Cyclosporine (Neoral®, Sandimmune®, Restasis®, Gengraf®)

**Pronounced:** SYE-kloe-SPOR-een

**Classification:** Immunosuppressant Agent

**About Cyclosporine (Neoral®, Sandimmune®, Restasis®, Gengraf®)**

Cyclosporine is a type of medication called an immunosuppressant and works primarily by inhibiting T lymphocytes. T lymphocytes are a type of white blood cell that is an important component of immune function.

**How to Take Cyclosporine**

Cyclosporine comes in a capsule or liquid formulation to be taken by mouth, or an intravenous (IV) version. There are two types of oral cyclosporine, the original version (Sandimmune®) and a version that is more rapidly available in your system (Neoral® and Gengraf®, also called modified cyclosporine). Because the body absorbs these two types of the medication differently, they are not interchangeable and you must be sure you receive the type your doctor prescribes. In addition, there are a few rules to follow when taking either type of cyclosporine:

- Do not drink grapefruit juice while on this medication, as it interferes with the body's absorption of the medication.
- Levels of the medication in your blood can vary and, for this reason, will be monitored with periodic blood tests.
- The liquid form can be mixed in milk (regular or chocolate), orange or apple juice, and should be added to a glass (not a plastic container) containing the liquid. The mixture should be drunk right away and the glass filled with the liquid a second time and drunk to rinse any medication remaining in the glass.
- Do not store in the refrigerator.

It is important to make sure you are taking the correct amount of medication every time. Before every dose, check that what you are taking matches what you have been prescribed.

Restasis® is an eye drop formulation of cyclosporine that is used to treat chronic dry eyes resulting from ocular inflammation.

Many other medications, vitamins, and herbs can interfere with cyclosporine levels in the blood. Be sure to let your healthcare team know about all medications or supplements you are taking.

You, or anyone you live with, should avoid having live or live-attenuated vaccines while receiving this medication. These include herpes zoster (Zostavax) for shingles prevention, oral polio, measles, nasal flu vaccine (FluMist®), rotavirus, and yellow fever vaccines.

**Storage and Handling**

Store your medication in the original, labeled container at room temperature and in a dry location (unless otherwise directed by your healthcare provider or pharmacist). This medication should not be stored in a pillbox. Keep containers out of reach of children and pets.

**Where do I get this medication?**

The oral form of cyclosporine is typically available through retail/mail-order pharmacies. Your oncology team will work with your prescription drug plan to identify an in-network retail/mail order pharmacy for medication distribution.
Insurance Information
This medication may be covered under your prescription drug plan. Patient assistance may be available to qualifying individuals without prescription drug coverage. Co-pay assistance, which reduces the patient co-pay responsibility for eligible, commercially (non-government sponsored) insured patients, may also be available. Your care team can help you find these resources if they are available.

The oral forms of this medication are covered under Medicare part B for Medicare recipients. Make sure your pharmacist knows to process this prescription through your Medicare part B and NOT part D.

Possible Side Effects
There are a number of things you can do to manage the side effects of cyclosporine. Talk to your care team about these recommendations. They can help you decide what will work best for you. These are some of the most common or important side effects:

High Blood Pressure
This medication can cause high blood pressure (hypertension). Patients should have their blood pressure checked regularly during therapy. Any hypertension should be treated appropriately. If hypertension cannot be controlled, the medication may be stopped. Report any headache or dizziness to your provider.

Kidney Problems
Cyclosporine can cause a decrease in kidney function or damage to the kidney. For this reason, your healthcare team will monitor your kidney function with blood tests while taking cyclosporine. Some patients will need to stop the medication due to kidney function changes. Notify your provider if you notice any decrease in urination or darkening of the urine.

Infection
You should let your doctor or nurse know right away if you have a fever (temperature greater than 100.4°F or 38°C), sore throat or cold, shortness of breath, cough, burning with urination, or a sore that doesn't heal. The most common infection related to this medication is a urinary tract infection. Symptoms of urinary tract infection include frequency, urgency and burning with urination.

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.

Tremors
Tremors in the hands are common with cyclosporine, particularly when starting therapy or increasing the dose. These tend to decrease over time as your body adjusts to the medication.

Nausea and/or Vomiting
Talk to your oncology care team so they can prescribe medications to help you manage nausea and vomiting. 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 saltines, or ginger ale to lessen symptoms.

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

**Headache**
This medication may cause headaches or migraines. Headache can also be a sign of elevated blood pressure, so this side effect should be reported to your provider for further evaluation.

**Diarrhea**
Your oncology care team can recommend medications to relieve diarrhea. Also, try eating, bland foods, such as white rice and boiled or baked chicken. Avoid raw fruits, vegetables, whole-grain breds, cereals, and seeds. Soluble fiber is found in some foods and absorbs fluid, which can help relieve diarrhea. Foods high in soluble fiber include applesauce, bananas (ripe), canned fruit, orange sections, boiled potatoes, white rice, products made with white flour, oatmeal, cream of rice, cream of wheat, and farina. Drink 8-10 glasses of non-alcoholic, un-caffeinated fluid a day to prevent dehydration.

**Less common, but important side effects can include:**

- **Liver Toxicity:** This medication can cause liver toxicity, which your oncology care team may monitor for using blood tests called liver function tests. Notify your healthcare provider if you notice yellowing of the skin or eyes, your urine appears dark or brown, or you have pain in your abdomen, as these can be signs of liver toxicity.

- **Progressive Multifocal Leukoencephalopathy (PML):** Progressive Multifocal Leukoencephalopathy (PML) is a rare but very serious brain infection that has been reported with this medication. The signs of PML may develop over several weeks or months. They may include changes in mood or usual behavior, confusion, thinking problems, loss of memory, changes in vision, speech, or walking, and decreased strength or weakness on one side of the body. If you develop any of these signs, notify your oncology care team immediately.

- **Secondary Cancers:** A secondary cancer is one that develops as a result of cancer treatment for another cancer. This is quite rare, but you should be aware of the risk. In most cases, a secondary cancer related to chemotherapy is a blood cancer (leukemia, lymphoma). This can occur years after treatment. This is most often associated with repeated treatments or high doses. Your provider will monitor your labs closely. Consider having a complete blood count with differential checked annually by your healthcare provider if you received high-risk therapies.

**Reproductive Concerns**
Exposure of an unborn child to this medication could cause birth defects, this medication should only be used during pregnancy when the benefits outweigh the risk. You should discuss this with your healthcare team before becoming pregnant. Effective birth control is necessary during treatment. Even if your menstrual cycle stops or you believe you are not producing sperm, you could still be fertile and conceive. You should consult with your healthcare team before breastfeeding while receiving this medication.

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