**Histology Evaluation Examination**

**First Year Medical Students – 14 April 2015**

# Answer Key

## • Section A:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | √ | | | | 16 | | | | √ | |
| 2 | √ | | | | | 17 | | √ | | | |
| 3 | | √ | | | | 18 | | | | √ | |
| 4 | | | √ | | | 19 | | | √ | | |
| 5 | √ | | | | | 20 | | | √ | | |
| 6 | | √ | | | | 21 | √ | | | | |
| 7 | | | | | √ | 22 | | | | | √ |
| 8 | √ | | | | | 23 | √ | | | | |
| 9 | | | √ | | | 24 | | | | √ | |
| 10 | | | | √ | | 25 | | | | | √ |
| 11 | | | | | √ | 26 | √ | | | | |
| 12 | | | | √ | | 27 | | | √ | | |
| 13 | | √ | | | | 28 | | | | | √ |
| 14 | | | | √ | | 29 | | √ | | | |
| 15 | | | | | √ | 30 | | | √ | | |

- **Section B: (10 Marks)**

**Give Reason For The Following Facts:**

- ***Crossing over of chromosomes occur in meiosis but not in mitosis.***

To exchange of genetic material (alleles) between homologous chromosomes and produce a new generation genotype.

- ***Presence of fibrocartilage in the intervertebral discs.***

Intervertebral discs are exposed to high compression forces. Fibrocartilage contain type I collagen fibers. It provides firm support to resist compression and shear forces and acts as shock absorber.

- ***Regeneration of neurons is possible in the peripheral nervous system, and impossible inside the CNS.***

**Schwann cells** are present **only** in the **peripheral** nervous system. They help in healing and regeneration. When stimulated by interleukin-1 → Schwann cells proliferate and the axon grows →the two ends come in contact →regeneration.

In the CNS, oligodendrocytes are responsible for the myelin production, but does not help in regeneration.

- ***Skeletal red muscle fibers can contract longer than white fibers.***

A: Red fibers depend on aerobic respiration and rich in myoglobin and mitochondria. This provides energy and oxygen required for prolonged contraction.

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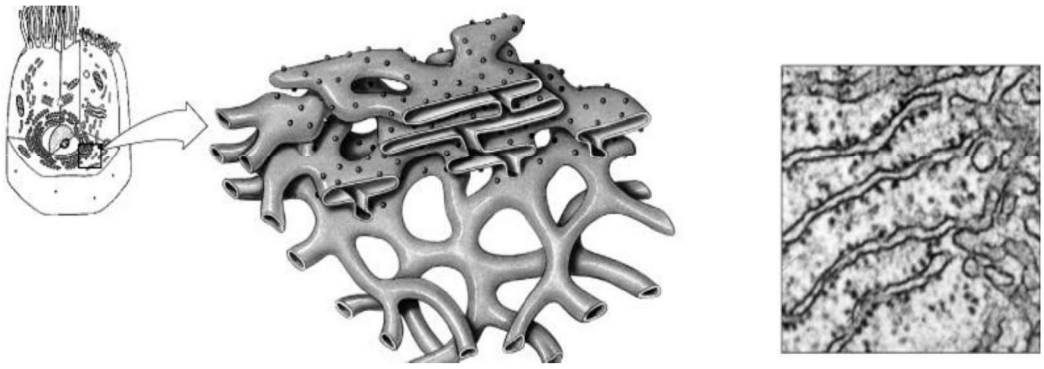
- **Section C: (9 Marks)**

**1- Rough Endoplasmic Reticulum (rER)**

- This organelle is formed of a membranous network that is covered by ribosomes. They are limited by two membranes (sometimes continuous with the outer nuclear membrane).
- Their number increase in cells having high protein secretion (e.g. pancreatic acini).
- *Functions:*
  1. Synthesis of proteins (via ribosomes).

2. Post-translational modifications of proteins (sulfation, folding, and glycosylation).
3. Storage and transport of proteins.



*A schematic diagram of smooth & rough ER*

**2- Connective tissue cells** are either resident or wandering:

*a) Resident cells include:*

1) Fibroblasts
2) myofibroblasts
3) Macrophages
4) Adipose cells
5) Mast cells
6) Undifferentiated mesenchymal cells

*b) Wandering cells include:*

1) Lymphocytes
2) Plasma cells
3) Neutrophils
4) Eosinophils
5) Basophils
6) Monocytes

## 3- Blood cells & their normal count

1) ***Red Blood Cells*** (RBCs) or erythrocytes: about 5 million cells/$mm^3$. (5 to 5.5 millions in males and 4.5 to 5 millions in females per $mm^3$)

2) ***White Blood Cells*** (WBCs) Leukocytes: are about 4000-10000 WBCs/$mm^3$

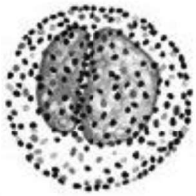
*a) Granular Leukocytes*

**Neutrophil**

***60-79%***
***2-5 lobed nucleus***
***Lavender cytoplasm***
***Very fine granules***

**Eosinophil**

***2-4%***
***bi-lobed nucleus***
***pink granules***



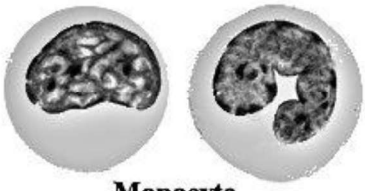
**Basophil**

***0.5-1.0%***
***S-shaped nucleus***
***dark blue granules***

*b) Non- Granular Leukocytes*


**Lymphocyte**

***20-30%***
***Round nucleus***
***B-cells: T-cells***



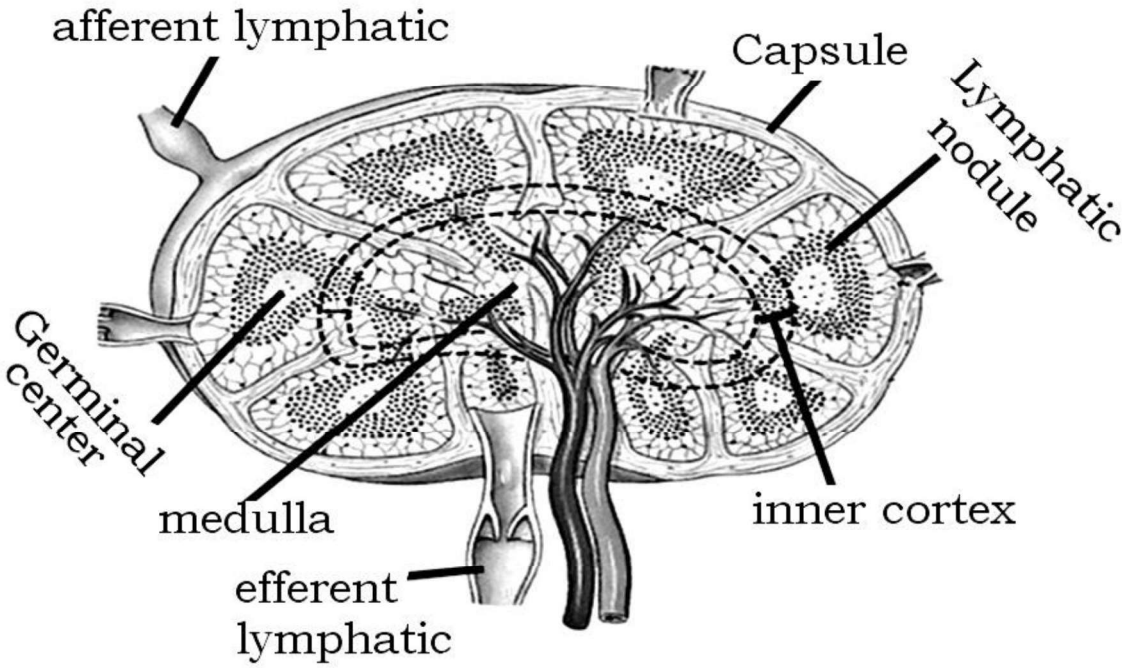
**Monocyte**

***3-8%***
***Indented, oval nucleus***
***Largest leucocytes***

3) ***Blood Platelets:*** from 200,000 to 400,000 per micro liter

## 4- Section in a lymph node:

- The gland consists of a stroma and parenchyma.
- The stroma consists of a connective tissue **capsule** surrounds the lymph node, sending trabeculae, and reticular C.T.




**The parenchyma consists of an outer cortex + inner medulla**

### 1. Cortex

- The **cortex** is formed of a network of reticular cells and fibers enriched with B cells. It has cortical spherical structures called **lymphoid nodules.**
- The **subcapsular sinus** is found at the surface of the outer cortex, and contains macrophages and reticular cells and fibers.
  - The deeper cortex contains manly T lymphocytes.

### 2. Medulla

- Composed of the **medullary cords** (branched extensions of the inner cortex).
- Contain B lymphocytes and some plasma cells. The medullary cords are separated by irregular spaces called**: medullary sinuses**.