

7. Division - for Growth and Reproduction

Let us assess

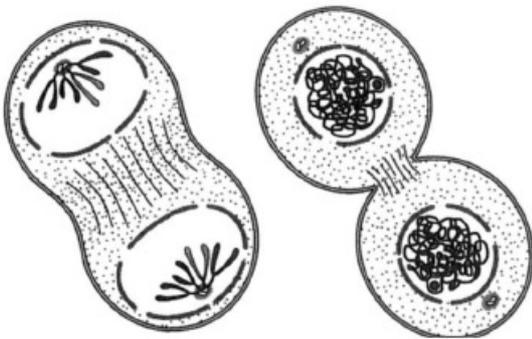
1. Question

The stage of karyokinesis at which daughter nuclei are formed.

- A. Prophase
- B. Metaphase
- C. Anaphase
- D. Telophase

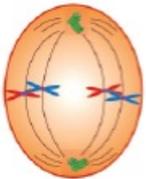
Answer

During telophase stage of Karyokinesis, daughter nuclei are formed. Karyokinesis is the process of division of nucleus. During this phase, two sets of chromosomes which have reached opposite poles de-condensed and become thread, network like chromatin reticulum. Nuclear membrane and nucleolus reappears. Thus two daughter nuclei are formed.



2. Question

Observe the figure.



- a. Which stage of mitosis is indicated in the figure?
- b. What is the main change that occurs in this stage?

Answer

- a. Metaphase stage of mitosis is shown in the figure. During metaphase stage of mitosis, chromosomes get aligned at the equator of cell. Each chromosome is held by spindle fibres at their centromere.
- b. During the metaphase stage chromosomes get aligned at the equatorial plane of the cell. The two sister chromatids of a chromosome are held at centromere. Spindle fibres get attached to the centromere of each chromosome. This is the stage where chromosomes are distinctly visible.

3. Question

List the meristems in various parts of the plant and list their functions.

Answer

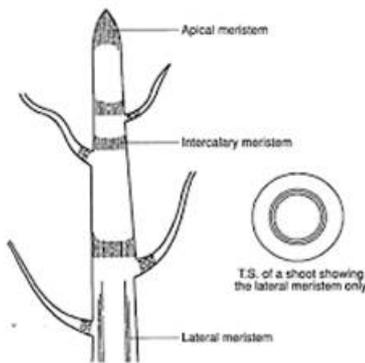
Meristematic tissues are found at all growing points of a plant like tips of roots, stems, branches. These cells can multiply rapidly to produce new cells. According to their position in plant, they are apical, lateral and intercalary meristem.

Apical meristem- They are situated at the growing tip of stems and roots and apices of young leaves, tips of

auxillary buds. They help to increase the length of roots and stem.

Lateral meristem- They are found below bark, cambium, in dicot roots and stems. They increase the diameter of the stem.

Intercalary meristem- They are found at the base of leaves or internode like stems of grasses and other monocots. They help in increasing the length of the stem.



Extended activities

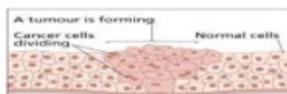
1. Question

Prepare a slide based on a story board on the reasons, symptoms and methods of treatment of cancer. Present it in the Health Club.

Answer

cancer

- > Cancer is a class of diseases characterized by out-of-control cell growth. There are over 100 different types of cancer, and each is classified by the type of cell that is initially affected.
- > Cancer harms the body when damaged cells divide uncontrollably to form lumps or masses of tissue called tumors.
- > Tumor cells are basically two types.
- > A tumor cell is part of a tissue that is abnormally growing. It may be either malignant or benign in nature



TYPES OF CANCER

- Brain cancer
- Breast cancer
- Lung cancer
- Liver cancer
- Skin cancer
- Kidney cancer
- Leukemia (Anemia Of White Blood Cells)
- Thyroid cancer
- Cervical cancer
- Pancreatic cancer

What causes cancer?

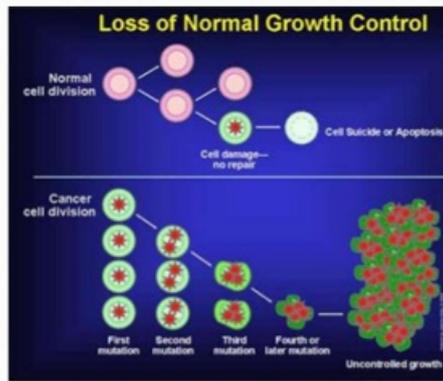
- Cancer arises from the **mutation** of a normal gene.
- A factor which brings about a mutation is called a **mutagen**.
- It is thought that several mutations need to occur to give rise to cancer
- Mutated genes that cause cancer are called **oncogenes**.

What Causes Cancer?

- **Chemicals in Food**
 - Sodium nitrate
 - Clostridium botulism
- **Viral Factors**
 - Herpes-related virus and human papillomavirus
- **Medical Factors**
 - Diethylstilbestrol (DES)
 - Chemotherapy

CAUSES

- ✓ Benzene and other chemicals
- ✓ Drinking excess alcohol
- ✓ Environmental toxins, such as certain poisonous mushrooms and
- ✓ a type of poison that can grow on peanut plants (aflatoxins)
- ✓ Excessive sunlight exposure
- ✓ Genetic problems
- ✓ Obesity
- ✓ Radiation
- ✓ Viruses



Signs and Symptoms

1. Changes in bowel or bladder habits
2. A sore that does not heal
3. Unusual bleeding or discharge
4. Thickening or lump in breast or elsewhere
5. Indigestion or difficulty in swallowing
6. Obvious change in a wart or mole
7. Nagging cough or hoarseness

CANCER TREATMENT

- A relatively long-standing strategy dating back to the 1950s is to flood the body with substances that are especially toxic to tumour cell
- A drug that is especially toxic to tumour cells is usually also toxic to healthy cells, and simply flooding the entire body with it causes system-wide damage and serious side effects

The few treatments are:-

- CHEMOTHERAPY
- RADIATION THERAPY
- IMMUNOTHERAPY
- HYPERTHERMIA
- STEM CELL TRANSPLANT (PERIPHERAL BLOOD, BONE MARROW AND CORD BLOOD TRANSPLANT)

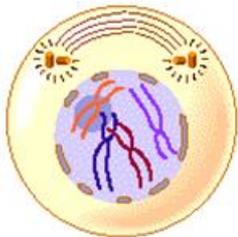
2. Question

Prepare models of various stages of karyokinesis using woollen threads of different colour, beads etc.

Answer

KARYOKINESIS:

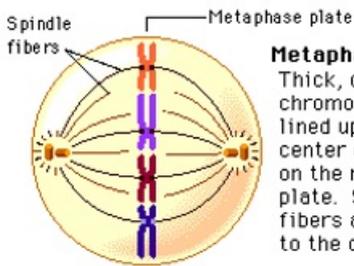
- The division of nucleus is called Karyokinesis.
- It has four stages - Prophase, Metaphase, Anaphase and Telophase.



Prophase

The chromosomes appear condensed, and the nuclear envelope is not apparent.

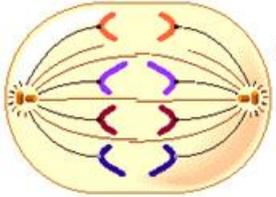
- It is the longest phase. Here thin, thread, network like chromatin reticulum condenses to form thick, short, coiled chromosomes.
- Each chromosome has two chromatids which are held at centromere.
- In animal cell centrosome splits into two. The centrioles present in centrosome have already duplicated and they start moving towards the opposite poles.
- Each centriole is surrounded by radiating rays called aster.
- Between two centrioles a number of fibres called spindle fibres appears.
- Nuclear membrane and nucleolus starts disappearing.



Metaphase

Thick, coiled chromosomes are lined up in the center of the cell on the metaphase plate. Spindle fibers are attached to the chromosomes.

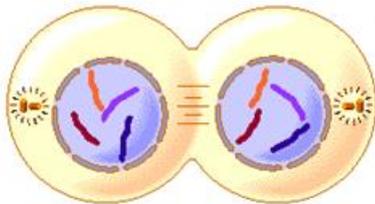
- The duplicated chromosomes have already reached and arranged on the equatorial plane of the cell.
- Each chromosome is attached by spindle fibre with its centromere.



Anaphase

The chromosomes have separated and are moving toward the poles.

- The centromere which is attached to the two chromatids divides and two sister chromatids separate from each other and start moving towards opposite poles.
- The movement of chromatids to opposite poles occurs due to contraction of spindle fibres.



Telophase

The chromosomes are at the poles, and are becoming more diffuse. The nuclear envelope is reforming. The cytoplasm may be dividing.

- Daughter chromosomes reach the opposite poles.
- They again become thin, long network like chromatin reticulum.
- Nucleolus and nuclear membrane reappears.