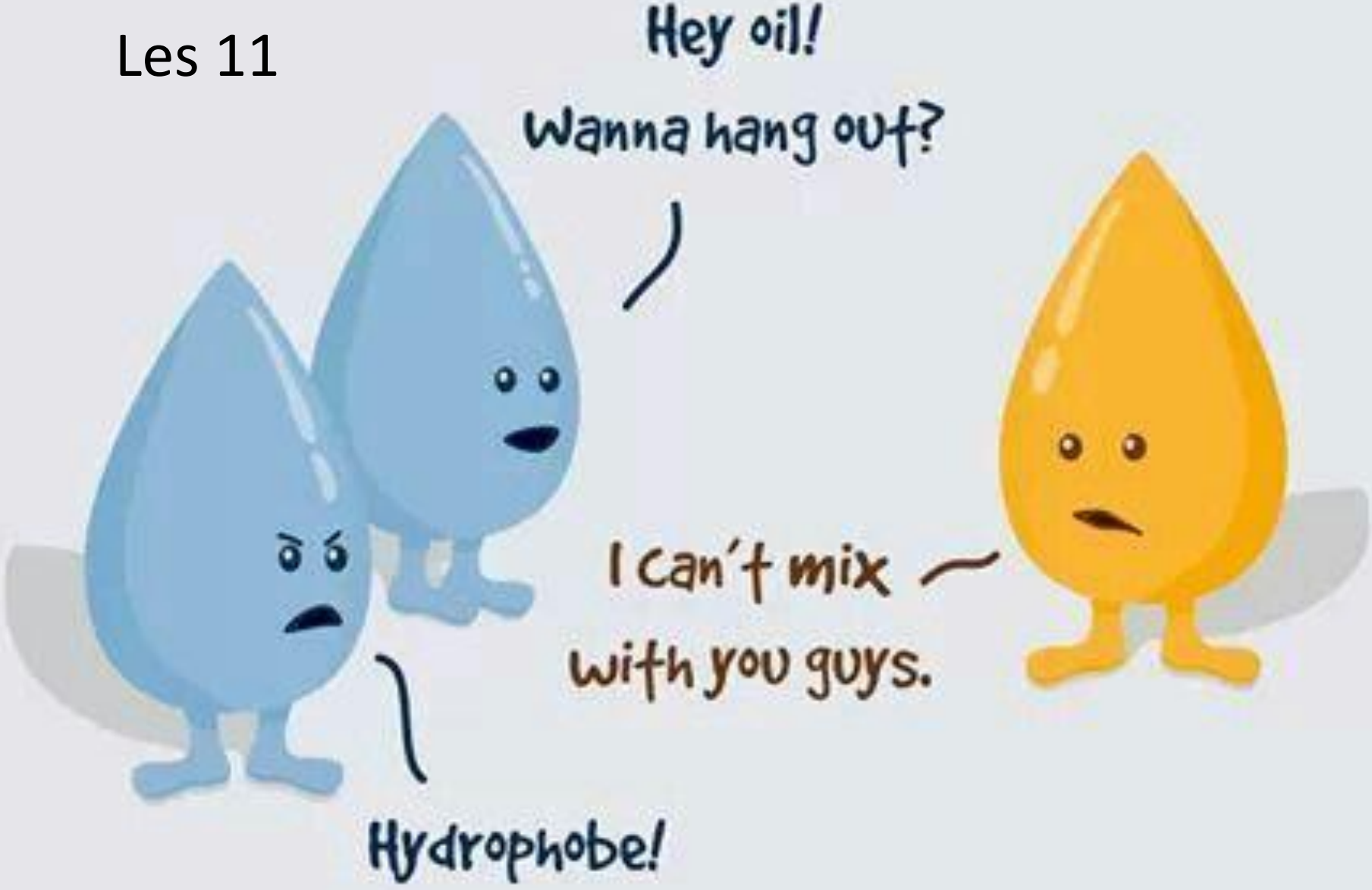
Biochemie 1

Les 11



Biochemie 1

Les 13

Hoofdstuk 11
Lipiden

Lipiden

Water-insoluble molecules that are highly soluble in organic solvents.

Verschillende functies, o.a.:

- energie (opslag)
- membranen
- signaaltransductie (→ hormonen)

Vormen lipiden polymeren?

Lipide klassen

1. Vrije vetzuren (*nonesterified fatty acids*)
    - vaak gebruikt als brandstof

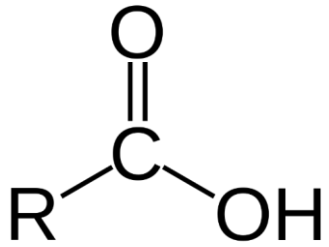
2. Triacyglycerolen
    - opslagvorm van vetzuren

3. Fosfolipiden
    - membranen

4. Glycolipiden
    - ook onderdeel membranen

5. Steroïden
    - Hormonen (b.v. steroïden)
    - polycyclisch

Vetzuren

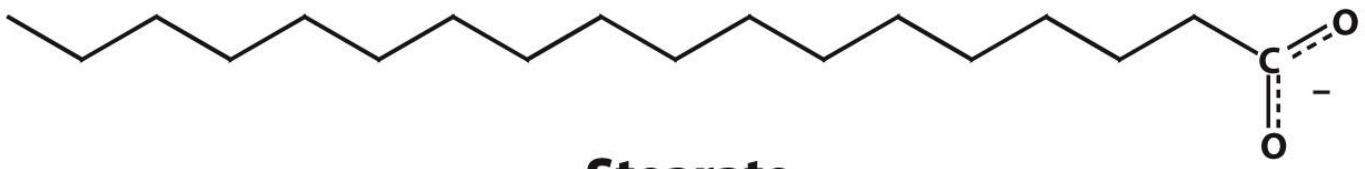


Meestal 12-20 koolstofatomen met aan het uiteinden een carboxylic acid (carbonzuur)

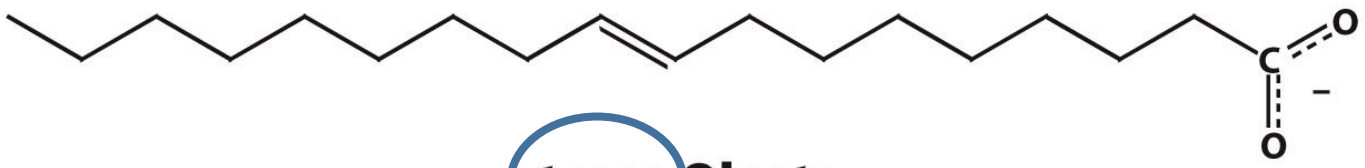
Kunnen dubbele bindingen bevatten

Belangrijke energiebron én component van fosfolipiden

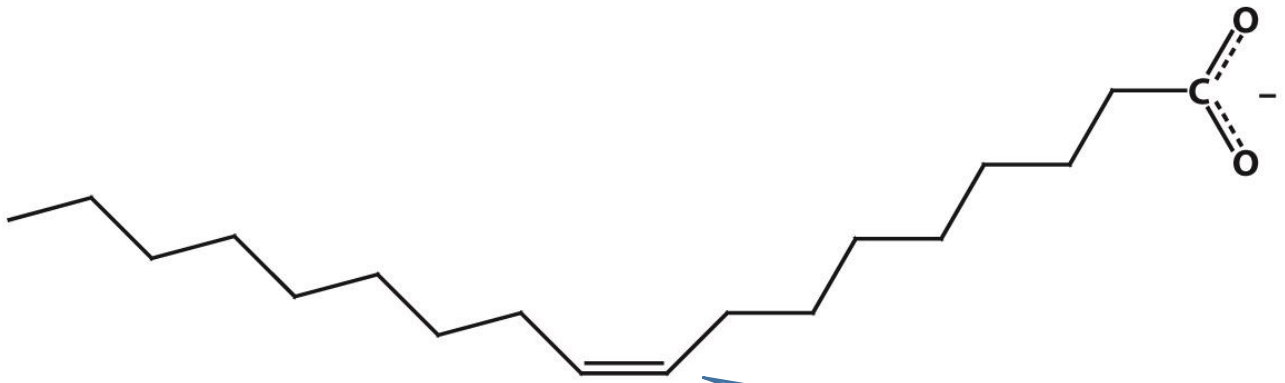
Vetzuren kunnen verzadigd of onverzadigd zijn



Stearate



trans-Oleate



cis-Oleate

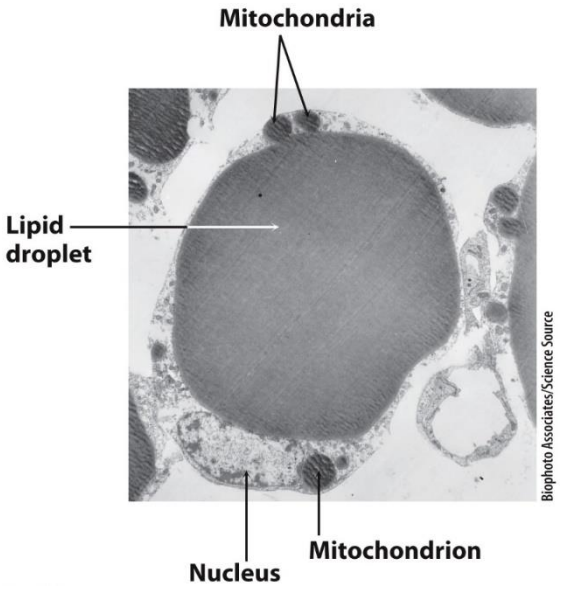
knik beïnvloedt ‘packing’

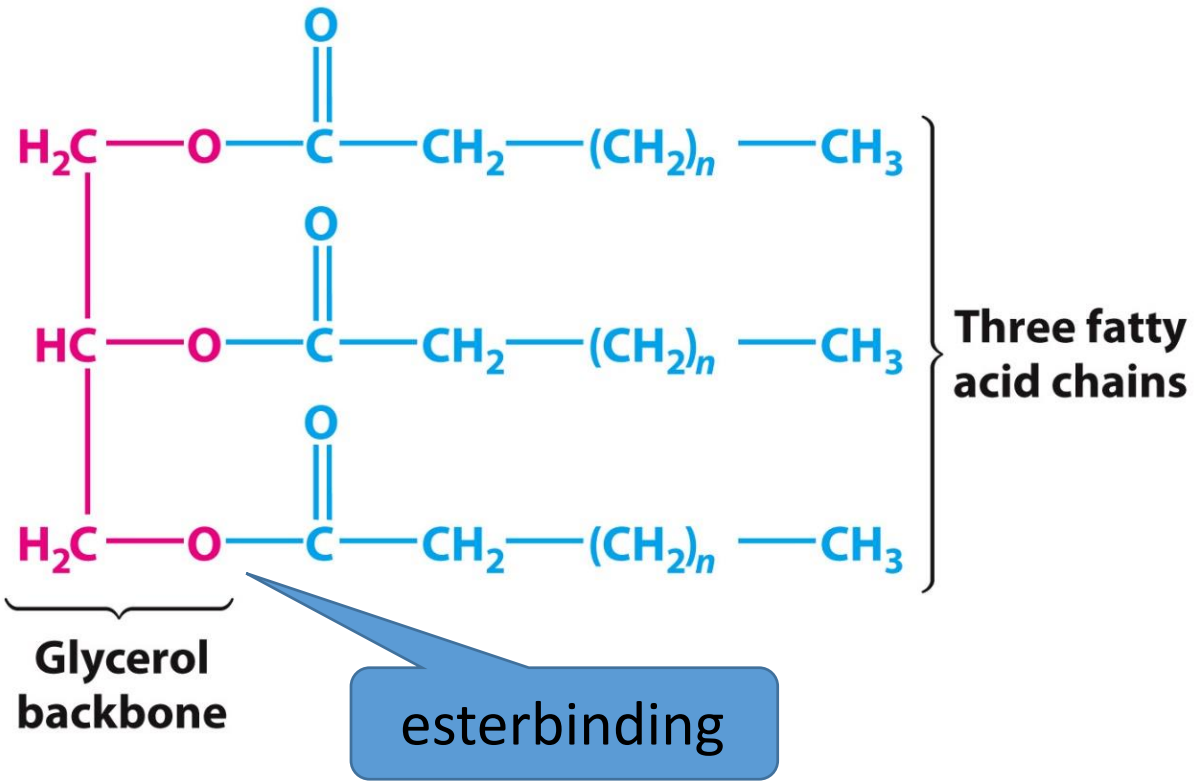
Vetzuren kunnen verzadigd of onverzadigd zijn

	Carbon Atoms/ Double Bonds	Common Name	mp (°C)
Saturated	12:0	lauric acid	44
	14:0	myristic acid	58
	16:0	palmitic acid	63
	18:0	stearic acid	71
	20:0	arachidic acid	77
Unsaturated	16:1	palmitoleic acid	-0.5
	18:1	oleic acid	16
	18:2	linoleic acid	-5
	18:3	linolenic acid	-11
	20:4	arachidonic acid	-49

Short chain length and cis unsaturation enhande the fluidity of fatty acids and their derivates

Triacylglycerolen





Opslag energie (→ vetweefsel)

Losse vetzuren zouden de pH balans in de cel verstoren

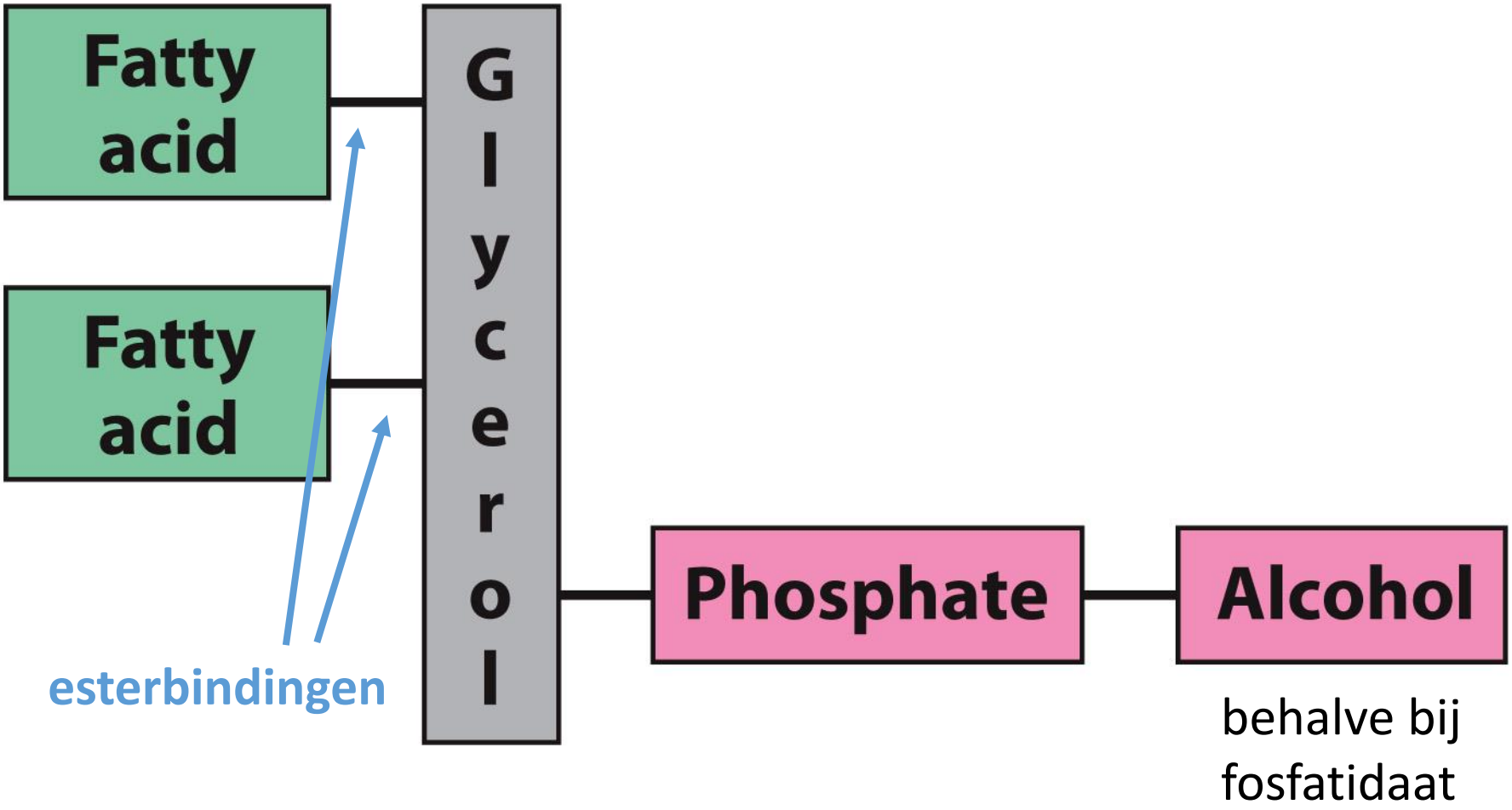
I.t.t. koolhydraten bindt er geen water aan triacylglycerolen: efficiëntere opslag

Membraanlipiden

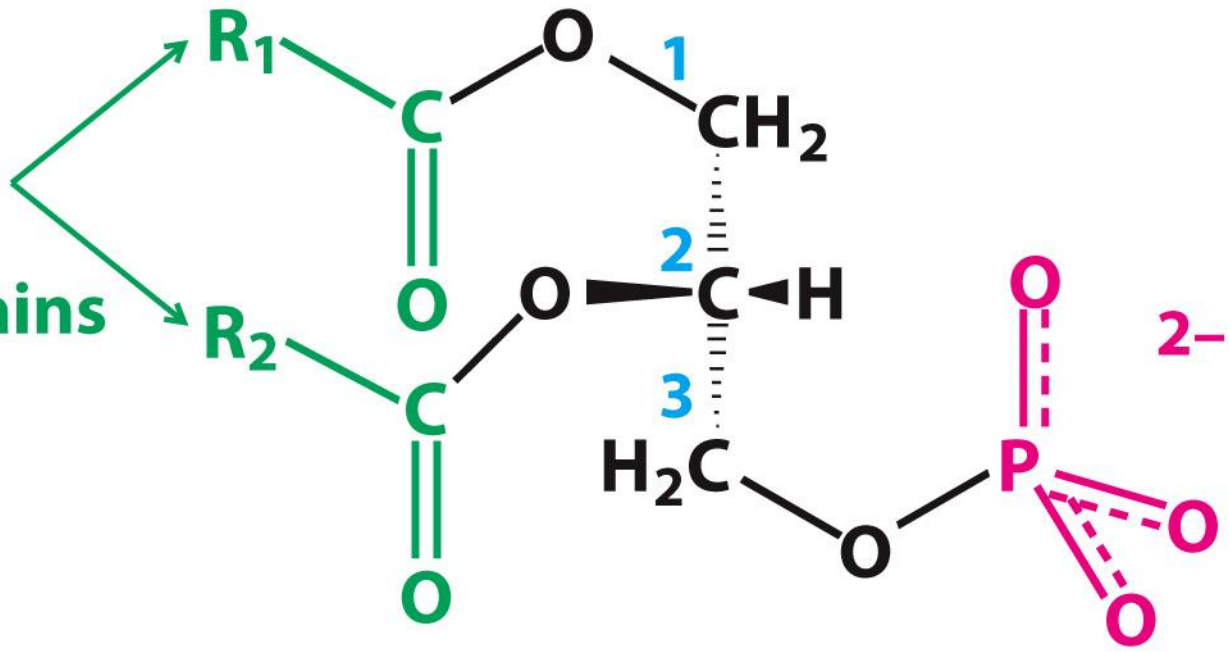
- Fosfolipiden
  - fosfoglycerides
  - sphingolipiden
- Glycolipiden
- Steroïden

Fosfoglycerides

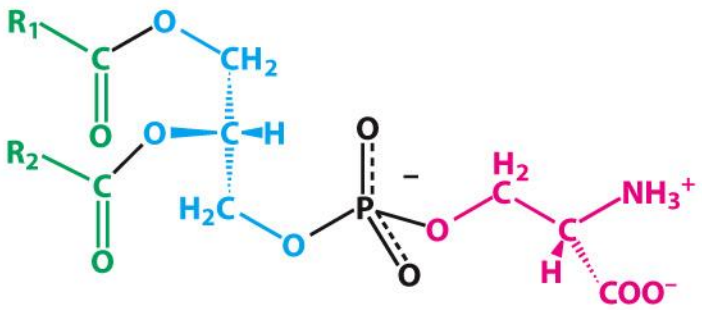
= glycerofosfolipiden



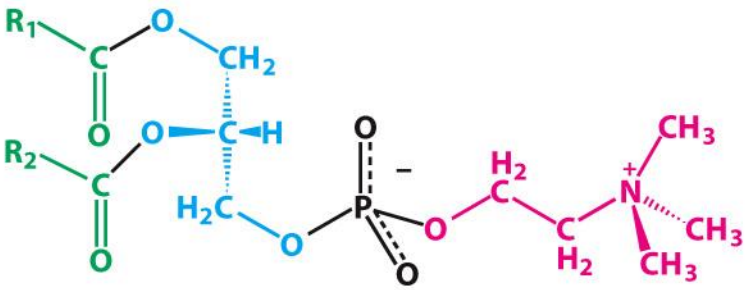
Acyl groups with fatty acid hydrocarbon chains



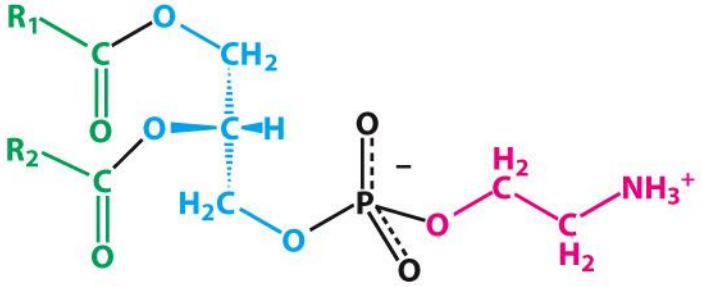
Phosphatidate
(Diacylglycerol 3-phosphate)



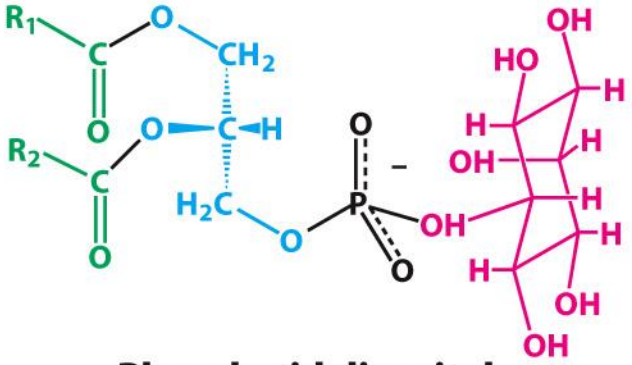
Phosphatidylserine



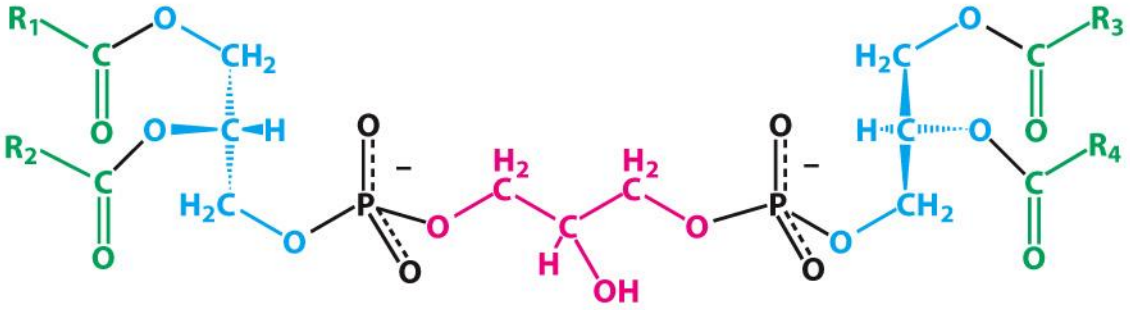
Phosphatidylcholine



Phosphatidylethanolamine

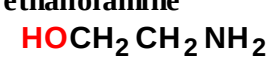
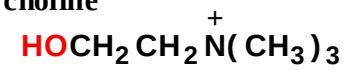
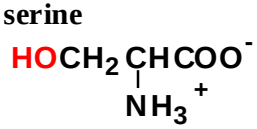
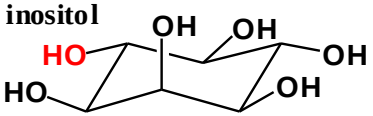
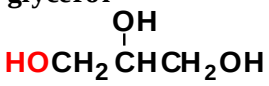
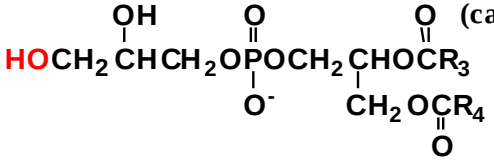


Phosphatidylinositol



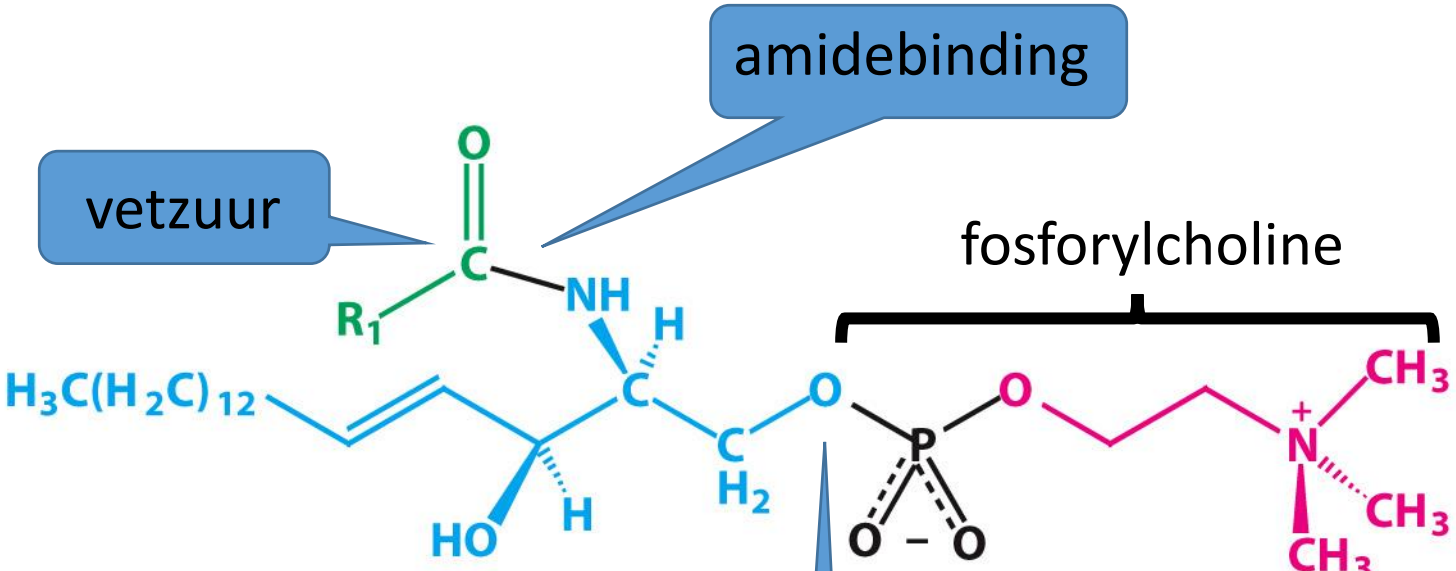
Diphosphatidylglycerol (cardiolipin)

Voorbeelden fosfoacylglycerolen

Name and Formula	Name of Phospholipid	Function
ethanolamine 	phosphatidylethanolamine (cephalin)	Curvature of the membrane
choline 	phosphatidylcholine (lecithin)	Component of the membrane
serine 	phosphatidylserine	Cell signalling in apoptosis
inositol 	phosphatidylinositol	Cell signalling (taste)
glycerol 	phosphatidylglycerol	Pulmonary surfactant
phosphatidylglycerol 	diphosphatidylglycerol (cardiolipin)	Inner membrane mitochondria

Sphingolipiden

Sphingosine (a long-chain amino alcohol)



Sphingomyelin

(common sphingolipid in membranes)

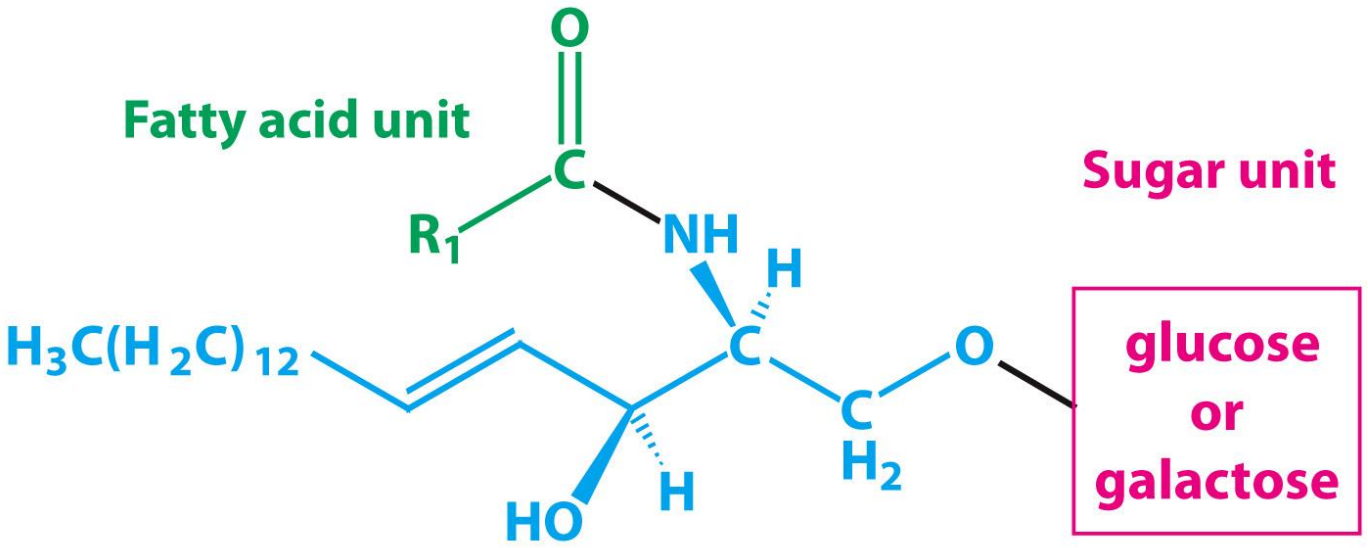
Glycolipiden

Suikerbevattende lipiden

Komen veel voor in celmembranen → betrokken bij cel-cel interacties

Van welk type lipide zijn glycolipiden afgeleid?

Afgeleid van sphingosine

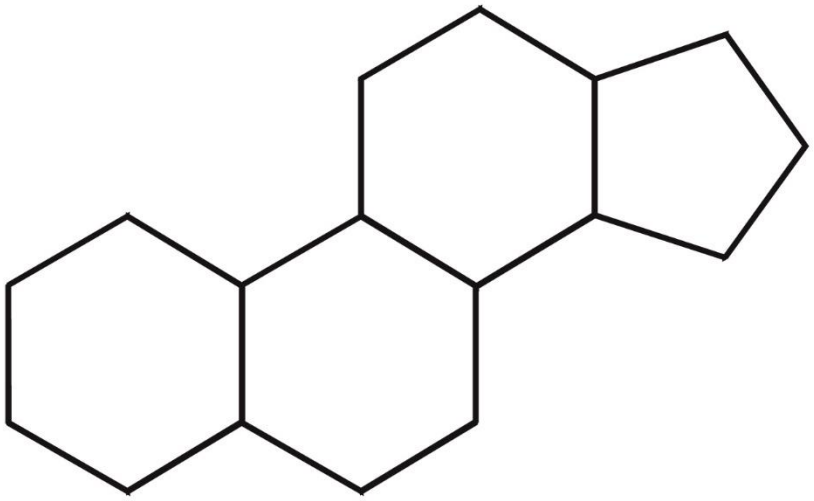


Cerebroside
(a glycolipid)

Steroïden

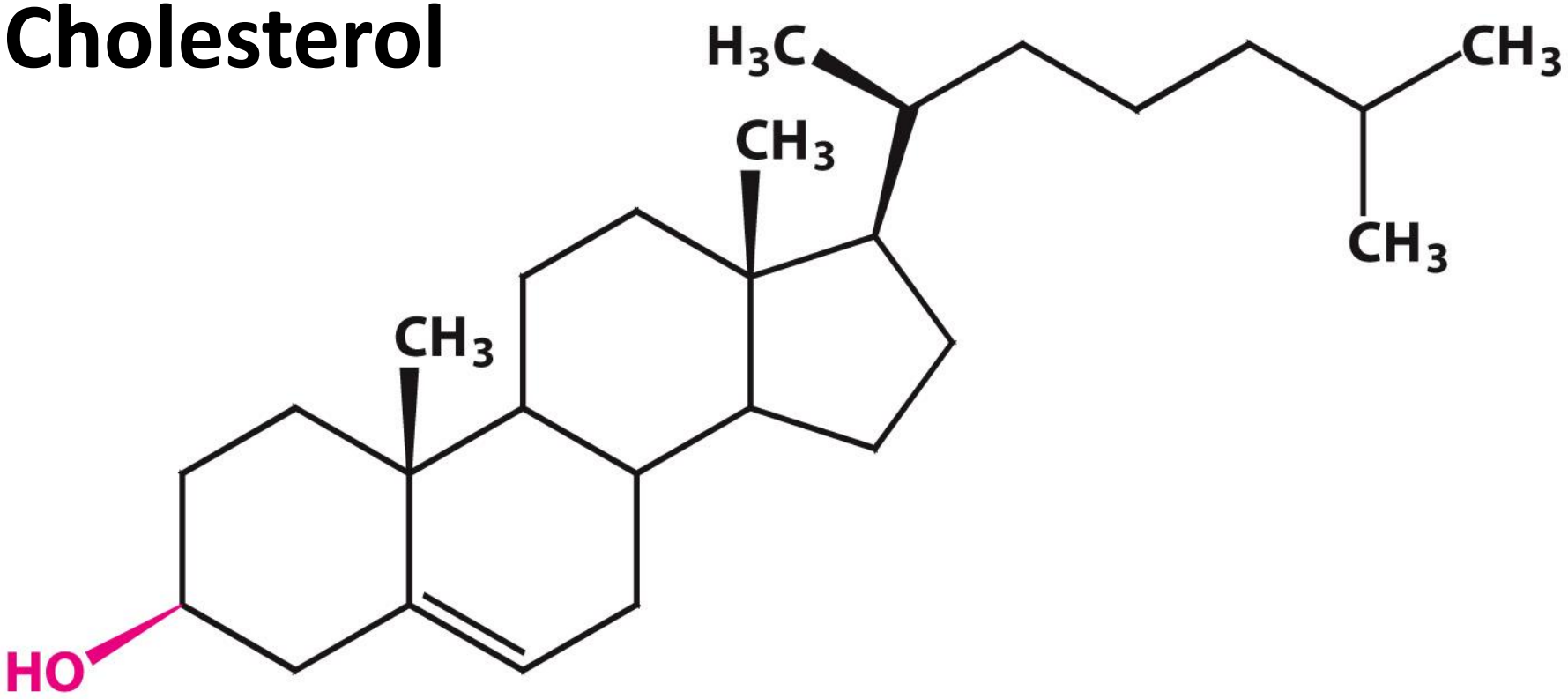
Steroïde nucleus: drie cyclohexaanringen en een cyclopentaanring

Bekend van hormonen (estrogeen, testosteron) en cholesterol



Steroid nucleus

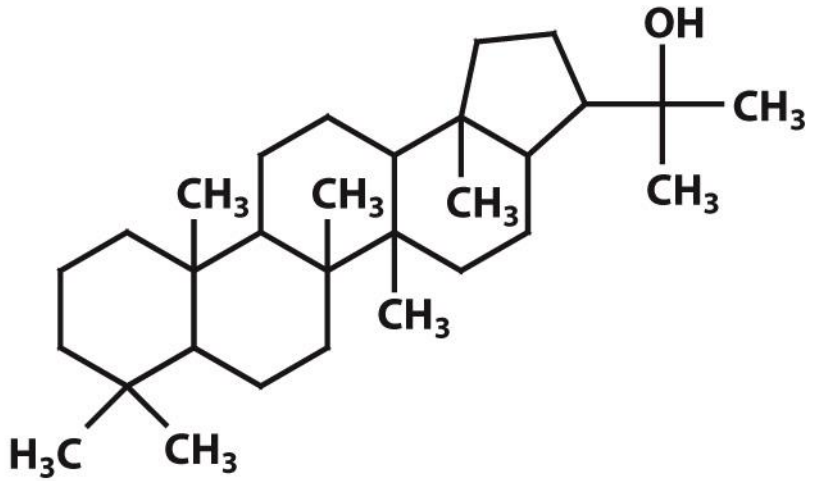
Cholesterol



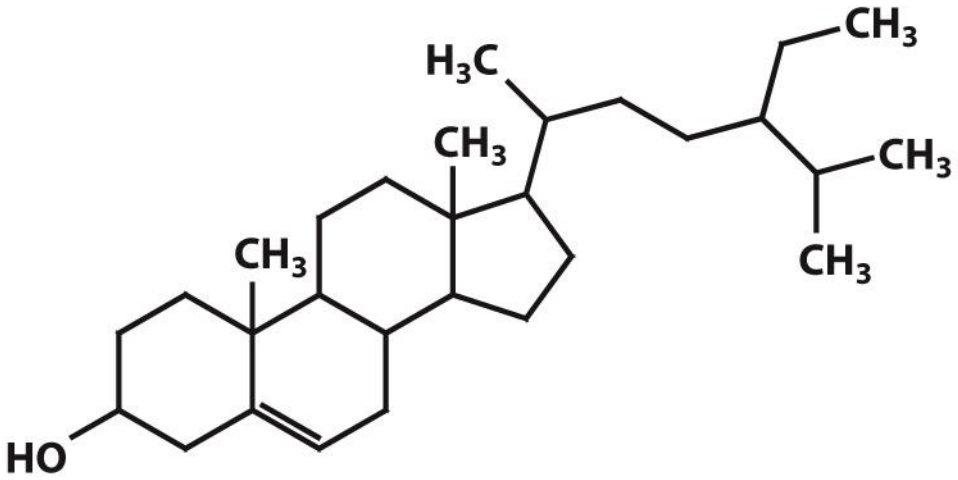
Belangrijke component biologische membranen (dierlijke cellen)

Essentieel voor regulatie van de vloeibaarheid van membranen

Precursor voor andere steroïden en vitamine D_3



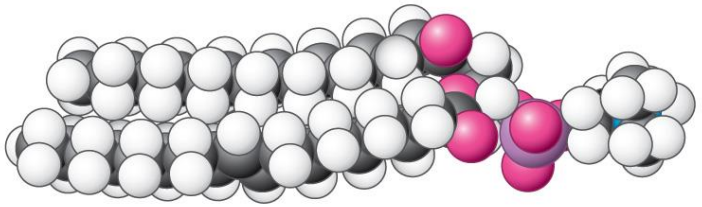
Diplopterol
(A hopanoid)



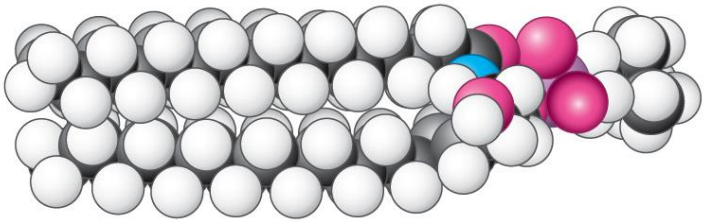
Sitosterol
(A plant sterol)

Membraanlipiden

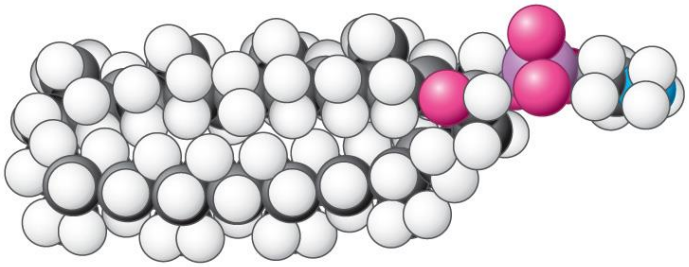
Amphipatische moleculen



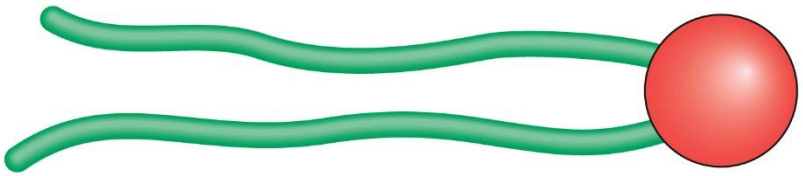
Phosphoglyceride



Sphingomyelin



Archaeal lipid

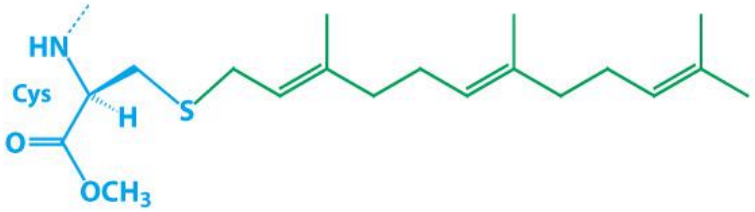


Shorthand depiction

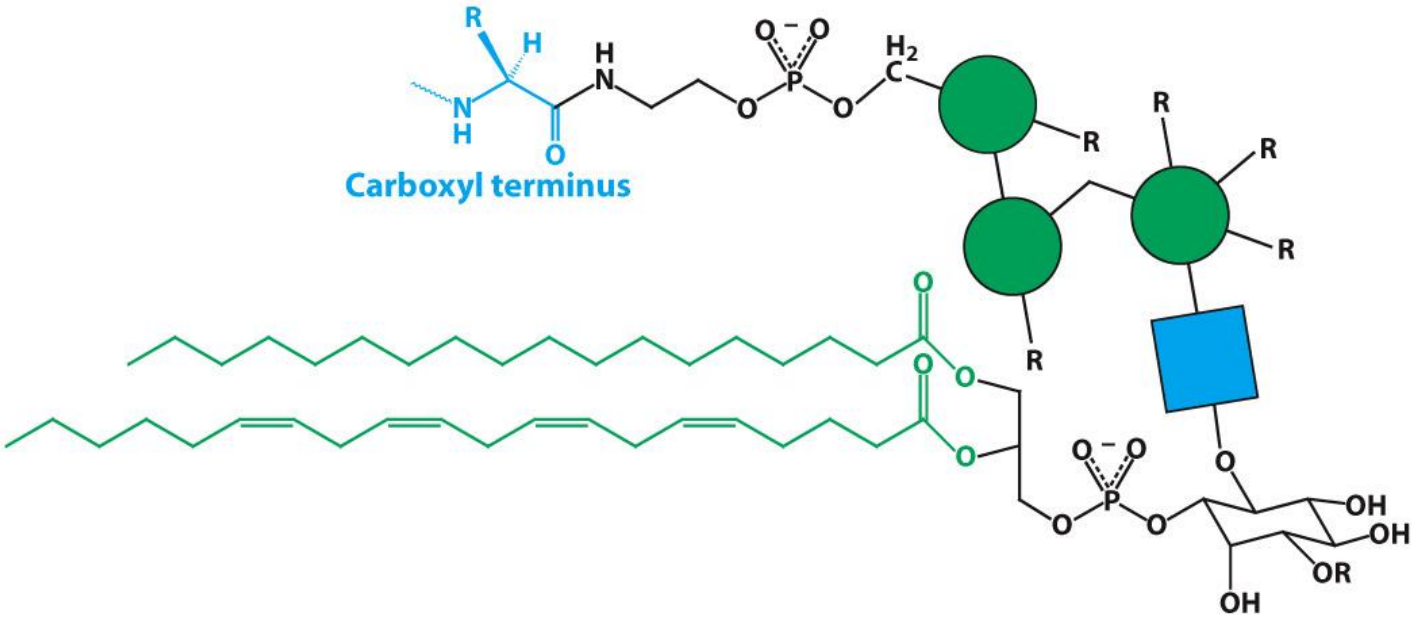
Membrane anchors

Hyrdrofobe groepen covalent gebonden aan eiwitten

S-Palmitoylcysteine



C-terminal S-farnesylcysteine methyl ester



Glycosylphosphatidylinositol (GPI) anchor

Oefening

Overzicht lipiden