

1. Define the following terms with 2 physiological and pathological examples each.

- A. Atrophy
- B. Hypertrophy
- C. Hyperplasia
- D. Metaplasia

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**ANSWER NO# 01**

**A. Atrophy;**

Atrophy is a decrease in cell size or shrinkage in the size of the cell by the loss of cell substances is known as atrophy .

**Physiological Examples;**

- 1. loss of hormone stimulation in menopause
- 2. tonsils in adolescence.

**Pathological examples;**

- 1. Guillain–Barré syndrome.
  - 2. nerve diseases include Charcot-Marie-Tooth disease
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**B. Hypertrophy;**

Hypertrophy is an increase in cell size or organ or tissue due to increase in the size of the cell. In hypertrophy there is no new cell , just bigger cells containing increased amounts of structural proteins and organelles.

**Physiological Examples;**

- 1. skeletal muscle with sustained weight bearing exercise.
- 2. enlargement of the uterus during pregnancy occur as a consequence of estrogen stimulated smooth muscles hypertrophy and smooth muscle hyperplasia.

**Pathological examples;**

1. cardiac muscle as a result of hypertension
  2. aortic valve disease.
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**C. Hyperplasia;**

Hyperplasia is an increase in the number of cells which result increase the size of an organ.  
It is the result of increased cell mitosis, or division .

Hyperplasia can be physiological or pathological

**Physiological Examples;**

1. Hormonal hyperplasia , the proliferation of the glandular epithelium of the female breast at puberty and during pregnancy.

**Pathological examples;**

1. Growth of adrenal glands due to production of adrenocorticotrophic hormone (ACTH) by a pituitary adenoma
  2. Proliferation of endometrium due to prolonged estrogen stimulus
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**D. Metaplasia**

Metaplasia is the transformation of one differentiated cell type to another differentiated cell type. The change from one type of cell to another may be part of a normal maturation process, or caused by some sort of abnormal stimulus.

Metaplasia is the reversible substitution of one type of fully differentiated cell for another within a given tissue; it is seen most commonly in epithelial tissue

**Physiological Examples;**

1. squamous metaplasia that occurs in the uterine cervix during the menstrual cycle as the squamocolumnar junction migrates across the transformation zone

**Pathological examples;**

1. changes associated with the respiratory tract in response to inhalation of irritants, such as smog or smoke.
  2. The bronchial cells convert from mucus-secreting, ciliated, columnar epithelium to non-ciliated, squamous epithelium incapable of secreting mucus
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**2. How does the calcium ions influx affects the cell?write it in your own words.**

**Answer NO# 2:**

:: Calcium play an important role in signal transduction pathways, where they act as a second messenger in neurotransmitter release from neurons, in contraction of all muscle cell types and in fertilization

:: Mitochondria perform aerobic mechanism which need O<sub>2</sub> and reduced oxidative phosphorylation,

:: Cell membrane reduced sodium pump then sodium and water enter the cell and potassium is out.

:: Then osmolarity is Increase inside the cell and Pull the water inside the cell. Endoplasmic reticulum dilates, the cell swells, blebs appear.

:: Anaerobic glycolysis occurs with loss of glycogen and decreased intracellular pH.

:: Then calcium pump of the leads to influx of Ca<sup>++</sup> into the cell because of Failure and then activate many enzymes to the detriment of the cell and activate the large number of enzymes which are danger and destroy the cell.

:: Influx of calcium comes from the extracellular fluid and stores in mitochondria and endoplasmic reticulum.

:: then Calcium activates phospholipases which damages cell membranes, proteases which damages cell membranes and cytoskeleton and endonucleases which damages DNA.

:: And then cell death occurs this is one of the main mechanisms of cell death

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**3. What is free radical?What is the effect of Reactive Oxygen Specie(ROS) on the cell?**

**Answer NO# 3**

A free radical as any molecular species capable of independent existence that contains an unpaired electron in an atomic orbital.

The presence of an unpaired electron results in certain common properties that are shared by most radicals. Many radicals are unstable and highly reactive

When its generated in cells they attack many times and degrade nucleic acid and membrane molecule. free radical usually derived from oxygen to produce reactive oxygen species, superoxide, hydroxyl radicals,H2O2.

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**4. Write down some differences between Apoptosis and Necrosis.**

**Answer no# 4**

<b><u>Apoptosis</u></b>	<b><u>Necrosis</u></b>
1. Apoptosis is a programmed cell death	Necrosis is a premature cell death
2. genetically controlled	No-genetically controlled
3. shrinkage of cells occurs	Swelling of cells occurs
4. nucleus get fragmented	Nucleus get disorganized
5. changes of ph in cells	No changes of ph in cells
6. DNA fragmentation is pre-lytic	DNA fragmentation is post-lytic
7. highly regulated timely event	Unregulated random event

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**5. Write a note on Air Embolism.**

**ANSWER NO# 5**

An air embolism is also known as a gas embolism, its a blood vessel blockage caused by one or more bubbles of air or other gas in the circulatory system.

Air embolisms may also occur in the xylem of vascular plants, especially when suffering from water stress. An air embolism can occur when your veins or arteries are exposed and pressure allows air to travel into them. This can happen in several ways, such as:

1. Injections and surgical procedures
2. Lung trauma
3. Scuba diving
4. Explosion and blast injuries
5. Blowing into the vagina etc etc.....

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**THE END**

**THANK U**