912>

- Videos:

- Lipoproteins <http://youtu.be/qglYWog3o8M>

- Fats: <http://youtu.be/eESpP5okA1I>

- Lipids <http://youtu.be/VGHD9e3yRIU>

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