*** IQRA NATIONAL UNIVERSITY***

***DEPARTMENT OF ALLIED HEALTH SCIENCES***

***FINAL-TERM EXAMINATIONS***

***SPRING – 2020***

***Course title: Macronutrients in Human Nutrition***

***Course instructor: Prof. Dr. Jehangir Khan Khalil***

***Department: Human Nutrition and Dietetics, 2nd semester***

***Time allowed: 6 hrs***

***Marks: 50 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

***NOTE:***

***Attempt all questions.***

***All questions carry equal marks.***

***Questions: 1***

***Define the following: (10)***

1. ***Bile acids***
2. ***Hydrogenation of oil***
3. ***Iodine Number***
4. ***Lecithin***
5. ***Triglycerides***

***Question: 2***

***What are Lipids? What is the difference between fats and waxes? What is the importance of lipids in our body? (10)***

***Question: 3***

***What are prostaglandins (PGs)? And what are their functions?***

***Question: 4***

***What are fatty acids? How fatty acids are classified?***

***Question: 5 (10)***

***Write short notes on the following:***

1. ***Lipoproteins***
2. ***Cholesterol***

***KAINAT GUL:***

***ID# 16768***

***QUESTION: 1***

***Define the following: (10)***

***1. Bile acids***

***2. Hydrogenation of oil***

***3. Iodine Number***

***4. Lecithin***

***5. Triglycerides***

***ANSWER:***

***1. BILE ACIDS:***

***DEFINITION:***

* *Bile acids are steroid acids found predominantly in the bile of mammals and other vertebrates.*
* *Diverse bile acids are synthesized in the liver.*
* *They are conjugated with glycine and taurine before they are secreted into the bile.*
* *Bile acids are cholic acid and chenodeoxycholic acid.*
* *They are synthesized from cho* *lesterol in liver.*

***2.HYDROGENATION OF OIL:***

***DEFINITION:***

* *it is a process by which hydrogen is added to unsaturated double bonds present in oils.*
* *Once hydrogenated the unsaturated Fas, (in oils) become saturated fatty acids.*
* *Hydrogenation is the process that uses hydrogen gas to change liquid vegetable oil into a hard spread/ margarine.*
* *This process stabilizes the oil and prevent spoilage from oxidation.*
* *This process known as hardening of oils.*

***3. IODINE NUMBER:***

***DEFINITION:***

* *Iodine value also called iodine number, in analytic chemistry,*
* *Measure of degree of the unsaturation of an oil, fat, or wax;*
* *The amount of iodine, in grams, that is taken up by 100 grams of the oil, fat, or wax.*

***4. LECITHIN:***

***DEFININTION:***

* *These GPLs are derivatives of alpha-phosphatide acid in which, choline (a nitrogenous base) is joined with H3PO4.*
* *Choline is strongly basic like NaOH.*
* *They are most abundant of the phospholipids in serum and bile.*
* *There are many types of lecithin depending upon the type of fatty acid.*
* *They are important constituents of lung surfactant.*
* *They attract both water and fatty substances (and so are both hydrophilic and lipophilic)*
* *And are used for smoothing food textures, emulsifying, homogenizing liquid mixtures, and repelling sticking materials.*

***5. TRIGLYCERIDES:***

***DEFINITION:***

* *A triglycerides is an ester derived from glycerol and three fatty acids.*
* *Triglycerides are the main constituents of body fat in humans and other vertebrates, as well as vegetable fat*

***QUESTION: 2***

***What are Lipids? What is the difference between fats and waxes? What is the importance of lipids in our body?***

***ANSWER:***

***LIPIDS:***

***DEFINITION:***

* ***ORGANIC COMPOUNDS:***  *Lipids are organic compounds made up of fatty acids, alcohols and may contain other compounds.*
* ***SOLUBILITY:*** *They are not soluble in polar solvent (water) but soluble in non-polar solvents (fat solvent).*
* ***EXAMPLE:***  *Like Ether, chloroform, benzene, acetone, etc.*

* *They are lighter than water i.e. they have lower density than water.*
* *They have greasy marks on paper.*
* *They include triglycerides (TG), cholesterol, bile salt, steroid hormones (derived from cholesterol), fat soluble vitamins and prostaglandins (PG).*

|  |  |
| --- | --- |
| * ***FATS:*** | * ***WAXES:*** |
| * ***DEFINITION:*** *Fats are a type of lipid consisting of tri esters of glycerol and fatty acids or Triglycerides.* | * ***DEFINITION:*** *A wax is a simple lipid that is an ester a long-chain alcohol and a fatty acid. The alcohol may be made up of 12-32 carbon atoms.* |
| * ***ORGANIC COMPOUND:***  *They are organic compounds consisting of carbon and hydrogen atoms.* | * ***FOUND:*** *These waxes can be found in nature as coatings on leaves and stems of plants, and prevent the plant from losing excessive amounts of water.* |
| * ***SOLUBILITY:*** *They are soluble in organic solvents and largely insoluble in water.* | * ***IMPORTANCE:***  *waxes are valuable to both plants and animals because of their hydrophobic nature. This makes them water resistant, which prevents water from sticking on surface.* |
| * ***SOLID:*** *fats are solid at room temperature.* | * ***TYPES:*** *Three types of waxing methods that are used; sugaring, soft and hard wax.* |
| * ***FUNCTION:*** *The body uses fats a s a fuel sources, and fat is the major storage form of energy in the body etc.* | * ***FUNCTION:*** *The wax on the surface of skin and hair keeps the surfaces pliable and water repellent etc.* |
| * ***EXAMPLE:*** *Fatty cuts of beef, pork, and lamb etc.* | * ***EXAMPLE:***  *beeswax, Chinese wax, ear wax etc.* |

***IMPORTANCE OF LIPID IN OUR BODY:***

* *They are components of cells and cell organelles membrane.*
* *They are the major storage form of energy.*
* *They are good emulsifying agents.*
* *In the body 1 gram of fat produces about 9.1 kilocalories.*
* *They have a high satiety value.*
* *Lipids under the skin prevent excessive loss of water and electrolytes.*
* *They help in the transportation of fat-soluble vitamins and other fat soluble compounds across cell membrane.*
* *They protect the body against the injurious effects of water-soluble substances.*
* *Ketone bodies act as a reserve fuel.*
* *Lipids provide insulation to the nervous system against atmospheric heat and cold.*

***QUESTION: 3***

***What are prostaglandins (PGs)? And what are their functions?***

***ANSWER:***

***PROSTAGLANDINS:***

***DEFINITION:***

*The Prostaglandins are a group of lipids made at sites of tissue damage or infection that are involved in dealing with injury and illness. They control processes such as inflammation, blood flow, the formation of blood clots and the induction of labor.*

***Foods that are high in prostaglandins:***

*These foods contain arachidonic acids, which instigate the production*

*Of cramp-causing prostaglandins.*

***FOODS:***

* *Bananas.*
* *Sun flower seeds.*
* *Ginger.*
* *Pineapple: remember that alcohol is contraindicated for cramps so stay away from the pina coladas!*

***CAUSES:***

* *High levels of prostaglandins are produced in response to injury or infection and cause inflammation, which is associated with the symptoms of redness, swelling, pain and fever. This is an important part of the body’s normal healing process.*
* *Prostaglandins and the related compounds i.e. thromboxanes (TXs) and leukotrienes (l.Ts) collectively termed as eicosanoids, are known as hormone like substances.*
* *PGs have been detected in almost every mammalian tissue and body fluids.*
* *They are produced in minute amount and they have broad spectrum and diverse biological effects.*
* *PGs are converted to inactive form at the site of their production.*
* *They are not stored to any appreciable amount.*
* *They are formed from a 20C unsaturated fatty acid known as prostanoic acid which is a derivative of Arachidoic acid (membrane bound essential fatty acid).*

***FUNCTIONS:***

* *Causes smooth muscle contraction (PG-E2,PG-F2 alpha)*
* *Increases interstitial motility.*
* *Causes contraction of uterus.*
* *Regulates menstruation and fertility.*
* *Induce labor.*
* *Prevents and alleviate stomach ulcers.*
* *Control inflammation.*
* *Vasodilation/vasoconstriction.*
* *Lowers blood pressure (antihypertensive).*
* *Induce blood clotting (TX-A2).*
* *Prevents blood clotting (PG-12)*
* *Broncho dilation/ Broncho construction.*
* *Relieve asthma and nasal congestion (PG-E2, PG-12).*
* *Platelet aggregation/ thrombosis.*
* *Inhibit the release of fatty acid from fats.*

***QUESTION: 4***

***What are fatty acids? How fatty acids are classified?***

***ANSWER:***

***FATTY ACIDS:*** *Fatty acids are organic acids that occur in nature and are aliphatic monocarboxylic acid, made up of hydrocarbon chains.*

* *They are the major component of lipids.*
* *They are made up of minimum two carbon atoms.*
* *Chain length of lipid-forming fatty acids ranges from 4 to about 24 carbon atoms.*
* *Fatty acids, which occur in neutral fats, usually contain even number of carbon atoms.*

***CLASSIFICATION:***

*They are classified into two:*

***1. saturated fatty acid.***

***2. Unsaturated fatty acid.***

***1. SATURATED FAs:***

* *These fatty acids do not contain double bonds e.g. butyric acid, caproic acid, palmitic acid, stearic acid, arachidic acid etc.*
* *The saturated fatty acids having less than eight carbon atoms are liquid at room temperature and are volatile.*

***2. UNSATURATED FAs:***

* *These fatty acids contain double bonds.*
* *Unsaturated fatty acids are further classified according to the degree of their unsaturated i.e. mono unsaturated and poly unsaturated fatty acid.*
* ***MONO UNSATURATED FATTY ACIDS:*** *contain only one double bond e.g. oleic acid, found in nearly all fats.*
* ***POLY UNSATURATED FATTY ACID:***
* *These contain more than one double bond (DB)*
* *Three polyunsaturated FAs have biological importance i.e. linoleic acid (2DB), linolenic acid (3DB) and Arachidonic acid (4DB).*
* *Polyunsaturated FAs, which are not synthesized in the body, are “essential FAs” and therefore should be taken in the diet.*
* *Oils contain significant quantity of polyunsaturated fatty acids e.g. oils from corn, wheat germ, peanut, soya bean etc.*

***QUESTION: 5***

***Write short notes on the following:***

1. ***Lipoproteins***
2. ***Cholesterol***

***ANSWER:***

***1. LIPOPROTEINS:***

* *Lipids are transported in the blood as lipoprotein.*
* *The major composition of lipoproteins is triacylglycerol, cholesterol, cholesterol esters, phospholipids and purified proteins.*
* *Purified proteins (purified proteins [Apo proteins] are designated as A, B, C and E).*
* *Lipoproteins are of five types i.e. chylomicrons, very slow density lipoproteins (VLDL), intermediate density lipoprotein (IDL), low density lipoproteins (LDL), high density lipoproteins (HDL).*

***2. CHOLESTROL:***

* *It is the most abundant animal sterol.*
* *Rich sources are brain, nerve tissues, adrenal cortex and egg yolk.*
* *The human body can synthesize about 3gm of cholesterol/day.*
* *Livers plays a central role in the regulation of body’s cholesterol balance.*
* *Normal level of cholesterol in blood is 150-250 mg/dl and its variation is a very good indicator of certain diseases.*
* ***FUNCTION:***
* *It is a structural component of cell membranes.*
* *It is not flexible and contributes in the rigidity of cell membranes.*
* *Prevents water evaporation from the skin.*
* *It is an important component of plasma lipoproteins.*

***THE END:***