OncoLink
Abramson Cancer Center of the University of Pennsylvania

Cyclophosphamide (Cytoxan®, Neosar®, Endoxan®)

Pronounced: SYE-kloe-FOS-fa-mide
Classification: Alkylating Agent

About Cyclophosphamide

Cyclophosphamide exerts its anti-cancer affect by a process called alkylation. Alkylation damages the DNA of cells, which prevents them from dividing, and causes them to die. Since cancer cells, in general, divide faster and with less error correcting than healthy cells, cancer cells are more sensitive to this damage.

How to Take Cyclophosphamide

Cyclophosphamide can be given through intravenous (into a vein) infusion or taken orally (by mouth) as a pill. Oral doses should be taken whole (not crushed or broken) and with food to decrease nausea. The dosage and schedule is determined by the person's size, type of cancer, and mode of administration.

Possible Side Effects of Cyclophosphamide

There are a number of things you can do to manage the side effects of Cyclophosphamide. Talk to your doctor or nurse about these recommendations. They can help you decide what will work best for you. These are some of the most common side effects:

Low White Blood Cell Count (Leukopenia or Neutropenia)

White blood cells (WBC) are important for fighting infection. While receiving treatment, your WBC count can drop, putting you at a higher risk of getting an infection. You should let your doctor or nurse know right away if you have a fever (temperature greater than 100.4 F), sore throat or cold, shortness of breath, cough, burning with urination, or a sore that doesn't heal.

Tips to preventing infection:

- Washing hands, both yours and your visitors, is the best way to prevent the spread of infection.
- Avoid large crowds and people who are sick (i.e.: those who have a cold, fever or cough or live with someone with these symptoms).
- When working in your yard, wear protective clothing including long pants and gloves.

- Do not handle pet waste.
- Keep all cuts or scratches clean.
- Shower or bath daily and perform frequent mouth care.
- Do not cut cuticles or ingrown nails. You may wear nail polish, but not fake nails.
- Ask your doctor or nurse before scheduling dental appointments or procedures.
- Ask your doctor or nurse before you, or someone you live with, has any vaccinations.

For more suggestions, read the Neutropenia Tip Sheet.

Low Red Blood Cell Count (Anemia)

Your red blood cells are responsible for carrying oxygen to the tissues in your body. When the red cell count is low, you may feel tired or weak. You should let your doctor or nurse know if you experience any shortness of breath, difficulty breathing or pain in your chest. If the count gets too low, you may receive a blood transfusion. Read the anemia tip sheet for more information.

Low Platelet Count (Thrombocytopenia)

Platelets help your blood clot, so when the count is low you are at a higher risk of bleeding. Let your doctor or nurse know if you have any excess bruising or bleeding, including nosebleeds, bleeding gums or blood in your urine or stool. If your platelet count becomes too low, you may receive a transfusion of platelets.

- Do not use a razor to shave (an electric razor is fine).
- Avoid contact sports and activities that can result in injury or bleeding.
- Do not take aspirin (salicylic acid), non-steroidal, anti-inflammatory medications (NSAIDs) such as Motrin®, Aleve®, Advil®, etc. as these can all increase the risk of bleeding. Unless your healthcare team tells you otherwise, you may take acetaminophen (Tylenol).
- Do not floss or use toothpicks and use a soft-bristle toothbrush to brush your teeth.

Read the thrombocytopenia tip sheet for more information.

Nausea and/or Vomiting

Take anti-nausea medications as prescribed. If you continue to have nausea or vomiting, notify your doctor or nurse so they can help you manage this side effect. In addition, dietary changes may help. Avoid things that may worsen the symptoms, such as heavy or greasy/fatty, spicy or acidic foods (lemons, tomatoes, oranges). Try antacids, (e.g. milk of magnesia, calcium tablets such as Tums), saltines, or ginger ale to lessen symptoms. Read the Nausea & Vomiting Tip Sheet for more suggestions.

Call your doctor or nurse if you are unable to keep fluids down for more than 12 hours or if you feel lightheaded or dizzy at any time.

Mouth Ulcers (Sores)

Certain cancer treatments can cause sores or soreness in your mouth and/or throat.

Notify your doctor or nurse if your mouth, tongue, inside of your cheek or throat becomes white, ulcerated or painful. Performing regular mouth care can help prevent or manage mouth sores. If mouth sores become painful, your doctor or nurse can recommend a pain reliever.

- Brush with a soft-bristle toothbrush or cotton swab twice a day.
- Avoid mouthwashes that contain alcohol. A baking soda and/or salt warm water mouth rinse (2 level teaspoons of baking soda or 1 level teaspoon salt in an eight ounce glass of warm water) is recommended 4 times daily.
- If your mouth becomes dry, eat moist foods, drink plenty of fluids (6-8 glasses), and suck on sugarless hard candy.
- Avoid smoking and chewing tobacco, drinking alcoholic beverages and citrus juices.

Read the mouth ulcer tip sheet for more information.

Decrease in Appetite

Visit OncoLink's section on Nutrition for tips on dealing with this side effect. Ask your nurse about nutritional counseling services.

- Try to eat five or six small meals or snacks throughout the day, instead of 3 larger meals.
- If you are not eating enough, nutritional supplements may help.
- You may experience a metallic taste or dislike foods or beverages that you liked before receiving chemotherapy. These symptoms can last up to several months.
- Avoid any food that you think smells or tastes bad. If red meat is a problem, eat chicken, turkey, eggs, dairy products and fish without a strong smell.
- Flavor meat or fish by marinating it in sweet juices, sweet and sour sauce or dressings. Use seasonings like basil, oregano or rosemary. Bacon, ham and onion can also add flavor to vegetables.

Heart Concerns

In rare cases, the heart muscle is weakened on this medication. It is important that you report immediately to your doctor or nurse any shortness of breath, cough, ankle swelling, chest pain, rapid or irregular heartbeats. Your doctor may order tests to check your heart function prior to receiving this drug or to evaluate your heart if symptoms develop.

Sexual and Reproductive Changes

This drug can affect your reproductive system, resulting in the menstrual cycle or sperm production becoming irregular or stopping permanently. Women may experience menopausal effects including hot flashes and vaginal dryness – read more about coping with vaginal dryness. In addition, the desire for sex may decrease during treatment. See OncoLink's section on sexuality for helpful tips for dealing with these side effects.

Diarrhea

Your oncology team can recommend medications to relieve diarrhea. Also, try eating

low-fiber, bland foods, such as white rice and boiled or baked chicken. Avoid raw fruits, vegetables, whole grain breads, cereals and seeds. Soluble fiber is found in some foods that absorbs fluid and can help relieve diarrhea. Foods high in soluble fiber include: applesauce, bananas (ripe), canned fruit, orange and grapefruit sections, boiled potatoes, white rice and products made with white flour, oatmeal, cream of rice, cream of wheat, and farina. Drink 8-10 glasses on non-alcoholic, un-caffeinated fluid a day to prevent dehydration. Read Low Fiber Diet for Diarrhea for more tips.

Taste and smell changes

You may experience a metallic taste or dislike foods or beverages that you liked before receiving chemotherapy. These symptoms can last up to several months. Avoid any food that you think smells or tastes bad. If red meat is a problem, eat chicken, turkey, eggs, dairy products and fish without a strong smell. Flavor meat or fish by marinating it in sweet juices, sweet and sour sauce or dressings. Use seasonings like basil, oregano or rosemary. Bacon, ham and onion can add flavor to vegetables. Ask your nurse about nutritional counseling services.

Loss or Thinning of Scalp and Body Hair (Alopecia)

Your hair may become thin, brittle, or may fall out. This typically begins two to three weeks after treatment starts. This hair loss can be all body hair, including pubic, underarm, legs/arms, eyelashes, and nose hairs. The use of scarves, wigs, hats and hairpieces may help. Hair generally starts to regrow soon after treatment is completed. Remember your hair helps keep you warm in cold weather, so a hat is particularly important in cold weather or to protect you from the sun. Read more on alopecia.

Bladder Irritation

Cyclophosphamide may irritate your bladder, cause blood in your urine or pain with urination. Drink at least 6 to 8 glasses of fluid/day to flush out your bladder. Let your doctor or nurse know if you have difficulty, pain, or bleeding during urination. When given in high doses, your doctor may give you a mediation to protect your bladder.

Other Concerns

Notify your healthcare team if you develop any of the following:

- Call your doctor or nurse if you have shortness of breath, cough or difficulty breathing.
- Call your doctor or nurse if you do not urinate for more than 12 hours, experience shortness of breath, unexpected weight gain or swelling in your hands, feet or legs.
- If during the infusion you develop a rash, itching, or difficulty breathing, call your nurse.
- You may experience nasal congestion for several days after treatment. Call your doctor or nurse if you experience sinus pain.

Secondary Malignancies

There is a slight risk of developing leukemia or other type of cancer due to treatment with this medication. This is most often associated with repeated treatments or high

doses.

Vincristine (Oncovin®, Vincasar PFS®, VCR)

Pronounced: vin-KRIS-teen
Classification: Antimicrotubule Agent

About Vincristine

Vincristine is a member of the vinca alkaloids family of chemotherapy drugs. The drug works by interfering with cell division, which leaves the tumor unable to grow and spread. Vincristine was developed from the Madagascar periwinkle plant.

How to Take Vincristine

This medication is given through an IV (into a vein) by a trained professional. Specific dosage and dosing schedule depends on the person's size and the type of cancer being treated.

This medication is a "vesicant". This means that even when carefully and correctly administered by trained personnel, this drug may cause feeling of burning and pain. There is a risk that this drug may leak out of the vein at the injection site, resulting in tissue damage that can be severe. If the area of injection becomes red, swollen, or painful at anytime during or after the injection, notify your doctor or nurse immediately. Do not apply anything to the site unless instructed by your doctor or nurse.

Possible Side Effects of Vincristine

There are a number of things you can do to manage the side effects of Vincristine. Talk to your doctor or nurse about these recommendations. They can help you decide what will work best for you. These are some of the most common side effects:

Constipation

Vincristine can cause serious constipation, abdominal pain and can even lead to a blockage or stoppage of the bowel (called paralytic ileus) if not treated promptly. There are several things you can do to prevent or relieve constipation. Include fiber in your diet (fruits and vegetables), drink 8-10 glasses of non-alcoholic fluids a day, and keep active. A stool softener once or twice a day may prevent constipation. If you do not have a bowel movement for 2-3 days, you should contact your healthcare team for suggestions to relieve the constipation.

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- Shower or bath daily and perform frequent mouth care.
- Do not cut cuticles or ingrown nails. You may wear nail polish, but not fake nails.
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For more suggestions, read the Neutropenia Tip Sheet.

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- Do not use a razor (an electric razor is fine).
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Call your doctor or nurse if you are unable to keep fluids down for more than 12 hours or if you feel lightheaded or dizzy at any time.

Fatigue

While on cancer treatment you may need to adjust your schedule to manage fatigue. Plan times to rest during the day and conserve energy for more important activities. Exercise can help combat fatigue; a simple daily walk with a friend can help. Talk to your healthcare team and see OncoLink's section on fatigue for helpful tips on dealing with this side effect.

Sexual and Reproductive Changes

This drug can affect your reproductive system, resulting in the menstrual cycle or sperm production becoming irregular or stopping permanently. Women may experience menopausal effects including hot flashes and vaginal dryness. The desire for sex may decrease during treatment.

Exposure of an unborn child to this medication could cause birth defects, so you should not become pregnant or father a child while on this medication. Effective birth control is necessary during treatment, even if your menstrual cycle stops or you believe your sperm is affected. You may want to consider sperm banking or egg harvesting if you may wish to have a child in the future. Discuss these options with your oncology team. See OncoLink's section on sexuality for helpful tips for dealing with these side effects.

Decrease in Appetite

Visit OncoLink's section on Nutrition for tips on dealing with this side effect. Ask your nurse about nutritional counseling services.

- Try to eat five or six small meals or snacks throughout the day, instead of 3 larger meals.
- If you are not eating enough, nutritional supplements may help.
- You may experience a metallic taste or dislike foods or beverages that you liked before receiving chemotherapy. These symptoms can last up to several months.

- Avoid any food that you think smells or tastes bad. If red meat is a problem, eat chicken, turkey, eggs, dairy products and fish without a strong smell.
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- Brush with a soft-bristle toothbrush or cotton swab twice a day.
- Avoid mouthwashes that contain alcohol. A baking soda and/or salt warm water mouth rinse (2 level teaspoons of baking soda or 1 level teaspoon salt in an eight ounce glass of warm water) is recommended 4 times daily.
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Neurotoxicity

This is a toxicity that affects the nerves. The most common affect is called peripheral neuropathy, which causes a numbness or tingling of the hands and feet, which can get progressively worse with subsequent doses. You should let your healthcare provider know if you experience numbness or tingling in the hands and feet, as they may need to change the doses of your medication. See OncoLink's section on peripheral neuropathy for tips on dealing with this side effect.

The vinca alkaloid chemotherapies are known to cause neuropathy, but vincristine can also cause neurologic toxicity that presents as mental depression, headache, malaise, dizziness and seizures. It can also cause toxicity of the cranial nerves, which affects the vocal cords (changes in voice), eyes (visual changes) or facial nerves (drooping of the face or mouth). If you notice any of these problems, notify your healthcare team

right away.

Other Side Effects

Patients can develop severe pain in the jaw soon after the first treatment with vincristine. Your healthcare team can recommend a pain reliever for this problem, which will go away in time. Urinary retention can develop. If you notice you are unable to urinate, you should call your healthcare team right away or go to the emergency room to be evaluated. Some patients will have an allergic reaction to the medication during the infusion. Let your nurse know right away if you have any swelling, rash, lightheadedness, dizziness or difficulty breathing.

Prednisone (Sterapred®, Prednisone Intensol™)

Pronounced: PRED-nih-sone
Classification: Glucocorticoid

About Prednisone

Prednisone is a corticosteroid, similar to a hormone that is made naturally in your body. Corticosteroids (sometimes abbreviated as "steroids") are used to decrease inflammation, (swelling and/or redness) and thus are involved in the management of a number of diseases, including asthma, autoimmune disorders, reactions to medications, and gastrointestinal disorders (colitis), among others. Prednisone may be given to prevent a reaction to a medication, prevent or decrease nausea or be used in high doses to treat certain cancers.

How to Take Prednisone

Prednisone comes as a tablet to take by mouth. Prednisone is best taken with food, as it can irritate your stomach. Your doctor will probably tell you to take your dose(s) of prednisone at certain time(s) of day every day. Your personal dosing schedule will depend on what the medication is being used for.

Possible Side Effects of Prednisone

There are a number of things you can do to manage the side effects of Prednisone. Talk to your doctor or nurse about these recommendations. They can help you decide what will work best for you. These are some of the most common side effects:

Increase in Appetite

Prednisone can cause people to be more hungry or thirsty than usual. Drink plenty of fluids and try to make your snacks healthy ones, since there may be quite a few of

them!

Increase in Energy

Prednisone can give people an increase in energy. They may also develop insomnia, or difficulty sleeping. Taking the medication in the morning may help to prevent this.

Irritability or Change in Mood

Some patients report feeling irritable or noticing a change in their mood. If this becomes difficult to handle or if the patient expresses a desire to hurt himself, notify a healthcare provider right away.

Swelling

Patients may notice swelling in their hands and/or feet. Elevating the feet may help to lessen swelling in the feet and ankles. Avoid restrictive or tight clothing that may make it harder for the fluid to drain from the hands, feet, and ankles.

Nausea and Heartburn

Taking prednisone with food or milk is generally enough to prevent nausea and heartburn. If possible, take the medication when you can be upright (not lying down) for a few hours after the dose. Avoid things that worsen the symptoms, and try antacids (milk of magnesia and calcium tablets, like Tums), saltines, or ginger ale to lessen symptoms.

Increased Blood Sugar

Prednisone can increase your blood sugar. Diabetics should monitor their blood sugar closely and may require higher doses of insulin while taking prednisone.

Weakening of the Bones (Osteoporosis)

Long-term use can lead to early osteoporosis. Your doctor may have you get a bone density scan (dexa scan) to assess your bone health if you are on long- term therapy.

Other Side Effects

Prednisone can cause delayed wound healing, headaches, muscle weakness, and cataracts (after long-term use).

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