CELL CYCLE SYNCHRONIZATION

Cell synchronization is the mechanism by which each cell in a culture is at the exact sample place in the cell cycle at a given time, in order to effectively study the cell-cycle is called **cell synchronization**. Cell cultures are naturally asynchronous (or unsynchronized) meaning that each cell in the culture is at some distinct and individual point in the cell cycle.

Methods to synchronize the cell

- **Centrifugal elutriation**: It involves the separation of cells based on size, mass and shape. This method is considered very reliable for the selection of cells in order to build a synchronized culture.

- **Block-and-release method**: This method generally involves blocking of cells at some stage of the cell cycle by addition of a drug (like Hydroxyurea) to the cell culture medium. They also produce much larger quantities of cells. Once all cells are sufficiently blocked the culture can then be released through the removal of the drug and the addition of fresh media.

Name some chemicals which helps in cell synchronization

Hydroxyurea blocks cells in S phase by inhibiting the production of dNTPs, thus DNA synthesis. Cells visually arrest with medium sized buds. Nocodazole blocks microtubule polymerization and holds cells in G2/M. It is one of anticancer drugs that synchronize cells at M-phase. Cells will have large buds and twice the DNA content due to the fact that they have completed S phase.

Briefly, the cell cycle exists as 3 main phases:

- G0/G1 phase – cell rest and recovery in preparation for subsequent rounds of cell division
- S Phase – DNA replication (interphase)
- G2/M phase – chromosome segregation and mitosis