

General Biochemistry

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Lipids and membrane

Based on its similarity to other lipids, this lipid most likely functions as

- a. a membrane component
- b. an energy storage molecule
- c. a sex hormone
- d. a vitamin required for vision

Which of the following is a 20:2 fatty acid

- A. $\text{CH}_3(\text{CH}_2)_9\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_2\text{COOH}$
- B. $\text{CH}_3(\text{CH}_2)_2\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_9\text{COOH}$
- C. $\text{CH}_3(\text{CH}_2)_{10}\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CHCH}_2\text{COOH}$
- D. $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_{10}\text{COOH}$

Name the two essential fatty acids

- A. Linoleate and linolenate
- B. Oleic and linoleic
- C. Lauric and myristic
- D. Arachidonic and oleic

Which of the following molecules or substances contain, or are derived from fatty acid

- A. Beeswax
- B. Prostaglandin

- C. Sphingolipids
- D. Triacylglycerol

E. All of the above contain or are derived from fatty acids

which will be a characteristic of a steroid that is part of a cell membrane

A. It will contain a hydroxyl group

- B. It will contain four aromatic ring
- C. It will contain choline
- D. It will contain an amide bond

Which is a characteristic of sphingolipids

- A. They all contain a fatty acid joined to glycerol
- B. They all contain a long-chain alcohol joined to isoprene

C. They all contain ceramide joined to a polar group

- D. They all contain a carbohydrate joined to a phosphate group

Which of the following is not a component of a phospholipid

- A. Phosphate
- B. Alcohol
- C. Glycerol

D. Protein

Micelles of fatty acids in water are organized such that the ____ face the solvent and the ____ are directed toward the interior

- A. Hydrophilic heads, hydrophobic tails
- B. Carboxylic acid groups, hydrocarbon chains
- C. Hydrocarbon chains, carboxylic acid groups
- D. Hydrophobic tails, hydrophilic heads

E. The first and second answers are both correct

which of the following phospholipid is considered as a major constituent of nervous tissue

- A. Glycerophospholipid
- B. Plasmalogen
- C. Inositol

D. Sphingomyelin

Which would be a property of all the major types of lipids in this membrane

- A. They would be saponifiable in base and hydrolyzed in acid
- B. They would have polar heads and non-polar tails
- C. They would be composed of five-carbon units
- D. They would be joined to each other through covalent bonds

Which of the following is a characteristic of both triacylglycerol and glycerophospholipid

- A. Both contain carboxyl groups and are amphipathic
- B. Both contain fatty acids and are saponifiable
- C. Both contain glycerol and ether bonds
- D. Both can negatively charged at cellular pH

The fats and oils are respectively rich in

- A. Unsaturated fatty acids
- B. Saturated fatty acids
- C. Saturated and unsaturated fatty acids
- D. Non of these

Which characteristic does this lipid share with a wax

- A. Both contain a polar head

B. Both contain three fatty acids

C. Both contain one or more ester bonds

D. Both contain one or more carboxyl groups

What is a general property of cell membranes

A. Membranes contain more lipid than protein

B. Membrane proteins have a polar head and a non-polar tail

C. Membrane lipids are amphipathic

D. Membranes contain covalent bonds between fatty acids

Find the incorrect statement about the biological functions of lipids

A. Storage form of metabolic fuel

B. Have a protective function in bacteria, plant and insects

C. The structural component of membranes

D. Exhibit increased catalytic activity

Which component is found in all sphingolipids

A. A carbohydrate

B. A negative charge

C. A phosphate group

D. An amino alcohol

Examples of monounsaturated fatty acids are

A. Oleic acid

B. Arachidonic acid

C. Palmitic acid

D. Linolenic acid

Which is a characteristic of all fatty acid components in this lipid

- A. They all contain an unbranched carbon chain
- B. They all contain unconjugated cis double bond
- C. They all are joined to glycerol through an ester bond
- D. They all are hydrophilic because they contain oxygen

Beta-oxidation of fatty acids takes place at

- A. Peroxisome
- B. Mitochondria
- C. Mitochondria and Peroxisome
- D. Mitochondria, Peroxisome and ER

Which of the following form of lipids are also referred as neutral lipids

- A. Triacylglycerol
- B. Steroid
- C. Phospholipids
- D. Wax

Which of the following molecules is a typical fatty acid

- A. A molecule that has an even number of carbon atoms in a branched chain
- B. An amphipathic dicarboxylic acid with unconjugated double bonds
- C. A molecule that has one cis double bond in linear carbon chain
- D. A polar hydrocarbon with that reacts with NaOH to form a salt

Which membrane lipid contains an amide bond

- A. Cholesterol
- B. Phosphatidylserine

C. Phosphatidic acid

D. Sphingomyelin

Generally, fats with unsaturated fatty acids are___at room temperature (25°C)

A. Solid

B. Liquid

C. Liquid in the presence of oxygen

D. Liquid in the absence of oxygen

The following is not a phospholipid

A. Sphingomyelin

B. Lecithin

C. Cephalin

D. Cerebroside

Which of the following is/are unsaturated fatty acids

A. Linoleic acid

B. Oleic acid

C. Palmitoleic acid

D. All of these

Cholesterol is essential for normal membrane functions because it

A. Can not be made by higher organisms, e.g. mammals

B. Spans the thickness of the bilayer

C. Keeps membrane fluid

D. Catalyzes lipid flip-flop in the bilayer

E. Plugs up the cardiac arteries of older men

The "fluid" and "mosaic" terms in the fluid mosaic model of membrane structure refers to the___and___respectively

A. Inside of the membrane; outside of the membrane

B. Lipids; proteins

C. Proteins; lipids

D. Fatty acid chains; polar groups

Which one of the following substances is an intermediate in the synthesis of both glycerol-containing phospholipids and triacylglycerol

A. CDP- Ethanolamine

B. Choline

C. Phosphatidic acid

D. Acetocetyl CoA

A membrane phospholipid that doesn't contain glycerol is

A. Cerebroside

B. Ceramide

C. Sphingomyelin

D. Lecitin

This brings in fluids and solutes into a cell during active transport

A. Pinocytosis

B. Phagocytosis

C. Osmosis

D. Diffusion

The cholesterol associated with membranes

A. Is attached to proteins and extends into the environment surrounding the cell

B. Helps stabilize the membrane at body temperature

C. Is an abnormality resulting from a diet high in cholesterol

D. Both A and C

Hydrolysis of fats by alkalines into fatty acids and glycerol is called

A. Colloidal

B. Saponification

C. Coagulation

D. Suspension

Where can proteins be found when part of a plasma membrane

A. On the outside of the membrane

B. On the inside of the membrane

C. Embedded part of the way into the membrane

D. Embedded the whole way through the membrane

E. All of the above

The brings in food or others cells into a cell during active transport

A. Pinocytosis

B. Phagocytosis

C. Osmosis

D. Diffusion

According to the fluid mosaic model of cell membranes, which type of molecule spans the membrane, from its inner to outer surface

A. Carbohydrate

- B. Cholesterol
- C. Hydrocarbon tails
- D. Phospholipid

E. Protein

Which is a characteristic of the lipids in a biological membrane

- A. Specific glycerolphospholipids are distributed equally in the two membrane surfaces
- B. Lipid molecules are held in fixed positions by non-covalent bonds with proteins
- C. The fluidity of the membrane decreases with lower levels of saturated fatty acids
- D. The fatty acids of lipid molecules are found in the interior of the membrane

Plasma membranes are selectively permeable, this means

- A. Any thing can pass in and out
- B. The membrane regulates the passage of the material in and out of the cell
- C. Glucose cannot enter the cell
- D. Cholesterol cannot enter

Which of the following is not an example of a lipid found in lipid-linked proteins

- A. Palmitic acid
- B. Myristic acid
- C. Stearic acid
- D. Glycosylphosphatidylinositol

Cholesterol is a precursor of all except

- A. Steroids
- B. Vitamin D
- C. Bilirubin
- D. Bile salts

The difference in the concentration of a substrate from one location to another is called a/an

A. Diffusion

B. Osmosis

C. Concentration gradient

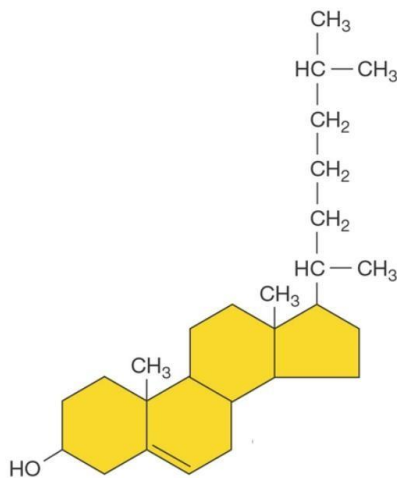
D. Passive transport

Fatty acids are amphipathic by nature

A. True

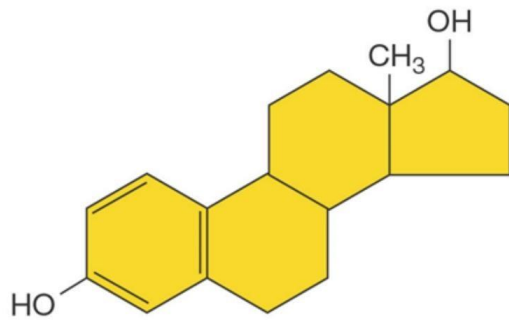
B. False

Identify the correct name of the following structure.



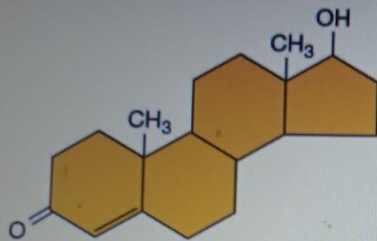
- ☐ a. Cholesterol
- ☐ b. Testosterone
- ☐ c. Sphingosine
- ☐ d. Estrogen

Identify the correct name of the following structure.



- ☐ a. Cholesterol
- ☐ b. Sphingosine
- ☐ c. Estrogen
- ☐ d. Testosterone

Identify the correct name of the following structure.



- ☐ a. Estrogen
- ☐ b. Sphingosine
- ☐ c. Testosterone
- ☐ d. Cholesterol

1. What is the solubility of lipids in water?
 - a) Soluble
 - b) Partially soluble
 - c) Insoluble
 - d) Partially insoluble
2. Fatty acids are amphipathic by nature.
 - a) True
 - b) False
3. Find the INCORRECT statement about the biological functions of lipids.
 - a) Storage form of metabolic fuel
 - b) Have a protective function in bacteria, plant, and insects
 - c) The structural component of membranes
 - d) Exhibit increased catalytic activity
4. Which of the following is an example of unsaturated fatty acids?
 - a) Lauric or Dodecanoic
 - b) Linoleic or octadecatrienoic
 - c) Palmitic or hexadecanoic
 - d) Myristic or tetradecanoic
5. Name the two essential fatty acids?
 - a) Linoleate and linolenate
 - b) Oleic and linoleic
 - c) Lauric and myristic
 - d) Arachidonic and oleic
6. The melting point of fatty acids depends upon chain length and _____.
 - a) The shape of the fatty acids
 - b) The position of the double bond
 - c) Charge on the carbon
 - d) Degree of unsaturation
7. Which of the following form of lipids are also referred as neutral lipids?
 - a) Triacylglycerol
 - b) Steroid
 - c) Phospholipids
 - d) Wax
8. Name the reagent which is used in Saponification?
 - a) Ammonia
 - b) Acetic acid
 - c) NaOH/KOH
 - d) Butanone
9. Which of the following is not a component of a phospholipid?
 - a) Phosphate
 - b) Alcohol
 - c) Glycerol
 - d) Protein

10. Which of the following phospholipid is considered as a major constituent of nervous tissue?

- a) Glycerophospholipid
- b) Plasmalogen
- c) Inositol

d) Sphingomyelin

11. Which of the following sterol is present in the cell membrane of fungi?

a) Ergosterol

- b) Stigmasterol
- c) Sitosterol
- d) Campesterol

12. Identify the lowest density lipoprotein among the following?

- a) HDL
- b) LDL
- c) VLDL

d) Chylomicrons

1. Which of the following is an essential fatty acid?

a) Linolenic

- b) Palmitic
- c) Oleic
- d) Stearic

2. Which of the following is a polar derivative of cholesterol?

a) Bile salt

- b) Oestrogen
- c) Vitamin D
- d) Progesterone

3. Which of the following fatty acid has the least melting point?

- a) Palmitic acid
- b) Stearic acid
- c) Arachidonic acid

d) Timnodonic acid

4. Out of the following which is not a source of glycerol?

- a) Adipolysis
- b) Glycolysis

c) Glycogenolysis

d) Diet

5. Which of the following is false about fatty acids?

- a) Melting point of fatty acids decreases with increase in degree of saturation
- b) Lipids in tissues that are subjected to cooling are more unsaturated

c) Naturally occurring unsaturated long-chain fatty acids are nearly Trans-configuration

d) The membrane lipids contain mostly unsaturated fatty acids

6. Which of the following fatty acid has 16 carbon atoms?

- a) Linolenic acid
- b) Oleic acid

c) Palmitic acid

- d) Stearic acid

7. Which of the following is a hydroxyl fatty acid?

- a) Linoleic acid
- b) Palmitic acid
- c) Linolenic acid

d) Cerebronic acid

8. Out of the following, which is not an essential amino acid?

- a) Linolic acid
- b) Linolenic acid

c) Arachidic acid

- d) Arachidonic acid

9. The number of milligrams of KOH required to neutralize the free and combined fatty acid in one gram of a given fat is called _____

a) Saponification number

- b) Iodine number
- c) Acid number
- d) Polenske number

10. Which of the following is a storage form of lipid?

- a) Glycolipid
- b) Phospholipid
- c) Sufolipid

d) Triacyl glycerol

1. Phosphorylation of phosphatidylinositol yields _____

a) Phosphatidylinositol 4, 5-biphosphate

- b) Phosphatidylinositol 3, 5-biphosphate
- c) Phosphatidylinositol 3, 4-biphosphate
- d) Phosphatidylinositol 5, 6-biphosphate

2. Which of the following vitamin is derived from cholesterol?

- a) A
- b) B
- c) C

d) D

3. What leads to the activation of protein kinase C?

a) Release of intracellular Ca^{+2} + diacylglycerol

- b) Release of intracellular Mg^{+} + diacylglycerol
- c) Release of intracellular Ca^{+2} + glycerol
- d) Release of intracellular Ca^{+2} + triacylglycerol

4. Which of the following serves as a specific binding site for the proteins involved in membrane fusion during exocytosis?

- a) Phosphatidylinositol
- b) Phosphatidylinositol 4, 5-bisphosphate**
- c) Phosphatidylinositol 3, 5-bisphosphate
- d) Phosphatidylinositol 3, 4-bisphosphate

5. Which of the following hormone is responsible for the activation of phospholipase C?

- a) Serotonin
- b) Cortisol
- c) Vasopressin**
- d) Adrenaline

6. An example of glycerophospholipid involved in cell signaling is _____

- a) Cardiolipin
- b) Phosphatidic acid
- c) Phosphatidylcholine
- d) Phosphatidylinositol**

7. Which of the following type structure contains all the three glycosphingolipids?

- a) B structure
- b) A structure
- c) O structure**
- d) AB structure

8. The lipids with potent bio activities derived from isoprenoid precursors are common in _____

- a) Vitamin A, K, ubiquinone and dolichol**
- b) Vitamin A, D, ubiquinone and dolichol
- c) Vitamin A, B, D and K
- d) Vitamin A, B, K and dolichol

9. Which of the following vitamin is responsible for Ca^{+2} and phosphate metabolism?

- a) A
- b) K
- c) E
- d) D**

10. How many products are obtained by the hydrolysis of phosphatidylinositol by phospholipase C?

- a) 1
- b) 2**
- c) 3
- d) 4

1. Which of the following is false about lipids?

- a) They are either strongly hydrophobic or amphipathic
- b) They are more soluble in water**
- c) Extraction of lipids from tissues require organic solvents
- d) They are insoluble in water

2. Which would move faster in thin layer chromatography?

- a) Beeswax
- b) Phosphatidylinositol
- c) Cholesterol
- d) Steroid

3. In which type of chromatography, solvents of increasing polarity are passed through a column of silica gel?

- a) High performance liquid chromatography
- b) Thin layer chromatography
- c) Adsorption chromatography
- d) Gas-liquid chromatography

4. Phosphatidylinositol, phosphatidylglycerol and phosphatidylserine are easily separated by _____

- a) Absorption chromatography
- b) TLC
- c) HPLC
- d) Gas-liquid chromatography

5. For the determination of fatty acid composition, transesterification is done in a warm aqueous solution of _____

- a) KCl+methanol
- b) KOH+methanol
- c) NaOH+methanol
- d) H₂O+methanol

6. A mixture of fatty acyl methyl esters are separated based on _____

- a) Charge
- b) Chain length and degree of saturation
- c) Molecular weight
- d) Ionic size

7. Which technique is preferred in the separation of fatty acyl methyl esters from a mixture?

- a) Gas-liquid chromatography
- b) Absorption chromatography
- c) TLC
- d) Centrifugation

8. The dye used in TLC for detecting separated lipids by spraying the plate is _____

- a) Mordant
- b) Alizarin
- c) Rhodamine
- d) Fuchsin

9. Which of the following is not a phospholipase?

- a) A
- b) C
- c) D
- d) K

10. In which type of chromatography lipids are carried up a silica gel coated plate by a rising solvent front, less polar travels farther than the more polar ones?

a) Absorption chromatography

b) Thin layer chromatography

c) Gas-liquid chromatography

d) HPLC

1. Which of the following acts as a passive electrical insulator?

a) Myelin sheath

b) Plasma membrane

c) Inner mitochondrial membrane

d) Outer mitochondrial membrane

2. Which of the following membranes contain low cholesterol and high cardiolipin?

a) Myelin sheath

b) Plasma membrane

c) Inner mitochondrial membrane of hepatocyte

d) Cell wall

3. Which of the following is important in signal transduction triggered by hormones?

a) Phosphatidylinositol and its derivatives

b) Phosphatidylserine and its derivatives

c) Phosphatidylglycerol and its derivatives

d) Phosphatidylethanolamine

4. Which of the following are the major component of chloroplast membrane of plants and are absent from animal cells?

a) Glycolipids

b) Phospholipids

c) Ether lipids

d) Triacylglycerols

5. How many types of lipid aggregates are formed when amphipathic lipids are mixed with water?

a) 1

b) 2

c) 3

d) 4

6. Which of the following types of lipid aggregates has maximum stability?

a) Micelles

b) Bilayer

c) Liposome

d) Myelin sheath

7. When cross sectional area of the head group and acyl side chain is similar, which of the following lipid aggregates formation is favored?

a) Micelles

b) Bilayer

c) Liposome

d) Myelin sheath

8. When cross sectional area of the head group is greater than that of the acyl side chain, which of the following lipid aggregates formation is favored?

a) Micelles

b) Bilayer

c) Liposome

d) Myelin sheath

9. Which of the following is choline containing lipid?

a) Sphingomyelin

b) Phosphatidylserine

c) Phosphatidylglycerol

d) Phosphatidylethanolamine

10. A platelet is able to play its role in the formation of blood clot when one of the glycerophospholipids in the plasma membrane moves into the outer leaflet.

a) Phosphatidylserine

b) Phosphatidylethanolamine

c) Phosphatidylinositol

d) Phosphatidylglycerol

11. Which of the following glycerophospholipids is not common in inner leaflet (cytoplasmic)?

a) Phosphatidylserine

b) Phosphatidylethanolamine

c) Phosphatidylinositol

d) Phosphatidylcholine

12. Which of the following has high lipid content?

a) Myelin sheath

b) Plasma membrane

c) Inner mitochondrial membrane

d) Outer mitochondrial membrane

13. Plasma membrane is permeable to _____

a) ATP

b) Glucose

c) K⁺

d) Urea

14. How are the intrinsic proteins in cell membrane distributed?

a) Uniform

b) Random

c) Symmetric

d) Asymmetric

1. Which of the following is not one of the states of lipids?

a) Para crystalline state

b) Liquid ordered state

c) Liquid disordered state

d) Crystalline state

2. Which of the following arrangement based on the increasing order of motion is correct?

a) Uncatalysed transverse motion, transverse diffusion catalyzed by flippase, uncatalysed lateral diffusion

b) Uncatalysed lateral diffusion, uncatalysed transverse motion, transverse diffusion catalyzed by flippase

c) Uncatalysed transverse motion, uncatalysed lateral diffusion, transverse diffusion catalyzed by flippase

d) Transverse diffusion catalyzed by flippase, uncatalysed lateral diffusion, uncatalysed transverse motion

3. Movement of phospholipids from side to side is called _____

a) Facilitated diffusion

b) Lateral diffusion

c) Transverse diffusion

d) Simple diffusion

4. Movement of phospholipids to opposite sides is called _____

a) Facilitated diffusion

b) Lateral diffusion

c) Transverse diffusion

d) Simple diffusion

5. Trans bilayer diffusion is also called _____

a) Facilitated diffusion

b) Lateral diffusion

c) Flip flop

d) Simple diffusion

6. Which of the following is an example of heterodimeric protein?

a) Integrin

b) Antibodies

c) Receptor tyrosine kinase

d) G-protein coupled receptor

7. Which of the following is an example of peripheral membrane protein?

a) Insulin receptor

b) Glycophorin

c) Integrin

d) Glycolipid transfer proteins

8. Which of the following proteins does not function in cell-cell interaction?

a) Integrin

b) Cadherin

c) N-CAM

d) Cytochrome c

9. Which of the following integral membrane protein is a special class of membrane rafts?

a) Caveolin

b) Integrin

c) Cadherin

d) Selectin

10. Which of the following is one of the family of immunoglobulin like proteins that mediate Ca^{+2} ?

a) N-CAM

b) Integrin

c) Cadherin

d) Selectin

1. Erythrocyte glucose transporter is an example of _____

a) Ion driven active transport

b) Facilitated diffusion

c) Active transport

d) Simple diffusion

2. Which out of the following is not mediated transport?

a) Facilitated diffusion

b) Primary active transport

c) Secondary active transport

d) Simple diffusion

3. Na^+ glucose transporter is an example of _____

a) Symport

b) Antiport

c) Facilitated diffusion

d) ATP driven active transport

4. Which of the following is energy independent?

a) Active transport

b) Primary active transport

c) Secondary active transport

d) Passive transport

5. Semipermeable membrane allows _____

a) Solute to pass

b) Solution to pass

c) Solvent to pass

d) Proteins to pass

6. When does saturation occur?

a) When molecules are moved by the use of vesicles

b) When the energy from a high-energy bond is required to move molecules

c) When a group of carrier proteins is operating at its maximum rate

d) When a carrier molecule has the ability to transport only one molecule or a group of closely related molecules

7. In which of the following means of transport a cell expels large molecules out of it?

a) Phagocytosis

b) Exocytosis

c) Endocytosis

d) Diffusion

8. HCO_3^- – Cl^- transporter is an example of _____

a) Uniport

b) Antiport

c) Symport

d) Facilitated diffusion

9. Which of the following transports only one kind of substrate?

a) Uniport carriers

b) Symport carriers

c) Antiport carriers

d) Membrane proteins

Antiport carriers move substrates in the opposite direction.

10. Which of the following induces conformational change in protein?

a) Uniport

b) Symport

c) Antiport

d) Facilitated diffusion

Which of the following is false about lipids?

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Which would move faster in thin layer chromatography?

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Which of the following molecules is a typical fatty acid?

- a) A molecule that has an even number of carbon atoms in a branched chain.
- b) An amphipathic dicarboxylic acid with unconjugated double bonds.
- c) A molecule that has one cis double bond in a linear carbon chain.
- d) A polar hydrocarbon with that reacts with NaOH to form a salt

Which of the following structures is a 20:2 ($\Delta^{4,9}$) fatty acid?

- a) $\text{CH}_3(\text{CH}_2)_9\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_2\text{COOH}$
- b) $\text{CH}_3(\text{CH}_2)_2\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_9\text{COOH}$
- c) $\text{CH}_3(\text{CH}_2)_{10}\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CHCH}_2\text{COOH}$
- d) $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_{10}\text{COOH}$

Which of the following is a characteristic of both triacylglycerols and glycerophospholipids?

- a) Both contain carboxyl groups and are amphipathic
- b) Both contain fatty acids and are saponifiable.
- c) Both contain glycerol and ether bonds.
- d) Both can be negatively charged at cellular pH

Which of the following is a characteristic of both waxes and terpenes?

- a) Both can contain an amino alcohol.
- b) Both can contain a fatty acid.
- c) Both can be non-saponifiable.
- d) Both can contain oxygen

Which is a characteristic of sphingolipids?

- a) They all contain a fatty acid joined to glycerol.
- b) They all contain a long-chain alcohol joined to isoprene.
- c) They all contain ceramide joined to a polar group.
- d) They all contain a carbohydrate joined to a phosphate group

Which is a property of eicosanoids?

- a) All eicosanoids contain three conjugated double bonds.
- b) All eicosanoids contain arachidonic acid and sphingosine.
- c) Prostaglandins and leukotrienes both contain a ring structure.
- d) Thromboxanes and prostaglandins both contain a carboxyl group

Which is a characteristic of all the fatty acid components in this lipid?

- a) They all contain an unbranched carbon chain.
- b) They all contain unconjugated cis double bonds.
- c) They all are joined to glycerol through an ester bond.
- d) They all are hydrophilic because they contain oxygen.

What is the proper designation for the unsaturated fatty acids in this lipid?

- a) 18:2 ($\Delta 9,12$)
- b) 18:2 ($\Delta 6,9$)
- c) 17:2 ($\Delta 9,12$)
- d) 17:2 ($\Delta 5,8$)

Which property does this lipid share with a typical triacylglycerol?

- a) Both contain an ether bond.
- b) Both contain a long-chain alcohol.
- c) Both are amphipathic.
- d) Both are saponifiable

Which characteristic does this lipid share with a wax?

- a) Both contain a polar head.
- b) Both contain three fatty acids.
- c) Both contain one or more ester bonds.
- d) Both contain one or more carboxyl groups.

Which characteristic is shared by this lipid and an eicosanoid?

- a) This lipid and a leukotriene are both polyunsaturated molecules.
- b) This lipid and a thromboxane can both be hydrolyzed in base to produce soaps.
- c) This lipid and a prostaglandin can both be hydrolyzed in acid to create fatty acids.
- d) This lipid and an arachidonic acid both contain glycerol and hydrocarbon chains

Which property can be shared by this lipid and a terpene?

- a) Both can contain isoprene.
- b) Both can form micelles.
- c) Both can contain a saturated fatty acid.
- d) Both can be very hydrophobic molecules

Based on its structural similarity to other lipids, this lipid most likely functions as

- a) a membrane component.
- b) an energy storage molecule.
- c) a sex hormone.
- d) a vitamin required for vision

Which is a general property of cell membranes?

- a) Membranes contain more lipid than protein.
- b) Membrane proteins have a polar head and a non-polar tail.
- c) Membrane lipids are amphipathic.
- d) Membranes contain covalent bonds between fatty acids.

Which component is found in all sphingolipids?

- a) a carbohydrate
- b) a negative charge
- c) a phosphate group
- d) an amino alcohol

Which is a property of lipids in cell membranes?

- a) The hydrophobic groups of lipid molecules are found on membrane surfaces.
- b) Some types of lipids are found preferentially in the outer membrane layer.
- c) Most of the lipids are hydrocarbons composed of five-carbon units.
- d) Most of the lipids function in transporting biomolecules into the cell.

Which is a characteristic of the components in cell membranes?

- a) A protein molecule in a membrane can move laterally and can also flip from one surface to the other.
- b) A lipid molecule in a membrane interacts with other membrane molecules through non-covalent forces.
- c) Increasing the proportion of protein in a membrane increases the amount of membrane symmetry.
- d) Increasing the proportion of saturated fatty acids in a membrane increases membrane fluidity

Which of the following molecules or substances contain, or are derived from, fatty acids?

- A) Beeswax
- B) Prostaglandins
- C) Sphingolipids
- D) Triacylglycerols
- E) All of the above contain or are derived from fatty acids.

Which of the following statements about membrane lipids is true?

- A) Glycerophospholipids are found only in the membranes of plant cells.
- B) Glycerophospholipids contain fatty acids linked to glycerol through amide bonds.
- C) Lecithin (phosphatidylcholine), which is used as an emulsifier in margarine and chocolate, is a sphingolipid.
- D) Some sphingolipids include oligosaccharides in their structure.
- E) Triacylglycerols are the principal components of erythrocyte membranes

Which of the following contains an ether-linked alkyl group?

- A) Cerebrosides
- B) Gangliosides
- C) Phosphatidyl serine
- D) Platelet-activating factor
- E) Sphingomyelin

Fatty acids are a component of

- A) carotenes.
- B) cerebrosides.
- C) sterols.
- D) vitamin D.
- E) vitamin K.

Which vitamin is derived from cholesterol?

- A) A
- B) B12
- C) D
- D) E
- E) K

Which of the following statements about sterols is true?

- A) All sterols share a fused-ring structure with four rings.
- B) Sterols are found in the membranes of all living cells.
- C) Sterols are soluble in water, but less so in organic solvents such as chloroform.
- D) Stigmasterol is the principal sterol in fungi.
- E) The principal sterol of animal cells is ergosterol.

Which of the following is not true of sterols?

- A) Cholesterol is a sterol that is commonly found in mammals.
- B) They are commonly found in bacterial membranes.
- C) They are more common in plasma membranes than in intracellular membranes (mitochondria, lysosomes, etc.).
- D) They are precursors of steroid hormones.
- E) They have a structure that includes four fused rings.

Which of the following statements concerning fatty acids is correct?

- A) One is the precursor of prostaglandins.
- B) Phosphatidic acid is a common one.
- C) They all contain one or more double bonds.
- D) They are a constituent of sterols.
- E) They are strongly hydrophilic.

An example of a glycerophospholipid that is involved in cell signaling is

- A) arachidonic acid.
- B) ceramide.
- C) phosphatidylinositol.
- D) testosterone.
- E) vitamin A (retinol).

Which of the following best describes the cholesterol molecule?

- A) Amphipathic
- B) Nonpolar, charged
- C) Nonpolar, uncharged
- D) Polar, charged
- E) Polar, uncharged

Which of the following is true of sphingolipids

- A) Cerebrosides and gangliosides are sphingolipids.
- B) Phosphatidylcholine is a typical sphingolipid.
- C) They always contain glycerol and fatty acids.
- D) They contain two esterified fatty acids.
- E) They may be charged, but are never amphipathic.

Tay-Sachs disease is the result of a genetic defect in the metabolism of

- A) gangliosides.
- B) phosphatidyl ethanolamine.
- C) sterols.
- D) triacylglycerols.
- E) vitamin D.

Which of the following statements is true of lipids?

- A) Many contain fatty acids in ester or amide linkage.
- B) Most are simply polymers of isoprene.
- C) Testosterone is an important sphingolipid found in myelin.
- D) They are more soluble in water than in chloroform.
- E) They play only passive roles as energy-storage molecules.

Sphingosine is not a component of:

- A) cardiolipin.
- B) ceramide.
- C) cerebrosides.
- D) gangliosides.
- E) sphingomyelin.

Which of the following is not a fat-soluble vitamin?

- A) A
- B) C
- C) D
- D) E
- E) K

Sphingolipids can contain all of the following except?

- A) glycerol.
- B) sphingosine.
- C) phosphate.
- D) a mono- or oligosaccharide.

1. Phospholipids are molecules that contain:

- positively charged functional groups.
- long water-soluble carbon chains.
- cholesterol.
- hydrophilic heads and hydrophobic tails.

The third and fourth answers are both correct.

2. Micelles of fatty acids in water are organized such that the ___ face the solvent and the ___ are directed toward the interior.

- hydrophilic heads; hydrophobic tails
- carboxylic acid groups; hydrocarbon chains
- hydrocarbon chains; carboxylic acid groups
- hydrophobic tails; hydrophilic heads
- The first and second answers are both correct.

3. The glycerophospholipids are composed of two fatty acids attached to glycerol and one of the following head groups:

ethanolamine.

choline.

serine.

threonine.

All but the fourth choice are correct.

4. The melting properties of fatty acids and lipid bilayers is due primarily to hydrogen bonds.

the hydrophobic effect.

van der Waals forces.

electrostatic interactions.

covalent bonds.

5. Cholesterol is essential for normal membrane functions because it cannot be made by higher organisms, e.g. mammals.

spans the thickness of the bilayer.

keeps membranes fluid.

catalyzes lipid flip-flop in the bilayer.

plugs up the cardiac arteries of older men.

6. The main difference between saturated and unsaturated fatty acids is the number of carbons.

the presence of keto groups.

the presence of double bonds.

that one is absent from phospholipids.

none of the above.

7. Which of the following fatty acids would have the lowest CMC?

C4-COOH.

C5-COOH.

C6-COOH.

C7-COOH.

C8-COOH.

1. According to the fluid mosaic model of cell membranes, which type of molecule spans the membrane, from its inner to outer surface?

carbohydrate.

cholesterol.

hydrocarbon tails.

phospholipid.

protein.

2. What are the membrane structures that function in active transport?

peripheral proteins.

carbohydrates.

integral proteins.

hydrophobic molecules.

cholesterol.

3. All of the following are found in membranes except:

nucleic acids.

phospholipids.

glycoproteins.

glycolipids.

steroids.

4. The membrane proteins that catalyze active transport reactions differ from soluble enzymes in that

they do not enhance the rates of reaction.

the product(s) of the reaction move in a specific direction.

the substrate(s) of the reaction are all outside the cell.

they are not specific.

they are permanently changed during the reaction.

5. Which of the following is not an example of a lipid found in lipid-linked proteins?

Farnesyl groups.

Palmitic acid.

Myristic acid.

Stearic acid.

Glycosylphosphatidylinositol.

Q. The difference in the concentration of a substance from one location to another is called a/an

diffusion

osmosis

concentration gradient

passive transport

2. Multiple-choice

Q. A molecule that diffuses down a concentration gradient goes from an area of _____ concentration into an area of _____ concentration.

high, low

low, high

passive, active

active, passive

3. Multiple-choice

Q. Passive transport requires no
concentration gradients

osmosis

motion

energy

4. Multiple-choice

Q. This example of passive transport is the diffusion of water.

osmosis

concentration gradient

isotonic

facilitated diffusion

5. Multiple-choice

Q. This example of passive transport gets energy from the natural motion of particles
osmosis

concentration gradient

isotonic

diffusion

6. Multiple-choice

Q. The higher the concentration of dissolved particles in a solution (solute), the _____
the concentration of water molecules in that solution.

higher

greater

lower

smaller

7. Multiple-choice

Q. This solution has the highest concentration of particles.

hypertonic

hypotonic

isotonic

8. Multiple-choice

Q. This solution has the highest concentration of water molecules.

hypertonic

hypotonic

isotonic

9. Multiple-choice

Q. This solution has the equal concentrations of water molecules and particles.

hypertonic

hypotonic

isotonic

10. Multiple-choice

Q. In facilitated diffusion, molecules move

Down a concentration gradient

Against a concentration gradient

11. Multiple-choice

Q. A solution with a higher level of solutes than the solution is called

hypertonic

hypotonic

isotonic

12. Multiple-choice

Q. This is the simplest form of passive transport:

osmosis

diffusion

facilitated diffusion

endocytosis

13. Multiple-choice

Q. This cell organelle helps organisms maintain homeostasis by controlling what substances may enter or leave cells.

vacuole

nucleus

cell membrane

cell wall

14. Multiple-choice

Q. Controlling what goes into or out of the cell without energy is called

active transport

endocytosis

passive transport

exocytosis

15. Multiple-choice

Q. Controlling what goes into or out of the cell with the help of energy is called

active transport

endocytosis

passive transport

exocytosis

16. Multiple-choice

Q. This brings in fluids and solutes into a cell during active transport.

pinococytosis

phagocytosis

17. Multiple-choice

Q. This brings in food or other cells into a cell during active transport.

pinococytosis

phagocytosis

18. Multiple-choice

Q. This process gets rid of wastes.

endocytosis

exocytosis

osmosis

diffusion

19. Multiple-choice

Q. The movement of molecules against a concentration gradient

simple diffusion

facilitated diffusion

active transport

osmosis

20. Multiple-choice

Q. The movement of molecules down a concentration gradient is all of the following except:

simple diffusion

facilitated diffusion

active transport

21. Multiple-choice

Q. The movement of molecules through selective membrane proteins happens in all of the following except:

simple diffusion

facilitated diffusion

active transport

22. Multiple-choice

Q. Most active transport proteins use energy from the breakdown of:

nucleus

cell membrane

ATP

mitochondria

23. Multiple-choice

Q. A cell may transport a substance in _____ if the substance is too large to cross the membrane.

lysosomes

ribosomes

vesicles

cytoplasm

24. Multiple-choice

Q. This uses energy

endocytosis

exocytosis

both

25. Multiple-choice

Q. This takes substances into a cell

endocytosis

exocytosis

both

26. Multiple-choice

Q. This releases substances outside a cell

endocytosis

exocytosis

both

27. Multiple-choice

Q. This moves substances in vesicles

endocytosis

exocytosis

both

28. Multiple-choice

Q. This is a term that means "cell eating" and describes a type of endocytosis

active transport

pincocytosis

phagocytosis

exosytosis

29. Multiple-choice

Q. In which solution will water move out of the cell resulting in the cell shriveling up?

Hypertonic

Isotonic

Hypotonic

30. Multiple-choice

Q. In which solution will water move into the cell resulting in the cell bursting?

Hypertonic

Isotonic

Hypotonic

31. Multiple-choice

Q. In which solution will water move into and out of the cell at the same rate?

Hypertonic

Isotonic

Hypotonic

FATTY ACIDS

1. Most commonly occurring fatty acids in nature are

A. Even number of carbon atoms in an unbranched chain of 12–24 carbons

B. Odd number of carbon atoms in an unbranched chain of 12–24 carbons

C. Even number of carbon atoms in a branched chain of 12–24 carbons

D. Odd number of carbon atoms in a branched chain of 12–24 carbons

2. In most of the naturally occurring monounsaturated fatty acids, the double bonds will be placed between _____

A. C6 and C7

B. C7 and C8

C. C8 and C9

D. C9 and C10

3. Which of the following molecules acts as a sugar carrier in animals?

A. Warfarin

B. Ubiquinone

C. Plastoquinone

D. Dolichol

4. The best source of trans fatty acid in diet is _____

A. Vegetables

B. Ground nut

C. Dairy products

D. Fruits

5. LDL and HDL are commonly known as _____ and _____, respectively

A. Good cholesterol and bad cholesterol

B. Bad cholesterol and good cholesterol

C. Assimilatory cholesterol and oxidative cholesterol

D. Oxidative cholesterol and assimilative cholesterol

6. The solubility of fatty acids in water _____
- A. Increase with increase in chain length and fewer the double bonds
 - B. Increase with increase in chain length and increase in double bonds
 - C. Decrease with chain length and decrease with number of double bonds
 - D. Decrease with chain length and increase with double bonds
7. At room temperature 25°C, a fat with saturated fatty acid of 12–20 carbon have
- A. Liquid consistency
 - B. Solid consistency
 - C. Cannot be predicted
 - D. None of the above
8. Carbon atoms in fatty acid are _____ than those of sugars
- A. Less reduced
 - B. More reduced
 - C. Less oxidized
 - D. More oxidized
9. In naturally occurring unsaturated fatty acids, the double bonds are in _____ conformation
- A. Cis conformation
 - B. Trans conformation
 - C. A mixture of cis and trans conformation
 - D. Cis and trans conformation alternatively
10. Increased dietary uptake of trans fatty acid causes blood level _____
- A. Increase of HDL
 - B. Increase of LDL
 - C. Increase of LDL and decrease of HDL
 - D. Increase of HDL and decrease of LDL
11. Which of the following is a cyclic fatty acid?
- A. Cerebronic acid
 - B. Ricinoleic acid
 - C. Chaulmoogric acid
 - D. Oleic acid
12. Which of the following is not an essential fatty acid?
- A. Linoleic acid
 - B. Linolenic acid
 - C. Oleic acid
 - D. Arachidonic acid
13. Which of the following statements is true?
- A. Cholesterols are present in both plants and animals
 - B. Sterol is the only type of cholesterol in plants
 - C. Cholesterol is not found in plants
 - D. Cholesterol is completely absent in liver cells of cold blood animals
14. Heart attack possibility in women is fewer than men. The probable reason for this may be _____
- A. Blood HDL level in female is more than male
 - B. Blood HDL in female is less than male
 - C. Blood of female individuals do not contain HDL
 - D. Blood of female individuals do not contain LDL
15. At room temperature 25°C, an unsaturated fatty acid will have ____
- A. Liquid consistency
 - B. Solid consistency
 - C. Waxy consistency
 - D. Cannot be predicted

16. Which of the following statements is true?

- (a) Sodium salt of higher fatty acid is called soft soaps
- (b) Potassium salt of higher fatty acid is called soft soaps
- (c) Sodium salt of higher fatty acid is called hard soaps
- (d) Potassium salt of higher fatty acid are called hard soaps

A. (a)

B. (a), (b), and (c)

C. (b) and (c)

D. (b) and (d)

17. The number of OH groups in fatty acids can be expressed as

A. Polenske number

B. Reichert–Meissl number

C. Acetyl number

D. Iodine number

18. The triterpenoid which acts as the precursor of all animals sterols

A. Lanosterol

B. Cholesterol

C. Cycloartenol

D. Isoprenoids

19. The precursor of all fungal sterols is _____

A. Lanosterol

B. Cholesterol

C. Cycloartenol

D. Isoprenoids

20. The triterpenoid which acts as the precursor of almost all plant sterols

A. Lanosterol

B. Cholesterol

C. Cycloartenol

D. Isoprenoids

21. A sterol present in the plasma membrane of fungi and protozoans instead of cholesterol is

A. Lanosterol

B. Cholesterol

C. Ergosterol

D. Cycloartenol

22. The sterol which acts as the precursor of Vitamin D2 provitamin D2 is

A. Cholecalciferol

B. Lanosterol

C. Cholesterol

D. Ergosterol

23. Which of the following is an example for phytosterol?

A. β -Sitosterol

B. Campesterol

C. Brassicasterol

D. All of these

E. None of these

24. A naturally occurring fatty acid with C–C triple bond in the hydrocarbon chain

A. Digitoxin

B. Ouabain

C. Nemotinic acid

D. None of these

25. Which of the following is not an omega-6 fatty acid?

A. Alpha-linolenic acid

B. Linoleic acid

C. Eicosadienoic acid

D. Arachidonic acid

LIPIDS

1. Which of the following molecules can act as molecular chaperons for assisting the folding of proteins?

A. Carbohydrates

B. Vitamins

C. Lipids

D. Amides

2. Which of the following macro-molecules can be most structurally diverse among the living world?

A. Carbohydrates

B. Proteins

C. Nucleic acids

D. Lipids

3. Fat storing cells of vertebrates are called

A. Hepatocytes

B. Astrocytes

C. Adipocytes

D. Melanocytes

4. The enzyme abundantly distributed in adipocytes and germinating seeds are

A. Proteases

B. Lipase

C. Cellulase

D. Nuclease

5. Rancidity of lipids of lipid rich food stuffs is due to

A. Hydrogenation of unsaturated fatty acids

B. Reduction of fatty acids

C. Oxidation of fatty acids

D. Dehydrogenation of saturation fatty acids

6. The main function of preen glands in birds is

A. Hormone secretion

B. Fatty acid degradation

C. Wax secretion

D. Pigment synthesis

7. Which of the following statements is true?

A. Oxidative rancidity is observed more frequently in animal fats than vegetable fats

B. Oxidative rancidity is observed more frequently in vegetable fats than animal fats

C. Plants fats do not undergo oxidative rancidity

D. Oxidative rancidity can be effectively checked by dehydrogenation of fatty acids

8. Number of milligrams of KOH required to neutralize fatty acids present in 1 g of fat is called

A. Potassium number

B. Acid number

C. Saponification number

D. Iodine number

9. Saponification number is the number of milligrams of KOH required to saponify 1 g fat. Which of the following statements is true about saponification number?

A. The shorter the chain length of fatty acids, the higher the saponification number

B. The shorter the chain length of fatty acids, the lower the saponification number

C. The higher the chain saturation of fatty acid, the lower the saponification number

D. The lower the saturation of fatty acid, the higher the saponification number

10. The degree of unsaturation of lipid can be measured as _____

A. Saponification number

B. Iodine number

C. Polenske number

D. Reichert–Meissil Number

11. The number of OH group in fats can be expressed as _____

A. Polenske number

B. Reichert–Meissil number

C. Acetyl number

D. Iodine number

12. Polenske value of fatty acid indicates _____

A. How much unsaturation is there in the fatty acid

B. Level of saturation in the fatty acid

C. Indication of branching of fatty acid in the fat

D. How much volatile fatty acid can be extracted through saponification

13. Which of the following is an example for derived lipids?

A. Steroids

B. Terpenes

C. Carotenoids

D. All of these

14. Naturally occurring fats are _____

A. L types

B. D types

C. An equimolar mixture of L and D types

D. Symmetric

15. Generally fats with unsaturated fatty acids are _____ at room temperature 25°C

A. Solid

B. Liquid

C. Liquid in the presence of oxygen

D. Liquid in the absence of oxygen

16. Carnauba wax is an example for _____

A. Liquid wax

B. Soft wax

C. Hard wax

D. Archaeobacterial wax

17. Specific gravity of lipid is _____

A. 0.2

B. 0.8

C. 1.0

D. 1.5

18. The greater the number of carbon atoms in the chain of fatty acids _____

A. The boiling point will be higher

B. The boiling point will be lesser

C. The melting point will be higher

D. The melting point will be lower

19. Dietary fats are transported as

A. Chylomicrons

B. Liposomes

C. Lipid globules

D. Oil droplets

20. Beta-oxidation of fatty acids takes place at

A. Peroxisome

B. Mitochondria

C. Mitochondria and Peroxisome

D. Mitochondria, Peroxisome, and ER