Chemotherapy: The Basics

What is chemotherapy?

Chemotherapy is a type of medicine that is used to treat cancer.

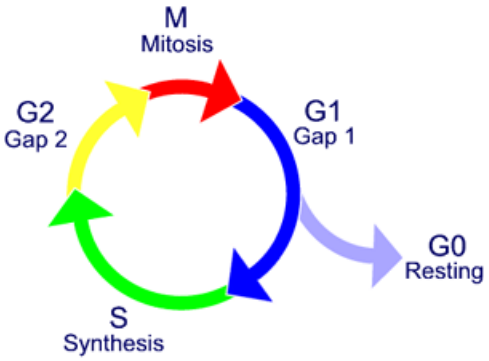
How does chemotherapy work?

Cancer cells grow and reproduce (multiply) very quickly. Normal, healthy cells know to stop growing and reproducing when they touch other cells. Cancer cells keep growing, not knowing when to stop. RNA and DNA in the cell tell it how to grow and reproduce. Chemotherapy hurts the RNA or DNA, stopping the cancer from growing.

What is the cell cycle?

The cell cycle is the way a cell copies itself to make more cells. This happens in phases:

- Resting phase (GO; nothing is happening).
- G1 phase (Gap 1; a growth phase).
- S phase (Synthesis; when the copying of DNA happens).
- G2 phase (Gap 2; another growth phase).
- M phase (Mitosis; when 1 cell splits into 2 cells).



How does chemotherapy affect the cell cycle?

Some chemotherapies can kill a cell during any phase of the cell cycle. They are called cell-cycle nonspecific agents. Other chemotherapies kill cancer cells only during a certain phase and are not able to work in the resting phase. These are called cell-cycle specific agents.

Cell-Cycle Nonspecific Chemotherapy

- Kills cancer cells at all phases of the cell cycle.
- These work best when given in a “bolus dose.” A bolus dose is a large dose, given in a short period of time. For example, the dose may be given once over 20 minutes.
- The cells don’t always die right away. A cell may have to go through a few cycles of chemotherapy

before it dies.

- Repeat doses of chemotherapy may be given to keep killing cancer cells.

Cell-Cycle Specific Chemotherapy

- These attack cancer cells during specific phases of the cell cycle, but never during the resting phase.
- These are often given more than once. This gives the chemotherapy the best chance to kill as many cells as possible.
- They may be given in “divided doses” or given at different times. For example, these may be given once a day for 5 days, or every 3 hours for 4 doses.
- They can also be given as a nonstop infusion. This is an infusion that runs for several hours or more. Some chemotherapy infusions are given over several days.

How is chemotherapy given?

Chemotherapy is a “systemic” therapy. This means it travels throughout the whole body to kill cells. Surgery and radiation are called “local” therapies because they treat only a certain part of the body. Chemotherapy can be given to a patient in a few ways:

- Orally (by mouth).
- Intravenously (IV, through a vein, over minutes to days at a time).
- As an injection or by needle.
- Directly into a body cavity (like the bladder or abdominal (belly) cavity).
- Intra-arterially (into an artery) – used in special cases, such as limb perfusion treatment for melanoma.
- Directly into a tumor.

When is chemotherapy given?

Your treatment may include more than one type of therapy (surgery, radiation, chemotherapy, etc.). Some terms used to describe chemotherapy treatments:

- **Adjuvant Therapy**: Chemotherapy given after surgery to lower the chance of your cancer coming back (called recurrence).
- **Neo-adjuvant Therapy**: Chemotherapy given before surgery to shrink the tumor. This lets your surgeon remove as much of the tumor as possible.
- **Concurrent Therapy:** When 2 or more therapies (like radiation and chemo) are given together.

What is a regimen?

A regimen is the combination of chemotherapies and medications you will get. In some cases, more than one chemotherapy is given because different chemotherapies work at different phases of the cell cycle. The other medications given are known to work well with the chemotherapies being given.

Regimens can be given “nicknames” based on the chemotherapies or other medications used in them. For example, the regimen called “CHOP” contains the medications **C**ytoxan, **H**ydroxydaunorubicin (also called Adriamycin), **O**ncovin, and **P**rednisone.

What is a cycle?

A cycle is the block of time in which a regimen is given. Each regimen can have a different cycle time. A cycle of CHOP is usually 21 days. This is how the cycle breaks down:

- Cytoxan, adriamycin, and oncovin are given on day 1.
- Prednisone is given on days 1-5.
- You then have 16 days “off” without chemotherapy. This totals 21 days, making your cycle.
- You then start all over again for a new cycle.

It can be helpful to ask your provider for a calendar to keep track of your regimen. Your regimen and cycle will depend on what type of cancer you have and your treatment plan. The number of cycles will also depend on your cancer and treatment plan. Your care team will go over your plan with you before and during treatment.

What is the goal of treatment with chemotherapy?

The goal of chemotherapy treatment depends on many things, like what type of cancer you have, where it is, and any other medical problems you have. The goals of treatment can be:

- Curing the cancer.
- Stopping the cancer from going to other parts of the body.
- Slowing the growth of the cancer.
- Killing cancer cells in areas of metastases (where cancer has spread).
- Ease symptoms that the cancer is causing to make you more comfortable (called palliative treatment).

It is important to talk to your provider about what your goals are for your chemotherapy treatment.

How do I know if chemotherapy is working for me?

There are a few ways to find out if your treatment is working. These can include:

- **Radiology/Imaging Studies**: CT scans, MRIs, PET scans. These can see if your tumors have changed in size.
- **Lab Draws**: Your blood can be tested for tumor marker levels. Tumor markers are made by the tumor or by the body due to the tumor. If the level is lower than when you started, most likely the chemotherapy is working.
- **Checking Symptoms**: If the symptoms caused by your cancer are getting better, chemotherapy is likely working.

You will be closely followed while getting chemotherapy. You should check in with your care team often. Let them know of any changes in how you are feeling or any new or worsening side effects that you are having.