

Medications

You will take many medicines after your surgery. They will be used for different reasons but all are important to your recover and health. The transplant pharmacist will assist you to understand the purpose of each medicine. You will take the most number of medicines during the first year after transplant. You will take some of the medicines for the rest of your life.

Please contact a pharmacist for other questions. The information below is a reference.

Safety Information About Medications

Please observe the following precautions when taking your medications. Remember that medicines can be dangerous, even fatal, if taken accidentally by a child. Make sure your pharmacy has put your prescription medications in child-proof containers, and store all your medicines out of the reach of small children. In addition:

- ◆ Keep a list of medicines and doses in your wallet or purse
- ◆ Bring a list of your medicines to clinic each visit
- ◆ Take each medication exactly as prescribed.
- ◆ Keep all medications in their original containers with labeling that shows the name, dosage, and expiration date. Keep your medications in a dry place away from heat and direct sunlight.
- ◆ Report any side effects of medications to the transplant team.
- ◆ Never change or skip a dose of medication. Remember, if you stop taking your immunosuppressive medications, your body will reject the transplanted liver. If you ever forget to take your medications, call your transplant coordinator as soon as you realize your mistake.
- ◆ Should you experience any vomiting that prevents you from taking your medications, or if you vomit immediately after taking your medications, call your transplant coordinator.

- ◆ Do not allow yourself to run out of your anti-rejection medication. Always keep at least an extra two weeks' supply on hand.
- ◆ When traveling, do not pack your anti-rejection medication and other medications in luggage that will be checked. Keep it with you in a carry-on bag or your hand bag. Always have your anti-rejection medication with you!

Other Medications

Do not take medication prescribed by other physicians until you check with us first. Because of your liver transplant and the medications you are taking, we prefer that you do not take some medications. Ketoconazole, Erythromycin, Diltiazem and Dilantin are just a few of the drugs that should be avoided, due to their interference with Prograf, Rapamune and Cyclosporin. Please call your transplant nurse coordinator about any new medication prescribed for you before you get the prescription filled.

Be cautious about over-the-counter medications, too. You may take up to 4 grams per day of Tylenol as needed for minor pains, and you may take Dulcolax or glycerin suppositories as needed for constipation. In general, we ask you to avoid using Non-Steroidal Anti-Inflammatory Agents or NSAIDS for pain. Examples of NSAIDS are Advil (ibuprofen), Anaprox, and Naprosyn (Naproxyn). These medicines can make you kidneys fail if used in combination with Prograf or cyclosporine. Please do not take any other over-the-counter medications without first checking with your transplant doctor or coordinator.

Immunosuppressants

Immunosuppression is a concept you need to understand in order to understand your care. Your immune system is a part of you that is able to recognize when foreign substances enter the body. Your immune system fights infection by recognizing and destroying foreign matter such as bacteria, viruses, and fungi.

Your transplanted liver is new and foreign to your body, and your immune system can recognize this. If something is not done to stop the process, your body's immune system will "see" your new liver as foreign and soon begin to destroy it. Preventing this natural response of the body's immune system is called immunosuppression.

Prograf, Cellcept, Rapamune, Cyclosporin and Prednisone are known as immunosuppressive drugs. They are given to transplant patients in order to decrease the body's ability to recognize and destroy foreign substances. Essentially, the body is "tricked" into thinking your new liver is not different from your old liver. Without these medications, rejection of the liver would certainly occur. It is therefore very, very important that you take these drugs exactly as prescribed for as long as you have the transplant. If you stop taking these medications, your body will reject the liver.

Being on immunosuppressive drugs does mean that you will be at greater risk for developing infections. It is important, therefore, to take some sensible precautions to avoid infection whenever possible. We will be discussing these precautions later.

Tacrolimus (also known as Prograf or FK-506)

Tacrolimus is an anti-rejection medication that specifically stops the action of certain immune cells called t-cells. Tacrolimus is the most common immunosuppressant medication started after liver transplant. In some cases, we may use cyclosporin or sirolimus (see information below).

It is very important that you take your Cyclosporine or Tacrolimus twice a day at regular intervals, twelve hours apart. These capsules should be swallowed whole, do not bite or chew the capsules. Sometimes, we may ask you to open the capsule and put the entire contents of the capsule under your tongue (sublingual administration). This

may be necessary to avoid drug interactions or help with absorption of the drug.

Cyclosporine (also known as Sandimmune, Neoral, or Gengraf)

*Please NOTE: these products (although all are Cyclosporine products) are NOT interchangeable! Let your transplant doctor know if you are taking a different cyclosporine product than the product you were originally prescribed.

Cyclosporine is an anti-rejection medication that specifically stops the action of certain immune cells (also known as T-cells) that are involved in the rejection process.

It is very important that you take your Cyclosporine or Tacrolimus twice a day at regular intervals, twelve hours apart. These capsules should be swallowed whole, do not bite or chew the capsules.

*Do not remove the capsules from the foil package in which they are wrapped more than a week before you need to take them. Longer exposure to air may damage the capsule and reduce the effectiveness of the medicine.

Cyclosporine and Tacrolimus Side Effects

Unfortunately, there are side effects to any medication. The following may be side effects of Cyclosporine or Tacrolimus. Some side effects occur more often with Cyclosporine and others occur more often with Tacrolimus. (Side effects that occur with one and not the other are designated as such in the following list). Not all side effects of these medications are listed in this document. This document is simply to help you become more familiar with these medications. Please report to your transplant doctor if you experience these or any other unusual symptoms.

Flushing: (Cyclosporine) A brief period of warmth or redness in your face for one to two hours after taking Cyclosporine. This feeling usually disappears on its own.

Hair growth: (Cyclosporine) Increased hair on the face, arms and body is common, but usually not a problem.

Hair loss: (Tacrolimus) Loss of hair in specific areas, most commonly on the head or when brushing your hair and the hair comes out in wads, may occur.

Fine hand tremor: (Cyclosporine, Tacrolimus) Some patients experience a trembling of the hands, especially in the first month. If this problem continues after that time, please notify your transplant doctor. If your tremor is increasing, it could mean your Cyclosporine or Tacrolimus blood level is too high.

Gum swelling: (Cyclosporine) Good dental hygiene is necessary to keep gums healthy. You should brush at least twice daily with a soft toothbrush and use dental floss daily. We recommend that you see your dentist every six months. Please let your transplant doctor know if you experience swelling of the gums.

Numbness, tingling, burning sensation and/or increased sensitivity in hands and feet: These symptoms can be annoying, but are usually not too uncomfortable.

Headaches: Notify your transplant doctor if headaches are severe and bothersome.

High blood pressure: (Cyclosporine) If this becomes a problem, it will be treated with appropriate medication. You may be taught to monitor your blood pressure at home.

High blood sugar: (Tacrolimus) You may experience high blood sugar (diabetes) as a side effect (especially possible early after transplant) and need to take insulin injections as part of your post-transplant care. High

blood sugar may go away after a few weeks or months post-transplant. But in some cases, you may need to take insulin for a long time. It is important to monitor your blood sugar regularly at home to avoid the consequences of high blood sugar.

High potassium levels: You will need to restrict the amount of potassium in your diet. The transplant doctor will let you know if you are experiencing this rare side effect.

Altered kidney function: If too much Cyclosporine or Tacrolimus is given for too long a time, it can be harmful to your kidneys. You will not usually experience any symptoms, but your creatinine level, which is a measure of kidney function, may become elevated. The transplant team will follow your lab work and Cyclosporine or Tacrolimus levels closely, and will adjust your dose accordingly. Treatment of altered kidney function as a result of too much Cyclosporine or Tacrolimus usually only involves reducing the Cyclosporine or Tacrolimus dose.

Sirolimus (also known as Rapamune)

Sirolimus is another medication that suppresses the activity of the immune system (blocking T-cell responses) but in a different way than Cyclosporine or Tacrolimus. Since it works differently than the previous anti-rejection medications, sometimes it may be used in combination with either Tacrolimus or Cyclosporine. Sirolimus is a good choice as a immunosuppressant drug when a patient has decreased kidney function or severe chronic rejection.

Sirolimus is taken only once a day (usually in the morning) but should be taken at the same time each day as well.

Sirolimus Side Effects

The following may be side effects of Sirolimus. Not all side effects are listed in this document. Please report to your transplant doctor if you experience these or any other unusual symptoms.

Upset Stomach: You may experience nausea, vomiting, or diarrhea. Do not self-medicate yourself with over-the-counter remedies for more than a day without letting your transplant coordinator know of your symptoms. Try taking the medication with food (this may lessen the possibility of upset stomach).

Heartburn: You may experience a feeling of burning in your stomach or burning in the throat area. You may try taking Mylanta or Tums to stop the heartburn but it's important not to take these medications at the same time as Sirolimus (Tacrolimus or Cyclosporine). Mylanta or Tums may bind the anti-rejection medications in the stomach and decrease their absorption from the stomach.

Low Blood Cell Counts: Red Blood Cells (RBC), White Blood Cells (WBC) and platelets may be decreased while you are taking Sirolimus. The only way we can tell if this is occurring is if you are having your blood drawn regularly as directed by your coordinator. Loss of RBC's (anemia) may make you feel tired and weak and loss of WBC's (neutropenia) will make you at risk for serious infections. Loss of platelets increases

your chance of bleeding (nose bleeds or gums bleeding) or easy bruising. Meeting with the transplant team or your local doctor as directed by the coordinator is essential to helping you avoid these problems with Sirolimus.

Headache: Notify your transplant doctor if headaches are severe and bothersome.

High cholesterol: You may experience high cholesterol as a side effect of Sirolimus. If cholesterol is not controlled, it can increase your risk for a heart attack. It is important to have your blood cholesterol level checked regularly as directed by your coordinator. High cholesterol levels require you to eat a healthy diet rich in fiber, vegetables, fruits and limited amounts of meats and fats. High cholesterol often means that you will need to take medications such as Zocor, Lipitor, or Pravachol to reduce your cholesterol level.

Regardless of which anti-rejection medication you are prescribed (Cyclosporine, Tacrolimus, or Sirolimus), you must follow these directions to optimize your anti-rejection regimen.

Determining How Much Immunosuppressant Is Right for You

It is important to determine the amount of anti-rejection medication in your blood stream so that your dose can be adjusted to your individual needs. This blood should be drawn in the morning before you take your first dose. Each time you come for a Liver Transplant Clinic visit or have labs at home, we will be drawing blood for a Cyclosporine, Tacrolimus, or Sirolimus level. On these days, bring your morning dose of Cyclosporine, Tacrolimus, or Sirolimus with you so that you can take it as soon as the blood sample has been drawn. You may take all other medicines prior to coming to clinic.

You will receive a letter to take to your local doctor and to your lab explaining the procedure for drawing and mailing the blood for the Cyclosporine and Tacrolimus. Sirolimus levels may be processed by commercial labs.

Grapefruit and grapefruit juice increase the concentrations (or levels) of Cyclosporine, Tacrolimus, and Sirolimus. Therefore, if you want to eat grapefruits or drink grapefruit juice, you should do so consistently. To drink or eat it some days and not others will cause your levels to vary too much, being too high some days and too low other days.

Prednisone

Prednisone is another medication that helps to prevent rejection by suppressing the body's immune system. Because of Prednisone's actions within the body, it belongs to a class of medications known as steroid. After transplant, you will start taking a fairly high dose of Prednisone, but this dose will be tapered (decreased) rapidly to a lower dose to avoid as many side effects as possible. Patients with certain liver diseases will take a small dose of prednisone for the rest of their life.

Prednisone Side Effects

Not every patient experiences all of these side effects, but they do occur frequently enough that we want you to be aware of them. Most of the time, the side effects are dose-related. In other words, as your dose is decreased the side effects should become less troublesome. Side effects of Prednisone include:

Increased appetite: It is very important that you watch your calories and maintain your ideal weight. Increased appetite does not have to mean increased weight!

High blood sugar: Prednisone (like the other anti-rejection medications listed before) may increase your blood sugar level. We will check your blood glucose with your routine labs. If your blood glucose is high you may need to avoid concentrated sweets or take insulin injections to control your blood sugar.

High blood pressure: Prednisone (like the other anti-rejection medications listed before) may increase your blood pressure. It is important to have your blood pressure monitored regularly.

High cholesterol: Prednisone (like the other anti-rejection medications listed before) may increase your cholesterol level. It is important to have your cholesterol level checked regularly.

Change in appearance: You may notice a rounded face, larger abdomen, and thin skin. You may bruise easily.

Increased sweating: This often occurs at night.

Acne on the face, back and chest: Wash your skin two to three times a day and keep the area as clean and dry as possible. If acne becomes problematic, an antiseptic wash followed by application of 10-percent benzoyl peroxide ointment is usually helpful.

Muscle weakness (particularly in the legs): Exercise! Walking is one of the best ways to strengthen leg muscles.

Eye problems: Inform the Transplant Team of any blurring or other changes in vision. We will examine your eyes for cataracts.

Bone/Joint problems: Steroids may cause loss of bone mass. We would like you to tell us if you have persistent bone or joint pains; you may need x-rays or referral to a specialist.

Delayed wound healing: Surgical incisions do not heal as quickly when taking prednisone. Inform the Transplant Team if you notice increased drainage or redness around your wound.

Emotional changes: You may notice an increase in restlessness or moodiness while on high doses of Prednisone.

Cellcept (Mycophenolate Mofetil)

Mycophenolate is an anti-rejection medication that comes in a pill form. It works by decreasing the T-cells in the body that cause rejection. Usually, only transplant patients with special anti-rejection needs will take this medication.

The side effects of Mycophenolate are similar to Sirolimus with a decrease in WBC's and RBC's and

platelets as well as upset stomach. Taking Mycophenolate with a meal may help with upset stomach.

Antibiotics or Anti-Infection Medications

Septra DS (Bactrim DS, TMP-SMZ or TMP-SMX)

Septra is a combination of 2 different antibiotic compounds (trimethoprim and sulfamethoxazole) which is used to help prevent a specific bacterial infection known as Pneumocystis Carnii Pneumonia or PCP. This bacteria, PCP, causes pneumonia in patients who are taking anti-rejection medications.

If you are allergic to sulfa, you should not take this medication.

Septra is started within one week after transplant. You will take one Septra DS (double strength) tablet three days a week (for example, Monday, Wednesday, and Friday). We will stop this medicine after 90 days.

Side effects of Septra

Patients may experience nausea/vomiting, diarrhea, loss of appetite, dizziness, and headache. Septra increases your skin's sensitivity to sunlight (sun exposure). Therefore, when you go out in the sun, you are more likely to get a BAD sun burn in a shorter period of time. You must be aggressive in protecting yourself from the harmful sun rays by wearing hats, and clothing that is appropriate for covering your skin while outdoors. This is very important because transplant patients have an increased risk of developing skin cancer after transplant.

Mycelex Troche (Clotrimazole)

Clotrimazole is a medication used to prevent fungus infections in the mouth and throat (fungus infection also known as "Thrush"). This troche (lozenge) should be taken four times a day, after meals and at bedtime. Slowly let the lozenge dissolve in your mouth and do not rinse

your mouth or eat or drink anything for at least fifteen minutes after dissolving this medicine in your mouth. If you wear dentures, they should be removed prior to taking this medication. No side effects have been reported to occur with Clotrimazole. Expect to take this medication for approximately 3 months after transplant.

Cytovene (Ganciclovir) or Valcyte (valganciclovir)

Ganciclovir is an anti-viral medication that treats infections and prevents infections caused by the Cytomegalovirus (CMV) virus. It can be given intravenously (IV) or orally (by mouth).

When given intravenously (IV), usually once or twice daily, Ganciclovir is usually administered in the hospital. However after the initial doses, it may be received (IV) at home with the assistance of a home health care agency. A usual IV course of Ganciclovir treatment is 14-21 days.

Ganciclovir is available in pill form (called Cytovene) and some patients will need to take these pills for 3 months after the transplant in order to prevent infection with CMV. Taking ganciclovir by mouth often means taking as many as 12 pills of ganciclovir a day.

Side effects of Ganciclovir may include abdominal pain, diarrhea, fever, headache, and tingling in the hands and/or feet. White blood cell counts (WBC) need to be monitored at least every two weeks while Ganciclovir is being given.

Because ganciclovir is a large pill and a patient may have to take as many as 12 pills a day, Valcyte (valganciclovir) was developed as a medication (based on ganciclovir) to treat and prevent CMV infection. Valganciclovir is taken by mouth and the dose typically requires patients to take no more than 4 capsules a day (significantly less than the 12 capsules of ganciclovir).

Antacid Medication or Anti-Ulcer Medication

Axid

Zantac (Ranitidine), Pepcid (Famotidine), Prilosec (Omeprazole), Protonix (Pantoprazole)

These medicines are used to decrease the amount of acid in your stomach. You are at risk for developing an ulcer because you are taking Prednisone. You will take one of these medicines after transplant to reduce the risk of ulcer.

Medications available in the hospital include:

Axid 150 mg tablets two times a day.

Pepcid 20 mg tablets two times a day.

Protonix 40 mg tablet one time a day.

Side effects of these medications include abdominal pain, nausea, and headache.

Magnesium Supplement

Magnesium Oxide

Cyclosporine or Tacrolimus can cause your kidneys to lose the ability to maintain constant levels of magnesium in your body. Diuretics (water pills) may cause you to lose magnesium through your kidneys as well. If magnesium stores in your body decrease too low, you will be at risk to experience heart rhythm changes and possibly, seizures. These are serious problems and we want to prevent these risks by having you take Magnesium Oxide (magnesium supplement).

Magnesium Oxide is taken by mouth usually 2 to 3 times each day. The main side effect of this medication is diarrhea.

It is very important to NOT take your Magnesium Supplement (Magnesium Oxide) with your anti-rejection or antibiotic medications. Magnesium is a salt that can

bind your medications and have them go through your stomach without being absorbed into the blood stream.

Antihypertensives or Blood Pressure Medication

Many liver transplant patients develop high blood pressure (hypertension) after transplant. This is usually caused by Prednisone, Prograf and/or Cyclosporine. If you have high blood pressure, we will have you take an antihypertensive medication. There are a lot of different types of antihypertensive medications. Some examples of commonly prescribed antihypertensive medications for our transplant patients include diltiazem (Cardizem), verapamil (Calan), nifedipine (Procardia), metoprolol (Toprol), and many, many more.

Because there are so many antihypertensive medications to choose from we recommend discussing the blood pressure medication with your coordinator or transplant pharmacist when one is prescribed for you at that time.

Diuretic or "Water Pill"

Lasix (Furosemide)

Furosemide is one type of diuretic, or "fluid pill", or "water pill". It is used to treat extra fluid in your abdomen or swelling in your legs. It tells your kidneys to pump out more urine or "water" and you will then get rid of extra fluid in your abdomen and legs.

The dose of furosemide is adjusted to each patient's needs for fluid loss. When you are first discharged from the hospital, a certain dosage will be prescribed for you, but we will need your assistance in making sure that the dosage is correct.

You will be asked to weigh yourself daily. A gain or loss of two or more pounds overnight indicates a change in body fluid, rather than true weight gain. If your weight increases by two or more pounds overnight, or if you have swelling in your lower legs and feet in the late

afternoon, you are retaining fluid. If your weight decreases by two or more pounds overnight, if you notice dizziness when standing, or if you are constantly thirsty, then you are eliminating too much fluid. Please notify the transplant coordinator if you experience any of these symptoms.

Other Medication

Actigall (Ursodiol)

Some patients will be placed on Actigall after transplant to help decrease the bilirubin in their blood. Too much bilirubin in your blood can make you itch. Bilirubin can also clog the drainage system for the liver waste products and cause an infection in your liver.

Actigall can decrease the bilirubin and lessen the opportunity to have problems. There are no major side effects of with this medication.

Colace or Bowel Stimulants

While you are taking pain medication and returning to your typical activity and diet, you may experience constipation. Prescription pain medication also contributes to constipation. You should drink at least 6 glasses of water each day. Taking a stool softener such as colace along with a bowel stimulant like sennekot will help keep you from being constipated. These may be prescribed while in the hospital. Please continue to take these while you are taking pain medication.