Mitosis and Cell Division

You have learned that the nucleus is the control center of the cell. You have also learned that a eukaryotic cell's cytoplasm contains organelles and other important structures. Mitosis and cell division ensures that when new cells are created, the contents of those cells are copied correctly. **Mitosis** (mi TOH sus) is the name given to the process when the nucleus divides. **Cytokinesis** (si toh keh NEE sus) is the process in which the cytoplasm divides.

Why are mitosis and cell division important?

Multicellular organisms grow by making more cells and replacing cells that die. Through mitosis and cell division, new cells replace short-lived cells. Some organisms reproduce by mitosis and cell division. When this happens, the offspring are identical to the parent.

Reading Check

3. Explain How do multicellular organisms grow?

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What are the phases of mitosis?

There are four phases of mitosis. The first phase of mitosis is **prophase**. During this phase two things happen. First, the DNA in a replicated chromosome twists into tight coils. Second, the membrane around the nucleus breaks apart. After this happens, chromosomes can move to other areas of a cell.

During the second phase of mitosis, called **metaphase**, the replicated chromosomes move to the middle of the cell. The pairs of sister chromatids line up end-to-end across the center of the cell. This happens because hairlike fibers pull and push the chromosomes to the middle of the cell.

The next phase of mitosis, **anaphase**, is when the sister chromatids of each replicated chromosome begin to separate. Hairlike fibers extend from each end of a cell and attach to the centromere of the sister chromatids. The fibers pull the centromere apart. The chromatids move from each other toward opposite ends of the cell. The chromatids are then called chromosomes.

Reading Check

4. Identify What is the third phase of mitosis?

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The final phase of mitosis is called **telophase**. During telophase, a new membrane forms around each set of chromosomes. The chromosomes become less tightly coiled. This is the reverse of what happens in prophase. At the end of this phase, there are two new nuclei that are identical to each other and the original nucleus. The cell, however, has not divided. The phases of mitosis are shown in the figure at the top of the next page.