* ***Topic***

 ***“ compound lipids “***

***Lipids:***

“ lipids are the heterogeneous group of compound related to fatty acid.

* Lipids are hydrophobic compound.
* Lipids are insoluble in water.
* Because water is polar while lipids are nonpolar.
* So like dissolve like. Lipid are soluble in non polar inorganic solvent like ether, benzene, etc.
* Lipids have high proportion of C-H

bond and low proportion of oxygen so it store double amount of energy as compared to carbohydrates.

* Lipids include fats, oil, waxes, cholesterol and related compound.



* **Easter bond** formed between fatty acid and related alcohol.
* **During easter** bond formation **H** from fatty acid and **OH** from alcohol like glycerol, combined fr water and elimination of water take place.
* **C-o-C** bond form called **easter bond.**

***Fatty* *Acid*:**

***“****fatty acids are aliphatic carboxyllic acid.*

* *Having the general formula****\_R\_(****CH2****)****n****\_COOH.***
* *They occur mainly in easterfied form in natural oils and fats.*

*Also accrue in non easterfied forms as free fatty acid, a transport form found in plasma membrane.*

* *Fatty acid in natural fats usually occur in straight chain derivative contains even number of carbon.*

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* *Fatty acid may be saturated and unsaturated.*

***Saturated fatty acid:***

* *There is no double bond in saturated fatty acid.*
* *Saturated fatty acid are solid at room temperature.*
* *Mostly animals fats is saturated.*

***Unsaturated fatty acid:***

* *There is double bond in unsaturated fatty acid.*
* *Unsaturated fatty acid are liquid at room temperature.*
* *Plant oils are unsaturated*
* ***Classification of lipid:***
1. ***Simple lipid***
2. ***Compound lipid***
3. ***Derived lipid/ precursor***
* ***Simple lipid:***

*“ of simple fatty acid with various alcohol.”*

***Fats.*** *Easter of fatty acid with glycerol.*

***Waxes.****easter of fatty acid with higher molecular weight of monohydric alcohol.*

* ***Compound******lipid:***

*“Compound lipid contains other group in addition to fatty acid and glycerol. “*

* *Contains in addition to fatty acid and glycerol or other alcohol, phosphoric acid residue,* nitrogenous *base and other substitutes.*
* ***Derived******lipid:***

 *“ hydrolysis product of simple and compound lipid. “*

* *Derived lipid also act as* ***precursor.***
* *Derived lipid contains fatty acid, glycerol, steroid, alcohol,fatty aldehyde, keto bodies, hydrocarbons, lipids soluble vitamins and hormones.*

***Steroid***

***Cholesterol***

***Bile acid***

***Vitamin D***

***Sex hormones***

***Adrenocortical hormone.***

***\*\*\*\*\*\*\*COMPOUND LIPIDS\*\*\*\*\****

***Compound*** *lipids contain other group in addition to fatty acid and glycerol or various alcohol.*

* *In other group consists of phosphorus acid,nitrogenous base and other substitute.*
* *According to the group attached with fatty acid and alcohol like if phosphorus present than compound lipid Called phospholipid.*
* *Examples:*

***Phospholipid***

***Glycolipid***

***Sulfolipid***

***Aminolipid ( lipoprotein)***

***\*Phospholipid:\****

* *Structural**formula.*

*Glycerol+ 2 fatty acid+ phosphorus+ choline*

* ***In*** *addition**to fatty acid phospholipid contains*

*An**alcohol*

*An phosphoric acid*

*May have nitrogenous bases,* ***choline, serine,ethanolamine.***

* *It is the constitute of cell membrane.*
* *It is consider the derivative of* ***phosphotidic acid.***
* *Important examples of phospholipid are.*

*1.****glycerophospholipid****.( alcohol is glycerol)*

*2.* ***Sphignosinephospholipid****(alcohol is sphignosine.*

***1.Glycerophospholipid.***

* *Structural formula.*

*Glycerol+ phosphate+ 2 fatty acid+ nitrogenous bases.*

* *It also called phosphoglyceride.*
* *It is membranes lipid.*
* *If we see its structure .than it shows that*

*Glycerol is 3C alcohol .*

*From* ***1st and 2nd C***  *two fatty acids are attached with the help of* ***easter bond*** *formation.*

*While with* ***3rd C*** *of glycerol ,a highly charged or polar body* ***phosphate ( P****O4)- .*

*Phosphate group attache with the 3rd C of glycerol by formation of* ***dieaster linkage.***

* *Important types of glycerophospholipid are.*

*Lecithin*

*Cephaline*

*Cardiolipid*

*Phosphotidic acid.*

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* ***Lecithin***
* *Lecithin also called* ***phosphatidyl Cholines.***
* *Choline is nitrogenous base which is the part of neuro- transmitter.*
* *Lecithin abundant in nervous tissue and do the transmission of nerve impulse across synaptic system.*
* *Choline is the part of lecithin.*
* ***Dipalmitoyl lecithin*** *is very effective active surface agent.*
* *Dipalmitoyl lecithin is the major constitute of surfactant.*

*“****surfactant,****lipid and protein make the lining of lungs ,called surfactant. “*

* *Surfactant keep the lungs fully inflate .*
* *So due to this lugs not collapse. Air pass easily and breathing easily take place.*
* *If the deficiency of surfactant take place than many respiratory disorders occur.*
* *Because due to deficiency of surfactant .lining of protein+ lipid in lungs not .*
* *Lungs not fully inflate.*
* *Lung constrict due to the constriction of lungs alveoli within the lungs collapse With each other and damaged.*
* *Alveoli damage and accumulated in the air passage way.so due to this difficulty occurs in breathing.*
* *And it causes ofany respiratory disorders.*
* *Disorder occurs by surfactant deficiency* ***called respiratory distress syndrome.***
* ***Cephaline.***
* *Also called phosphotidyl ethanolammine.*
* *Cphaline structurally similar to the lecithin.*
* *Exception is that base ethanolammine replaced the base choline.*
* *Brain and nervous tissues are rich in cephaline.*

***Function of phospholipid.***

* *Components of cell membrane*
* *It perform the both structurally and regulatory function.*
* *Structurally .lipid bilayer*
* *Regulations. Head is hydriphillic which remains out side while tail is hydrophobic which remains in side in core.*
* *Phospholipid in mitochondria like lecithin,cephaline .*
* *These phospholipid maintain the electron transport chain ETC.*
* *Help**in**transport**of**lipid.*
* *Cephaline help in the blood clotting.*

***Sphignosine lipid:***

* *Found in large quantity in brain and nervous tissues.*
* *Fatty acid, phosphoric acid, choline and complex amino alcohol,****sphignosine.***
* *No glycerol is present.*
* *Combination of fatty acid and sphingosine called the* ***Ceramide.***
* *Ceramide found in sphignosinephospho lipid.*

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***\*Glycolipid:\****

* *Widely distributed in every tissue of the body.*
* *Particularly in brain tissues present abundantly.*
* *Outer leaf let of plasma membrane.where they contributed to cell surface carbohydrate.*
* ***Example:***
* ***Glycosphingolipids****.*
* *It**contains**ceramides and one or more sugar.*
1. *Glucosylceramides*
2. *Ganglioside*

***1.ganglioside:***

* *These are acidic .*
* *These are negatively charged at physiological pH.*
* *The negative charged imparted by the N \_ acetyl neuraminic acid (silic acid).*
* *Brain ganglioside contains up to four silic acid*

***2.Glactosylceramid:***

* *It contains ceramides due to presence of it , its name is galactosylceramide .*

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 ***\* Aminolipid( lipoprotein)***

***Define:***

***“*** *complexes of protein with lipids called aminolipid.*

* *Aminolipid also called lipoprotein because amino acid are the Structural and functional units of protein.*
* *Lipoprotein are transport protein .*
* *It is used as a transport vehicles for lipids.*
* *Five types of lipoprotein are following.*
1. *Chylomicron*
2. *Very low density lipoprotein*

*( VLDL)*

1. *Low density lipoprotein(LDL)*
2. *High density lipoprotein*
3. *Free fatty acid complexes*
4. ***Chylomicron.***
* *The density of chylomicron less than the 0.95 g/ ml .*
* *The ranges of diameter in 100 to 1000 nm.*
* *These lipoprotein responsible for the transportation of triglycerides in the gastrointestinal tract to the other part of body such as transport to liver, Skelton tissues and adipose tissues.*
1. ***Low density lipoprotein.***
* *Low density lipoprotein responsible for the transportation of fat molecules such as phospholipid, cholesterol and*

 *Triglycerides around the body.*

* *It is sometimes called “ bad cholesterol “ because elevated concentration of low density lipoprotein are the indicators of underlying diseases such as* ***atherosclerosis.***

***3.High density lipoprotein.***

* *High Density lipoproteins responsible for the collection of fat molecules such as phospholipid, cholesterol and triglycerides from the cell of body and transport to the liver to be broken down.*
* *High density lipoprotein also called good cholesterol because high concentration of this lipoprotein corresponding to healthier blood vessels and lowered the risk of arthrosclrosis.*

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***:FUNCTIONS OF LIPIDS:***

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* ***Energy storage:***
* *As we know about this , lipids have high proportion of C- H bond*
* *Due to this lipids stores double amount of energy as compared to the carbohydrates.*
* *Lipids carry 9 kcal energy as compared to the carbohydrates.*
* *Carbohydrate carry 4 kcal energy. So ,its clear that lipid store double amount of energy as compared to the carbohydrates.*
* *Fat store in adipose tissues in the vertebrates.*
* *Fats also stored in seeds. In the form of glyoxysomes.*
* ***Thermal insulation.***
* *Adipose tissues act as thermal insulation.*
* *Adipose tissues conducted the heat very slowly.*
* *So triglycerides which store fats in vertebrae important for maintain the optimum temperature.*
* ***Mechanical protection:***
* *Adipose tissues act as the physical cushion*
* *It present in the palm of hand, sole of feet, around eyes and around the body organs such as kidneys.*
* *Waxy cuticle on the leaf epidermal act as water proof.*
* *Waxy cuticle also protect from external agent.*
* ***Inside body chemical reactions n. (Metabolism)***
* *In liver cholesterol is the precursor of bile acid.*
* *Bile acid contains salts and enzymes which help in digestion process.*
* *Cholesterol is the precursor of the vitamin D3.*
* *Vitamin D3 produced when body skin come in exposure of sunlight.*
* *This is necessary for healthy bones.*
* *Deficiency of this vitamin cause bone diseases such as rickets.*
* *Plasma membrane rich in cholesterol and sphingolipid.*
* *This is important for neuron cell adhesion ,guide the axon and synaptic transport.*
* ***Immunity.***
* *Lipids activated the aggregation of platelets at injury .*
* ***Prostaglandlin*** *maintained this process.*
* ***Lecithin act as surfactant.***
* *Absence of surfactant caused the respiratory disorders.*
* *Phosphotidyl serine play role in apoptosis.*
* *Apoptosis is the program death of cell.*
* *Lipid and derivatives of lipid involved in sleep induction.*

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* ***Medical:***
* *Transport the drugs to target area.*
* *Liposome combined With tissue specific antibodies. Function as carry the drugs in the circulation to target area.*
* *Isopernoids compound include rubber and camphor.*
* *Camphor use for cough .*
* ***In pesticides:***
* *They use as pesticides.*
* *Citronella oil uses in Candle, lotion sprays to repel insects.*
* ***Lubricant:***
* *Waxy cuticle act as lubricant .*
* *It protect from abrasive damage.*
* ***Cosmetics industry:***
* *Soaps , hand lotions, cream and other cosmetic.*
* *Lipid play important rule in cosmetic industry.*
* *Dirty particles react with non polar fatty acids .while polar head make bonding with water and in this way wash out the dirt’s and soap clean our skin.*
* ***Buoyancy.***
* *Fats and oils have less density .*
* *So fats and lipids are less dense than water and this help the fishes in buoyancy.*
* ***Hibernation:***
* *This is dormant and inactive period of time .*
* *Breathing rate ,blood circulation rate became less .*
* *Not feed even.*
* *So store triglycerides give energy in this dormant period and organism can survived without feed.*

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***MCQS.***

***1.****why lipid store double amount of energy as compared to carbohydrate*

*(a) high oxygen proportion*

*(b)high hydrogen proportion*

*(c) C-H high proportion*

*(d)C-O high proportion*

***2.****lipid carry------ kcal energy and carbohydrates carry------ kcal energy respectively.*

*( a) 5,9*

*(b)8, 7*

*(c)9, 4*

*(d)9, 6*

***3.****structural formula of phospholipid is.*

*(a)glycerol+ fatty acid+ choline*

*(b)glycerol+ fatty acid*

*(c) glycerol+ 2 fatty acid+ phosphate+choline*

*(d)fatty acid + phosphate*

***4.****fatty acid with the combination of glycerol called*

*(a) sphignosine*

*(b) ceramide*

*(c) coral*

*(d)phospholipid*

***5.****which act as the surfactant.*

*(a) choline*

*(b)cephalin*

*(c) glycolipid*

*(d)lecithin*

***6.****in phospholipid which attach to the glycerol 3C.*

*(a)phosphate group*

*(b) choline*

*(c)alcohol*

*(d)serine*

***7.****which protein is transport protein.*

*(a) phospholipid*

*(b) lipoprotein*

*(c)glycoprotein*

*(d)sulfolipid*

***8.****which tissue act as the thermal insulation.*

*(a)kidney tissue*

*(b) adipose tissue*

*(c)complex tissue*

*(d)xylem tissue*

***9.****precursor of steroids, vitamin D,hormones is ------.*

*(a)acetone*

*(b)glycerol*

*(c) cholesterol*

*(d)triglyceride*

***10.****when skin exposed to sunlight ,vitamin D secrete.*

*(a)calcium*

*(b) phosphorus*

*(c)both*

*(d) none*

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* *This is all of my side .l try best for this assignment.*
* *Thanks for giving the chance, to write assignment.*