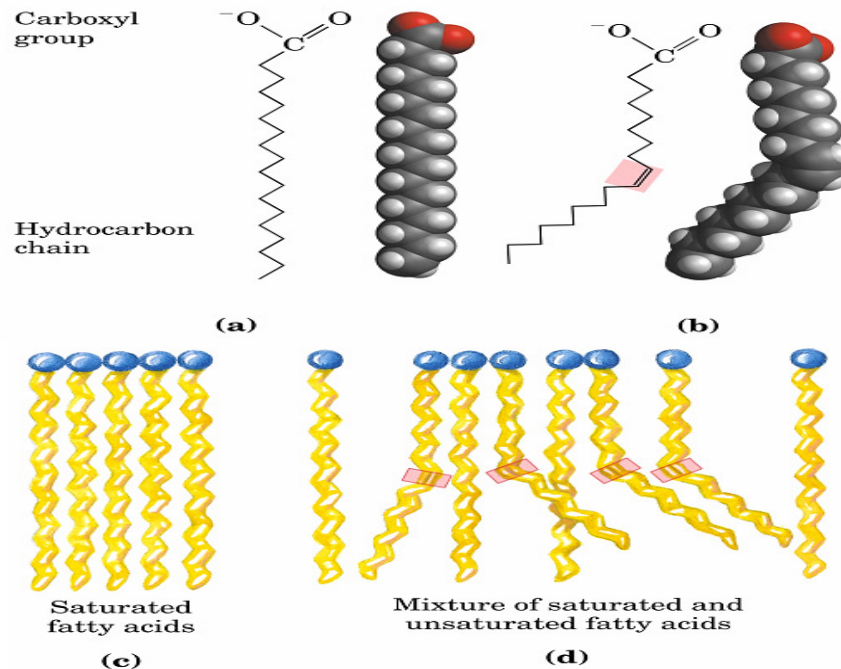


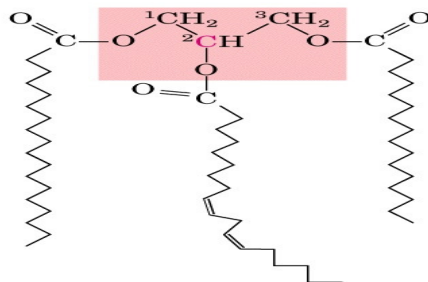
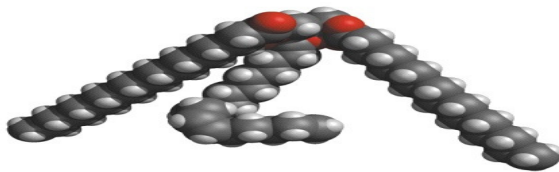
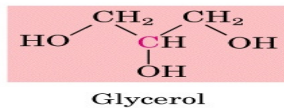
Lipids

Lipids – functional role

- Fats and oils are the principal stored forms of energy in many organisms. Phospholipids and sterols are major structural elements of biological membranes
- Other lipids, although present in relatively small quantities, play critical roles of enzymes cofactors, electron carriers, light-absorbing pigments, hydrophobic anchors, emulsifying agents, hormones and intracellular messengers



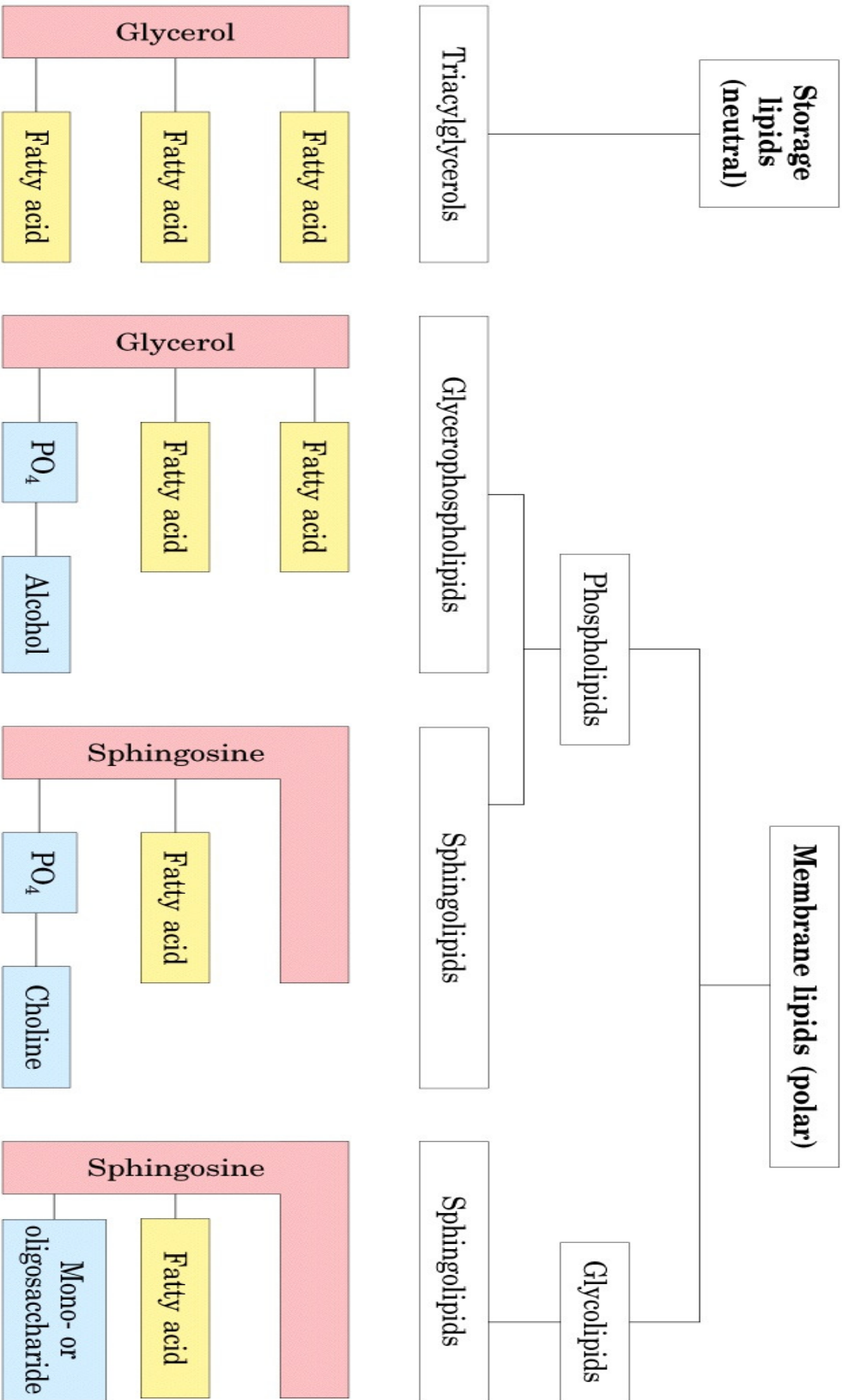
Unsaturated fatty acids have a markedly lower melting point



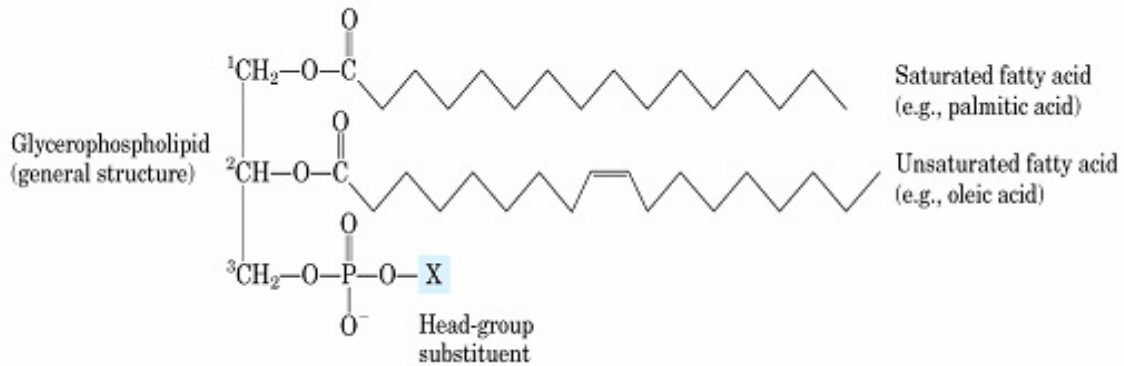
1-Stearoyl, 2-linoleoyl, 3-palmitoyl glycerol, a mixed triacylglycerol

Fatty acids are carboxylic acids with a hydrocarbon chains ranging from 4 to 36 carbons long (C₄ to C₃₆). The simplest lipid constructed from fatty acids are the **triacylglycerols**, also referred to as triglycerides, fats or neutral fats.

The principal classes of storage and membrane lipids

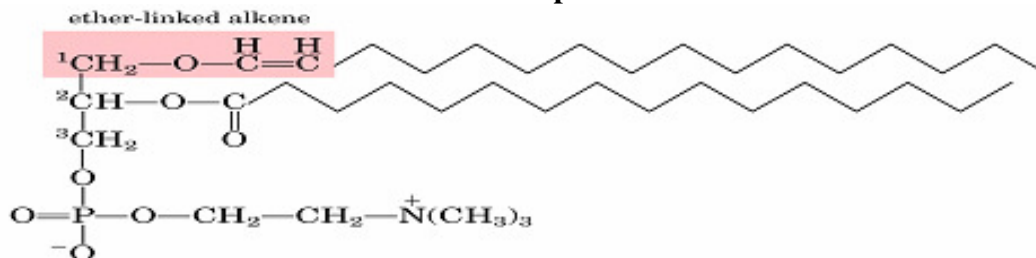


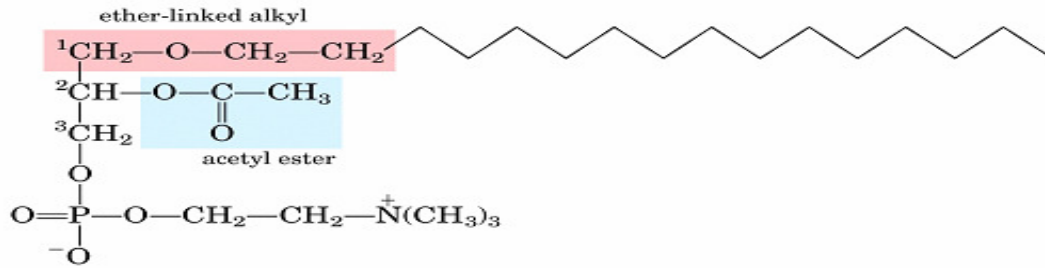
Glycerophospholipids



Name of glycerophospholipid	Name of X	Formula of X	Net charge (at pH 7)
Phosphatidic acid	—	— H	-1
Phosphatidylethanolamine	Ethanolamine	— CH ₂ —CH ₂ — $\overset{+}{N}H_3$	0
Phosphatidylcholine	Choline	— CH ₂ —CH ₂ — $\overset{+}{N}(CH_3)_3$	0
Phosphatidylserine	Serine	— CH ₂ —CH— $\overset{+}{N}H_3$ COO ⁻	-1
Phosphatidylglycerol	Glycerol	— CH ₂ —CH—CH ₂ —OH OH	-1
Phosphatidylinositol 4,5-bisphosphate	<i>myo</i> -Inositol 4,5-bisphosphate		-4
Cardiolipin	Phosphatidyl-glycerol	— CH ₂ CHOH CH ₂ —O—P—O—CH ₂ O ⁻ CH—O—C—R ¹ CH ₂ —O—C—R ²	-2

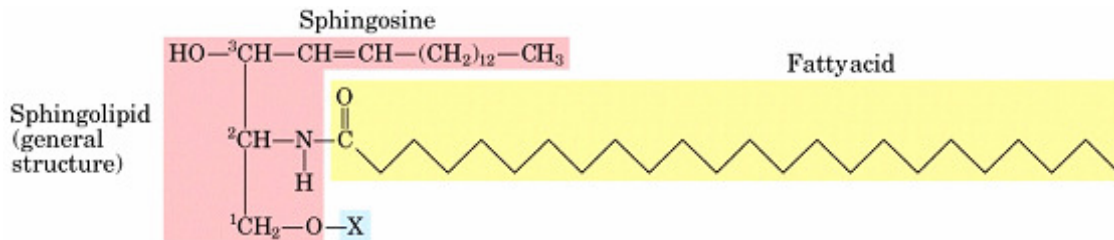
Ether lipids

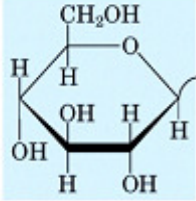
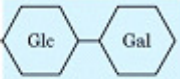
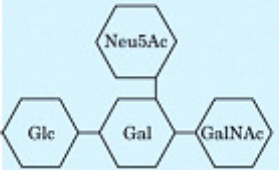


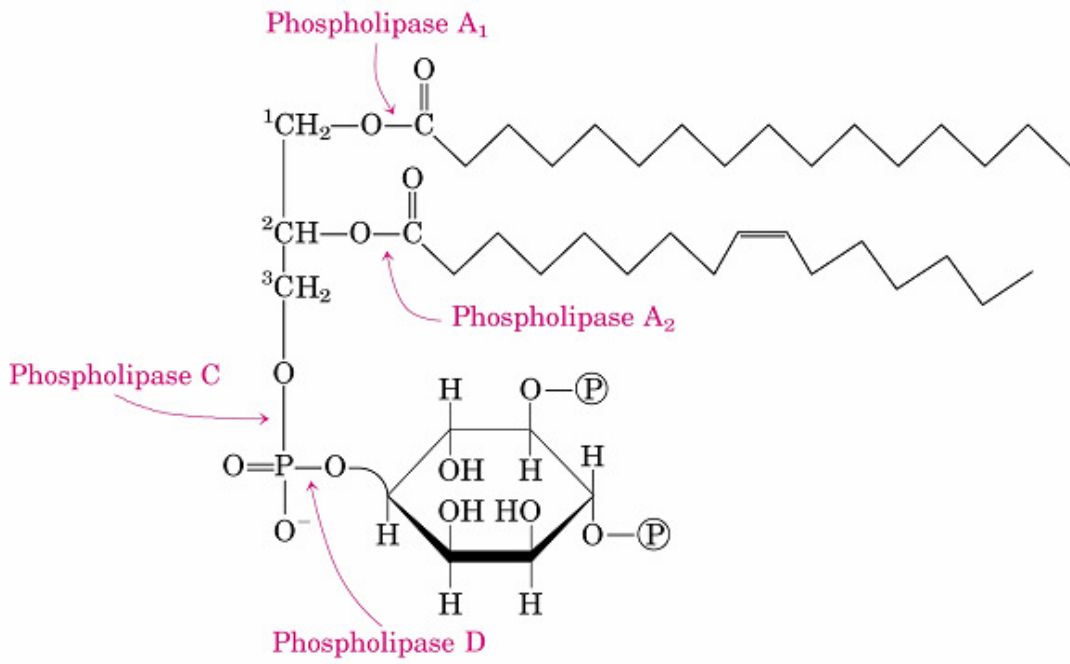
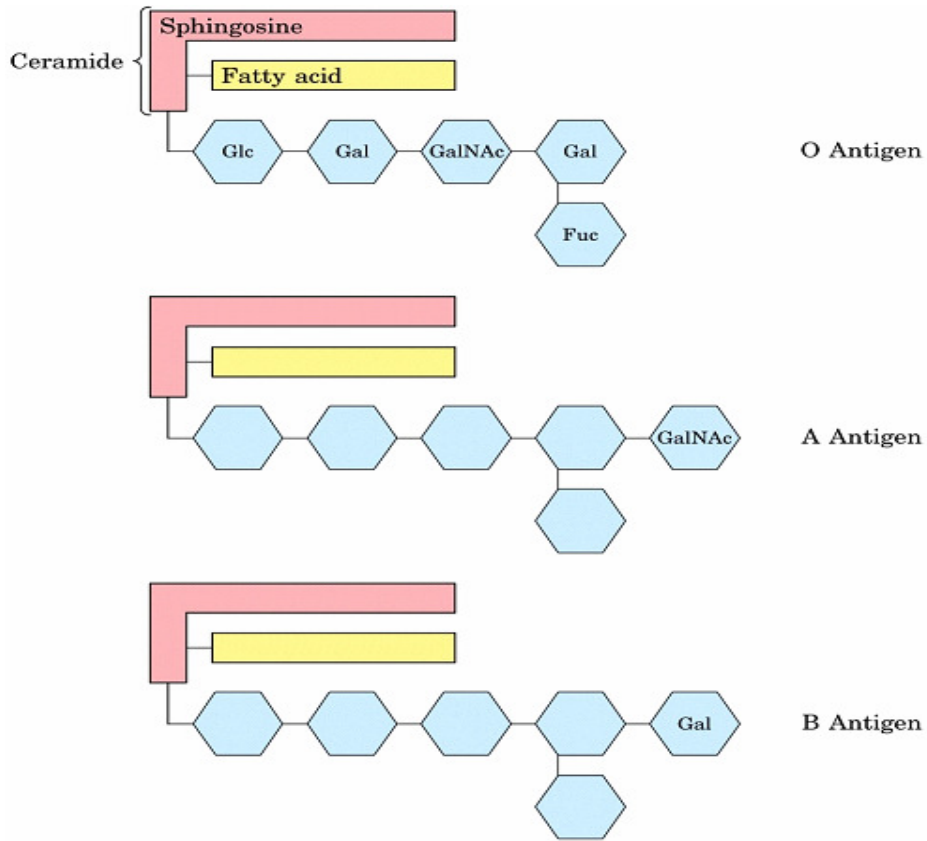


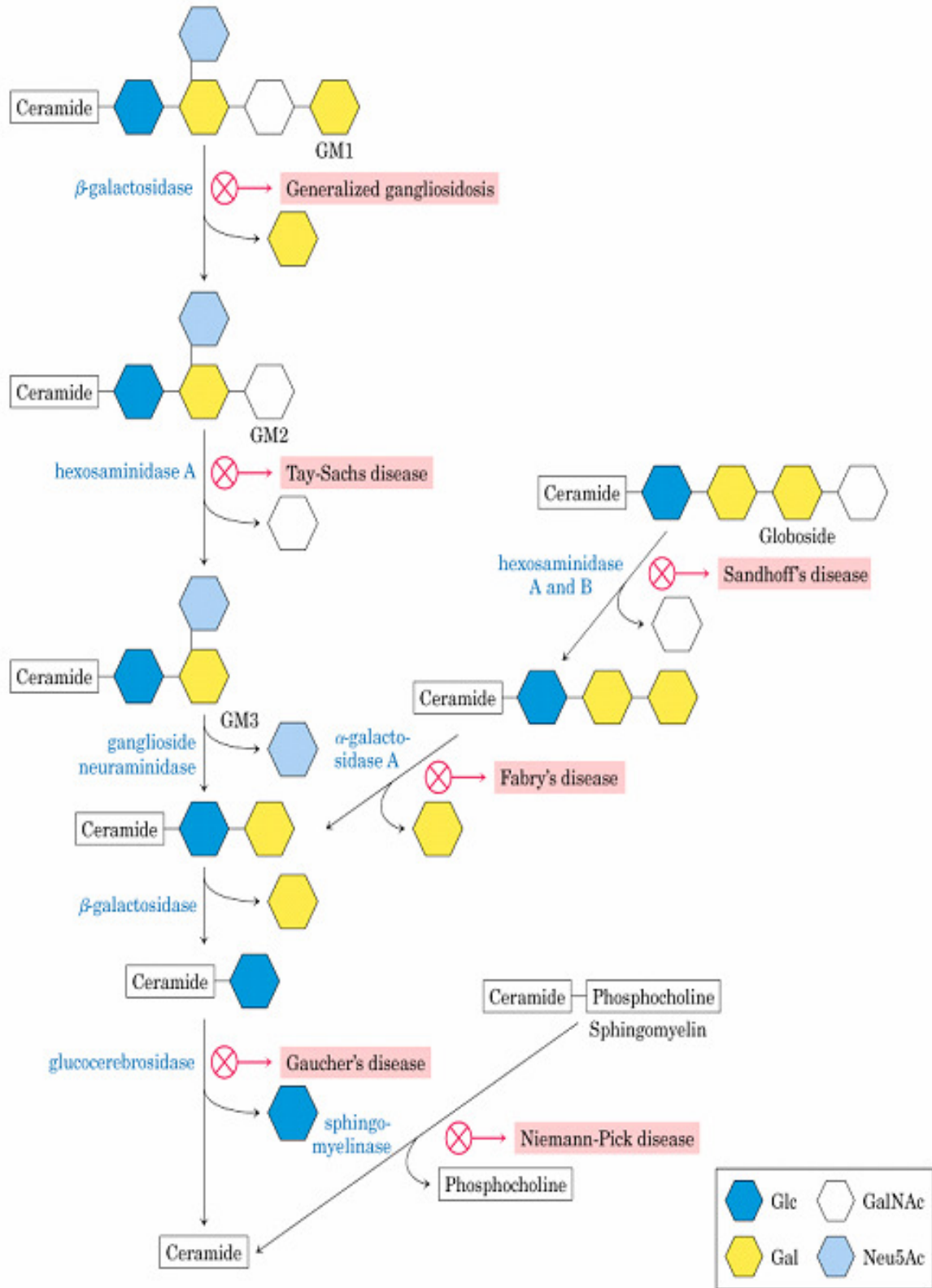
Platelet-activating factor

Sphingolipids



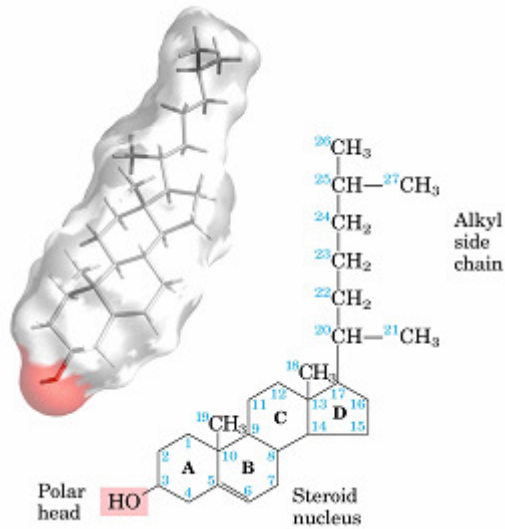
Name of sphingolipid	Name of X	Formula of X
Ceramide	—	— H
Sphingomyelin	Phosphocholine	$ \begin{array}{c} \text{O} \\ \\ -\text{P}-\text{O}-\text{CH}_2-\text{CH}_2-\text{N}^+(\text{CH}_3)_3 \\ \\ \text{O}^- \end{array} $
Neutral glycolipids Glucosylcerebroside	Glucose	
Lactosylceramide (a globoside)	Di-, tri-, or tetrasaccharide	
Ganglioside GM2	Complex oligosaccharide	





Inherited human diseases resulting from abnormal accumulations of membrane lipids

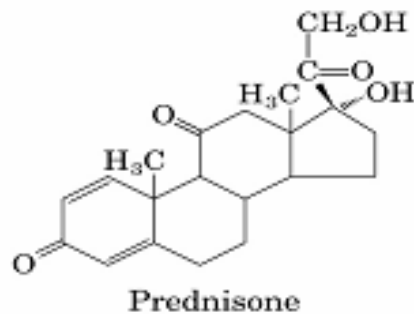
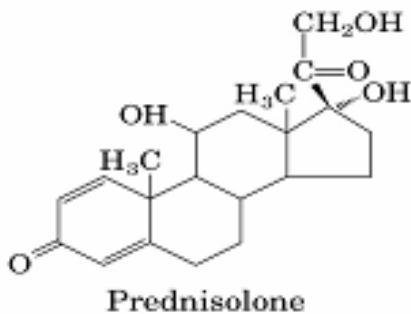
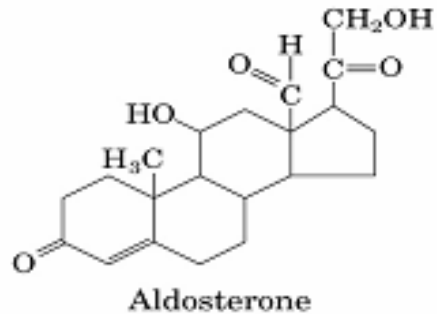
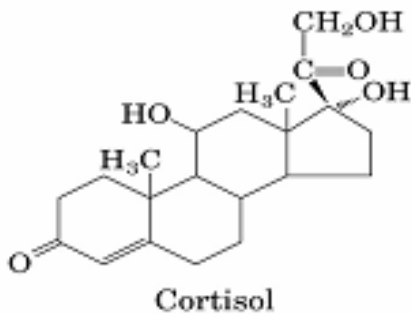
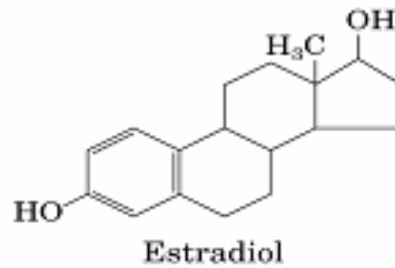
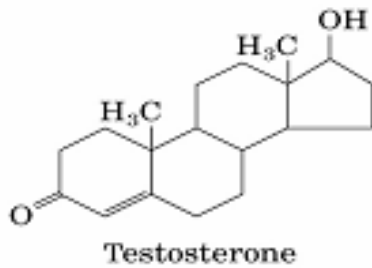
Cholesterol



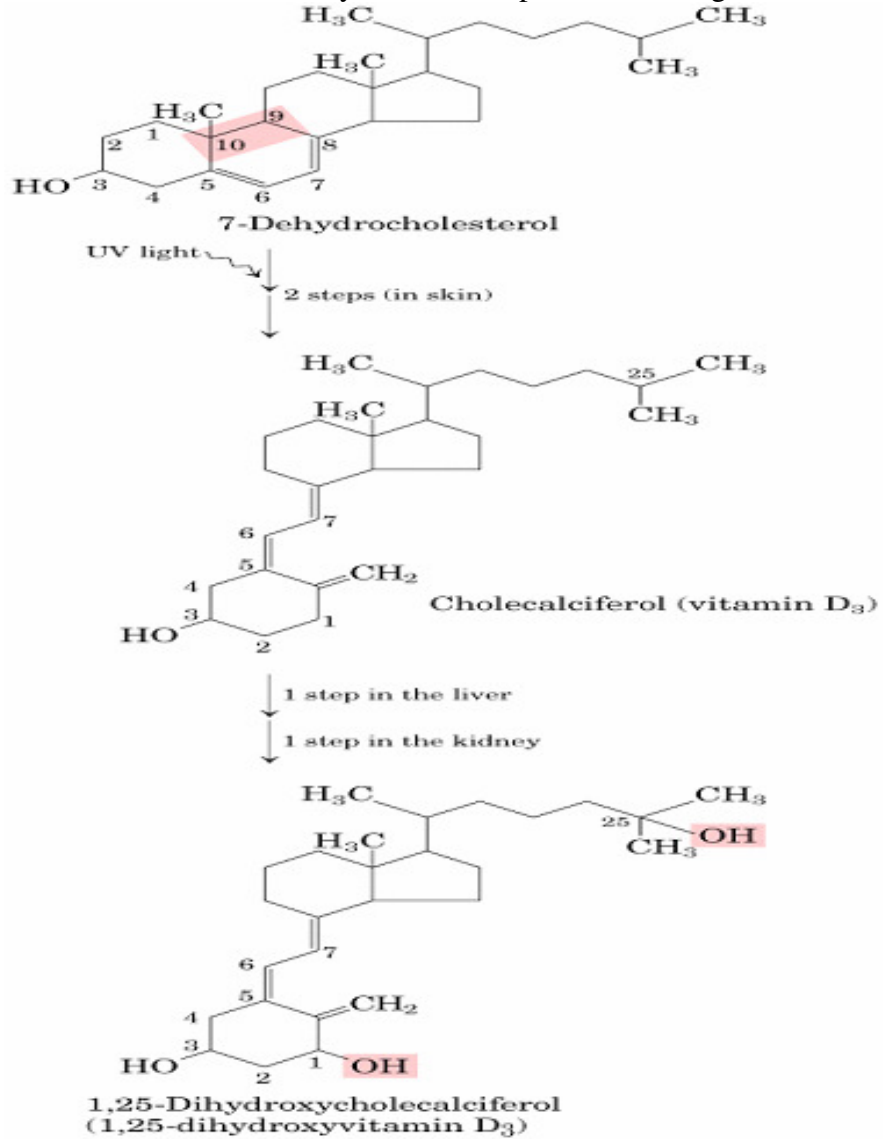
Sterols are structural lipids present in the membranes of most eukaryotic cells.

Cholesterol, the major sterol in animal tissues, is amphipathic, with a polar head group and a nonpolar hydrocarbon body

Steroids derived from cholesterol.



Vitamin D3 – Cholecalciferol, is normally formed in the skin from 7-dehydrocholesterol in a photochemical reaction driven by the UV component of sunlight



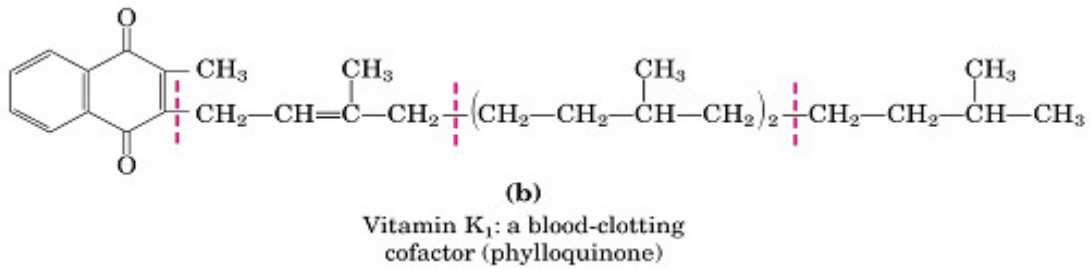
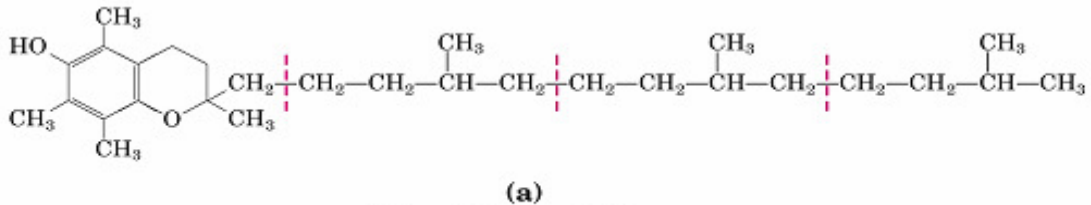
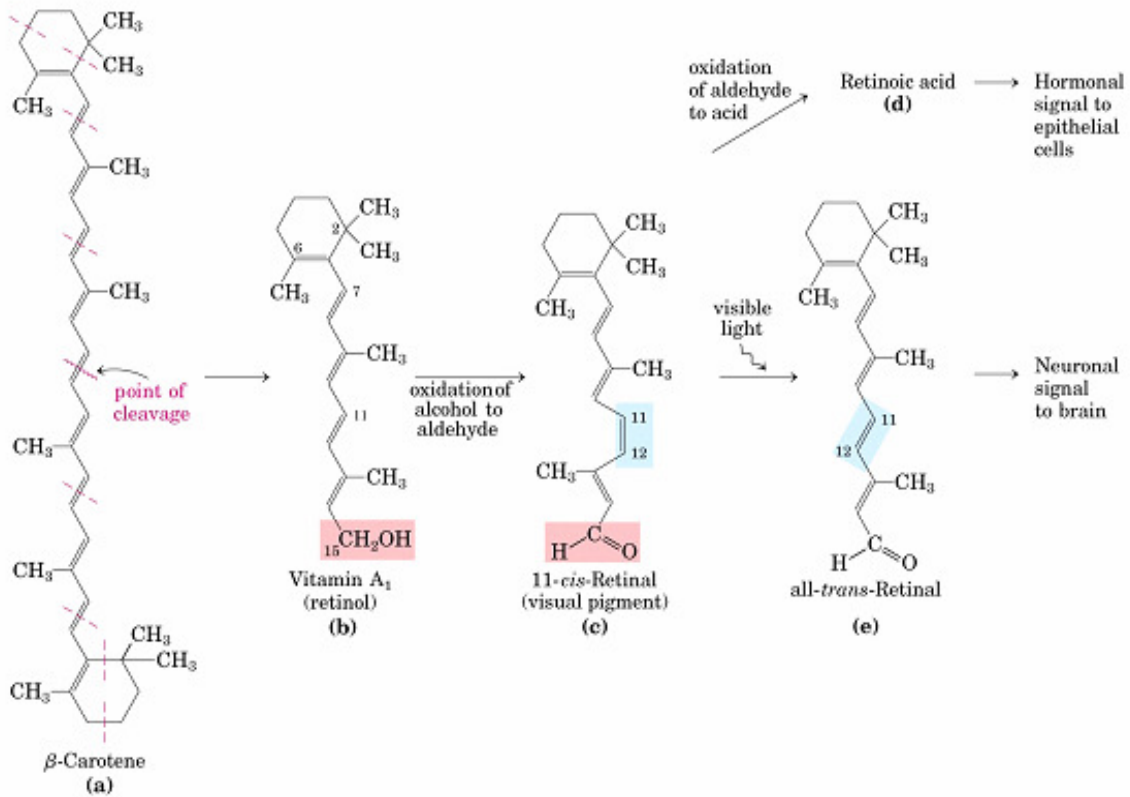
Before vitamin D treatment



After 14 months of vitamin D treatment

(b)

Vitamin A1 – its precursor and derivatives



Tocopherols – contain a substituted aromatic ring and a long isoprenoid side chain.
 (Lipid Quinones)

