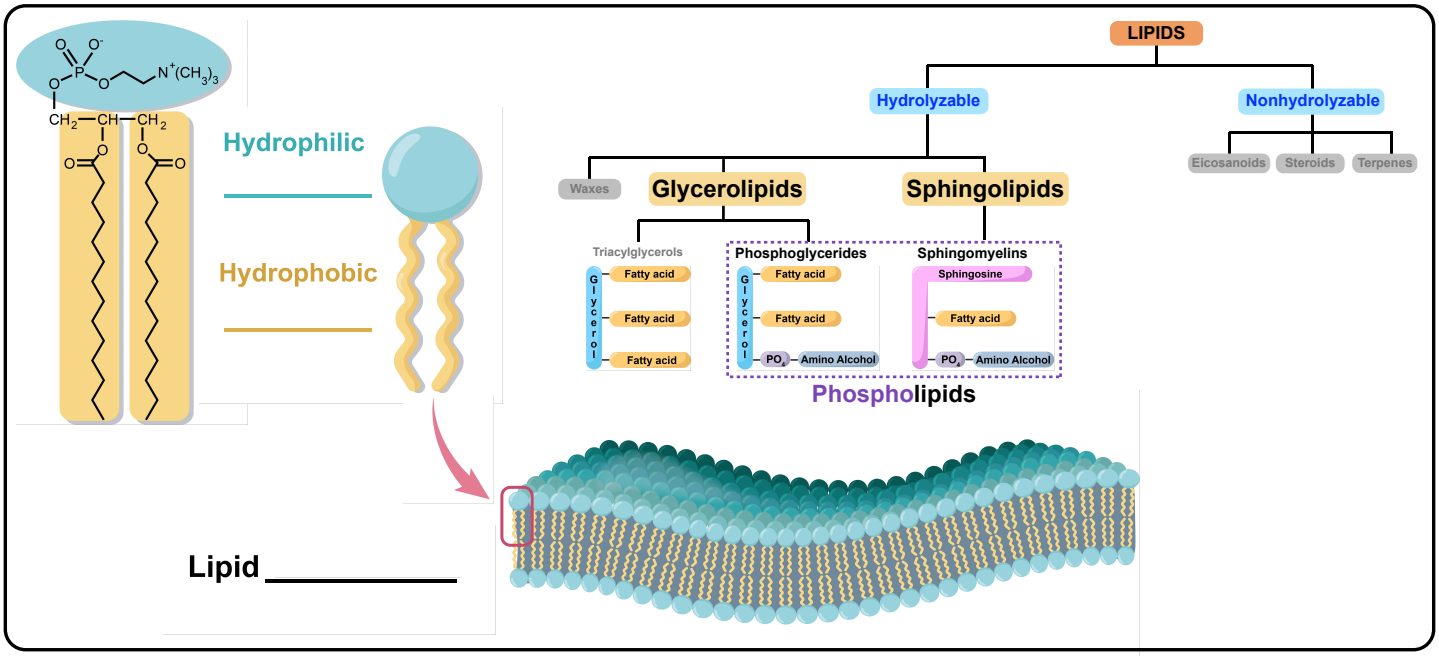
**CONCEPT:** PHOSPHOGLYCERIDES

- **Phospholipids:** lipids that contain a _____ group attached to a glycerol or sphingosine backbone.
  - □ Like fatty acids, phospholipids are amphipathic with a hydrophilic _____ and a hydrophobic _____.




- Phospholipids are a major component of _____ cell membranes.
  - □ Rigidity of lipid bilayer depends on the identity of _____ acids that compose the phospholipids.

**EXAMPLE:** Which one of the following in not a component of phospholipids?

a) Fatty acid

b) Phosphate

c) Cholesterol

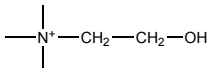
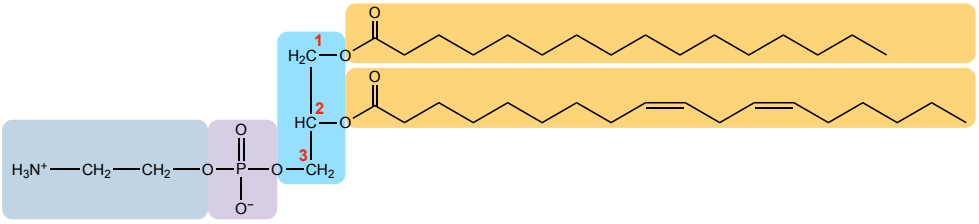
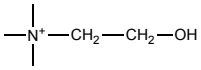
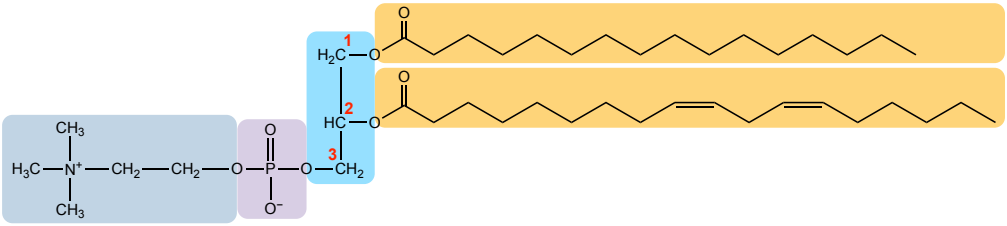
d) Glycerol

**CONCEPT:** PHOSPHOGLYCERIDES

## Phosphoglycerides

- Phosphoglycerides (Glycerophospholipids) are phospholipids with a glycerol backbone and two fatty acids.
  - □ **Head:** a phosphate group extended with an amino alcohol _____ group.
  - □ **Tails:** Two fatty acids attached through _____ bonds.
- Classified based on the head group attached to the phosphate group.

**Types of Phosphoglycerides**

| Class | Head Group | Example |
|---|---|---|
| **Cephalin** |  Ethanolamine |  |
| **Lecithin** |  **CH**oline |  |

- Phosphoglycerides are the most abundant lipids in cell membranes.

**EXAMPLE:** What is the basis of the classification of glycerophospholipids?

a) Fatty acid molecule at C1

b) Number of double bonds in the C2 fatty acid

c) Fatty acid molecule at C2

d) Head group attached to the phosphate group

**PRACTICE:** Which one of the following statements accurately describes the difference between cephalins and lecithins?

a) Cephalins contain saturated fatty acids while lecithins have unsaturated fatty acids.

b) Lecithins and cephalins have different backbone molecules.

c) The head groups in cephalins and lecithins are ethanolamine and choline, respectively.

d) Lecithins do not have a head group.

**CONCEPT:** PHOSPHOGLYCERIDES

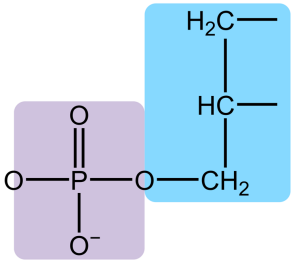
**Drawing Phosphoglycerides**

- Drawing a phosphoglycerides requires recalling the structures of fatty acids and head groups.

**EXAMPLE**: Draw the structure of a phosphoglyceride that contains two lauric acid acyl groups and ethanolamine bonded to the phosphate group.

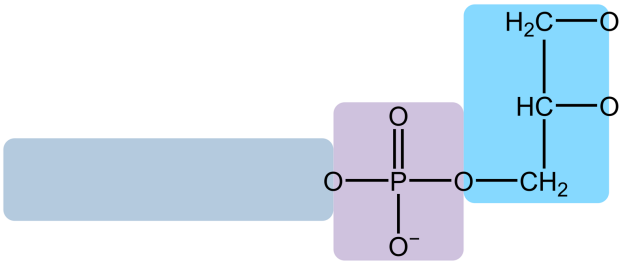
**STEP 1:** Draw the glycerol backbone with a phosphate group at C3.

□ Instead of two ____ groups at C1 and C2, write only ___ atoms.

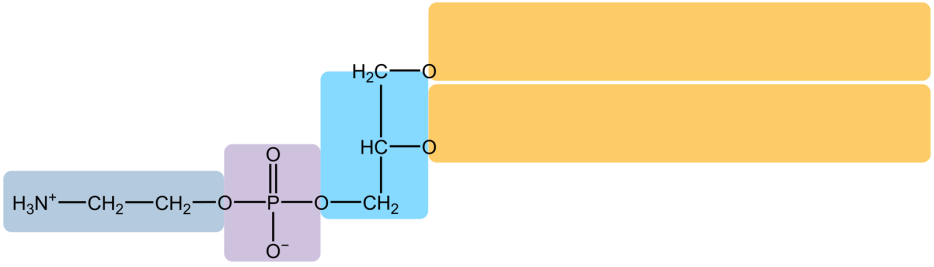



**STEP 2:** Extend the phosphate group at C3 with a $–CH_2–CH_2–$ group.

□ Complete the head group with a _____ group (ethanolamine) or a _____ group (choline).




**STEP 3:** Draw the two fatty acyl groups (FA without –OH) from the two O atoms at C1 and C2.



**CONCEPT:** PHOSPHOGLYCERIDES

**PRACTICE:** Draw a glycerophospholipid with lauric acid at C1, myristic acid at C2, and choline bonded to phosphate.

**PRACTICE:** Draw a cephalin with stearic acid at C1 and oleic acid at C2.

**PRACTICE:** Phosphoglycerides can undergo saponification reaction. Draw products of complete basic hydrolysis of following cephalin. (Hint: 5 products are formed.)