

Cell Division Notes

Mitosis is a form of nuclear division that produces daughter nuclei containing the same number of chromosomes as the parent nucleus. The daughter nuclei are genetically identical. Mitosis produces two cells of diploid number with $2n/46$ chromosomes.

Chromosomes are made up of DNA. DNA stores all the information that a cell needs in order to grow and to carry out vital activities. This information is stored as sections of DNA or genes. The daughter cells produced by mitosis are genetically identical to the parent cell. This ensures that daughter cells produced by mitosis contain all the sections of DNA needed for subsequent cell division and differentiation. The cells must be identical to develop normally. If an error occurs, it will be transmitted to the daughter cells, which will affect how the cells function or cause abnormal proteins to be produced. This may cause uncontrolled division of cells. In such a case, cells lose the ability to control the way they divide and cannot perform their normal functions.

Cell Cycle

1. Interphase- Cells spend most of their lives in a non-dividing stage. Cells carry out normal cellular activities. At interphase, chromosomes appear as long thin threads called chromatin. They cannot be distinguished individually. Centrioles also divide at this phase. Just before mitosis, each chromatin replicates, producing two identical sister chromatid threads joined by the centromere.
2. Prophase- Chromatin threads condense, coil and shorten to become chromosomes. Each chromosome consists of two sister chromatids and are in an X-shaped structure. Asters form around the centrioles. Asters are made of microtubules. The two pairs of centrioles move apart to two opposite ends of the cell. The nucleolus and nuclear envelope disappear. A spindle forms with the spindle fibres extending from one pole of the cell to another.
3. Metaphase- Chromosomes line up along the equatorial plane of the spindle. The centromere of each chromosome is attached to a spindle fibre on both sides.
4. Anaphase- Each centromere divides. The spindle fibres shorten and pull apart the chromatids toward opposite poles of the cell. Once the chromatids are separated, they are called daughter chromosomes.
5. Telophase- Spindle fibres break down. A nuclear envelope forms around the chromosomes at each pole of the cell. A nucleolus reforms in each nucleus and the chromosomes uncoil and lengthen to become thin chromatin threads.
6. Cytokinesis- The division of the cytoplasm. In animal cells, furrows appear in the cytoplasm between the two nuclei which deepen and two identical daughter cells are finally produced.