

Cell

1. Who discovered cell in 1665?

- a) Robert Hook
- b) Robert Crook
- c) David Thomson
- d) Marie Francois

Ans. a)

2. Name an Organelle which serves as a primary packaging area for molecules that will be distributed throughout the cell?

- a) Mitochondria
- b) Plastids
- c) Golgi apparatus
- d) Vacuole

Ans. c)

3. Name the outer most boundary of cell?

- a) Plasma membrane
- b) Cytoplasm
- c) Nuclear membrane
- d) None of the above

Ans. a)

4. Name the process in which the ingestion of material by the cells is done through the plasma membrane?

- a) Egestion
- b) Diffusion
- c) Osmosis
- d) Endocytosis

Ans. d)

5. Which among the following sentence is not correct about the organelles?

- a) They are found in all Eukaryotic cells.
- b) They are found in multicellular organisms.
- c) They coordinate to produce the cell.
- d) They are small sized and mostly internal.

Ans. b)

6. Name the process in which the passage of water goes from a region of higher concentration to a region of lower concentration through a semi permeable membrane?

- a) Diffusion
- b) Osmosis
- c) Both a) and b)
- d) Neither a) nor b)

Ans. b)

7. Name an organism which contains single chromosome and cell division occurs through fission or budding?

- a) Eukaryotes
- b) Prokaryotes
- c) Bacteria

d) Primitive organism

Ans. b)

8. Name the process in which the membrane of a vesicle can fuse with the plasma membrane and extrude its contents to the surrounding medium?

- a) Exocytosis
- b) Endocytosis
- c) Osmosis
- d) Diffusion

Ans. a)

9. The jelly like substance present inside the cell is known as:

- a) Cytoplasm
- b) Ectoplasm
- c) Nucleoplasm
- d) None of the above

Ans. a)

10. Blue green Algae are:

- a) Prokaryotes
- b) Eukaryotes
- c) Both a) and b)
- d) Neither a) nor b)

Ans. a)

1. The power house of cell is called

- a) Cell wall
- b) Mitochondria
- c) Ribosomes
- d) Nucleus

2. The kitchen of the cell is called

- a) Cell wall
- b) Nucleus
- c) Vacuoles
- d) Plastids

3. The functional unit of life is called

- a) Cell
- b) Egg
- c) Nucleus
- d) None of these

4. Chloroplast is found in

- a) Plant cell only
- b) Animal cell only
- c) Both of these
- d) None of these

5. The control unit of cell is

- a) Nucleus
- b) Cell wall
- c) Cytoplasm
- d) All of these

6. Single celled organisms are called

- a) Unicellular
- b) Multi-cellular
- c) Both of these
- d) None of these

7. Tissue is a

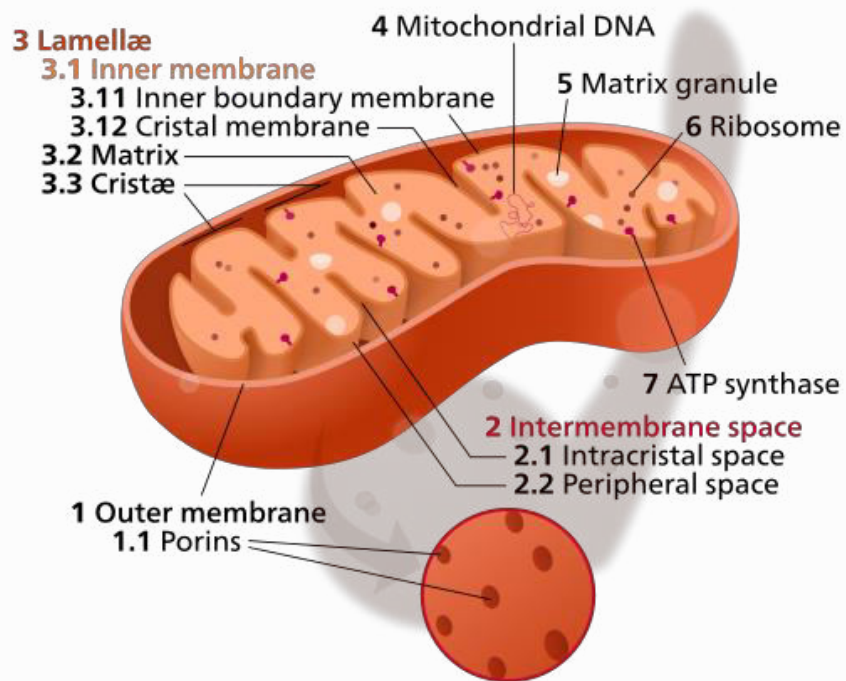
- a) Group of organs
 - b) Group of cells
 - c) Group of tissues
 - d) Group of organisms
- 8.** Cell is discovered by
- a) Robert Brown
 - b) Robert Hooke
 - c) John Mendal
 - d) Charse Darwin
- 9.** The calls capable of changing shapes are
- a) Amoeba cell
 - b) WBC
 - c) Both of these
 - d) None of these
- 10.** Hen's egg is a
- a) Tissue
 - b) Organ
 - c) Organ system
 - d) cell

ANSWERS

- 1. b
- 2. d
- 3. a
- 4. a
- 5. a
- 6. a
- 7. b
- 8. b
- 9. c
- 10. d

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Cytology MCQ 01: MCQ on Mitochondria

(Multiple Choice Questions in Biology / Life Science)

(Sample/Model/Practice Questions for JRF/NET Life Science Examination, ICMR JRF, DBT BET JRF, GATE, ICAR NET, PG Entrance)

- (1). Which of the following cell organelle can be viewed by a light microscope?
- Ribosome
 - Endoplasmic Reticulum
 - Golgi
 - Mitochondria

- (2). Which of the following statement about mitochondria is NOT true?
- a. Size and shape of mitochondria varies in a cell
 - b. Mitochondria in the cell can fuse with one another
 - c. Large mitochondria in the cell can split into two
 - d. In all cells, one mitochondria will be exceptionally larger than others

- (3). Nebenkern of insect sperm cells is a modified _____.
- a. Nucleus
 - b. Golgi apparatus
 - c. Mitochondria
 - d. Centrosome

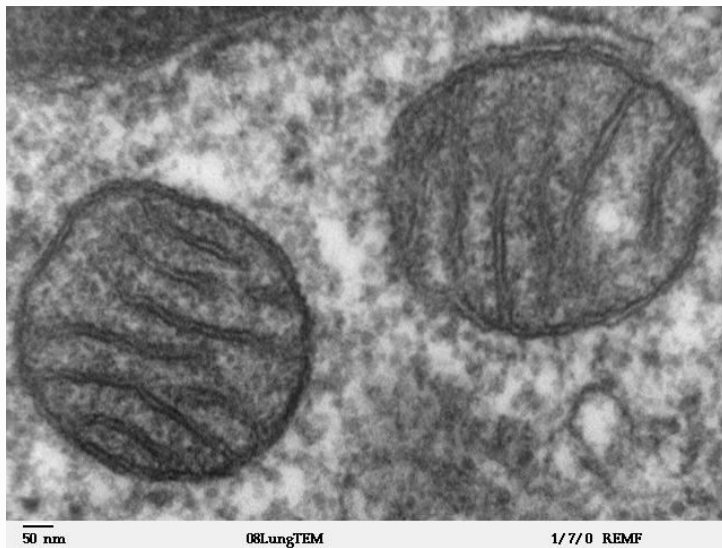
- (4). Mitochondria in the human sperm cell are occupied at _____.
- a. Sperm head
 - b. Mid piece
 - c. Sperm tail
 - d. No mitochondria in the sperms

- (5). Which of the following statement is true regarding the membrane system of mitochondria?
- a. Chemical composition of both inner and outer membrane of mitochondria are same
 - b. Outer membrane contain more proteins/lipid ratio (by weight) than inner membrane
 - c. Inner membrane contain more proteins/lipid ratio (by weight) than outer membrane
 - d. Phospholipids are completely absent on the outer membrane of mitochondria

- (6). Which of the following membrane lipid constituent can be considered as the lipid marker of inner mitochondrial membrane?
- a. Lecithin
 - b. Cardiolipin
 - c. Ceramide
 - d. Sphingo-ceramide

- (7). The only other place where cardiolipin can be found naturally other than mitochondrial inner membrane is _____.
- a. Inner membrane of Golgi apparatus
 - b. Apoptosome
 - c. Bacterial plasma membrane
 - d. Membrane of glyoxysome

- (8). Which of the following statement regarding the distribution of cholesterol is true in the membrane system of mitochondria?
- a. Cholesterol is completely absent in mitochondrial membrane
 - b. Cholesterol is absent in the inner membrane
 - c. Cholesterol is present only in the inner membrane
 - d. Cholesterol is present in both inner and outer membrane



Transmission electron microscope image Mitochondria (source wikipedia)

(9). Mitochondrial membrane system processes a variety of porin proteins which allow the passage of selective molecules. Which of the following statement is true regarding the porin protein in the mitochondrial membrane system?

- a. Mitochondrial outer membrane possess porins but they lack the usual beta barrel structure of the usual porins
- b. Both inner and outer mitochondrial membrane possess porin proteins
- c. Only the inner mitochondrial membrane possess porin proteins
- d. Many porin proteins which are structurally similar to the porins of bacterial cells are present in the outer membrane of mitochondria

10. ATP, NAD and CoA can be _____.

- a. Freely transported through both outer and inner membrane of mitochondria
- b. Freely transported through the outer membrane of mitochondria
- c. Freely transported through the inner membrane of mitochondria
- d. Cannot be transported freely through outer and inner membrane of mitochondria

11. Cellular organelle(s) involved in the regulation of Ca^{2+} level in the cell _____.
- Mitochondria
 - Endoplasmic Reticulum
 - Endoplasmic Reticulum and Mitochondria
 - Mitochondria and vesicles
12. The only enzyme in citric acid cycle (Kreb's cycle) which is attached to the inner mitochondrial membrane is:
- Succinate dehydrogenase
 - NADPH dehydrogenase
 - Isocitrate dehydrogenase
 - Malate dehydrogenase
13. Which of the following can be used as an enzyme marker for inner mitochondrial membrane?
- Succinate dehydrogenase
 - ATP synthase
 - Succinyl Co-A synthase
 - Cardiolipin
14. Which of the following is a mobile electron carrier in the mitochondrial electron transport system?
- NADH dehydrogenase
 - FADH Dehydrogenase
 - Ubiquinone
 - Succinate dehydrogenase
15. Which of the following cellular event is NOT directly involved with mitochondria?
- Apoptosis
 - ATP synthesis
 - Controlling cell cycle
 - Protein degradation
16. Which of the following statement is NOT true about mitochondria?
- Hepatocytes have more than 2000 mitochondria per cell
 - RBC completely lack mitochondria
 - Sperm cells of Insects completely lack mitochondria
 - Mitochondrial number may change in each cell of a species
17. Example for autonomous organelle(s):
- Mitochondria
 - Chloroplast
 - Mitochondria and chloroplast
 - Chloroplast, mitochondria and Golgi

18. Pick-out the odd one:
- Kearns-Sayre syndrome
 - Tay-sach syndrome
 - MELAS syndrome
 - Leber's hereditary optic neuropathy
19. Mitochondrial DNA (mtDNA) is considered as one of the best marker tool for population biologists and evolutionary biologists. The reason for this is:
- Mitochondrial DNA undergo spontaneous mutation
 - Mitochondrial DNA can be easy isolated
 - Mitochondrial genes are specific to mtDNA
 - Absence of genetic recombination in mtDNA
20. Cyanide is a mitochondrial toxin. The mechanism of action of cyanide is by inhibiting:
- NADH dehydrogenase
 - Succinate dehydrogenase
 - Cytochrome c oxidase
 - ATP synthase

Answer key, Explanations

1. Ans. (d). Mitochondria.

Mitochondria is a large cell organelle, Most probably the second largest cell organelle in the cells after nucleus in animal cells, and in plants probably the third largest cell after vacuole and nucleus. The average size of mitochondria is about 1 to 4 μ and this size is best enough the resolve through light microscope. (The maximum limit of resolution of light microscope is $\sim 0.2\mu$)

For details, refer: Cell and Molecular Biology by Gerald Karp, Ed. 6, Chapter 5: Aerobic Respiration and Mitochondria, Page 174

2. Ans. (d). In all cells, one mitochondria will be exceptionally larger than others

This is a wrong statement, even though the size of mitochondria in a single cell varies, we cannot say that one is exceptionally larger than others

3. Ans. (c). Mitochondria

4. Ans. (b). Mid piece

Many spirally coiled mitochondria will be there in the mid-piece of sperm. They are situated around the basal region of flagella. The energy (ATP) produced by these mitochondria are used by the flagella for their beating.

5. Ans. (c). Inner membrane contain more proteins/lipid ratio (by weight) than outer membrane

The protein/lipid ratio of inner membrane of mitochondria is 3:1 by weight

6. Ans. (b). Cardiolipin

Cardiolipin is a diphosphatidylglycerol belongs to the class of glycerol-phospholipids. It is abundantly present in the inner mitochondrial membrane, where it contributes about 20% of the total lipid components. The only other place where cardiolipin can be found is the membrane of most bacterial cells. The presence of cardiolipin in the inner mitochondrial membrane is a strong evidence for the endosymbiot theory about the origin of mitochondria and chloroplasts in eukaryotes

For details (

7. Ans. (c). Bacterial plasma membrane

For details, refer: Lehninger's Principles of Biochemistry, Ed. 5, Chapter 10 – Lipids: Membrane lipids, page: 349-351

8. Ans. (b). Cholesterol is absent in the inner membrane of mitochondria

For details, refer: Cell and Molecular Biology by Gerald Karp, Ed. 6, Chapter 5: Aerobic Respiration and Mitochondria, Page 176

9. Ans. (d). Many porin proteins which are structurally similar to the porins of bacterial cells are present in the outer membrane of mitochondria

For details, refer: Cell and Molecular Biology by Gerald Karp, Ed. 6, Chapter 5: Aerobic Respiration and Mitochondria, Page 176

10. Ans. (b). Freely transported through the outer membrane of mitochondria

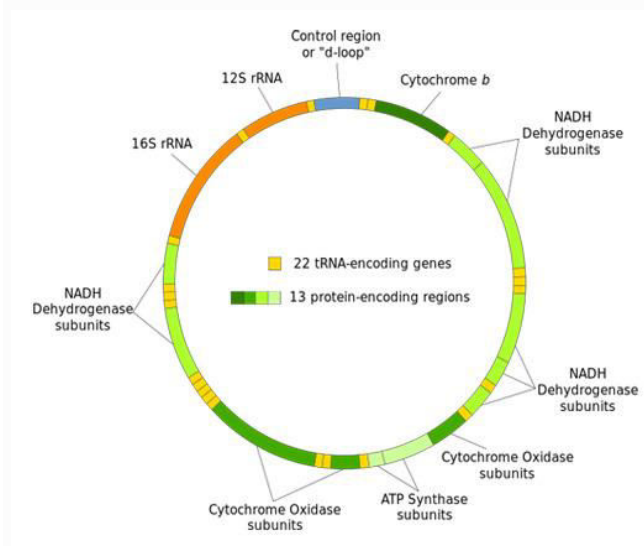
ATP, NAD and Co-A can be freely transported through the outer mitochondrial membrane through the porin protein channels with beta-barrel structures

11. Ans. (c). Endoplasmic Reticulum and Mitochondria

12. Ans. (a). Succinate dehydrogenase

13. Ans. (a). Succinate dehydrogenase

14. Ans. (c). Ubiquinone



Mitochondrial DNA (source wikipedia)

15. Ans. (d). Protein degradation

Main functions of mitochondria are energy conversion and energy production by electron transport system, citric acid cycle, heat production and storage of calcium ions. Apart from these main functions, mitochondria are also involved in cellular process like regulation of membrane potential, induction of apoptosis, regulation of cellular metabolism, synthesis of heme (porphyrin), and synthesis of some steroids.

16. Ans. (c). Sperm cell of insects completely lack mitochondria

17. Ans. (c). Mitochondria and Chloroplast

18. Ans. (b). Tay-sach syndrome

Kearns-Sayre syndrome, MELAS syndrome and Leber's hereditary optic neuropathy are the metabolic disorders associated with the dysfunction of mitochondria in the cell. Tay-sach syndrome is an autosomal genetic disorder due to the defect in membrane lipids turnover in the cell.

19. Ans. (d). Absence of genetic recombination in mtDNA

20. Ans. (c). Cytochrome c oxidase

1. The term cell was coined by

- a) Schwann
- b) Robert Hooke
- c) de Bary
- d) Tatum

2. Cell theory was proposed by

- a) Beadle and Tatum
- b) Robert Hooke
- c) Schleiden and Schwann
- d) Leenuwenhoeck

3. The cell theory is not applicable to

- a) Bacteria
- b) algae
- c) Virus

d) fungi

4. Semiautonomous organelle in the cell is

- a) Peroxisomes
- b) Chloroplast
- c) Endoplasmic reticulum
- d) Golgi bodies

5. The membrane around the vacuole is called

- a) cytoplasm
- b) tonoplast
- c) amyloplast
- d) elaioplast

6. Identify the non-membraneous organelle from the following

- a) Ribosome
- b) Endoplasmic reticulum
- c) Nucleus
- d) Chloroplast

7. Microfilaments are composed mainly of a protein called

- a) actin
- b) tubulin
- c) myosin
- d) chitin

8. Experiments demonstrating the importance of the nucleus in controlling the growth of the cell was performed in

- a) Starfish
- b) Acetabularia
- c) Neurospora
- d) Leucocytes

9. Which of the following is associated with the structure of Golgi complex?

- a) Cristae
- b) Cisternae
- c) Annuli
- d) Quasomes

10. The subunit of prokaryotic ribosomes are

- a) 60 S+40 S
- b) 70 S+30 S
- c) 60 S+30 S
- d) 50 S+30 S

11. Plant cell wall mainly composed of

- a) cellulose
- b) starch
- c) protein
- d) lipid

12. Smooth endoplasmic reticulum is the site of

- a) protein synthesis
- b) carbohydrate synthesis
- c) amino acid synthesis
- d) Lipid synthesis

13. In higher plants, the shape of the chloroplast is

- a) Discoid
- b) cup shaped
- c) girdle shaped
- d) ribbon shaped

14. The main function of Centrosome is

- a) Secretion
- b) osmoregulation
- c) Protein synthesis
- d) Formation of spindle fibre

15. Assembly of two subunits 40 S and 60 S of the ribosome is

- a) 100 S unit
- b) 80 S unit
- c) 70 S unit
- d) 90 S unit

Answers:

1- b	2- c	3-c	4-b	5-b
6-a	7-a	8-b	9-b	10-d
11-a	12-d	13-a	14-d	15-b

1. Holds the genetic information (DNA) for the cell. It controls all cell activities.

- A) lysosome
- B) ribosome

- C) nucleus
- D) mitochondria

2. Food producer for the plant cell. It converts the energy of the sun into sugar.

- A) chloroplast
- B) cytoplasm
- C) nucleus
- D) cell membrane

3. Acts as the digestive system inside a cell. It helps to break down old or unneeded parts of the cell, and substances that have been brought into the cell from the outside.

- A) lysosome
- B) ribosome
- C) endoplasmic reticulum
- D) mitochondria

4. Monitors and controls entry into and out of the cell.

- A) vacuole
- B) chloroplast
- C) ribosome
- D) cell membrane

5. Creates proteins. It can float within the cytoplasm or be attached to an organelle.

- A) ribosome
- B) mitochondria
- C) nucleus
- D) cytoplasm

6. Checks, makes necessary changes, packages and secretes proteins.

- A) endoplasmic reticulum
- B) mitochondria
- C) cell wall
- D) Golgi Bodies / Golgi Apparatus

7. Jelly-like fluid that fills the cells and suspends the organelles.

- A) chloroplast
- B) cytoplasm
- C) nucleus
- D) lysosome

8. Thick, rigid layer that surrounds the plant cell and provides support and structure.

- A) cell wall
- B) mitochondria
- C) chloroplast
- D) nucleus

9. Helps transport proteins.

- A) lysosome
- B) endoplasmic reticulum
- C) cell wall
- D) vacuole

10. In plant cells, a large, fluid-filled space inside the cell that helps the cell maintain its shape and may also be used to store nutrients and waste products. In animal cells, small fluid spaces inside the cell that are used to store nutrients and waste products.

- A) ribosome
- B) chloroplast
- C) cell wall
- D) vacuole

11. Produces energy to fuel the cell's activities.

- A) cytoplasm
- B) cell wall
- C) mitochondria
- D) Golgi Bodies / Golgi Apparatus

Answer Key

1.C 2.A 3.A 4.D 5.A 6.D 7.B 8.A 9.B 10.D 11.C

1. Centromere is required for _____
a) Transcription
b) Crossing over
c) Movement of chromosomes towards poles
d) Cleavage
View Answer

Answer: c

Explanation: Centromere is a special region of chromosome. It helps in movement of chromosomes towards poles.

2. Polytene chromosomes are formed due to _____
a) Endomitosis
b) Meiosis
c) Mitosis
d) Endomixis
View Answer

Answer: a

Explanation: Polytene chromosomes are oversized chromosomes. It is formed due to endomitosis (without cell division).

3. Racker's particles occur in _____
a) Mitochondria
b) Nucleus
c) Chromosome
d) Golgi complex
View Answer

Answer: a

Explanation: Racker's particles occur in Mitochondria. They are also known as F1 particles. They help in production of ATP.

4. Cell membrane is _____
a) Semi permeable
b) Permeable
c) Selectively permeable
d) Impermeable
View Answer

Answer: a

Explanation: Cell membrane is also known as plasma membrane. It is semi permeable membrane surrounding the cytoplasm of a cell.

5. Which of the following does not have a membrane?
a) Ribosome
b) Mitochondria
c) Nucleus
d) Chloroplast
View Answer

Answer: a

Explanation: Ribosome are the protein builders or the protein synthesizer of the cell. They consist of two major components: the small subunit and the large subunit.

6. Cell theory was proposed by _____

- a) Virchow
- b) Robert Hooke
- c) McClintock
- d) Schleiden and Schwann

View Answer

Answer: d

Explanation: Cell theory was proposed by Schleiden and Schwann. It states that

All living things are composed of cells.

All the cells are produced from other cells

Cells are the basic units of structure and function in living things.

7. There is no DNA in _____

- a) An enucleated ovum
- b) Mature RBC
- c) Hair root
- d) Mature spermatozoa

View Answer

Answer: b

Explanation: Mature RBC is flexible and oval biconcave discs. They lack a nucleus and most organelles in order to accommodate maximum space for hemoglobin.

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8. Cell theory is not applicable to _____

- a) Virus
- b) Bacteria
- c) Fungi
- d) Algae

View Answer

Answer: a

Explanation: Cell theory is not applicable to the Virus. Viruses can be considered alive depending upon the host. They are much smaller than cells.

9. Histones octamer contains _____

- a) Eight types of histones
- b) Five types of histones
- c) Eight histones of four different types
- d) Six types of histones

View Answer

Answer: c

Explanation: Histones octamer is an 8 protein complex found at the center of nucleosome core particles. it consists of two copies of each of four core histone proteins (H2A, H2B, H3 and H4).