**Mid-Term Assignment**

**Course Title: Human Physiology Instructor: Dr Sara Naeem Total Marks: 30**

1. Differentiate between
* Positive and negative feedback mechanism
* Smooth and rough endoplasmic reticulum
* Lysosomes and peroxisomes
* Pepsin and pepsinogen
* Peptic ulcer and duodenal ulcer
1. What is portal triad. Give clinical significance of portal triad.
2. Give properties of cell membrane structure.

**Answer Sheet**

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**Q1# Differentiate between**

1. **Positive and negative feedback mechanism**
2. **Smooth and rough endoplasmic reticulum**
3. **Lysosomes and peroxisomes**
4. **Pepsin and Pepsinogen**
5. **Peptic ulcer and duodenal ulcer**

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| **S.No** | **Lysosomes** | **Peroxisomes** |
| **1** | Membrane bounded organelles  | Single membrane bounded organelles |
| **2** | Lysosomes contain hydrolase enzymes that is responsible for digestion | Peroxisome contain oxidase enzyme, responsible for the protection of the cell against metabolic hydrogen eroxide |
| **3** | Derived from either Golgi apparatus  | They originate from Endoplasmic reticulum and self replicate through fission |
| **4** | Lysosomes comparatively large in size. | Comparatively small in size |
| **5** | Involved in endocytosis ,autophagy&phagocytosis | Involved in biosynthesis of lipids and photorespiration |
| **6** | Breakdown of lysosomes but did not produce energy  | Oxidative reactions in generate ATP energy  |
| **7** | Contains enzyme to digest food, wastes, | Enzyme in peroxisomes is oxidases that catalyze redox reactions |
| **8** | Lysosomes found in animals. | Found in all eukaryotes. |
| **9** | Membrane bounded sacs  | Membrane bounded sacs |

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| **S.No** | **Rough Endoplasmic reticulum**  | **Smooth Endoplasmic reticulum** |
| **1** | Membrane is covered with Ribosome’s  | Membrane is without Ribosome’s |
| **2** | It is formed of cisternae and a few tubules |  It is established of tubules and vesicles |
| **3** | Synthesis of enzyme and proteins | Synthesis of glycogen ,lipids and steroids |
| **4** | provides biochemical for Golgi apparatus | Provides vesicles foe cis face of Golgi apparatus |
| **5** | Develop from nuclear envelop | Develop from Rough Endoplasmic reticulum |
| **6** | Found near the cytoplasm | Found near the cell membrane |
| **7** | Mainly presrent in rotein forming cells | Mainly presrent in Lipids forming cells |
| **8** | It is more stable | It is less stable |
| **9** | Involved in post translational protein modification | Involved in biogenesis of Golgi complex and lysosomes |

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| **S.No** | **Positive Feedback Mechanism** | **Negative Feedback Mechanism** |
| **1** | A feedback Mechanism resulting in the growth of the output signal. | A feedback mechanism resulting in the Slowing down of the process. |
| **2** | Breakdown the homeostasis of the system. | Always maintain the conditions of homeostatic. |
| **3** | Less common but occur in specific situations | Occur more often in the bodies, Helps in the maintaining various conditions of the body.  |
| **4** | Less frequent mechanism. | More frequent mechanism  |
| **5** | Exhibits positive correlation between stimulus and product or process  | Exhibits Negative correlation between stimulus and product or process |
| **6** | Derived from either Golgi apparatus  | They originate from Endoplasmic reticulum and self replicate through fission |
| **5** | Less associated with stability  | Closely associated with stability |
| **6** | Enhances change  | Resists change  |
| **7** | Wider Range | Narrower Range |
| **8** | May be linked with death and even vicious cycles. | Most often associated with restoring homeostasis |
| **9** | May required external Interruptions  | Doesn’t required external interruption  |
| **10** | Ex .Childbirth, blood clotting and fruit ripening. | Ex. Regulation of body temperature, Blood pressure and fluid contact. |

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| **S.No** | **PEPSIN** | **PEPSINOGEN** |
| **1** | The Chief digestive enzyme in the stomach , which Converts Protein into polyptides. | The substance which is secreted by the stomach wall and converted into the enzyme pepsi. By gastric acid. |
| **2** | Molecular Weight 34.5 kDa | . Molecular weight. 41.4 kDa |
| **3** | Active protease | Pro enzyme of pepsin  |
| **4** | Digest proteins into Miniscule chains of amino acids. | Becomes activated into pepsin by the HCI present in the gastric juice. |
| **5** | Pepsin is a proteolyticenzyme | Pepsinogen is a pro enzyme. |
| **6** | Pepsin is the active form of Pepsinogen | Pepsinogen is the in active predecressor of pepsin. |
| **5** | Pepsin can be activated by lowering the pH of the medium. | Pepsinogen can’t be activated by lowering the pH of the medium. |
| **6** | Pepsin can hydrolyze proteins. | Pepsinogen cannot hydrolyze proteins. |
| **7** | Pepsin is unstable in both neutral and alkaline solutions | Pepsinogen is safe in both neutral and alkaline solutions. |
| **8** | Pepsin is not secretion is stimulated by vagal simulation, gastrin, and histamine. | Pepsinogen secretion is motivated by vagal simulation, gastrin, and histamine. |

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| **S.No** | **DUODENAL ULCER** | **PEPTIC ULCER** |
| **1** | Hyper secretion of stomach acid HCL | Normal–hyposecretion of stomach acid HCL |
| **2** | May have weight gain | .Weight loss may occur |
| **3** | Pain occurs 2-3 Hours after a meal – often awakened between 1-2am  | Pain occurs 1/2 to 1 hour after a meal , rarely occur at night may be relieved by vomiting.  |
| **4** | Vomiting uncommon  | Vomiting common |
| **5** | Ingestion of food relieves pain  | Ingestion of food does not help sometimes grow pain |
| **6** | Less likely to hemorrhage ,but if occurs ,likely to manifest as melena  | More likely to hemorrhage manifests as hematemesis  |

1. **What is portal triad? Give clinical significance of portal triad.**

**Portal triad**

A portal triad (portal canal, portal field [citation needed], portal area [citation needed], or portal tract [citation needed]) is a distinctive arrangement within lobules. It’s include of the following five structures:

1. proper hepatic artery, an arteriole branch of the hepatic artery that transfer oxygen
2. Hepatic portal vein, a venule branch of the portal vein, with blood rich in nutrients but low in oxygen.
3. 1 or 2 small bile ductules of cuboidal epithelium, branches of the bile conducting system.
4. Lymphatic vessels
5. Branch of the vagus nerve

The misnomer "portal triad" traditionally has added only the first three structures, and was named before lymphatic vessels were discovered in the structure. It can refer both to the largest branch of each of these vessels running inner the hepatoduodenal ligament, and to the smaller branches of these vessels inside the liver.

In the smaller portal triads, the four vessels lie in a grid of connective tissue and are surrounded on all sides by hepatocytes. The ring of hepatocytes disconnect the connective tissue of the triad is called the periportal limiting plate.

1. **Give properties of cell membrane structure.**

**Structural Model of the Cell Membrane**

The fuid mosaic model, the membrane isa fluid with mosaic of proteins (mosaic means pattern formed by arrangement of different colored pieces of stone, tile, glass or other such materials). This model is accepted by the scientists til now. In this model, the proteins are found to float in the lipid layer instead of damming the layers of the sandwich-type model. pid Layers of the Cell Membrane The central lipid layer is a bilayered structure. This is formed by thin film of lipids. The characteristic feature of lipid layer is that, it is fluid in nature and not a solid structure. So, the portions of the membrane. Move from YPro one point to another point along the surface of the cell .The materials dissolved in lipid layer also move to all areas of the cell membrane.

 **Major lipids are:**

 1. Phospholipids. 2. Cholesterol.

 **Phospholipids**

Phospholipids are the lipid substances containing phosphorus and fatty acids. Phospholipids present in lipid layer of cell membrane are listed in Box 1.2. BOX 1.2: Phospholipids present in lipid layer of cell membrane.

1. Amino phospholipids 2. Sphingomyelin 3. Phosphatidylcholine 4. Phosphatidylethanolamine

5. Phosphatidylglyceral 6. Phosphatidyiserine 7. Phosphatidylinositol

Phospholipid molecules are arranged in two layers . Each phosobolipid molecule resembles the headed pin nshape. The outer part of the phospholipid molecule is called the head portion and the inner portion S called tai portion Head portion is the polar end and it is soluble in water and has strong affinity for water (hydrophila. Tall poion s lhe non-polar end. It is insoluble in water and Tepelled by water (hydrophoblc). Two layers of phospholipids are organized in such a way that the hydrophobic tail portions meet in the center of the membrane Hydrophilie head oortlons of outer layer face the ECH and those of the Inner layer face ICF cyloplasm) -2. Cholesterol Cholesterol molecules organized in between the phospholipid molecules. Phospholipids are soft and olly structures and cholesterol helos to 'pack the phospho- lipids in the membrane. So, cholesterol is accountable for the structural integrity of lipid layer of the cell membrane. Functions of Lipid Layer in Cell Membrane Lipid layer of the cell membrane is a semipermeable membrane and allows only the fat-soluble substances to pass through R Thus, the fat-soluble substances like oxygen, carbon dioxide and alcohol can pass through this lipid layer, The water-soluble substances like glucose, YProtein Layers of the Cell Membrane Protein layers of the cell membrane are electron-dense urea and electrolytes cannot pass through this layer. layers. These layers wrap the two surfaces of the central lipid layer. Protein layers give shield to the central lipid layer. The protein substances present in these layers are mainly glycol proteins.

Lipids of the cell membrane Protein molecules are classified into two categories:

1. Integral proteins or Trans membrane proteins.
2. Peripheral proteins or peripheral membrane proteins.

**Integral proteins Integral** Integral proteins Integral or Trans membrane proteins are the proteins that pass through entire thickness of cell membrane from one side to the other side. These proteins ere tightly bound with the cell membrane, some of the integral proteins are.

**Some of the integral proteins**

 1. Cell adhesion proteins

2. Cell junction proteins

3. Carrier (transport) proteins

 4. Channel proteins

5. Hormone receptors

6. Antigens

 7. Enzyme

2**. Peripheral proteins** Peripheral proteins or peripheral membrane proteins or extrinsic are the proteins, which are partially embedded in the outer and inner surfaces of the cell membrane and do not penetrate the cell membrane. Peripheral proteins are loosely bound with integral proteins or lipid layer of cell membrane. So, these protein molecules dissociate easily from the cell membrane.

 **Types of peripheral proteins:**

1. **Intracellular peripheral proteins** which are located on inner surface of cell membrane. Examples are receptors, transport proteins and some enzymes.

2. **Extracellular peripheral proteins** that are situated on outer surface of cell membrane, Examples are antigens, adhesion proteins and some enzymes

**Functions of Proteins in Cell Membrane**

 1. Integral proteins provide the structural integrity the cell membrane.

 2. Channel proteins help in the diffusion of water substances such as glucose and electrolytes

3. Carrier or transport proteins help in the transoon substances across the cell membrane by meen active or passive transport.

 4. Pump. Some carrier proteins act as pumps which lons are transported actively across the membrane.

 5. Receptor proteins serve as the receptor sites hormones and neurotransmitters.

 6. Enzymes: Some of the protein molecules form enzymes and control chemical (metabolic) reactions within the cell membrane.

 7. Antigens: Some proteins act as antigens and Ind. use the process of antibody formation.

 8. Cell adhesion molecules or the integral protein are accountable for the attachment of cells to the neighbors or to basal lamina.

 **Carbohydrates of the Cell Membrane**

Some of the carbohydrate molecules present in.CA membrane are attached to proteins and make glycopro- teins (proteoglycans). Some carbohydrate molecules are attached to lipids and make glycolipids. Carbohydrate molecules make a thin and loose wrapping over the entire surface of the cell membrane called glycocalyx.

**Functions of Carbohydrates in Cell Membrane**

1. Carbohydrate molecules are negatively charged and do not allow the negatively charged substances to move in and out of the cell.

 2. Glycocalyx from the nearest cells helps in the tight fixation of cells with one another.

 3. Some carbohydrate molecules role as the receptors for some hormones.

**FUNCTIONS OF CELL MEMBRANE**

 1. **Protective function**: Cell membrane covers the cytoplasm and the organelles present in the cytoplasm.

 2. **Selective permeability** Cell membrane work as a semi permeable membrane, which allows only some substances to pass through it and acts as a barrier for other substances.

**3. Absorptive function**: Nutrients are suck upinto the cell by the cell membrane.

4. **Excretory function**: Metabolites and other waste products make the cell are expel out through the cell membrane.

 5. **Exchange of gases:** Oxygen goes to the cell from the blood and carbon dioxide leaves the cell and enters the blood through the cell membrane.

 6. **Maintenance of shape and size of the cell:** Cell membrane is Accountable for the maintenance of shape and figure of the cell.