

Cyclophosphamide

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(syeh-kloeh-fahs-fah-mide)

Trade names: Cytosan®, Neosar®

Chemocare.com uses generic names in all descriptions of drugs. Cytosan is the trade name for cyclophosphamide. Neosar is another name for cyclophosphamide. In some cases, health care professionals may use the trade name cytosan or other names neosar when referring to the generic drug name cyclophosphamide.

Drug type: Cyclophosphamide is an anti-cancer (“antineoplastic” or “cytotoxic”) chemotherapy drug. This medication is classified as an “alkylating agent.” (For more detail, see “How this drug works” section below).

What this drug is used for:

- Cancers treated with cyclophosphamide include: Hodgkin’s and non-Hodgkin’s lymphoma, Burkitt’s lymphoma, chronic lymphocytic leukemia (CLL), chronic myelocytic leukemia (CML), acute myelocytic leukemia (AML), acute lymphocytic leukemia (ALL), t-cell lymphoma (mycosis fungoides), multiple myeloma, neuroblastoma, retinoblastoma, rhabdomyosarcoma, Ewing’s sarcoma; breast, testicular, endometrial, ovarian, and lung cancers, and in conditioning regimens for bone marrow transplantation.
- Cyclophosphamide is also used to treat many disorders that are not cancer.

Note: If a drug has been approved for one use, physicians may elect to use this same drug for other problems if they believe it may be helpful.

How this drug is given:

- Cyclophosphamide can be given can be given by a number of different routes. The route that it is given depends on the dosage, the condition being treated, as well as the purpose it is being used for.
- It is usually given through a vein by injection or infusion (intravenous, IV) or by mouth in tablet form, depending upon the diagnosis.
- Cyclophosphamide is also approved to be given by a shot into a muscle (IM), into the abdominal lining (intraperitoneal, IP), or into the lining of the lung (intrapleural).
- Tablets should be given with food or after meals. Tablets should not be cut or crushed.
- The amount of cyclophosphamide that you will receive depends on many factors, including your height and weight, your general health or other health problems, and the type of cancer or condition you have. Your doctor will determine your exact dosage and schedule.

Side effects:

Important things to remember about the side effects of cyclophosphamide:

- The side effects of cyclophosphamide and their severity depend on how much of the drug is given. In other word, high doses may produce more severe side effects.
- You will not get all of the side effects mentioned below.
- Side effects are often predictable in terms of their onset, duration, and severity.

- Side effects are almost always reversible and will go away after therapy is complete.
- Side effects are quite manageable. There are many options to minimize or prevent them.

The following side effects are common (occurring in greater than 30%) for patients taking cyclophosphamide:

- Low blood counts. Your white and red blood cells and platelets may temporarily decrease. This can put you at increased risk for infection, anemia and/or bleeding.

Nadir: Meaning low point, nadir is the point in time between chemotherapy cycles in which you experience low blood counts.

Onset: 7 days

Nadir: 10-14 days

Recovery: 21 days

- Hair loss. Temporary - usually begins 3-6 weeks after the start of therapy. Hair will grow back after treatment is completed although the color and/or texture may be different.
- Nausea and vomiting, more common with larger doses, usually beginning 6-10 hours after therapy.
- Poor appetite
- Loss of fertility. Meaning, your ability to conceive or father a child may be affected by cyclophosphamide. Discuss this issue with your health care provider.
- Discoloration of the skin or nails (see skin reactions).

These are less common side effects for patients receiving cyclophosphamide:

- Diarrhea
- Mouth sores
- Bladder irritation and bleeding (hemorrhagic cystitis) (see bladder problems)

Delayed effects:

- There is a slight risk of developing a blood cancer such as leukemia or myelodysplasia after taking cyclophosphamide. Talk to your doctor about this risk.

This list includes common and less common side effects for those taking cyclophosphamide. Side effects that are very rare -- occurring in less than about 10 percent of patients -- are not listed here. But you should always inform your health care provider if you experience any unusual symptoms.

When to contact your doctor or health care provider:

Contact your health care provider *immediately*, day or night, if you should experience any of the following symptoms:

- Fever of 100.4° F (38° C) or higher, chills (possible signs of infection)

The following symptoms require medical attention, but are not an emergency. Contact your health care provider *within 24 hours* of noticing any of the following:

- Nausea (interferes with ability to eat and unrelieved with prescribed medication).
- Vomiting (vomiting more than 4-5 times in a 24 hour period).
- Diarrhea (4-6 episodes in a 24-hour period).
- Unusual bleeding or bruising
- Black or tarry stools, or blood in your stools.
- Blood in the urine.

- Pain or burning with urination.
- Extreme fatigue (unable to carry on self-care activities).
- Mouth sores (painful redness, swelling or ulcers).

Always inform your health care provider if you experience any unusual symptoms.

Precautions:

- Before starting cyclophosphamide treatment, make sure you tell your doctor about any other medications you are taking (including prescription, over-the-counter, vitamins, herbal remedies, etc. Do not take aspirin, products containing aspirin unless your doctor specifically permits this.
- Do not receive any kind of immunization or vaccination without your doctor's approval while taking cyclophosphamide.
- For both men and women: Use contraceptives, and do not conceive a child (get pregnant) while taking cyclophosphamide. Barrier methods of contraception, such as condoms, are recommended.
- Do not breast feed while taking this medication.

Self-care tips:

- Drink at least two to three quarts of fluid every 24 hours, unless you are instructed otherwise.
- It is important to void (empty your bladder) frequently especially in the first 24 hours after taking cyclophosphamide. Report any pain or burning on urination to your health care provider.
- You may be at risk of infection so try to avoid crowds or people with colds, and report fever or any other signs of infection immediately to your health care provider.
- Wash your hands often
- To help treat/prevent mouth sores, use a soft toothbrush, and rinse three times a day with 1 teaspoon of baking soda mixed with 8 ounces of water.
- Use an electric razor and a soft toothbrush to minimize bleeding.
- Avoid contact sports or activities that could cause injury.
- To reduce nausea, take anti-nausea medications as prescribed by your doctor, and eat small, frequent meals.
- Avoid sun exposure. Wear SPF 15 (or higher) sunblock and protective clothing.
- In general, drinking alcoholic beverages should be kept to a minimum or avoided completely. You should discuss this with your doctor.
- Get plenty of rest.
- Maintain good nutrition.
- If you experience symptoms or side effects, be sure to discuss them with your health care team. They can prescribe medications and/or offer other suggestions that are effective in managing such problems.

Monitoring and testing:

You will be checked regularly by your doctor while you are taking cyclophosphamide, to monitor side effects and check your response to therapy. Periodic blood to monitor your complete blood count (CBC) as well as the function of other organs (such as your kidneys and liver) will also be ordered by your doctor.

How this drug works:

Chemotherapy (anti-neoplastic drugs):

Cancerous tumors are characterized by cell division, which is no longer controlled as it is in normal tissue. "Normal" cells stop dividing when they come into contact with like cells, a mechanism known

as contact inhibition. Cancerous cells lose this ability. Cancer cells no longer have the normal checks and balances in place that control and limit cell division. The process of cell division, whether normal or cancerous cells, is through the cell cycle. The cell cycle goes from the resting phase, through active growing phases, and then to mitosis (division).

The ability of chemotherapy to kill cancer cells depends on its ability to halt cell division. Usually, the drugs work by damaging the RNA or DNA that tells the cell how to copy itself in division. If the cells are unable to divide, they die. The faster the cells are dividing, the more likely it is that chemotherapy will kill the cells, causing the tumor to shrink. They also induce cell suicide (self-death or apoptosis).

Chemotherapy drugs that affect cells only when they are dividing are called cell-cycle specific. Chemotherapy drugs that affect cells when they are at rest are called cell-cycle non-specific. The scheduling of chemotherapy is set based on the type of cells, rate at which they divide, and the time at which a given drug is likely to be effective. This is why chemotherapy is typically given in cycles.

Unfortunately, chemotherapy does not know the difference between the cancerous cells and the normal cells. Chemotherapy will kill all cells that are rapidly dividing. The “normal” cells will grow back and be healthy but in the meantime, side effects occur. The “normal” cells most commonly affected by chemotherapy are the blood cells, the cells in the mouth, stomach and bowel, and the hair follicles; resulting in low blood counts, mouth sores, nausea, diarrhea, and/or hair loss. Different drugs may affect different parts of the body.

Cyclophosphamide is classified as an alkylating agent. Alkylating agents are most active in the resting phase of the cell. These drugs are cell-cycle non-specific. There are several types of alkylating agents.

- **Mustard gas derivatives:** Mechlorethamine, Cyclophosphamide, Chlorambucil, Melphalan, and Ifosfamide.
- **Ethylenimines:** Thiotepa and Hexamethylmelamine.
- **Alkylsulfonates:** Busulfan.
- **Hydrazines and Triazines:** Procarbazine, Dacarbazine and Temozolomide.
- **Nitrosureas:** Carmustine, Lomustine and Streptozocin. Nitrosureas are unique because, unlike most chemotherapy, they can cross the blood-brain barrier. They can be useful in treating brain tumors.
- **Metal salts:** Carboplatin and Cisplatin.

Note: We strongly encourage you to talk with your health care professional about your specific medical condition and treatments. The information contained in this website is meant to be helpful and educational, but is not a substitute for medical advice.