EDITORIAL

A study on phases of cell cycle

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EDITORIAL NOTE

The replication of its DNA (DNA replication) and some of its organelles, followed by the partitioning of its cytoplasm and other components into two daughter cells in a process known as the cell division, are among these events.

The cell cycle for eukaryotes (cells with nuclei), including animal, plant, fungal, and protist cells, is divided into two stages: interphase and mitotic (M) phase (including mitosis and cytokinesis). The cell develops during interphase, gathering nutrients for mitosis and replicating its DNA and some organelles. The replicated chromosomes, organelles, and cytoplasm separate into two new daughter cells during the mitotic phase. After each of the essential parts of the cycle, control mechanisms known as cell cycle checkpoints determine if the cell can advance to the next phase, ensuring correct replication and division of cellular components.

The cell cycle is divided into the B, C, and D periods in cells without nuclei (prokaryotes), including such bacteria and archaea. The B period is defined as the time between the end of cell division and the start of DNA replication. During the C stage, DNA replication occurs. The D period is the time between the completion of DNA replication and the bacterial cell's divisions into two daughter cells.

The cell-division cycle is a fundamental process that occurs during the development of a single-celled egg cell into a mature organism, as well as the replacement of hair, skin, blood cells, and various internal organs. Each of the daughter cells enters the interphase of a new cycle after cell division. Due to the fact that the various stages of interphase are not normally recognizable physically, each phase of the cell cycle has its own set of specific biochemical activities that prepare the cell for cell division.

The G1 phase, S phase (synthesis), G2 phase (interphase), and M phase are the four distinct phases of the eukaryotic cell cycle (mitosis and cytokinesis). M phase is made up of two closely linked processes: mitosis (division of the cell's nucleus) and cytokinesis (division of the cell's cytoplasm, resulting in two daughter cells). Each phase's activation is conditional on the previous one's proper progression and completion. G0 phase refers to a condition of quiescence in which cells have temporarily or reversibly stop dividing.

Each of the daughter cells starts the interphase of a new cycle after cell division. Although the various stages of interphase are not normally identifiable physically, each phase of the cell cycle has its own set of specific biochemical processes that prepare the cell for cell division.

G0 is a phase where the cell has stopped dividing and has completed the cycle. This is where the cell cycle begins. In multicellular eukaryotes, non-proliferative (non-dividing) cells often enter the quiescent G0 state from G1 and may be quiescent for long periods of time, possibly indefinitely (as is often the case for neurons). This is a common occurrence in fully differentiated cells. Some cells, such as those in the liver, kidneys, and stomach, enter the G0 phase semi-permanently and are considered post-mitotic. Many cells, including such epithelial cells, do not enter G0 and continue to divide throughout an organism's lifespan.

Both quiescent and senescent cells are sometimes referred to as "post-mitotic." Cellular senescence is defined by a G1 arrest in response to DNA damage and external stress. Cellular senescence can make a cell's progeny nonviable; it's a biochemical alternative to a damaged cell's self-destruction via apoptosis.

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