



## Cyclophosphamide (*Cytoxan*)

### Description

Cyclophosphamide (*Cytoxan*) belongs to a class of drugs known as alkylating agents, which have been used to treat some types of cancer. It is also considered an immunosuppressant—a medicine that can decrease the immune response.

### Fast Facts

- Cyclophosphamide is reserved for severe, refractory rheumatoid arthritis or severe complications of lupus, myositis or vasculitis.
- Cyclophosphamide can be associated with serious side effects and requires careful monitoring by your physician.

### Uses

Conditions treated with cyclophosphamide include [lupus](#); [systemic sclerosis](#) (scleroderma); some forms of [vasculitis](#); [myopathies](#) such as polymyositis and dermatomyositis; and, sometimes, [rheumatoid arthritis](#).

Cyclophosphamide is used for severe complications of rheumatoid arthritis, such as blood vessel inflammation (known as vasculitis). In lupus, it is given for serious kidney problems or other organ-threatening complications. Although cyclophosphamide has allowed people with some of the diseases listed to live longer, this medication can cause serious side effects. Careful monitoring is needed for this medicine.

### How it works

Cyclophosphamide blocks the production of the deoxyribonucleic acid (DNA) in cells. This prevents cells from dividing, leading to cell death. Some of the cells affected by this medication are immune cells. These play a key role in autoimmune diseases such as rheumatoid arthritis, lupus, scleroderma or vasculitis.

### Dosing

The dosing of cyclophosphamide varies from person to person and depends on the disease being treated. For the form taken by mouth, a usual dose is 1.5 to 2.5 milligrams (mg) per kilogram (kg) of body weight per day.



This medication also is given in an intravenous (IV) form in the doctor's office or hospital. For example, cyclophosphamide is sometimes given as a monthly infusion for the treatment of lupus kidney disease.

### Time to effect

It may take several weeks for symptoms to improve, and the full effect may take several months or longer.

### Side effects

Common side effects, which may be worse with the pills, include nausea and vomiting. These symptoms usually can be controlled with anti-nausea medications. Hair loss can occur, but hair usually will grow back when the medication is stopped. Other common side effects include skin rashes. Cyclophosphamide increases the risk of developing some kinds of infections, especially herpes zoster, often referred to as "shingles." Unusual infections can occur with cyclophosphamide use.

### Other important side effects include:

**Blood cells:** Cyclophosphamide can have significant effects on the blood cells, typically causing a reduced number of white blood cells, a key component of the body's immune system. This can occur 8-12 days after starting treatment. Your doctor will check your blood counts around this time and make dose adjustments as needed.

**Fertility problems:** Cyclophosphamide can cause infertility in both men and women. This often is seen in older patients or those taking higher doses for long periods of time. Discuss this issue with your doctor before taking cyclophosphamide. Although women taking cyclophosphamide can stop having periods, they can still become pregnant so an effective form of birth control to prevent pregnancy should be used while taking this medication. Taking cyclophosphamide during pregnancy is very dangerous to an unborn child.

**Bladder problems:** Cyclophosphamide is broken down in the body into several other products. One byproduct known as acrolein can cause an irritation of the bladder, or "cystitis," which may result in blood in the urine or scarring of the bladder. Patients taking oral cyclophosphamide should drink plenty of fluids each day to help prevent problems. Patients receiving intravenous therapy are sometimes given a medication called mesna (*Mesnex*) to help prevent bladder problems.

**Cancers:** Cyclophosphamide increases the risk of developing some kinds of cancers, which can occur years after taking this medication. Long-term use and higher doses of cyclophosphamide may lead to a higher risk. Bladder cancer is the most common cancer related to cyclophosphamide, so your doctor will recommend periodic urine tests to screen for this.

### Points to remember

Because cyclophosphamide can cause serious birth defects, women who are pregnant or considering having a child should talk with their doctor before taking this drug. To avoid pregnancy, use an effective form of birth control throughout the course of this treatment. Also talk with your doctor about breast-feeding while on this medication.



Some of the side effects of cyclophosphamide may be serious. You should contact your doctor if you notice the following: blood in your urine, fevers and chills, easy bruising or bleeding, shortness of breath or swelling of the feet and ankles.

Because cyclophosphamide use increases the risk of infection, some doctors suggest that patients take a concurrent antibiotic called trimethoprim sulfa (*Bactrim*), unless there is an allergy to sulfa medications. Be sure to talk with your doctor before receiving any vaccines and undergoing any surgeries while taking this medication. Caution also needs to be taken if any household members, particularly children, receive live vaccines while you take this medication.

### Drug interactions

Let your physician know all medications you are taking, including over-the-counter medicines and herbal supplements. Important drug interactions can occur with the following medications: the [gout](#) medication allopurinol (*Aloprim*, *Zyloprim*); phenobarbital (*Solfoton*); warfarin (*Coumadin*); thiazide diuretics, such as hydrochlorothiazide; and some psychiatric medications. Other medications also can interfere with cyclophosphamide.

### Information to Discuss with Your Primary Care Physician and other Specialists

Be sure to notify your other physicians that you are taking this drug or have been given this in the past. This is important, as there are some long-term risks with this medicine that might need to be considered even years after taking the medication. Live vaccines should be avoided while on this medication and you should discuss updating your vaccinations prior to starting this medication. Because this medication can lower your ability to fight infection, it is important that you discuss this with any treating physician, as this may lead to a different evaluation or treatment.

### For more information

The American College of Rheumatology has compiled this list to give you a starting point for your own additional research. The ACR does not endorse or maintain these Web sites, and is not responsible for any information or claims provided on them. It is always best to talk with your rheumatologist for more information and before making any decisions about your care.

National Institutes of Health: Medline Plus Link

<http://www.nlm.nih.gov/medlineplus/druginfo/meds/a682080.html>

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Written by Michael Cannon, MD, and reviewed by the American College of Rheumatology Patient Education Task Force.

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