**Question 1**

Which of the following cell organelles is found in the greatest number in growing cells and synthesis ribosomes?

A Endoplasmic reticulum

B Mitochondria

C Nucleoli

D Golgi bodies

Explanation C

This question can be an EMQ

Potential stems: ER, golgi, nucleus, peroxisomes, lysosomes, mitochondria and nucleoi

The nucleus of most cells contains a nucleolus, a patchwork of granules rich in RNA. In some cells, the nucleus contains several of these structures. Nucleoli are most prominent and numerous ingrowing cells. They are the site of synthesis of ribosomes, the structure in the cytoplasm in which proteins are synthesised.

**Question 2**

Regarding dystrophic calcification, which of the following statements is correct?

A It may be caused by multiple myeloma

B It causes organ dysfunction

C It is associated with hypercalcaemia

D Calcuim deposition occurs in viable tissues

Explanation B

Dystrophic calcification occurs in nonviable (damaged) or dying tissues. It occurs despite normal serum levels of calcium and in the absence of derangements in calcium metabolism. Although dystrophic calcification may be a simple sign of a previous cell injury, it is often a cause of organ dysfunction. Myeloma causes destruction of bone and an increase calcium level and thus is associated with metastatic calcification

**Question 3**

In relation to atrophy, which of the following statements is false?

A Decreased autophagic vacuoles

B Decreased myofilaments

C Decreased smooth endoplasmic reticulum

D Persistance of residual bodies

Explanation A

There is an increase of autophagic vacuoles in atrophy

Atrophy is characterized by shrinkage and loss of structural elements of cell (like myofilaments, ER). There is an increase in autophagic vacuoles, into which lysosomes discharge their hydrolytic contents. Some cell debris resists digestion, and they persist as membrane bound residual bodies in cytoplasm (eg Lipofuscin granules).

**Question 4**

Which of the following is an example of hypertrophy?

A Increased respiratory epithelium in response to vitamin A deficiency

B Increased size of female breast during puberty

C Increase in size of female uterus during pregnancy

D Increase in liver size after partial hepatectomy

Explanation C

Hypertrophy refers to an increase in the size of the cells and, with such change, an increase in the size of the organ. The hypertrophied organ has no new cells, just larger ones. The increased size of the cells is not due to cellular swelling but to the synthesis of more structural components. It can be physiological and pathological and can occur together with hyperplasia for example in the pregnant uterus. The breast hypertrophies during lactation, but during puberty and pregnancy the breast will undergo hyperplasia. Following a partial hepatectomy, the liver undergoes compensatory hyperplasia.

Note: Vit A deficiency induces respiratory epithelium metaplasia.

**Question 5**

Which of the following is an example of hypertrophy?

A the breast at puberty

B tissue with a high capillary to myocyte ratio

C the liver post hepatectomy

D the pregnant uterus

Explanation D

Hypertrophy refers to an increase in the size of the cells and, with such change, an increase in the size of the organ. The hypertrophied organ has no new cells, just larger ones. The increased size of the cells is due not to cellular swelling but to the synthesis of more structural components. It can be physiological and pathological and can occur together with hyperplasia for example in the pregnant uterus. The breast hypertrophies during lactation, but during puberty and pregnancy the breast will undergo hyperplasia. Following a partial hepatectomy the liver undergoes compensatory hyperplasia.

Note: in muscular hypertrophy, capillary growth is not able to match myocyte growth, hence Capillary to Myocyte ratio decreases in hypertrophy

**Question 6**

In relation to hypertrophy, which of the following statements is correct?

A It is triggered by specific hormonal stimulation

B It increases the function of an organ exponentionally

C It is usually pathological

D It occurs after partial hepatectomy

Explanation A

Hypertrophy refers to an increase in the size of the cells and, with such change, an increase in the size of the organ. The hypertrophied organ has no new cells, just larger ones. The increased size of the cells is due not to cellular swelling but to the synthesis of more structural components. It can be physiological and pathological and can occur together with hyperplasia, for example, in the pregnant uterus. The breast with hypertrophies during lactation, but during puberty and pregnancy the breast will undergo hyperplasia. Following a partial hepatectomy the liver undergoes compensatory hyperplasia. Other triggers of hypertrophy include mechanical and trophic triggers. Eventually the hypertrophied organ reaches a limit when it is no longer able to compensate for the increased demand, and failure ensues.

**Question 7**

All the following are features of apoptosis, with the exception of?

A Chromatin condensation

B Formation of cytoplasmic blebs

C Cell swelling

D Phagocytosis of apoptotic bodies

Explanation C

Cell shrinkage occurs during apoptosis, which is a form of cell death whereby no harmful substances are released into the surrounding tissue. It is the body's natural process for removing old, diseased or unnecessary cells.

Apoptotic cells usually exhibit a distinctive constellation of biochemical alterations that underline structural changes. These include:

Activation of caspases: the presence of cleaved, active caspases is a marker for cells undergoing apoptosis.

DNA breakdown

Membrane alterations and recognition by phagocytes

**Question 8**

Which of the following statements is correct in relation to dystrophic calcification?

A It rarely causes dysfunction

B It does not occur on heart valves

C It is formed by crystalline calcium phosphate

D It is specific to coagulative necrosis

Explanation C

Dystrophic calcification occurs in nonviable or dying tissues. It occurs despite normal serum levels of calcium, and in the absence of derangements in calcium metabolism. Although dystrophic calcification may be a simple sign of a previous cell injury, it is often a cause of organ dysfunction. Myeloma causes destruction of bone and an increase calcium level and is thus associated with metastatic calcification. Dystrophic calcification occurs in all area of necrosis including coagulative, caseous and liquifactive

**Question 9**

Reversible cell injury is characterised by all of the following, except?

A Detachment of ribosomes

B Nuclear chromatin clumping

C Cellular swelling

D Lysosomal rupture

Explanation D

In reversible injury, there is cellular swelling, organelle swelling, blebbing of the plasma membrane, detachment of ribosomes from the ER and nuclear chromatin clumping. It also includes decreased ATP generation, loss of cell membrane integrity, and defects in protein synthesis, cytoskeletal and DNA damage. For a cell to enter the "point of no return"-irreversible injury, it goes through the stages of reversible injury-so features will overlap. However, nucleus destruction in irreversible injury includes pyknosis-karyorrhexis and karolysis. Other features of irreversible cell injury include: lysosomal rupture and disruption/defects of the cellular membranes and depletion of ATP

**Question 10**

With regard to metaplasia, which of the following statements is correct?

A It is typically an irreversible process

B It preserves mucus secretion in the respiratory tract

C It is the process that occurs in Barrett's oesophagitis

D It can be caused by vitamin B12 deficiency

Explanation C

Metaplasia is a reversible change in which one adult cell type is replaced by another adult cell type. It is an adaptive substitution of cells, which are sensitive to stress, by cell types better able to withstand the adverse environment. The most common metaplasia is columnar to squamous occurring in the bronchial tree due to smoking. Metaplasia of squamous to columnar type occurs in Barrett’s oesophagitis. Vitamin A deficiency induces squamous metaplasia in the respiratory epithelium which is a reversible process. However, if the stimulus which has predisposed to such a metaplasia persists, it may induce cancer transformation.

Note:

Vit B12 deficiency is associated with a number of disorders, but most commonly it is associated with penicious anaemia. In pernicious anaemia, the most characteristic alteration is atrophy of the fundic glands, affecting both chief and parietal cells, the latter being virtually absent. The glandular lining epithelium is replaced by mucous-secreting goblet cells that resemble those lining the large intestine, a form of metaplasia referred to as intestinalisation. Pernicious anaemia is believed to result from an autoimmune attack on the gastric mucosa. The gastric atrophy and metaplastic changes are due to autoimmunity and not vitamin B12 deficiency; hence while parenteral administration of B12 corrects the megaloblastic changes in the marrow and the epithelial cells of the alimentary tract, gastric atrophy and achlorhydria will persist).

**Question 11**

With regards to dysplasia, which of the following features is correct?

A It is characterised by cellular pleomorphism

B It inevitably progresses to cancer

C It is not associated with architectural abnormalities

D It is a feature of mesenchymal cells

Explanation A

Dysplasia means disordered growth and is encountered principally in the epithelia. It is characterised by a constellation of changes which include a loss in the uniformity of the individual cells, as well as a loss in their architectural orientation. Dysplastic cells exhibit considerable pleomorphism (variation in shape and size). Dysplasia does not necessarily progress to cancer and only if the entire thickness of the epithelium becomes dysplastic is it likely to progress to a carcinoma in situ. If not the process is usually reversible.

**Question 12**

Which of the following statements is correct regarding metastases?

A They are proven by the finding of lymph node enlargement adjacent to a tumour

B They are the most common presentation of melanoma

C The breast usually metastasises to supraclavicular nodes

D They unequivocally prove malignancy

Explanation D

Metastases are tumour implants that are discontinuous with the primary tumour. Metastases unequivocally mark a tumour as malignant, because benign tumours do not metastasise. Breast cancers usually metastasise to the axillary lymph nodes. The tumour following, the natural lymphatic drainage route. Lymph node enlatgement adjacent to a tumour may be reactive or inflammatory in nature

**Question 13**

Metastatic calcification may occurs in which of the following situations?

A Atherosclerotic vessels

B Gastric mucosa

C Damaged heart valves

D Tuberculous lymph nodes

Explanation B

Metastatic calcification occurs in normal tissues and is associated with a raised serum calcium

There are 4 principal causes of hypercalcaemia;

 - Increased serum parathyroid hormone (PTH)

 - Destruction of bony tissue

 - Vit D related disorders

 - Renal failure

Metastatic calcification may occur widely throughout the body but mainly affects the interstitial tissues of the gastric mucosa, kidneys, lungs systemic arteries and pulmonary veins. These tissues excrete acid and therefore have an internal alkaline medium that predisposes them to metastatic calcification.

Note: atherosclerotic vessels have dystrophic calcium deposits