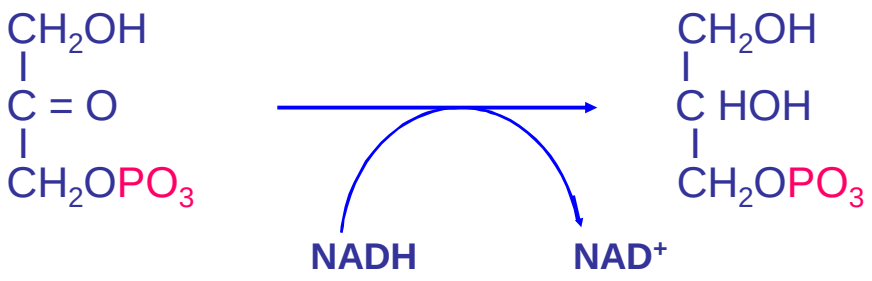
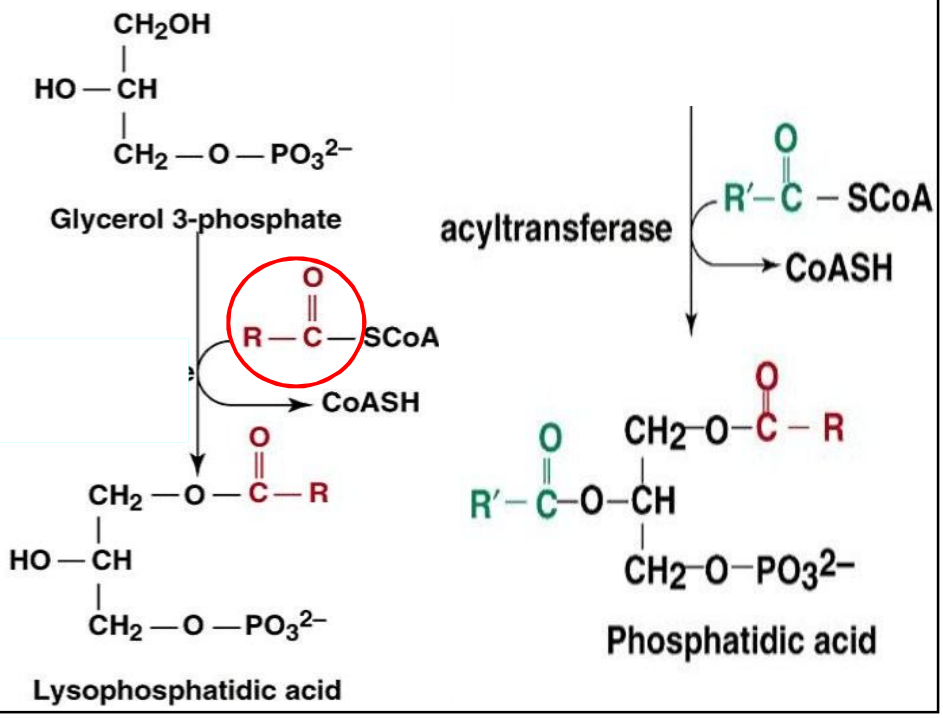
Production of Glycerol Phosphate

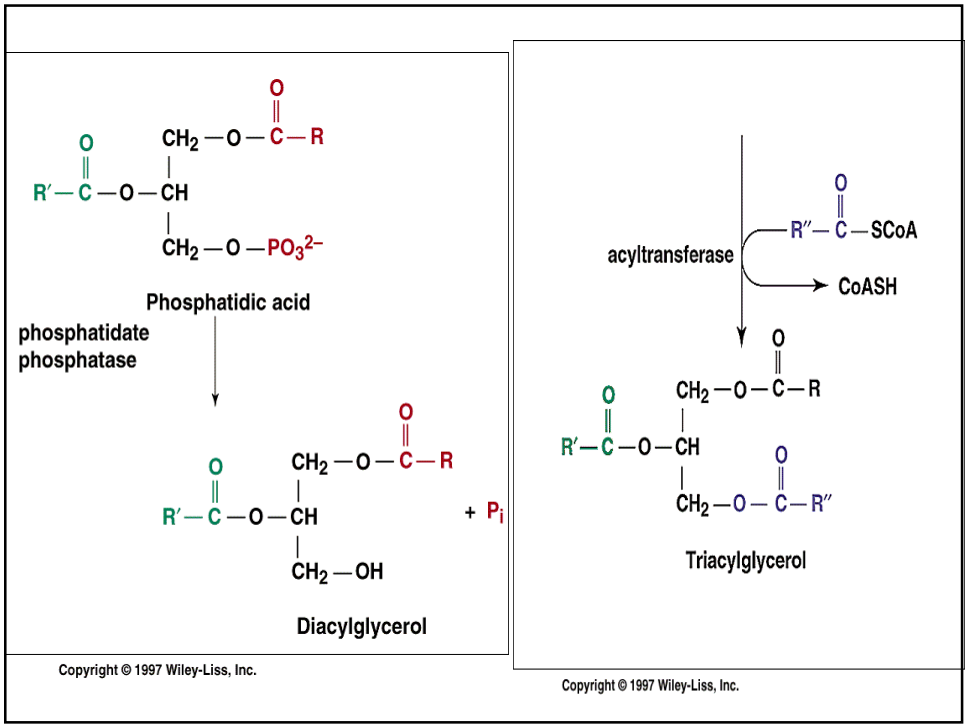
- Glycerol + ATP ---→ Glycerol 3 Phosphate

Enz: Glycerol Kinase

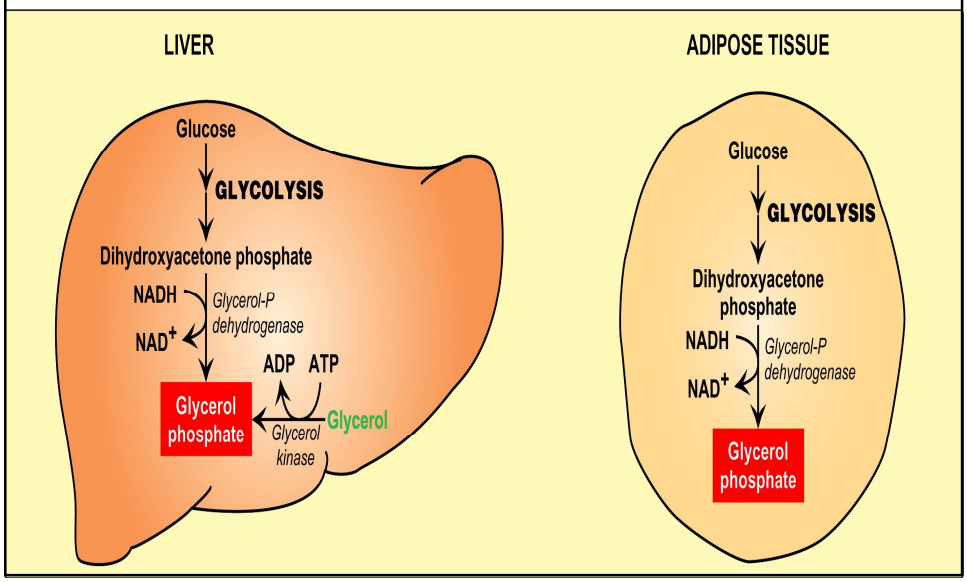
Not in Adipose tissue

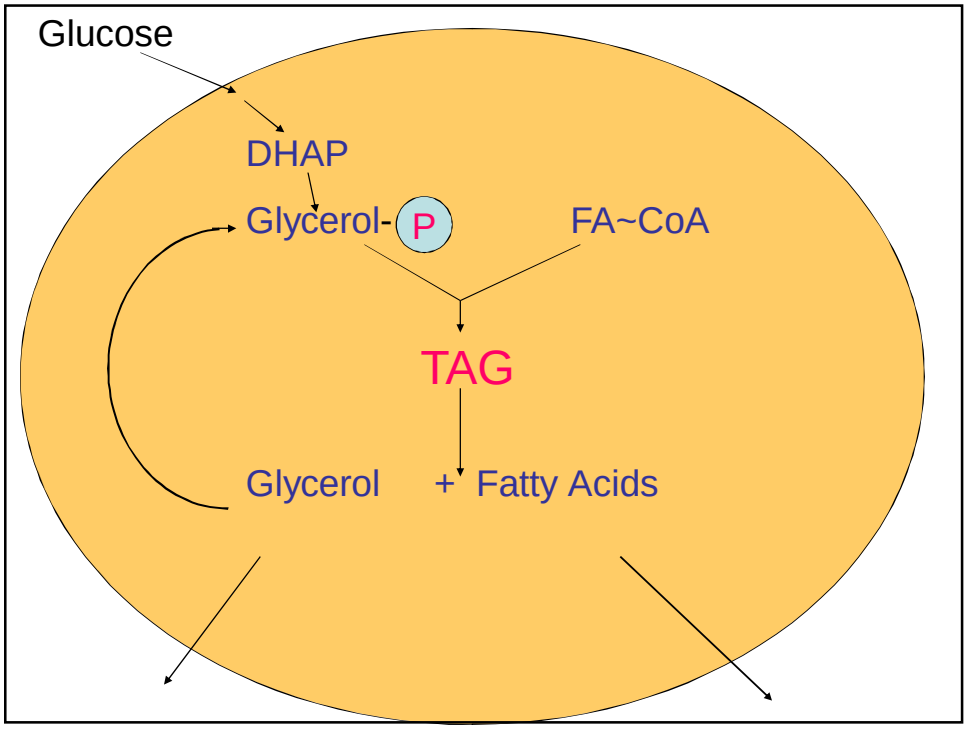






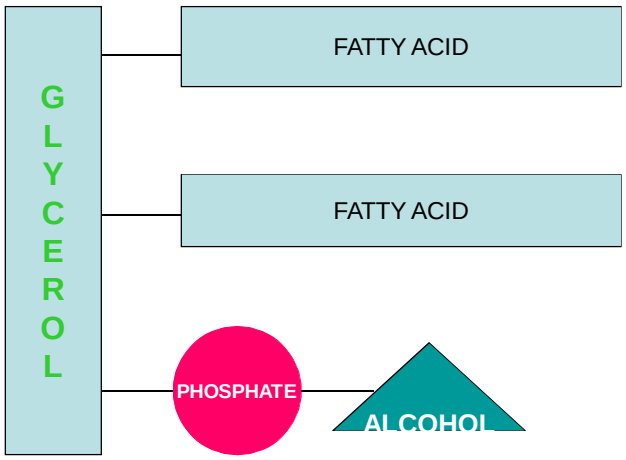
Production of Glycerol Phosphate



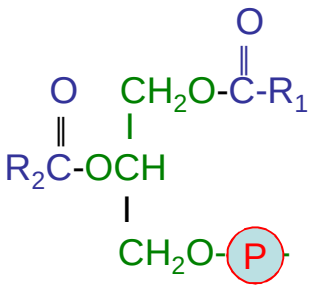


Biosynthesis of Glycerophospholipids

also known as
Phosphoglycerides or
Phosphoacylglycerol
Lippincott's Ch 17



PHOSPHOACYLGLYCEROL

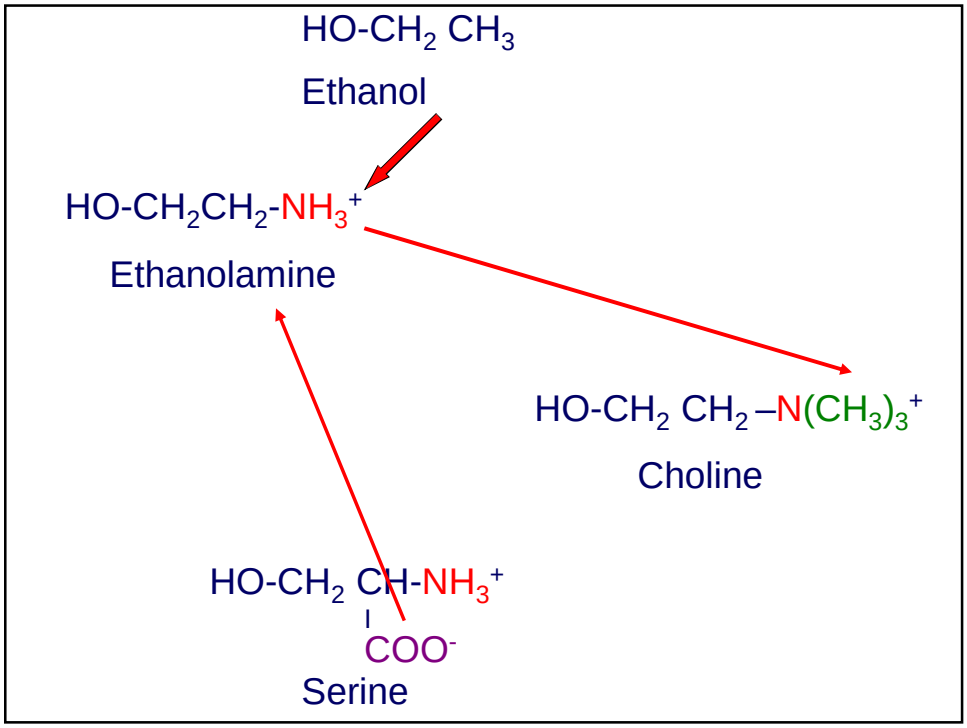


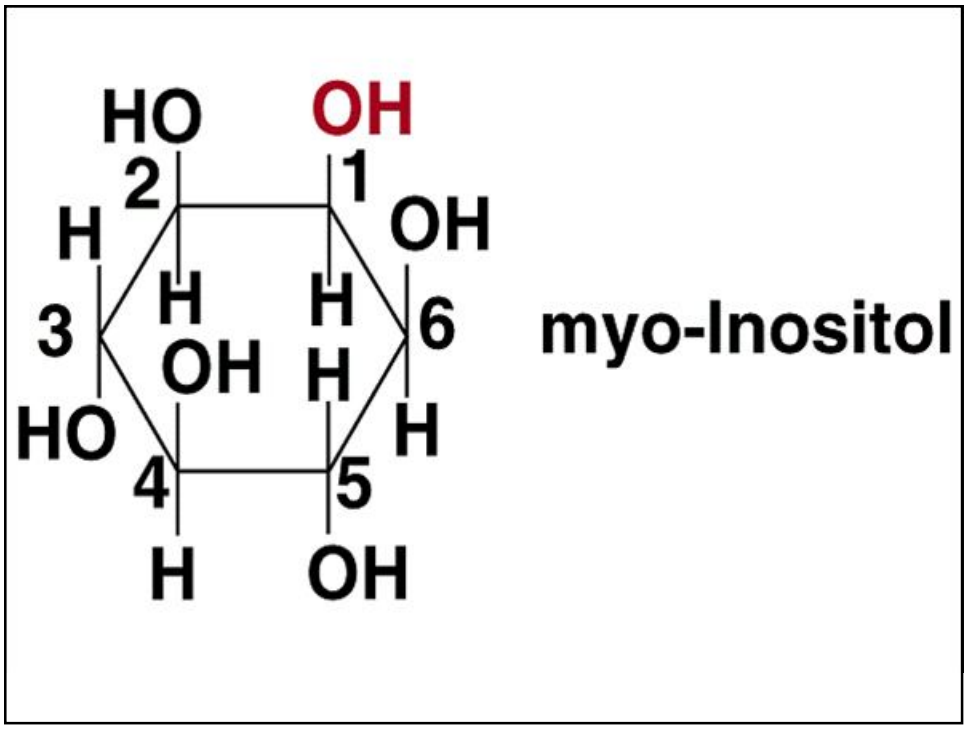
Phosphatidic Acid

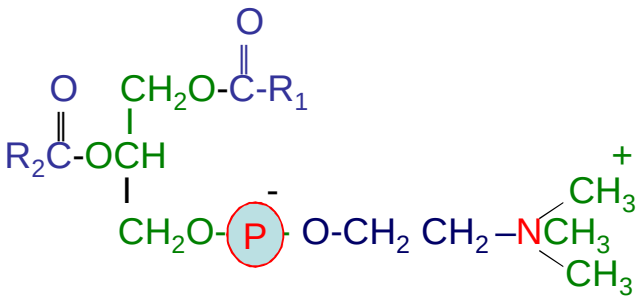
Can Form Ester with Alchol:

- **Serine**
- **Ethanolamine**
- **Choline**
- **Inositol**
- **Glycerol**

Phosphatidyl -


HO-CH2 CH3
Ethanol
HO-CH2CH2-NH3+
Ethanolamine
HO-CH2 CH2 –N(CH3)3+
Choline
HO-CH2 CH-NH3+
COO-
Serine


HO
OH
2
1
H
OH
3
H
H
6
OH
H
HO
H
4
5
H
OH
myo-Inositol



Phosphatidyl Choline (Lecithin)

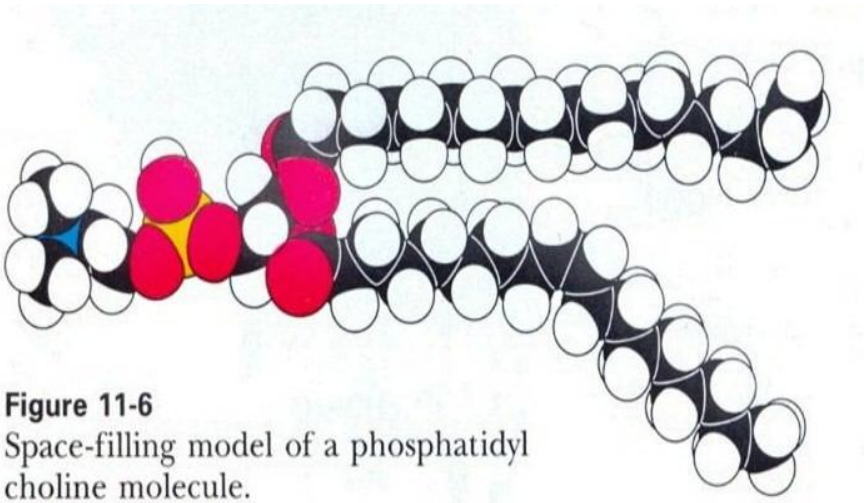
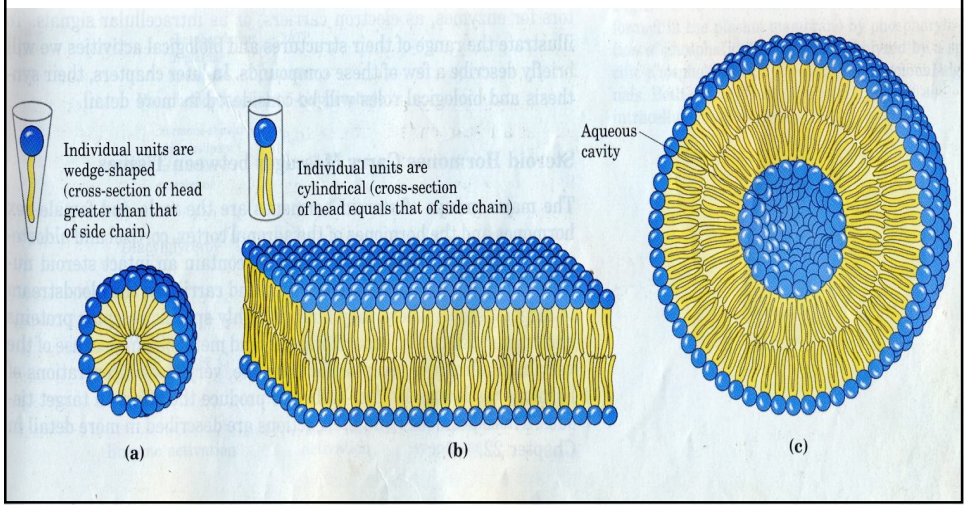
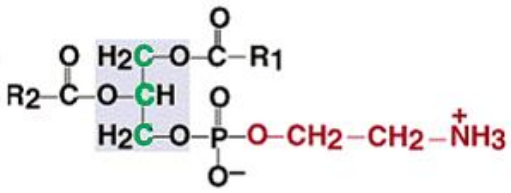


Figure 11-6
Space-filling model of a phosphatidyl choline molecule.


Individual units are wedge-shaped (cross-section of head greater than that of side chain)
Individual units are cylindrical (cross-section of head equals that of side chain)
Aqueous cavity
(a)
(b)
(c)



?

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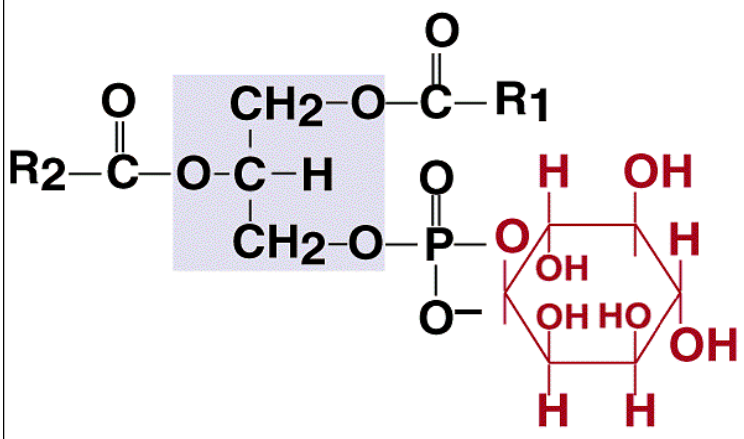
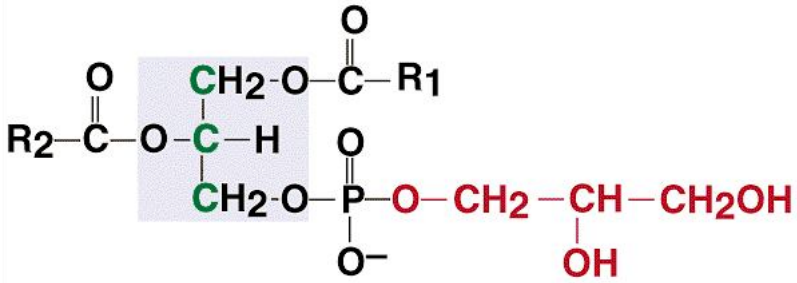
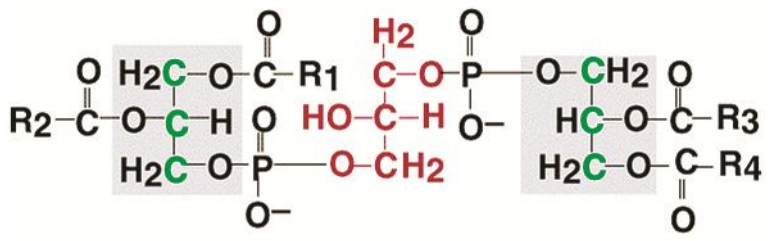


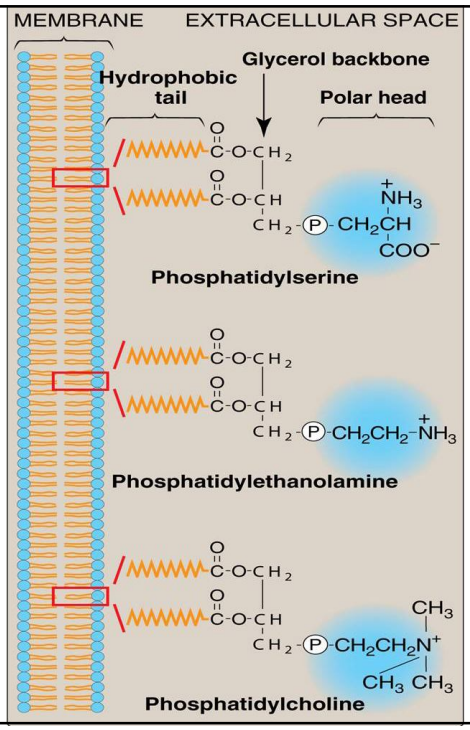
Phosphatidylinositol

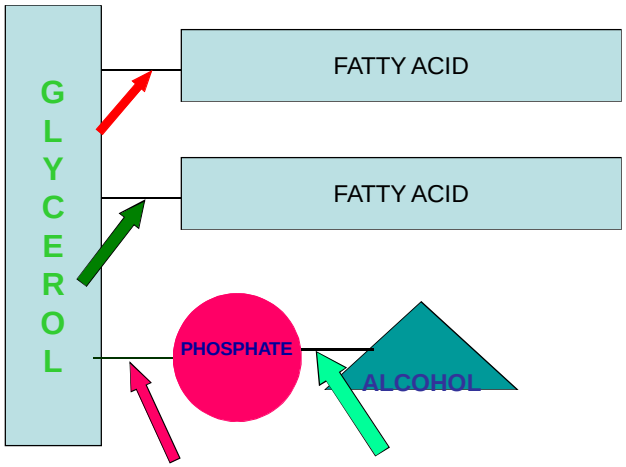


Phosphatidylglycerol



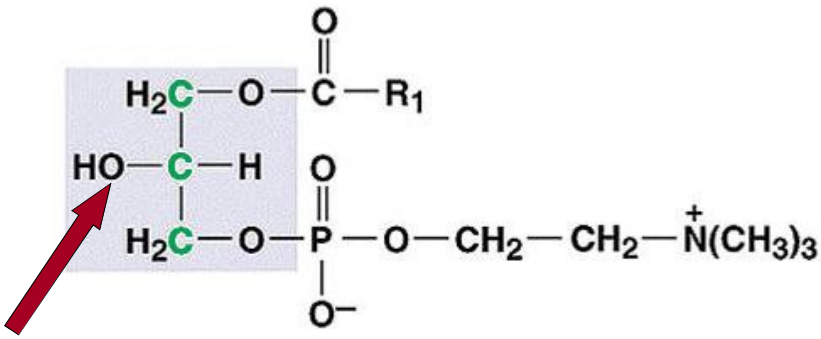
Cardiolipin: Two molecules of Phosphatidic Acid Connected through **Glycerol**



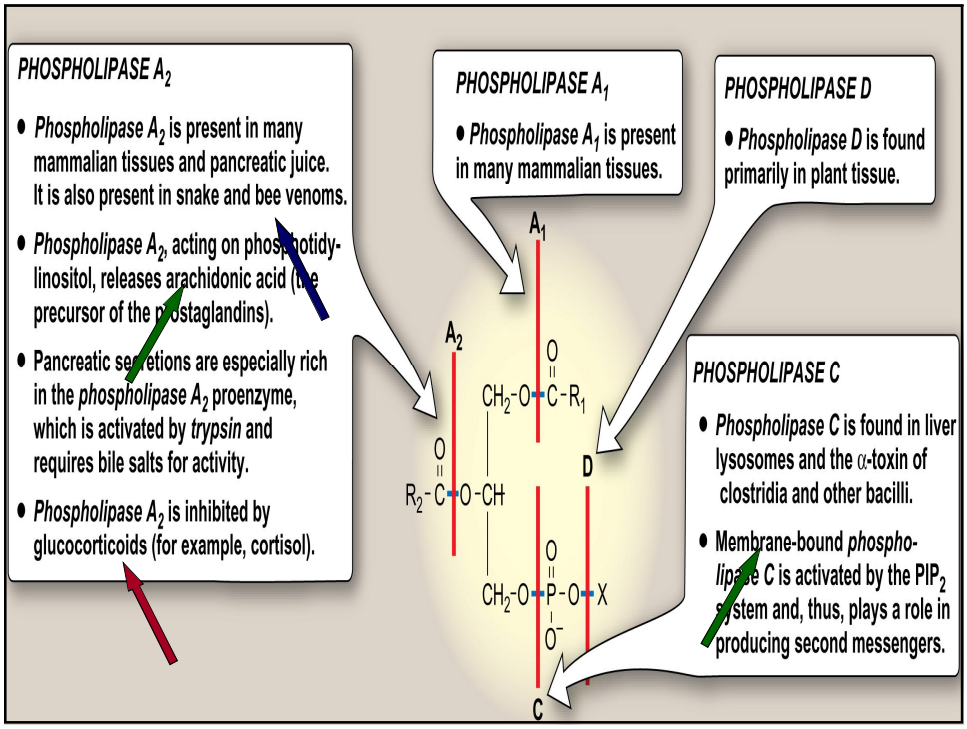


Degradation of Phospholipids:

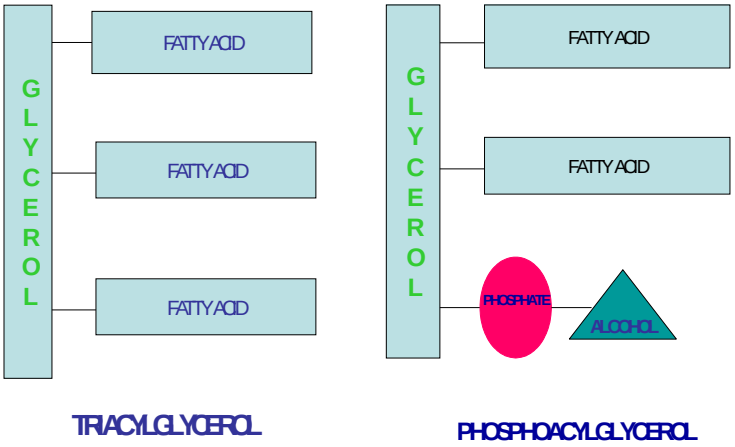
Phospholipase A_1
Phospholipase A_2
Phospholipase C
Phospholipase D



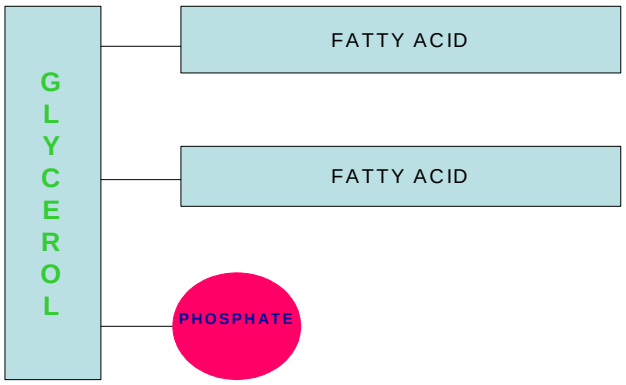
Lysophosphatidylcholine



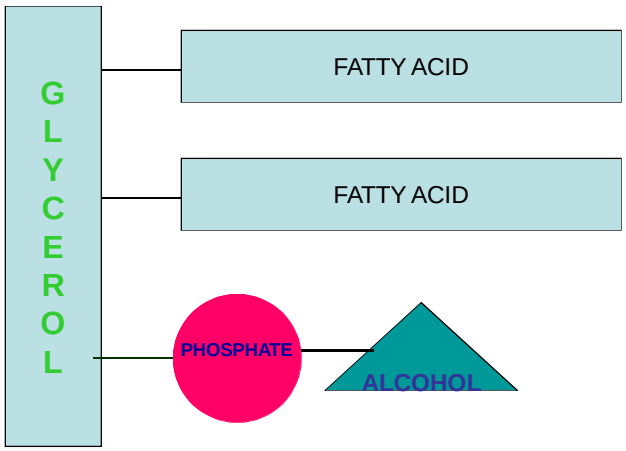
Biosynthesis of Triacylglycerol & Phosphoacylglycerol



Phosphotadic Acid is Common Intermediate



PHOSPHOACYLGLYCEROL



Biosynthesis of glycerophospholipids

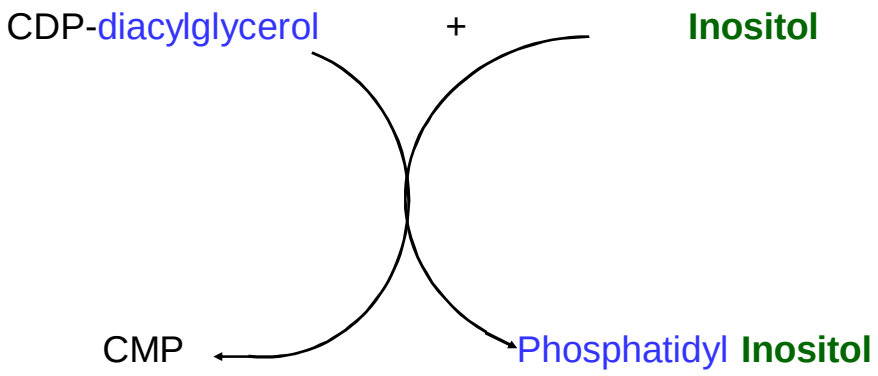
Alcohol$_1$ Phosphate Alcohol$_2$

Transfer ~(Phosphate-Alcohol$_1$) to Alcohol$_2$ or

Transfer ~(Phosphate-Alcohol$_2$) to Alcohol$_1$

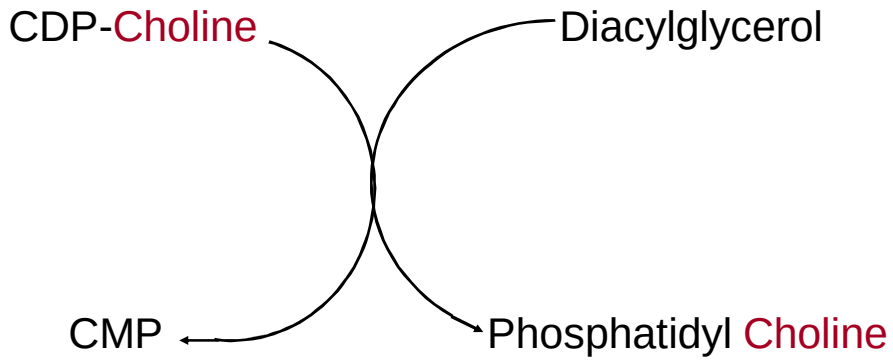
Synthesis of Phosphatidyl Inositol

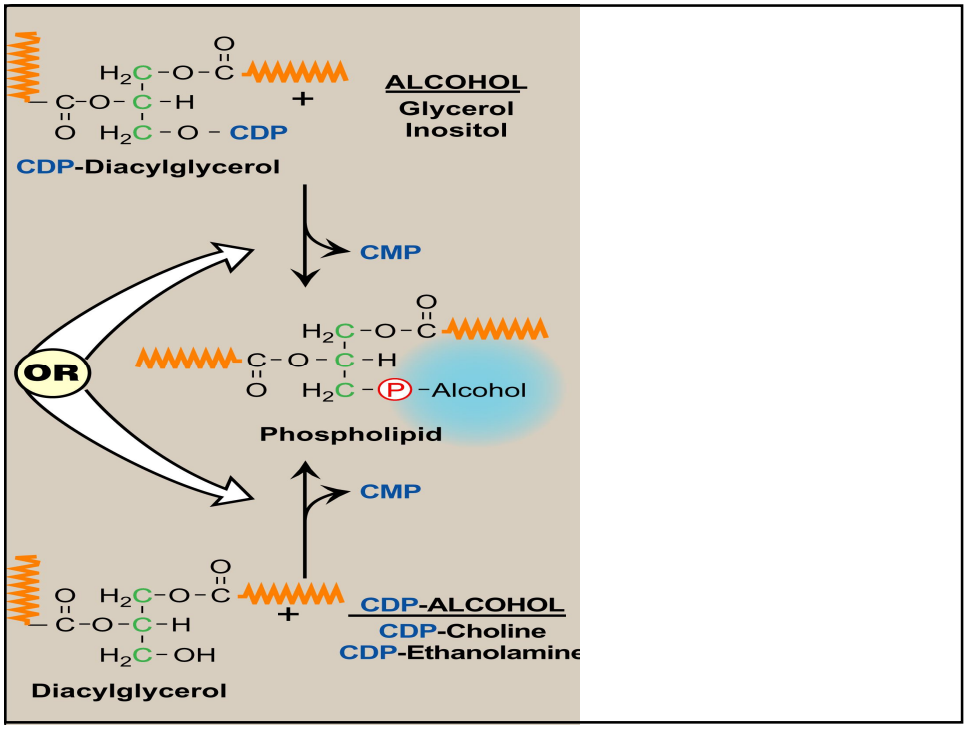
Transfer or Phosphatidic acid to Inositol

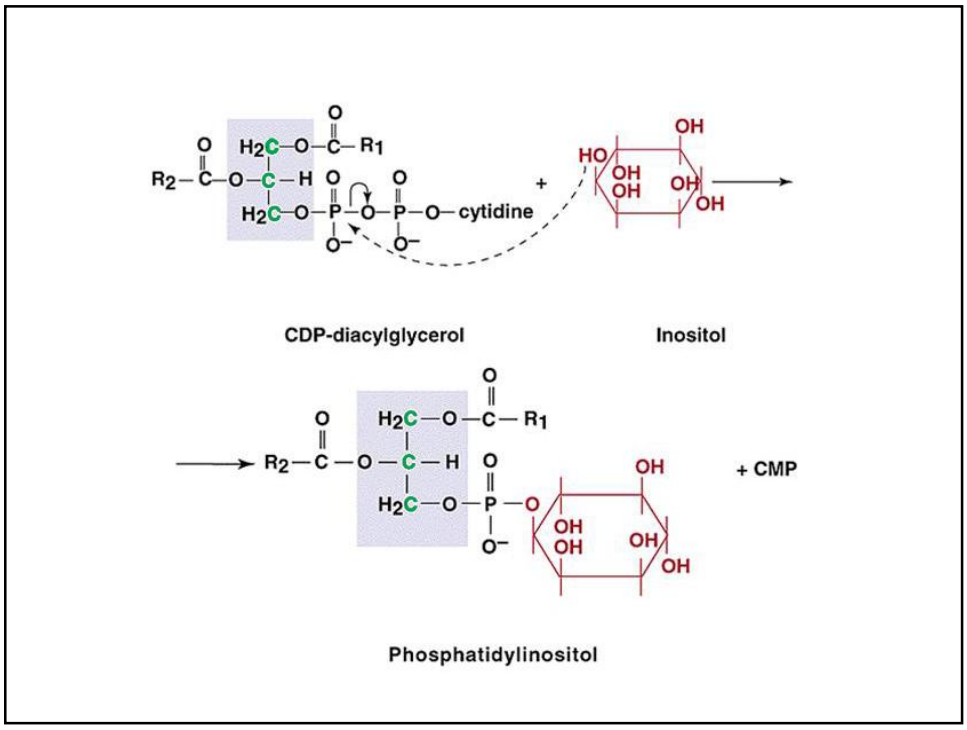


Synthesis of Phosphatidyl Choline

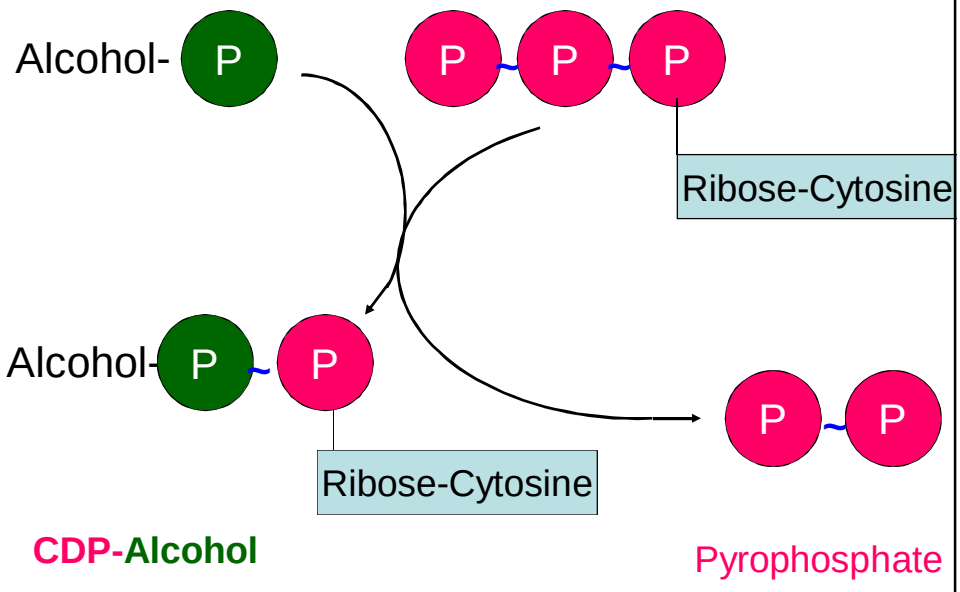
Transfer or Phosphocholine (Ethanolamine) to Diacylglycerol




ALCOHOL
Glycerol
Inositol
CDP-Diacylglycerol
CMP
OR
Phospholipid
CMP
CDP-ALCOHOL
CDP-Choline
CDP-Ethanolamine
Diacylglycerol

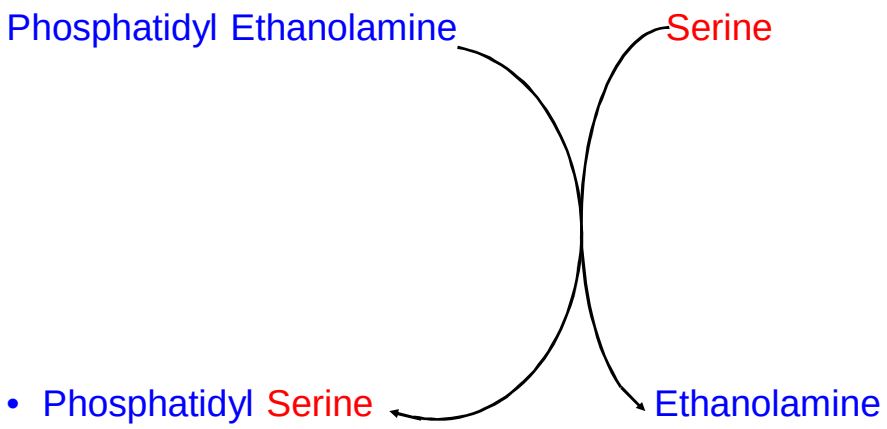

cytidine
CDP-diacylglycerol
Inositol
+ CMP
Phosphatidylinositol

Formation of Activated Carrier



Alteration of Polar Head Group

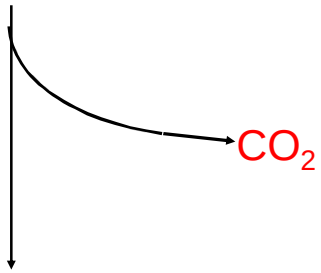
- Exchange of the Polar Head Group



Alteration of Polar Head Group

- **Decarboxylation of Phosphatidyl Serine**

Phosphatidyl Serine



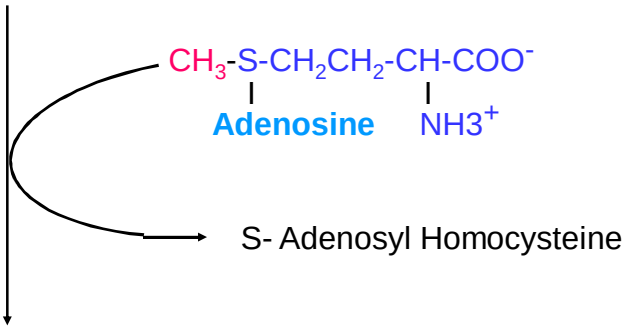
Phosphatidyl Ethanolamine

Alteration of Polar Head Group

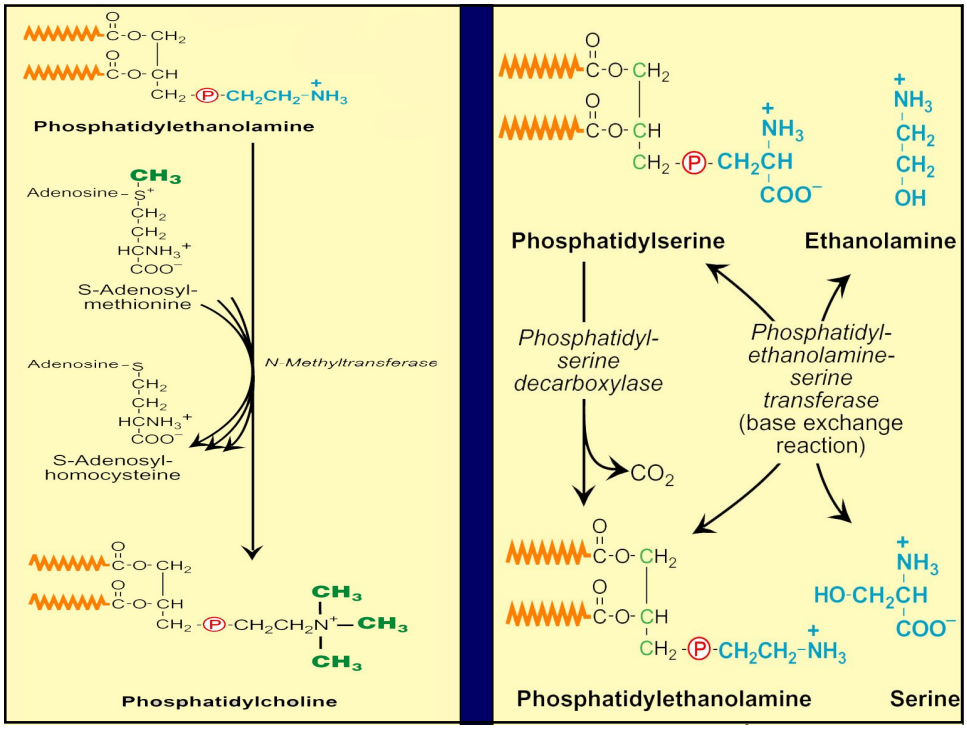
- **Methylation of Phosphatidyl Ethanolamine**

S- Adenosyl Methionine (SAM); Methyl donor

Phosphatidyl Ethanolamine



Phosphatidyl Choline


Phosphatidylethanolamine
Adenosine
S-Adenosyl-methionine
N-Methyltransferase
S-Adenosyl-homocysteine
Phosphatidylcholine
Phosphatidylserine
Ethanolamine
Phosphatidyl-serine decarboxylase
Phosphatidyl-ethanolamine-serine transferase (base exchange reaction)
Phosphatidylethanolamine
Serine