



**Answer the following question:-**

**A: Write notes about. (12marks).**

- 1- Unipotent stem cells and its types.
- 2- How are the *hox* genes in mammals involved in the generation of limbs?

**B: Chose the correct answer (12marks):**

- a- The human embryo that consists of only two layers of cells is called
  - 1-a blastocyst
  - 2-an embryonic disc
  - 3-a placenta
  - 4-an amniotic sac
  - 5-A yolk sac
- b- What kind of tissue is found in somites?
  - 1-gonadal tissue
  - 2-ectoderm
  - 3-hypoderm
  - 4-endoderm
  - 5-mesoderm
- c- The protein of a developing limb bud where most *hox* genes are expressed is best described as
  - 1-proximal anterior
  - 2-distal anterior
  - 3-proximal posterior
  - 4-distal posterior
  - 5-none of the above
- d- Lipide-A stimulates the synthesis of which factors?
  - 1-platelet-derived growth factors (PDGF)
  - 2-epidermal growth factors(EGF)
  - 3-transforming growth factors( TGF)
  - 4-tumor necrosis factors (TNF)
  - 5-none of these
- e- The active CDCK-2(Cdk-cyclineA complex) phosphorylates lamins, topoisomerase, and microtubule-associated proteins. This cause
  - 1-the chromosomes to detach from the nuclear membrane.
  - 2-the nuclear membrane to fragment
  - 3-the solenoid DNA to condense on matrix proteins
  - 4-microtubules to polymerize from microtubule-organizing centers or centrosomes
  - 5-all the above
- f- Into which of the following categories do the tumor suppressor protein fit
  - 1-inhibitor G protein
  - 2-surface receptors that inhibit signal transduction pathways
  - 3-proteins that sequester and consequently inhibit transcriptional activators
  - 4-all the above
  - 5-none of the above

With best regards  
Dr. Hayam Elshaarawy



**Answer the following question:-**

**A: Write notes about. (12marks).**

**1- Unipotent stem cells and its types.**

Cells that reside within the adult tissues and retain the ability to generate cells for the tissue type to which they belong are unipotent stem cells. New information suggests that adult stem cells may actually be pluripotent. Adult stem cells have been identified for a number of different tissue types such as brain, bone marrow, peripheral blood, blood vessels, skeletal muscle, skin, and liver

- a- **Hematopoietic stem cells**, including red blood cells, B lymphocytes, monocytes, macrophages, and platelets.
- b- **Mesenchymal stem cells**: also called bone marrow stromal cells, mesenchymal cells give rise to a variety of cell types, including osteoblasts (bone cells), chondrocytes (cartilage cells), adipocytes (fat cells), and other kinds of connective tissue.
- c- **Skin stem cells**: these stem cells are found in the basal layer of the epidermis and also at the base of hair follicles. Epidermal stem cells give rise to keratinocytes, while the follicular stem cells give rise to both hair follicles and the epidermis.
- d- **Neural stem cells**: stem cells in the brain give rise to its three major cell types: nerve cells (neurons) and two types of nonneural cells- astrocytes and oligodendrocytes.
- e- **Epithelial stem cells**: located in the lining of the digestive tract, epithelial stem cells are found in deep crypts and give rise to several cell types, including absorptive cells, goblet cells, Paneth cells and enteroendocrine cells.

**2- How are the *hox* genes in mammals involved in the generation of limbs?**

Vertebrate limbs are segmented in much the same way that the trunk of the body is. Thus, it is not surprising that homeotic genes are involved in differentiating vertebrate limb segments. Some of the same *hox* genes in vertebrates that control the segmentation of the body also determine limb development. Developing limbs have an anterior-posterior axis, a ventral-dorsal axis, and proximal-distal dimension. In the very early limb bud, *hox* gene expression is segmented along the anterior-posterior

axis. As the limb bud grows, *hox* gene expression become twisted so that *hox* gene products are found within diagonal stripes that cut across the limb bud.

Some of the mouse genes most closely related to *Drosophila*'s *abd-B* gene (*hox-4.8, 4.7, 4.6, 4.5* and *4.4*) are expressed in the segments along the lengthening limb. The expression of five *hox-4* genes defines the most distal posterior segment. Expression of only *hox-4.4* defines the most proximal and most anterior regions of the limb.

**B:Chose the correct answer (12marks):**

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