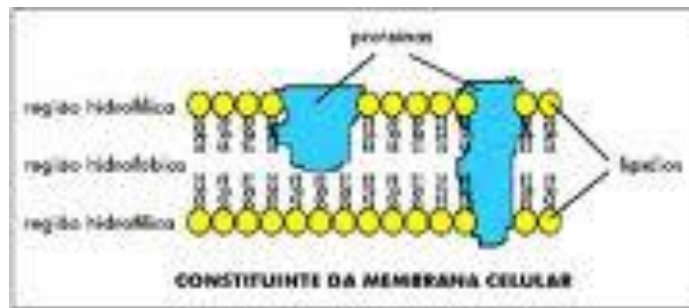
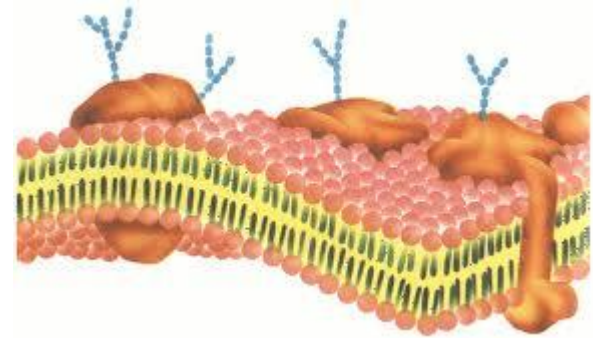




LIPÍDIOS



Jaqueline Garda Buffon – Bioquímica I
Engenharia Bioquímica



Vitaminas A, D, E e K

AÇÕES METABÓLICAS ESPECIALIZADAS

Hormônios
Esteróides



Nomenclatura

TABLE 10-1 Some Naturally Occurring Fatty Acids: Structure, Properties, and Nomenclature

Carbon skeleton	Structure*	Systematic name [†]	Common name (derivation)	Melting point (°C)	Solubility at 30 °C (mg/g solvent)	
					Water	Benzene
12:0	CH ₃ (CH ₂) ₁₀ COOH	<i>n</i> -Dodecanoic acid	Lauric acid (Latin <i>laurus</i> , "laurel plant")	44.2	0.063	2,600
14:0	CH ₃ (CH ₂) ₁₂ COOH	<i>n</i> -Tetradecanoic acid	Myristic acid (Latin <i>Myristica</i> , nutmeg genus)	53.9	0.024	874
16:0	CH ₃ (CH ₂) ₁₄ COOH	<i>n</i> -Hexadecanoic acid	Palmitic acid (Latin <i>palma</i> , "palm tree")	63.1	0.0083	348
18:0	CH ₃ (CH ₂) ₁₆ COOH	<i>n</i> -Octadecanoic acid	Stearic acid (Greek <i>stear</i> , "hard fat")	69.6	0.0034	124
20:0	CH ₃ (CH ₂) ₁₈ COOH	<i>n</i> -Eicosanoic acid	Arachidic acid (Latin <i>Arachis</i> , legume genus)	76.5		
24:0	CH ₃ (CH ₂) ₂₂ COOH	<i>n</i> -Tetracosanoic acid	Lignoceric acid (Latin <i>lignum</i> , "wood" + <i>cera</i> , "wax")	86.0		
16:1(Δ ⁹)	CH ₃ (CH ₂) ₅ CH=CH(CH ₂) ₇ COOH	<i>cis</i> -9-Hexadecenoic acid	Palmitoleic acid	1-0.5		
18:1(Δ ⁹)	CH ₃ (CH ₂) ₇ CH=CH(CH ₂) ₇ COOH	<i>cis</i> -9-Octadecenoic acid	Oleic acid (Latin <i>oleum</i> , "oil")	13.4		
18:2(Δ ^{9,12})	CH ₃ (CH ₂) ₄ CH=CHCH ₂ CH=CH(CH ₂) ₇ COOH	<i>cis</i> -, <i>cis</i> -9,12-Octadecadienoic acid	Linoleic acid (Greek <i>linon</i> , "flax")	1-5		
18:3(Δ ^{9,12,15})	CH ₃ CH ₂ CH=CHCH ₂ CH=CHCH ₂ CH=CH(CH ₂) ₇ COOH	<i>cis</i> -, <i>cis</i> -, <i>cis</i> -9,12,15-Octadecatrienoic acid	α-Linolenic acid	-11		
20:4(Δ ^{5,8,11,14})	CH ₃ (CH ₂) ₄ CH=CHCH ₂ CH=CHCH ₂ CH=CHCH ₂ CH=CH(CH ₂) ₃ COOH	<i>cis</i> -, <i>cis</i> -, <i>cis</i> -, <i>cis</i> -5,8,11,14-Icosatetraenoic acid	Arachidonic acid	-49.5		

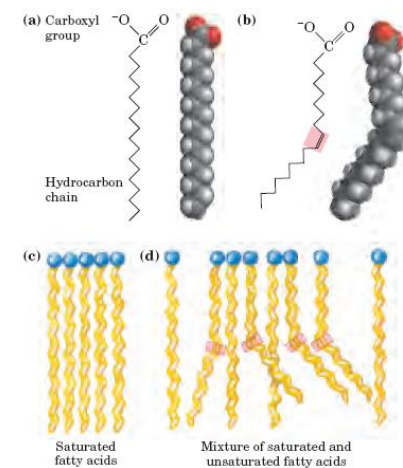
► Configuração *cis* e *trans*

► *LDL* e *HDL*

► Propriedades físicas

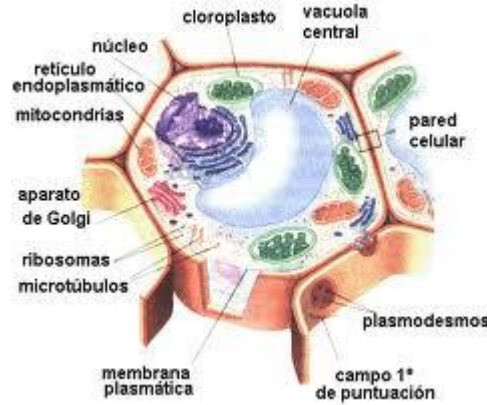
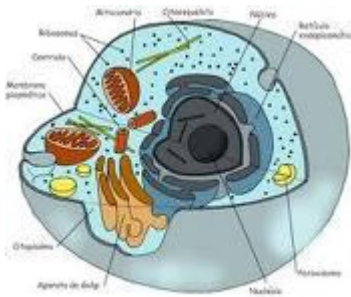
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20:4(Δ ^{5,8,11,14})	CH ₃ (CH ₂) ₄ CH=CHCH ₂ CH=CHCH ₂ CH=CHCH ₂ CH=CH(CH ₂) ₃ COOH	<i>cis</i> -, <i>cis</i> -, <i>cis</i> -, <i>cis</i> -5,8,11,14-Icosatetraenoic acid	Arachidonic acid	-49.5		

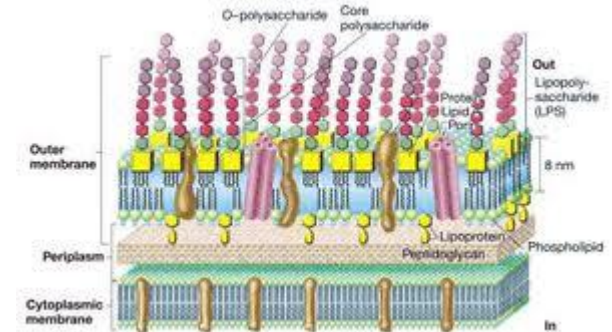
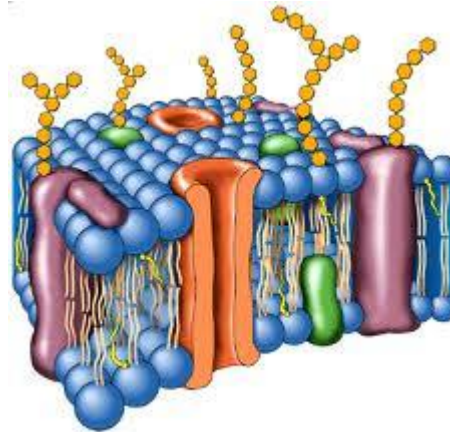
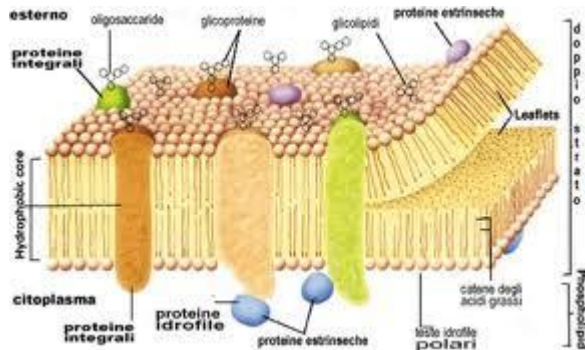
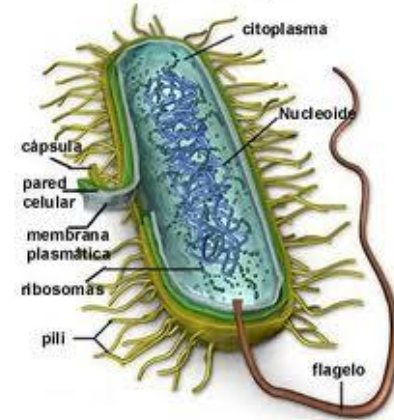


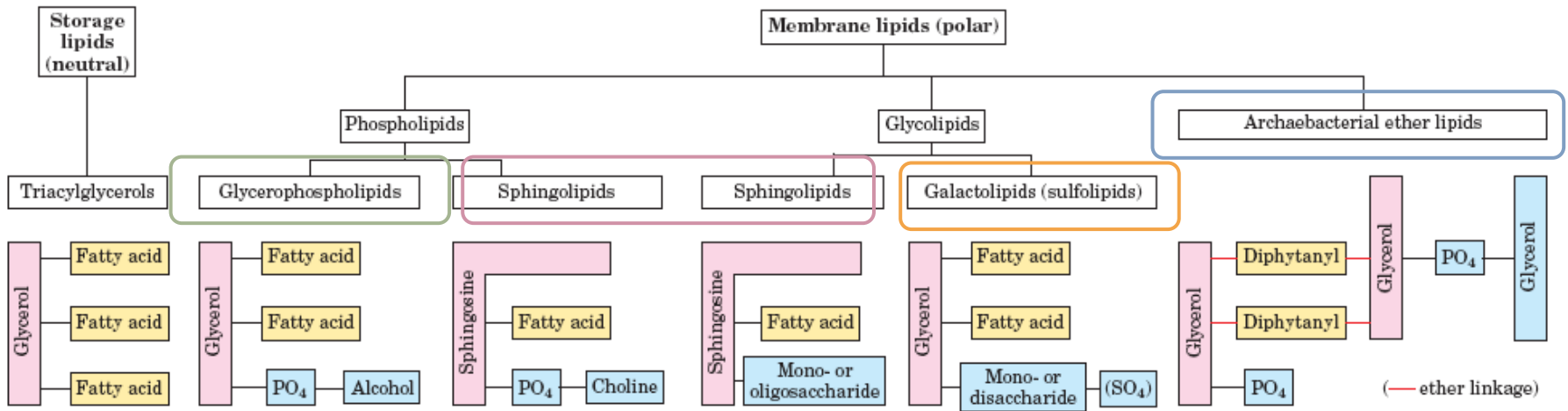
Lipídios estruturais das membranas

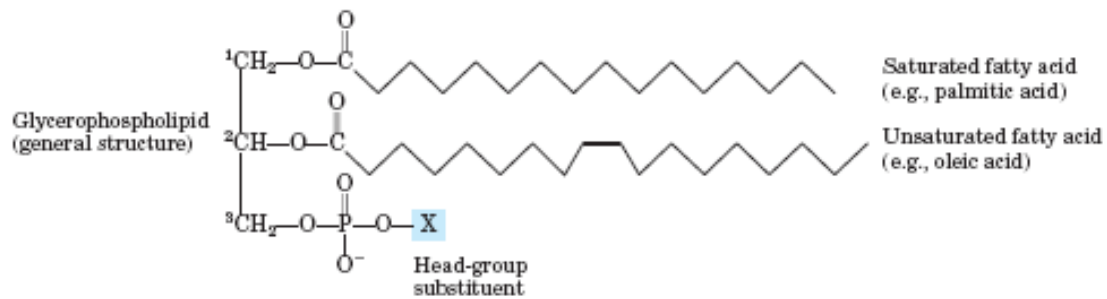
Membrana biológica



Estrutura de la célula procariota



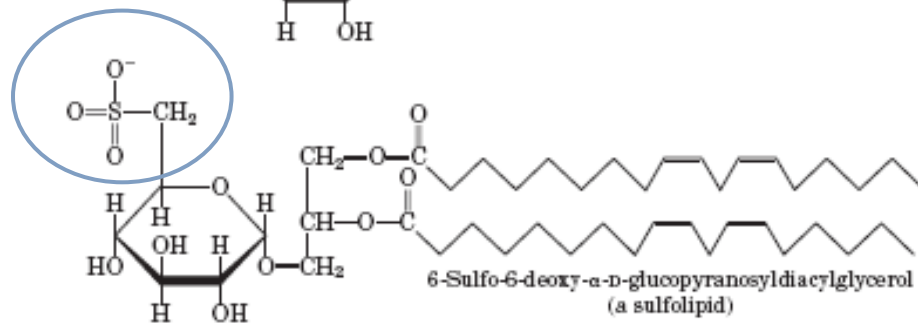
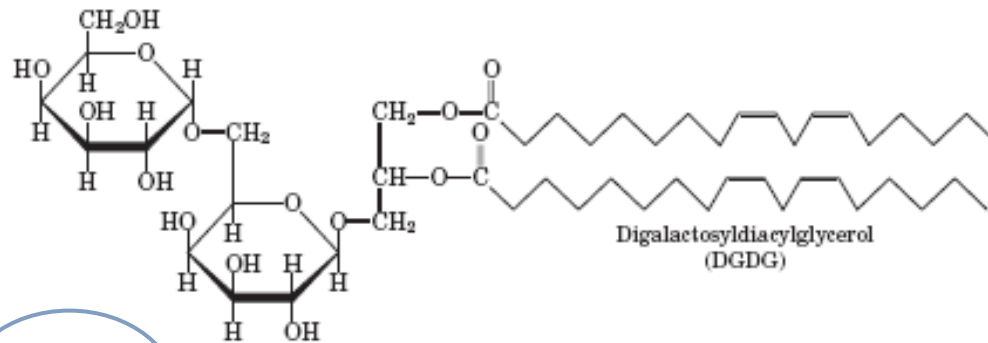
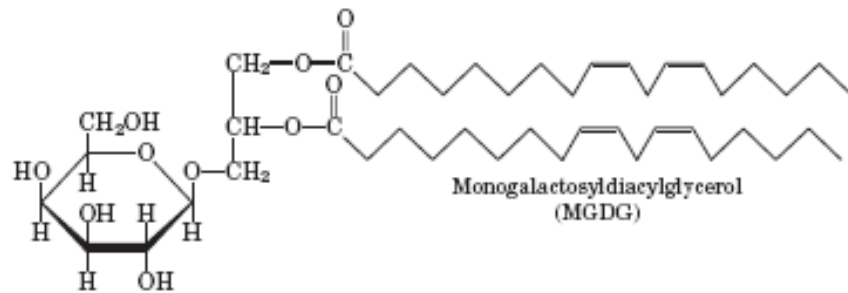


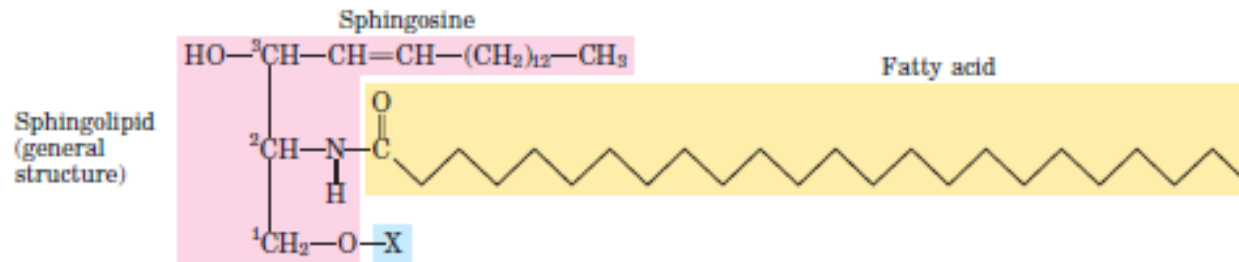


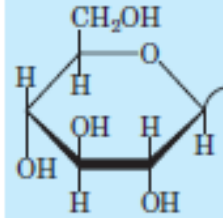
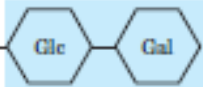
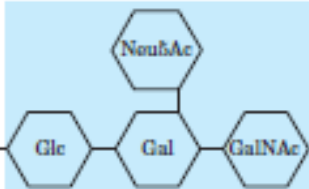
C 16 ou 18

C 18 ou 20

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(OH)-CH ₂ -OH	-1
Phosphatidylinositol 4,5-bisphosphate	<i>myo</i> -Inositol 4,5-bisphosphate		-4
Cardiolipin	Phosphatidyl-glycerol	— CH ₂ -CH(OH)-CH ₂ -O-P(=O)(O ⁻)-O-CH ₂ -CH(O-C(=O)-R ¹)-CH ₂ -O-C(=O)-R ²	-2





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



Johann Thudichum,
1829–1901

▶ Glicoesfingolípídios

- ▶ Face externa da membrana plasmática
- ▶ 1 ou + açúcares ligado ao –OH em C-1 da ceramida
- ▶ Não contém grupo fosfato

▶ Cerebrosídeos: 1 açúcar

- ▶ Galactose – membrana plasmática → tecido neural

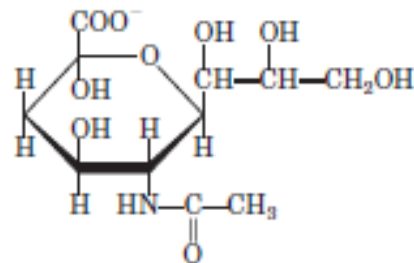
▶ Globosídeos: 2 ou + açúcares

- ▶ D-glicose, D-galactose ou N-acetil-D-galactosamina

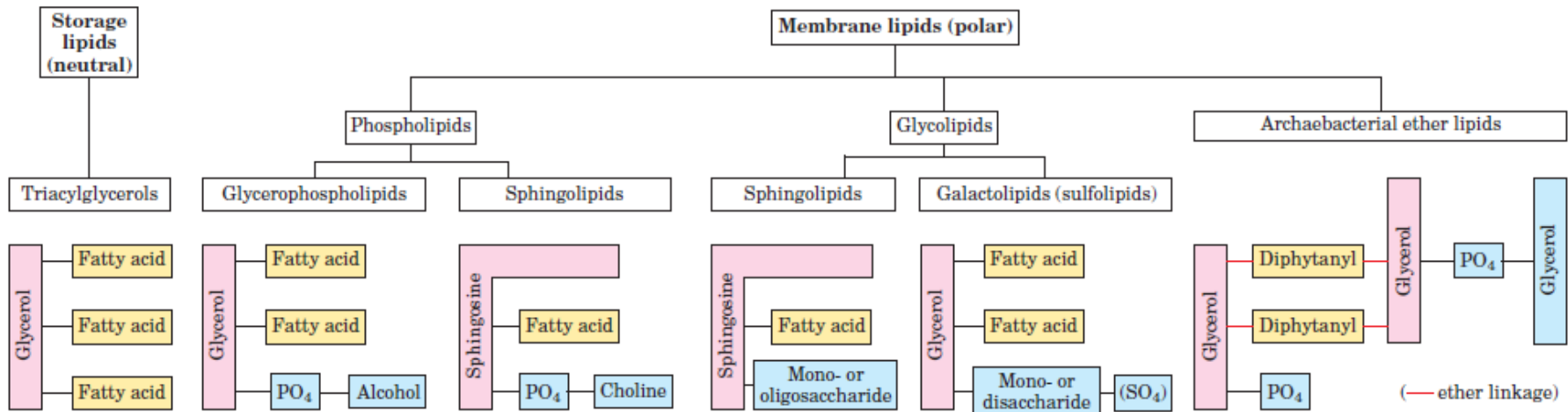
Glicolípídios
neutros

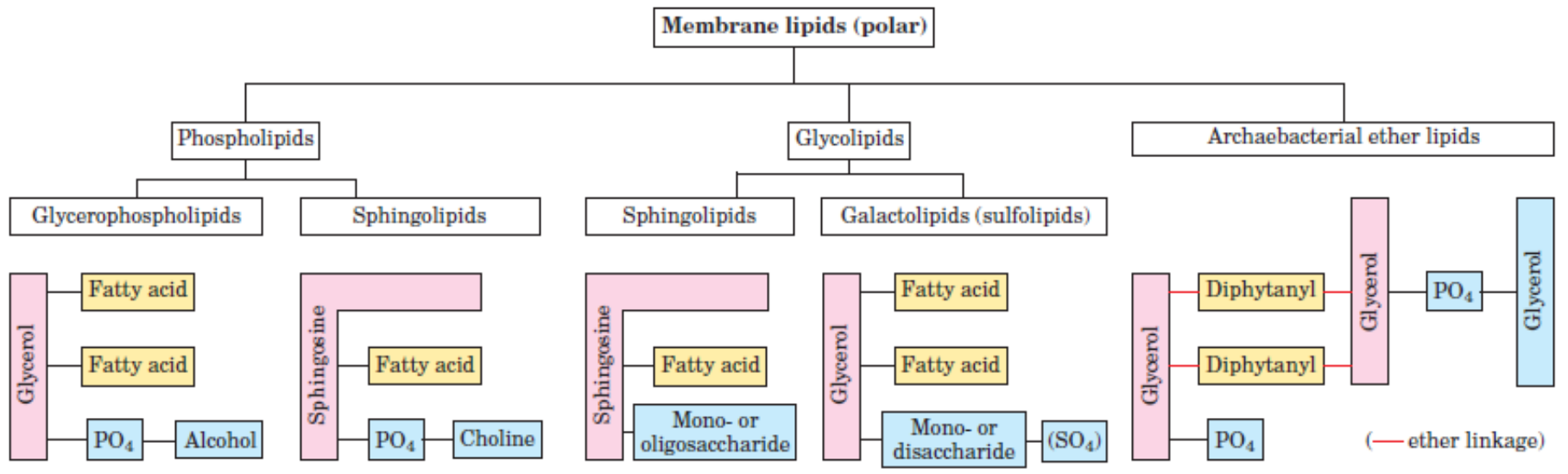
▶ Gangliosídeos

- ▶ Oligossacarídeos + unidades terminais N-acetilneuramínicas (Neu5Ac)

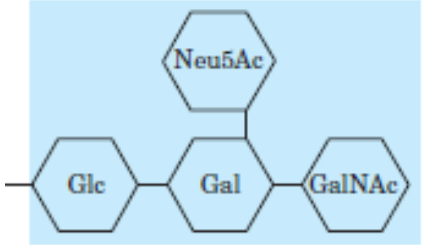
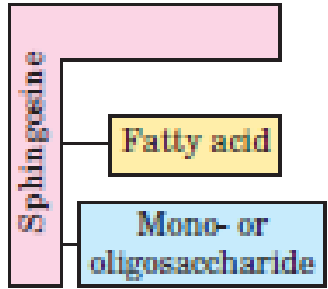
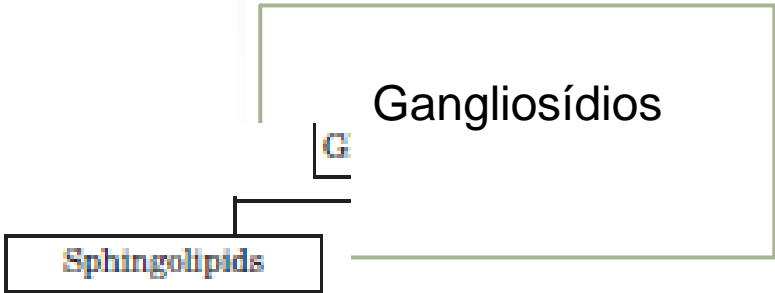
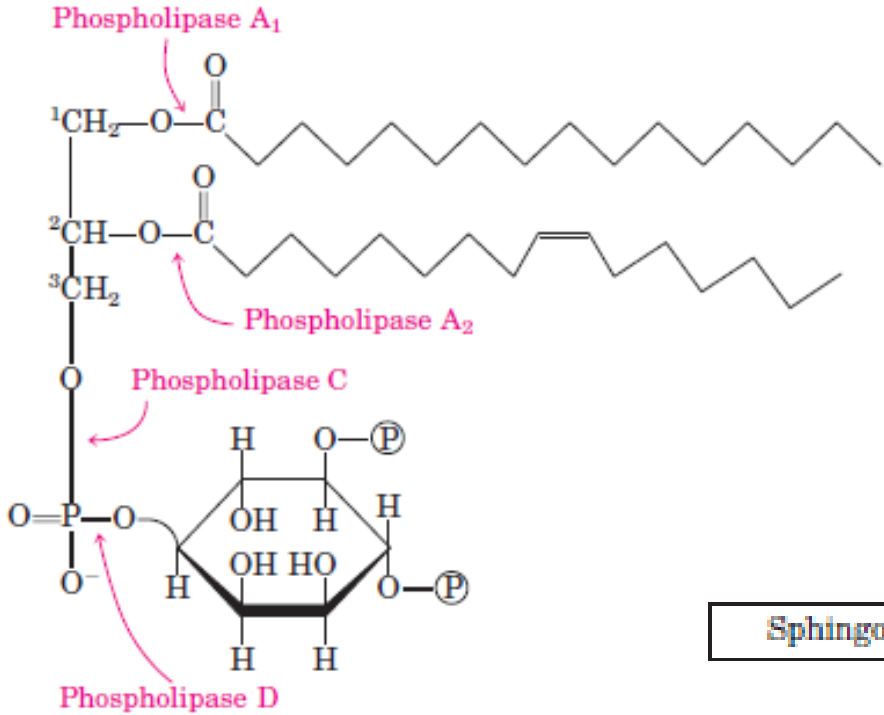


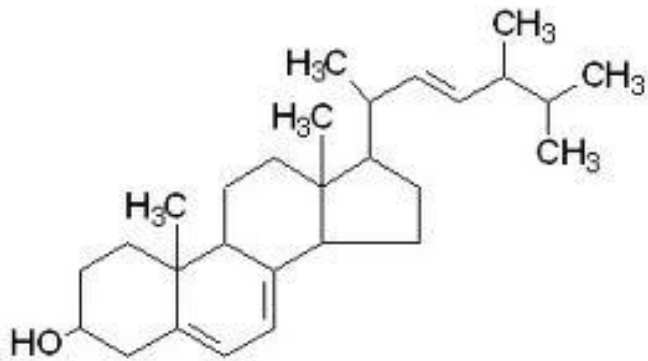
N-Acetylneuraminic acid (a sialic acid)
(Neu5Ac)



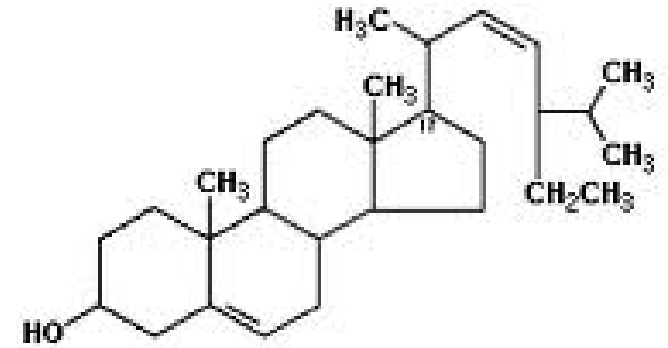


Glicerofosfolipídio

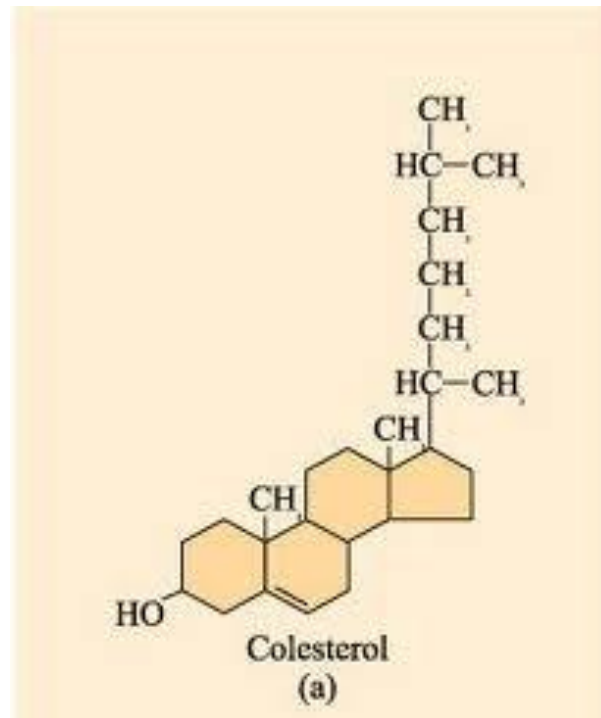




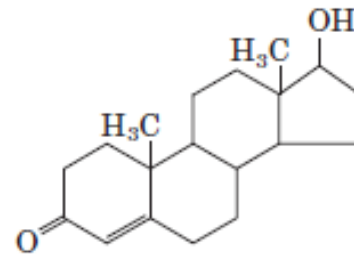
Ergosterol



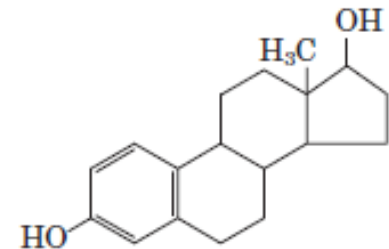
Stigmasterol



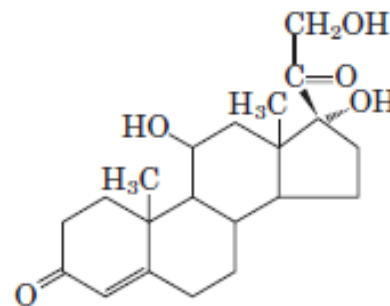
► Hormônios esteróides



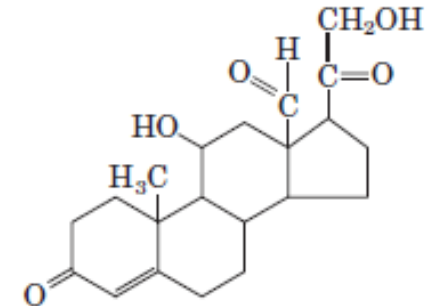
Testosterone



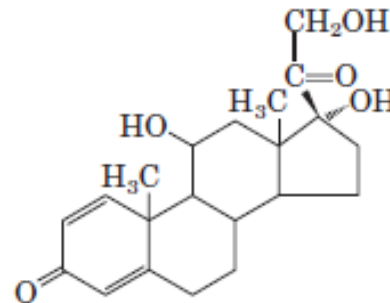
Estradiol



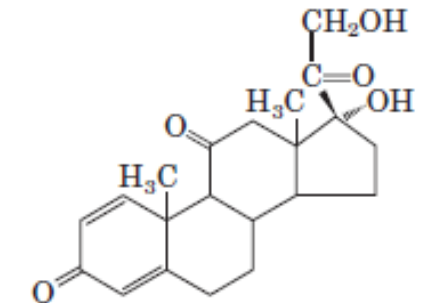
Cortisol



Aldosterone



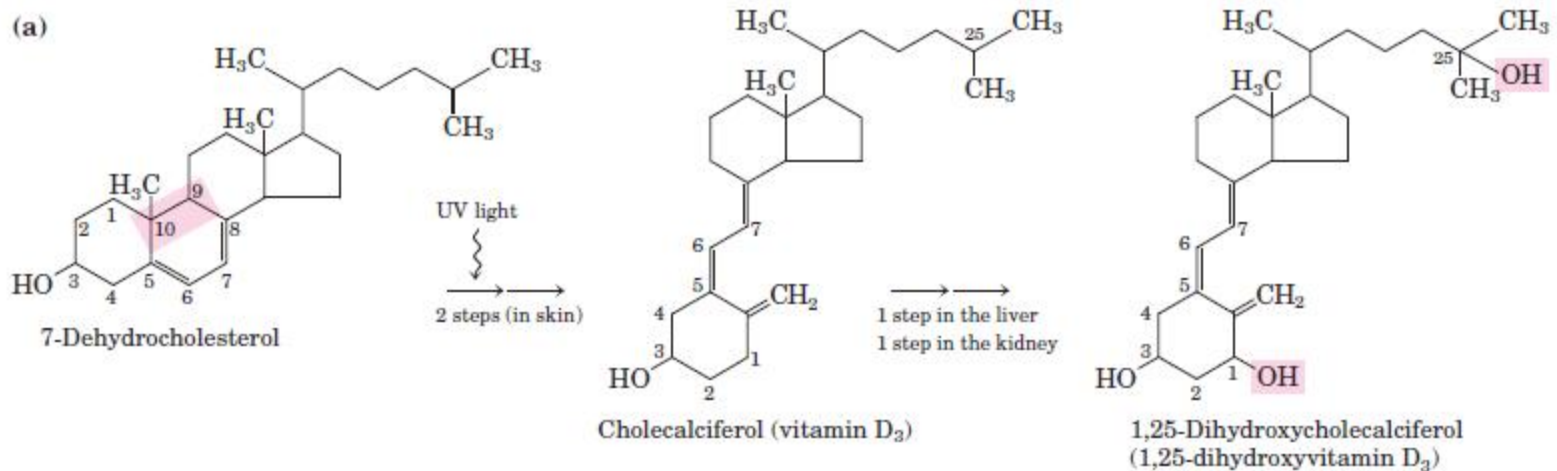
Prednisolone



Prednisone



Vit. D



Before vitamin D treatment



After 14 months of vitamin D treatment

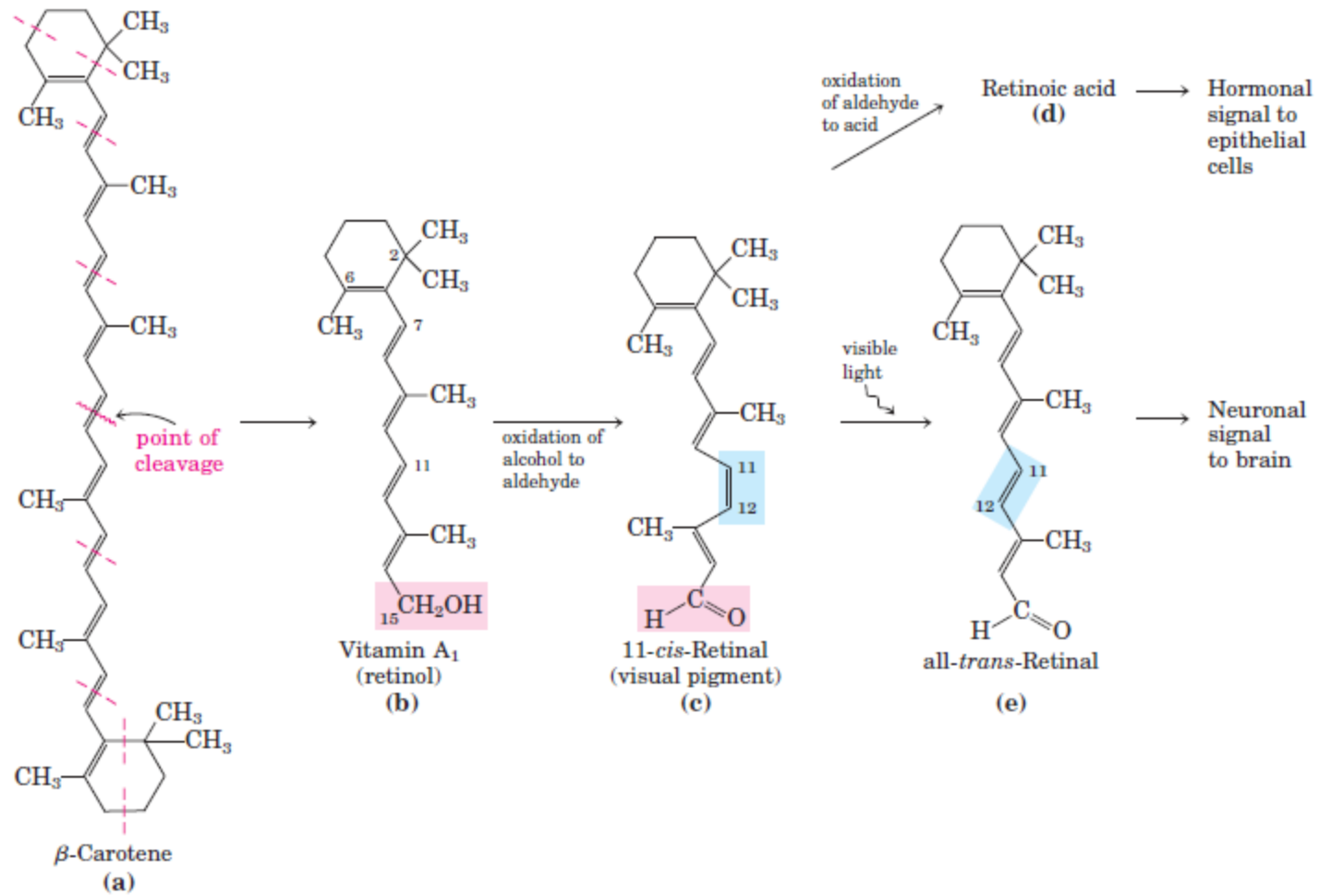
(b)



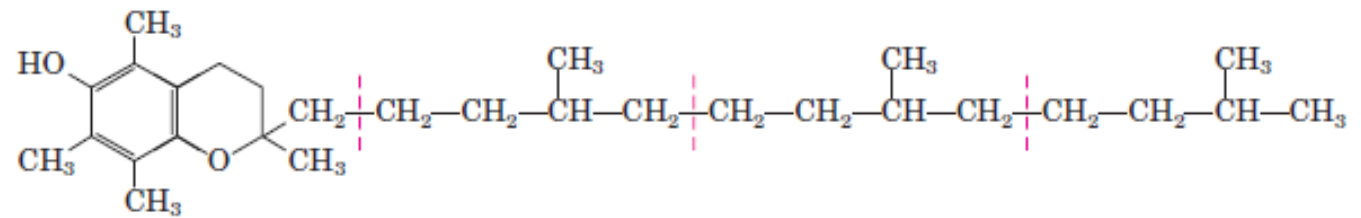
FIGURE 10-20 Vitamin D₃ production and metabolism.

(a) Cholecalciferol (vitamin D₃) is produced in the skin by UV irradiation of 7-dehydrocholesterol, which breaks the bond shaded pink. In the liver, a hydroxyl group is added at C-25 (pink); in the kidney, a second hydroxylation at C-1 (pink) produces the active hormone, 1,25-dihydroxycholecalciferol. This hormone regulates the metabolism of Ca²⁺ in kidney, intestine, and bone. (b) Dietary vitamin D prevents rickets, a disease once common in cold climates where heavy clothing blocks the UV component of sunlight necessary for the production of vitamin D₃ in skin. On the left is a 2½-year-old boy with severe rickets; on the right, the same boy at age 5, after 14 months of vitamin D therapy.

Vit. A



(a)
Vitamin E: an antioxidant



(b)
Vitamin K₁: a blood-clotting
cofactor (phylloquinone)

