

**TD N°. 7: Cytoskeleton- Endomembrane System - Golgi Apparatus**

---

**Exercise 1: What are the main components of the cytoskeleton?**

---

**Exercise 2**

**1. The cytoskeleton:**

- A. Maintains cell shape
- B. Is involved in cell movement
- C. Is visible under an optical microscope
- D. Can be dispersed in the hyaloplasm

**2. Actin is a microfilament of the cytoskeleton found in:**

- A. Microvilli
- B. Muscle cells
- C. The submembrane cytoskeleton of erythrocytes
- D. Cilia

**3. Actin microfilaments are located in:**

- A. Microvilli of intestinal cells
- B. The submembrane cytoskeleton of erythrocytes
- C. Macrophage pseudopodia
- D. Muscle cells
- E. Cellular organelles

**4. Intermediate filaments of the cytoskeleton are:**

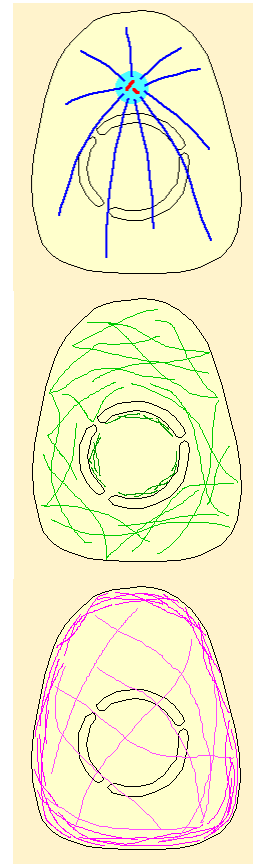
- A. Fibrous proteins of variable nature
- B. Organized into protofilaments
- C. The most stable and resistant
- D. Present in the nuclear lamina

**5. Microtubules:**

- A. Are made of keratin
- B. Constitute the cytomuscular structure of the cell
- C. Are contractile
- D. Are hollow filaments

**6. Microtubules of the cytoskeleton are involved in:**

- A. Supporting the striated border



- B. Cell division
- C. Amoeboid cell movement
- D. Transporting molecules within the cytoplasm

**7. During mitosis:**

- A. Centriole self-replication occurs
- B. Chromosome condensation occurs
- C. Filaments of the lamina disappear
- D. The nuclear envelope disappears

**8. Chromatin is:**

- A. The condensed form of the chromosome
- B. Transcriptionally active in euchromatin
- C. Located at nuclear pores
- D. Positioned against the nuclear lamina
- E. Made up of DNA associated with proteins

**9. The chromosome consists of:**

- A. DNA
- B. Carbohydrates
- C. Histone proteins
- D. Non-histone proteins (sometimes)
- E. Lipids

**10. During mitosis:**

- A. The nuclear envelope fragments and disappears
- B. The mitotic spindle forms in pre-metaphase
- C. Chromosomes migrate during prophase
- D. Chromosomes decondense during metaphase

**MCQs on the Endomembrane System**

**11. Question 1: Definition and components**

Which statement is correct about the endomembrane system?

- 1. It includes the membranes of mitochondria and chloroplasts.
- 2. It includes the endoplasmic reticulum, Golgi apparatus, and lysosomes.
- 3. It is limited to prokaryotic cell membranes.
- 4. It is not continuous with the plasma membrane.

**12. Question 2: Differences between RER and SER**

What is the main role of the rough endoplasmic reticulum (RER)?

- 1. Lipid and steroid hormone synthesis
- 2. Protein synthesis for membranes, organelles, and secretion
- 3. Chemical detoxification
- 4. Intracellular calcium storage

**13. Question 3: Organization of the endomembrane system**

The endomembrane system of eukaryotic cells:

- 1. Comprises only tubules
- 2. Corresponds to a network of interconnected cavities, canaliculi, and vesicles
- 3. Is disconnected from the nucleus
- 4. Includes trilamellar membranes 30 Å thick

#### **14. Question 4: Lipid synthesis**

What role does the smooth endoplasmic reticulum (SER) play in the cell?

1. Assembly of lipid bilayers, synthesis of phospholipids and cholesterol
2. Protein synthesis for secretion
3. Degradation of misfolded proteins
4. Conversion of lipids into carbohydrates

#### **15. Question 5: Functional importance**

Why is the endoplasmic reticulum essential in eukaryotic cells?

1. It is solely for protein storage
2. It is involved in cell membrane synthesis and intracellular transport
3. It is absent in cells with low metabolic activity
4. It is responsible only for ion transport

### **MCQs on the Golgi Apparatus**

#### **16. Question 1: Structure and organization**

**How is a functional unit of the Golgi apparatus (dictyosome) structured?**

1. It consists of a single continuous membrane without compartmentalization.
2. It is composed of 4 to 8 curved membranous saccules surrounded by vesicles.
3. It contains ribosomes on its membranes.
4. It is directly connected to the plasma membrane.

#### **17. Question 2: Localization and interactions**

**Where is the Golgi apparatus primarily located in a eukaryotic cell?**

1. Near the mitochondria
2. Between the endoplasmic reticulum and the plasma membrane
3. In the nucleus
4. Outside the cell

#### **18. Question 3: Function of vesicles**

**What types of vesicles are associated with the Golgi apparatus for material transport?**

1. Transition, transport, and secretion vesicles
2. Transition vesicles only
3. Storage vesicles only
4. Vesicles associated only with the cytoskeleton

#### **19. Question 4: Functional roles**

**What is the main function of the Golgi apparatus?**

1. Protein synthesis
2. Sorting, modifying, and directing cellular products
3. Chemical degradation
4. Energy storage in the form of lipids

#### **20. Question 5: Dynamics of saccules**

**What is the role of the trans-Golgi network (TGN)?**

1. It serves as an entry point for products from the endoplasmic reticulum.
2. It is the site of ribosome synthesis.
3. It is responsible for exporting mature cellular products.
4. It recycles inactive ribosomes.