What Is the Cell Cycle?

Worksheet

The cell cycle is the ordered sequence of growth (G1, S, G2) and division (mitosis, cytokinesis) phases a cell goes through to produce two genetically identical daughter cells.

Questions

1. Which phase involves DNA replication?

A) G1
B) S
C) G2
D) M

2. What is the correct order of interphase?

A) S, G1, G2
B) G1, S, G2
C) G2, S, G1
D) G1, G2, S

3. What happens at the G2/M checkpoint?

A) The cell checks DNA is undamaged before mitosis
B) DNA replicates
C) The cytoplasm divides
D) The cell exits the cycle permanently

4. Uncontrolled passage through cell cycle checkpoints can lead to

A) Apoptosis only
B) Cancer
C) Faster healing with no risk
D) Immediate cell death

5. A human cell has a 24-hour cell cycle: G1 = 11h, S = 8h, G2 = 4h, M = 1h. What percentage of the cycle is spent in S phase?

6. A cancer cell divides every 18 hours instead of 24. If G1 shrinks to 5h while S, G2, and M stay at 8h, 4h and 1h, what is the new total cycle length?

7. A tissue sample has 1,000 cells; a mitotic index study finds 40 cells in M phase. What percentage of cells are actively dividing?

8. Define: What are the two main stages of the cell cycle?

9. Define: What happens during S phase?

10. Define: What is a checkpoint?

Answer Key

1. B) S - S stands for synthesis - DNA is copied during this phase.

2. B) G1, S, G2 - Interphase always runs G1 S G2 before mitosis.

3. A) The cell checks DNA is undamaged before mitosis - This checkpoint confirms replication finished correctly before mitosis begins.

4. B) Cancer - Skipping checkpoint controls lets damaged cells divide uncontrollably, a hallmark of cancer.

5. Percent = (S total) 100 = (8 24) 100 = 33.3%

6. Total = G1 + S + G2 + M = 5 + 8 + 4 + 1 = 18 hours This matches the faster division rate - a shortened G1 is a hallmark of uncontrolled proliferation

7. Mitotic index = (cells in M total cells) 100 = (40 1000) 100 = 4%

8. Interphase (G1, S, G2) and the mitotic (M) phase, which includes mitosis and cytokinesis.

9. DNA is replicated, doubling the chromosome number before division.

10. A control point (G1/S, G2/M, spindle checkpoint) where the cell verifies conditions are right before proceeding.