



**HISTOLOGY Exam for 1<sup>st</sup> year**

**9<sup>th</sup> January 2017**

**First semester**

**Time allowed:- 3 hours**

**I- First Group**

**(Total 16 marks)**

**A-Describe the ultrastructure of the following:**

1- Golgi apparatus.

**(3 marks)**

It also known as Golgi network, Golgi apparatus

Membranous organelles consists of several number of flatten sacs or cisternae that stack together like plate of cups in several location of the cell.

The Golgi apparatus consists of a collection of vesicles and folded membranes. These are usually connected to an endoplasmic reticulum (ER) as the Golgi apparatus stores and then transports the proteins produced in the ER.

\*Because of its functions of strong and transporting proteins, the Golgi apparatus may be creatively thought of as the "Post Office" of the cell. The Golgi apparatus is particularly well developed in cells that produce secretions.

\* The shape of the Golgi apparatus varies according to physiological state.

Hungary→ small dense body in intestinal cell.

Feeding→ increase in size.

Young→ Golgi form small net like structure in the axon pole of the nerve cell.

Aging → theses small net became fragmented or discrete granules.

**E.M.**

Parallel array of smooth surface membrane called flatten saccules or cisternae.

These cisternae flatten peripherally "budding"

it assume semi lunar configuration

it has two surface

Concave ( mature or trans ), it associated with secretory vesicles of various stage of condensation & maturation

Convex (immature), it associated with transferred vesicle of r.E.R.

2- Centriole.

**(3 marks)**

It present in all dividing cell except nerve cell and R.B.Cs.

Any cell contain pair of centrosome

Non membranous structure.

**L.M**

(1) Small dark body surrounded with clear dark zone (microcentrum).

(3) Dark zone (dense) centrophere from which astral rays or astrosphere radiate in dividing cell.

(4) 0.5 u in length and 0.2 u in diameter

**E.M**

- Each centrosome consists 2 centriole cylindrical bodies both of them perpendicular to each other.

- It consists of nine triple hollow microtubules.

- Each triple consists of sub fibrils a .b. c. & 2 arms one connected to adjacent fibrils & other extend at center.

**b- Compare between the following:**

1- Endogenous and exogenous pigments.

**(3 marks)**

Exogenous

That generated out side the body then taken by the body.

Lipochrome caretonied ' vegetable "

Dusts "by respiratory system "

Mineral "by ingestion of lead, silver.

Tattoo marks by tattooing machine. (Ink of the tattoo taken by phagocyte & remain under subcutaneous tissue.

Endogenous

Generated inside the body from non pigmented ingredient:-

(1) Hb "Hemoglobin.

(2) Lipofuchsin 'brown in color in fresh state present in heart, liver and nerve cell.

(3) Melanin “responsible for dark color of skin, hair and eyes.

2- Ribosomes and lysosomes.

(4 marks)

Small electron dense particles 15-20 nm in size

Composed of r RNA & protein (Ribosomes are particles consisting of ribonucleic acid (RNA) and protein that interpret cellular information from the nucleus and synthesize appropriate proteins as required by the cell.

Ribosomes are either attached to the endoplasmic reticulum (RER) or free in the cytoplasm as polysomes.

Each ribosome consists of:-

2 different size subunit in case of “Ribosome” polysome they are held together by stand of mRNA

**NB**

The protein and rRNA of the ribosome synthesis in the nucleoli then transport to the cytoplasm to form ribosome

**There are two Type of ribosome:**

Ribosome in Eukaryotic cells.

Ribosome in Prokaryotic cells chloroplast & mitochondria.

Membranous organelles contain hydrolytic enzyme act on pH medium (acidic). Lysosomes are tiny sacs filled with enzymes that enable the cell to utilize its nutrients and are responsible for destroying the cell after it has died. However, there are some circumstances (diseases/conditions) in which lysosome begin to 'break-down' living cells.

800 nm in diameter.

It derived from Golgi complex.

**L.M** → vesicle of basophil, eosinophil and/ neutrophil.

**E.M** → homogenous round vesicle bounded with thin membrane.

Chemically they are lipoprotein complex, their cavity filled with hydrolytic enzyme.

**How lysosome are formed.**

The lysosome are the freshly formed secretory vesicle contain hydrolytic enzyme “**primary lysosome**”

It comes from r.E.R as transfer vesicle contains enzyme synthesis with ribosome of r.E.R.

3- Heterochromatine and euchoromatin

(3 marks)

	Heterochromatin	Euchromatin
<i>Known As</i>	Condensed	extended or diffuse
<i>Location</i>	cells with low activity	cells with high activity
<i>Shape</i>	dark clumps inside the envelope	light stain strands of DNA and mRNA
<i>Action</i>	Inert in protein synthesis	active in protein synthesis
<i>Position</i>	Peripheral chromatin Nucleolus associated chromatin Chromatin island	Diffuse in the karyolymph

## II-Second Group

(Total 16 marks)

**A-Discuss the histological features of the followings:**

1- The different types of simple columnar epithelium.

(3 marks)

The surface epithelium is formed of sheet of cells cover the body surfaces and cavities, it may be single layer of cells (simple epithelium) or numerous layer of cells (stratified epithelium). Another classification of the epithelial tissue based on the shape of the outermost layer (squamous, cuboidal, columnar and dome shape)

**A- Simple epithelium:-**

**Simple squamous:** - single layer of cells characterized by flat shape (squamous) with flat bulged nucleus and tiny cytoplasm.

**Location:-**

lining of pleura, pericardium and peritoneum ( mesothelium)

Lining of cardiovascular system (heart and blood vessels). (endothelium)

respiratory bronchi and alveoli Bowman's capsule ( parietal layer), loop of henle (thin segment)

Inner aspect of ear drum

### **2-Simple cuboidal: -**

(single layer of cells characterized by cubic shape in appearance with centrally located nucleus)

#### **Location**

lining of many duct & glands (Salivary gland and thyroid gland) lining certain kidney tubules "P.C.T , D.C.T" inner epithelial layer of the cornea of eye, surface of ovary and rete testis

it may be classified as *simple cuboidal ciliated epithelium* ( lining epithelium of the respiratory bronchiole of the lung )

### **3- Simple columnar: -**

single layer of epithelial cells characterized by columnar appearance with basal oval nuclei)

#### **It may classify to:-**

*1-Simple columnar ciliated epithelium:*

it has cilia in the free border

(eg. Oviduct)

*2- Simple columnar non ciliated epithelium:* according its function, they includes: 1- Absorptive type: - in the free border in cells have microvilli. ( eg. intestine).

2- Secretory type: - there are secretory granules in the apical part of cells. (e.g. stomach).

### **4- Pseudo stratified columnar epithelium**

The epithelium consists of one row of cells but of two type characterization, the first is columnar in shape with tall basal nucleus and the second is round with round and basely situated nucleus. The two type of cells rest on the same basement membrane. The crowdnesses of the cells seem to be it consists of many layers of cells so it called pseudo stratified.It may classified to *pseudo stratified columnar epithelium with Sterocilia* (epididymis)

*Pseudo stratified columnar epithelium with kenocilia* (respiratory passage)

Pseudo stratified columnar epithelium non ciliated (urethra)

#### **Location**

Trachea, larynx and primary bronchiole

Eustachian tube part of middle ear, portion of urethra

2- Desmosomes and hemidesmosome.

**(3 marks)**

Spot like junction = macula junction

- The intercellular space (15-20nm) of adjacent cell membrane.

The two cell membrane are thickened by the condensation of the Tonofilament intermediate line of dense material seen in the inter cellular region, "This dark line may represent condensation of fusion of the cell coats (glycocalyx) in this region, it is present in the cardiac muscle cells, in the stratified squamous cells.

It attaches the basal cell

of the epithelium to the

underlying basal lamina.

It has the structure of half desmesomes.

3- Stratified squamous epithelium.

**(3 marks)**

(A) Mucous type "non keratinized:-

The epithelium consists of many layer of epithelial cells, the innermost is tall columnar rest on the basement membrane while the middle layer consists of polyhedral cells and the outermost consists of squamous cells

Location: On the most orifice of the body as mouth, vagina, pharynx, esophagus and urethra

(B) Cutaneous type "keratinized:-

This type is similar to the non keratinized type except presence of keratin on the outermost squamous cells

Location:- In all body surface except cornea of eye

**b- Classify and discuss the glandular epithelium depending on the nature and mode of secretions.**

**(7 marks)**

It has a smaller diameter, and a narrower lumen.

It is deeply stained.

The cells are pyramidal with, indistinct boundaries. (3-4 cells)

The nuclei are rounded and nearer to the centre.

The cytoplasm is deeply basophilic, with acidophilic zymogen (secretory) granules near the free border. The basophilia is due to R.N.A.

- Larger diameter and, wider lumen Paler, and lightly stained.

Cells are irregularly cuboidal with, distinct boundaries (6-8).

Nuclei are flattened and basal in position.

Cytoplasm is pale, foamy or vacuolated (because the mucinogen granules dissolve during preparation of the section).

Basket cells are more numerous.

The secretion is a mucous fluid, (mucus)

Mixed (Seromucoid):-

Contain both type serous, mucous gland eg. Submandibular salivary gland

Waxy:- The gland secretes waxy substance eg. Seruminous gland

Sebum:- Sebaceous substance eg. Sebaceous gland

Germinal:- The gland secretes cells eg. Testis & ovary

\* Merocrine:-The secretory product is released through cell membrane while the cell shows no changes in its structure. eg. Salivary & pancreas

\* Apocrine:- The secretory product leaves the cell with part of its apical cytoplasm. eg. Mammary gland and sweat gland

\* Holocrine,The secretory product leave the cells including the cell it self as one of the secretory components eg. Sebaceous gland

### **III-third Group**

**(Total 18 marks)**

**In the table mention the histological difference between the following:**

#### **1- Different connective tissue fibers.**

**(4 marks)**

Collagen fibers:-

They are the most numerous fibers in the body.

Colorless when fresh.

Take whitish coloration when aggregation of numerous fibers.

eg-tendon , eg- apponurosis

In many parts of the body the collagen arranged as array.

It formed from collagen bundles- fibers - fibrils- Tropocollagen molecules

Collagen is inelastic due to molecular configuration.

NB- it may be elongated for several percentage if increases tension over the fiber before breaking or cutting point the fiber.

Has tensile strength more than steel.

Average size 50-75nm according to the thickness of collagen bundles.

Longitudinal striation appears in the bundles.

5 types of collagen are recognized:-

Reticular Fiber

Thin fiber 0.5-2um; contain 6-12% hexoses.

Arranged as extended network of anastomosing fibers.

Present in endoneurium of muscle fibers.

In frame work of hemopiotic organs "spleen, bone marrow and lymph node.

Around the paranchymatous organ "liver, kidney and endocrine gland.

Most of reticular fiber is present in inflammatory process, wound healing but it replaced by regular collagen fiber subsequently.

Elastic Fiber

Is thinner tougher than collagen fiber.

Is wavy, broad, diffusely stained bundles.

Has stretch ability 1½ time than original length, then return back to the original length when stretching removed.

Elastic fiber branched, reunited with one another.

By E.M. Amorphous central region of elastic surrounded by sheath 10 nm tubular fibrils.

#### **2- Hyaline and elastic cartilage**

**(5 marks)**



Present in inflammation “chronic site of bacterial penetration.

Macrophage:-

It derived from precursor cell of bone marrow.

Changed to monocyte in the blood then migrate to C.T.

In C.T become Macrophage.

It may divided & increase in number in the C.T.

When it stimulated increase in size forming epitheloid or fuse together giving giant cell.

Irregular surface with plates, protrusion, indentation.

Well developed Golgi, many Lysosomes, R.E.R.

Size 10-30 um.

Kidney shape, oval nucleus eccentrically located.

Chromospheres

#### **4- Melanocyte and mast cells.**

**(4 marks)**

Mast cells play a central role in inflammatory and immediate allergic reactions.

Mast cells contain special cytoplasmic granules which store mediators of inflammation. The extra cellular release of the mediators is known as degranulation

Large ovoid cell

Cytoplasm intensely contains basophilic granules which obscure spherical centrally located nucleus.

It present in many parts of the body & Mast cells settle in connective tissues and usually do not circulate in the blood stream.

Function

Secrete heparin “anticoagulant “.

Secrete SRS- slow reacting substance of anaphylaxis

E.C.F.A “eosinophilic chemotactic factors of anaphylaxis.

Both SRS-A , Ec.F-A are produced by mast cell but not stored in it.

Surface of mast cell contain specific receptor for IGE.

Not detected by H&E. By Toluidine blue → reddish purple granule “metachromsia “.

**Melanocyte**

Large size cell, contain large branching process

Cytoplasm contains melanin granules.

It present in pigmented layer of retina, meninges, subcutaneous C.T

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