

Cyclophosphamide (Cytosan)

[Wendy Brooks, DVM, DABVP](#)

Date Published: 04/28/2003

Date Reviewed/Revised: 04/27/2021

(For veterinary information only)

WARNING

The size of the tablet/medication is NOT an indication of a proper dose. Never administer any drug without your veterinarian's input. Serious side effects or death can occur if you use drugs on your pet without your veterinarian's advice.

Brand Name: Cytosan

Available as 25 mg and 50 mg tablets and capsules

How this Medication Works

Cyclophosphamide is a serious drug used to treat very serious disease. Veterinarians use cyclophosphamide to kill cells that are causing harm, usually cancer cells or inflammatory cells.

This potent cell-killing medication is a nitrogen mustard derivative, meaning it is related to the toxic chemical weapon mustard gas (so named because of its mustard or horseradish odor) used widely in the first World War. In chemotherapy, cyclophosphamide is classified as an alkylating agent, which means it works by binding to DNA, and interfering with normal cell function. By disrupting cellular DNA, cyclophosphamide is able to kill the cell. Cells that divide rapidly (and thus replicate their DNA rapidly) are especially targeted by cyclophosphamide. This makes cyclophosphamide especially able to kill:

- Rapidly dividing cancer cells
- Bone marrow cells such as developing blood cells
- Stimulated lymphocytes (those engaged in proliferation and antibody production)
- Fetal cells
- Hair follicle cells
- Intestinal cells.

Uses of this Medication

Because of its ability to kill rapidly dividing cells, cyclophosphamide has been used most successfully in two situations:

- Immune-mediated diseases (especially those of life-threatening nature such as [immune-mediated hemolytic anemia](#))
- Cancer chemotherapy (especially for bone marrow or blood cell cancers such as [lymphoma](#))
- More recently, metronomic chemotherapy has emerged as a cancer treatment method. In metronomic chemotherapy, small doses of drugs are used daily. This minimizes drug side effects and presents the tumor with a daily attack, keeping it at bay. Cyclophosphamide and [piroxicam](#) are used together on some sarcomas in dogs as a means of addressing the tumor with reduced potential for the side effects listed below.

Side Effects

There are several important side effects to consider when using cyclophosphamide:

Bone Marrow Suppression

White cell blood lines show suppression (i.e. counts will drop) approximately 1 to 2 weeks following a dose of cyclophosphamide. This time period makes the patient especially vulnerable to infection. Many oncologists like to monitor the white blood cell count and withhold cyclophosphamide if the white blood cell count is not greater than a certain number. Other oncologists do not like to reduce the cyclophosphamide dose without evidence of infection as reducing it will give the tumor an advantage and possibly jeopardize the remission.

Hair Loss

While human chemotherapy patients commonly lose their hair, animal patients almost never do. (The exceptions are wavy-coated dogs such as poodles, many poodle mixes, and Old English Sheepdogs). Cats undergoing chemotherapy commonly lose their whiskers. Hair texture on pets in general tends to get softer on chemotherapy.

Upset Stomach

Despite the image most people have of nausea associated with chemotherapy, this is actually a surprisingly uncommon problem in dogs and cats. When it occurs, it is generally readily controllable with anti-nausea medications.

Development of Hemorrhagic Cystitis

Up to 30% of dogs (depending on the study) receiving cyclophosphamide for over two months develop bloody urine caused by excretion of irritating

cyclophosphamide metabolites. This condition may represent pre-cancer in itself and must be distinguished from a bladder infection. This is a serious side effect of cyclophosphamide use and any sign of bloody urine should be reported to the veterinarian at once. Hemorrhagic cystitis is much rarer in cats but is still as serious when it arises.

Interactions with other Drugs

Special consideration should be used when cyclophosphamide is given to patients taking additional medications with bone marrow suppressing potential. Examples of such medications include [methimazole](#). Additional monitoring tests may be recommended.

[Phenobarbital](#) will increase the rate of excretion of cyclophosphamide (i.e., cyclophosphamide will be more rapidly removed from the body). This rate will increase the toxicity potential of the cyclophosphamide. Conversely, the antibiotic [chloramphenicol](#) may reduce the metabolism of cyclophosphamide, thereby increasing its potency.

Diuretics of the thiazide class may increase the bone marrow suppression side effects of cyclophosphamide. Allopurinol, a medication used to reduce uric acid crystal deposits, can also increase the bone marrow suppression side effects of cyclophosphamide.

In the treatment of immune-mediated disease, it is common and usual to use cyclophosphamide in conjunction with corticosteroids such as [dexamethasone](#).

Ondansetron, a nausea medication, may reduce the strength and efficacy of cyclophosphamide and [cyclosporine](#), an immunomodulator, may decrease cyclophosphamide levels and weaken its strength.

Concerns and Cautions

Obviously, it is not prudent to suppress the immune system in the face of a known infection.

Cyclophosphamide is toxic to the unborn fetus and should not be used in pregnancy.

The majority of cyclophosphamide is excreted in urine and a dose is still detectable in urine some 72 hours after administration.

Due to the unique manufacture of cyclophosphamide tablets, these tablets cannot be accurately dosed after being cut. It is best to use tablets whole.

If cyclophosphamide is given at home, it is important that you ***wear gloves when handling it. Wear disposable gloves when disposing with the pet's body waste.*** The waste and gloves should be disposed of in a plastic bag deposited in the regular trash. Do not flush leftover cyclophosphamide down the toilet.

Availability of brand name Cytoxan has become a problem recently. Generic cyclophosphamide is available but frequently at a high price. Use of a [compounding pharmacy](#) may be a reasonable choice but in many protocols cyclophosphamide is being replaced by [chlorambucil](#) for practicality.

Cyclophosphamide should be given with food.

If a dose is accidentally skipped, consult your veterinarian before re-dosing. Never double up on the next dose.

Store cyclophosphamide at room temperature unless you have a compounded product that requires specific storage instructions.

Animal waste should be collected (wear gloves) for the day of administration and a few days after and disposed of, with the gloves, in a plastic bag which can be deposited in the regular trash.

It is our policy not to give dosing information over the Internet.