

What is "Chemo" and How Does Chemotherapy Work?

Chemotherapy is the use of medicines (or drugs) to treat disease. We sometimes call this type of treatment just "chemo." Although surgery and radiation therapy destroy or damage cancer cells in a specific area, chemotherapy works throughout the body. Chemotherapy drugs can destroy cancer cells that have metastasized or spread to parts of the body far from the primary (original) tumor.

More than 100 chemotherapy drugs are used in various combinations. Although a single chemotherapy drug can be used to treat cancer, generally they are more powerful when used with other drugs. Your chemotherapy treatment probably will consist of more than one drug. This is called combination chemotherapy. A combination of drugs with different actions can work together to kill more cancer cells and reduce the chance that you may become resistant to a particular chemotherapy drug.

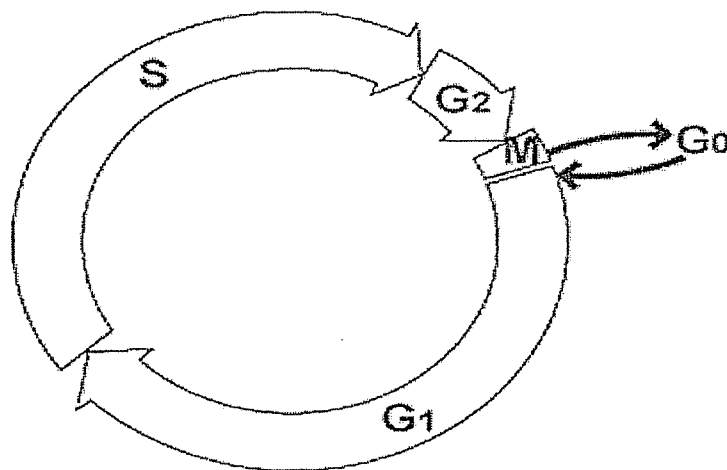
You and your doctor will decide which drug or combination of drugs, dosages, way it will be given, and frequency and length of treatment are best for you. All of these decisions will depend on the type of cancer, its location, the extent of its growth, how it is affecting your normal body functions, and your general health.

To understand how chemotherapy works as a treatment, it is helpful to understand the normal life cycle of a cell in the body. All living tissue is composed of cells. Cells grow and reproduce to replace cells lost during injury or normal "wear and tear." The cell cycle is a series of steps that both normal cells and cancer cells go through in order to grow and reproduce to form new cells.

This discussion is somewhat technical, but it can help you understand how doctors predict which drugs are likely to work well together and how doctors decide how often doses of each drug should be given.

There are 5 phases in the cell cycle, designated by letters and numbers:

- G₀ = Resting stage
- G₁ = RNA and protein synthesis
- S = DNA synthesis
- G₂ = Construction of mitotic apparatus
- M = Mitosis



The Cell Cycle

G₀ phase (resting stage): Cells have not yet started to divide. Cells spend much of their lives in this phase. Depending on the type of cell, it can last for a few hours to a few years. When the cell is signaled to reproduce, it moves into the G₁ phase.

G₁ phase: During this phase, the cell starts making more proteins to get ready to divide. This phase lasts about 18 to 30 hours.

S phase: In the S phase, the chromosomes containing the genetic code (DNA) are copied so that both of the new cells formed will have the right amount of DNA. This phase lasts about 18 to 20 hours.

G₂ phase: The G₂ phase is just before the cell starts splitting into two cells. It lasts from 2 to 10 hours.

M phase (mitosis): In this phase, which lasts only 30 to 60 minutes, the cell actually splits into 2 new cells.

This cell cycle is important to cancer doctors (oncologists) because many chemotherapy drugs work only on actively reproducing cells (not on cells in the resting phase, G₀). Some of these drugs specifically attack cells in a particular phase of the cell cycle (the M or S phases, for example). Understanding how these drugs function helps oncologists predict which drugs are likely to work well together. Doctors can also effectively plan how often doses of each drug should be given.

Although chemotherapy drugs attack reproducing cells, they cannot tell the difference between reproducing cells of normal tissues (that are replacing worn-out normal cells) and cancer cells. The damage to normal cells can result in side effects.

Each time chemotherapy is given, it involves trying to balance between destroying the cancer cells (in order to cure or control the disease) and sparing the normal cells (to lessen undesirable side effects).