COMMUNITY LIVER ALLIANCE ™
GLOBAL AWARENESS. LOCAL IMPACT.

100 W. Station Square Drive
Suite 212
Pittsburgh, PA 15219
412-501-3CLA (3252)
www.communityliveralliance.com

Liver Transplantation Guide

A liver transplant is a surgery that removes a liver that no longer functions properly (liver failure) and replaces it with a healthy liver from a deceased donor or a portion of a healthy liver from a living donor.

Liver transplant is usually reserved as a treatment option for people who have significant complications due to end-stage chronic liver disease. Liver transplant may also be a treatment option in rare cases of sudden failure of a previously healthy liver.

The number of people waiting for a liver transplant greatly exceeds the number of available deceased-donor livers.

Receiving a portion of a liver from a living donor is an alternative to waiting for a deceased-donor liver to become available. Living-donor liver transplant is possible because the human liver regenerates and returns to its normal size shortly after surgical removal of part of the organ.

How the Liver Works

The liver is one of the largest and most complex organs in the body. It weighs about three pounds in adults and is made up of a spongy mass of wedge-shaped lobes. The liver has numerous functions that are necessary for life. The liver helps process carbohydrates, fats and proteins, and stores vitamins. It processes nutrients absorbed from food in the intestines and turns them into materials that the body needs for life. For example, it makes the factors that the blood needs for

clotting. It also secretes bile to help digest fats, and breaks down toxic substances in the blood such as drugs and alcohol. The liver is also responsible for the metabolism of most drugs.

Common Diseases That May Lead to Transplantation

- Primary sclerosing cholangitis
- Acute hepatic necrosis
- Cirrhosis
- Metabolic diseases
- Portal hypertension
- Hepatitis (viral, autoimmune and idiopathic)
- Liver tumors
- Biliary Atresia

The liver is the second most commonly transplanted major organ, after the kidney, so it is clear that liver disease is a common and serious problem in this country. It is important for liver transplant candidates and their families to understand the basic process involved with liver transplants, to appreciate some of the challenges and complications that face liver transplant recipients (people who receive livers), and to recognize symptoms that should alert recipients to seek medical help.

Some basics are as follows:

A liver transplant is the process of replacing a sick liver with a donated, healthy liver. Liver transplants require that the blood type and body size of the donor match the person receiving the transplant. Liver transplant surgery usually takes between four and twelve hours. Most patients stay in the hospital for up to three weeks after surgery.

The liver **donor** is the person who gives, or donates, all or part of his or her liver to the waiting patient who needs it. Donors are usually people who have died and wish to donate their organs. Some people, however, donate part of their liver to another person (often a relative) while living.

Currently, more than 17,000 people in the United States are waiting for **liver transplants**, but only 6,000 liver transplants are performed each year in the United States.

Choosing a transplant center

If your doctor recommends a liver transplant, you may be referred to a transplant center. You're also free to select a transplant center on your own or choose a center from your insurance company's list of preferred providers.

When you're considering transplant centers, you may want to:

- Learn about the number and type of transplants the center performs each year.
- Ask about the transplant center's liver transplant survival rates.
- Compare transplant center statistics through the database maintained by the Scientific Registry of Transplant Recipients.
- Understand the costs that will be incurred before, during and after your transplant. Costs will include tests, organ procurement, surgery, hospital stays, and transportation to and from the center for the procedure and follow-up appointments.
- Consider additional services provided by the transplant center, such as coordinating support groups, assisting with travel arrangements, helping with local housing for your recovery period and offering referrals to other resources.
- Assess the center's commitment to keeping up with the latest transplant technology and techniques, which indicates that the program is growing.

After you've selected a transplant center, you'll need an evaluation to determine whether you meet the center's eligibility requirements. Each transplant center has its own eligibility criteria. If you aren't accepted at one transplant center, you may undergo evaluation at another center.

The goals of the evaluation process are to determine whether you:

- Are healthy enough to have surgery and can tolerate lifelong post-transplant medications
- Have any medical conditions that would interfere with transplant success
- Are willing and able to take medications as directed and follow the suggestions of the transplant team

Specific tests, procedures and consultations you may undergo include:

- **Laboratory tests,** such as blood and urine tests to assess the health of your organs, including your liver
- **Imaging tests,** such as an ultrasound of your liver
- **Heart tests** to determine the health of your cardiovascular system
- **A general health exam,** including routine cancer screening tests, to evaluate your overall health and to check for any other illnesses that may impact the success of your transplant

Your evaluation may also include:

- **Nutrition counseling with dietitians** who assess your diet and make recommendations on how to plan healthy meals before and after your transplant
- **Psychological evaluation** to assess and treat any underlying issues, such as depression or anxiety, and determine whether you fully understand the risks of a liver transplant
- **Meetings with social workers** who assess your support network to determine whether you have friends or family to help care for you after transplant
- **Addiction counseling** to help people who are having difficulty stopping their use of alcohol, drugs or tobacco
- **Financial counseling** to help you understand the cost of a transplant and post-transplant care and to determine what costs are covered by your insurance

Once these tests and consultations are completed, the transplant center's selection committee meets to discuss your situation. The committee determines whether a liver transplant is the best treatment for you and whether you're healthy enough to undergo a transplant.

If the answer to both questions is yes, then you're placed on the liver transplant waiting list.

Being placed on the waiting list

Doctors will use the results of your liver function tests and other factors to assess the severity of your illness, how urgently you need a transplant and your place on the liver transplant waiting list.

Transplant waiting list priority is determined by a scoring system. Doctors use the Model for End-Stage Liver Disease (MELD) score for adults and Pediatric End-Stage Liver Disease (PELD) score for children younger than age 12.

Your doctor will use a specific formula to determine your MELD score, which can range from 6 to 40. The score estimates the risk of death within 90 days without a transplant. A high MELD score indicates the urgent need of a transplant.

As deceased-donor organs become available, they are classified by blood type and allocated according to MELD scores. People with higher MELD scores are generally offered donated livers first. Time spent on the liver transplant waiting list is used to break ties among people with the same MELD scores and blood types.

Some liver conditions, such as liver cancer, may not result in a person getting a high MELD score. The transplant center can request additional MELD points for people with specific diseases if they meet defined exception criteria.

In addition, adults with acute liver failure are exempted from the MELD-based donor organ prioritization system and may be placed higher on the transplant waiting list according to the severity of their disease.

Waiting for a new liver

The wait for a donor liver can vary greatly. Some people wait days, while others wait months or may never receive a deceased-donor liver.

As you wait for a new liver, your doctor will treat the complications of your liver failure to make you as comfortable as possible.

Complications of end-stage liver failure are serious, and you may be frequently hospitalized. If your liver deteriorates, your MELD score is updated.

Living liver donors

A small percentage of liver transplants each year are from living donors. In these cases, surgeons transplant a small portion of a liver from a healthy, living person. Living-donor liver transplants were initially used for children needing liver transplants because suitable deceased-donor organs are scarce. Now, it is also an option for adults who have end-stage liver disease.

Living-donor liver transplants offer an alternative to waiting for a deceased-donor liver and allow the organ recipient to avoid possible health complications of waiting for a transplant. The first step is to identify a living donor who is healthy and able to safely undergo a major surgical procedure. The donor's age, blood type and organ size also are critical considerations in determining whether you and the donor are a match for living-donor liver transplant.

Most living liver donors are close family members or friends of the liver transplant candidate. If you have a family member or friend who is willing to donate part of his or her liver to you, talk to your transplant team about this option.

Living-donor transplants have good results, just as transplants using livers from deceased donors. But finding a living donor may be difficult. Living liver donors go through extensive evaluation to ensure they are a match with the organ recipient and to assess their physical and mental health. The surgery also carries significant risks for the donor.

Your transplant team can discuss the benefits and risks with you and the potential donor.

Domino liver transplant

Another, less common, type of living-donor liver transplant is called a domino liver transplant. In a domino liver transplant, you receive a liver from a living donor who has a disease called familial amyloidosis. Familial amyloidosis is a very rare disorder in which an abnormal protein accumulates and eventually damages the body's internal organs.

In this procedure, the donor with familial amyloidosis receives a liver transplant to treat his or her condition. Then, the donor gives his or her liver to you in a domino liver transplant because the liver still functions well. You may eventually develop symptoms of amyloidosis, but these symptoms usually take decades to develop.

Doctors usually select recipients who are 55 years old or older and who aren't expected to develop symptoms before the end of their natural life expectancy. After the transplant, doctors monitor for signs of the condition.

Doctors will evaluate you to determine if you may be a candidate for a domino liver transplant or if another treatment option would be more appropriate for your condition.

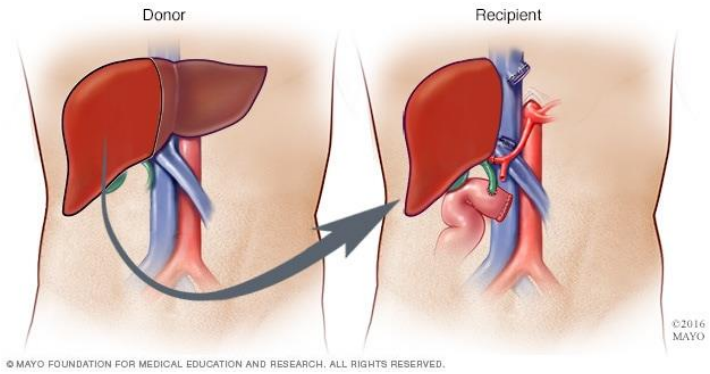
Staying healthy

Whether you're waiting for a donated liver or your transplant surgery is already scheduled, work to stay healthy. Being healthy and as active as you're able can make it more likely you'll be ready for the transplant surgery when the time comes. It may also help speed your recovery from surgery. Work to:

- Take your medications as prescribed
- Follow your diet and exercise guidelines
- Keep all appointments with your health care team
- Stay involved in healthy activities, including relaxing and spending time with family and friends

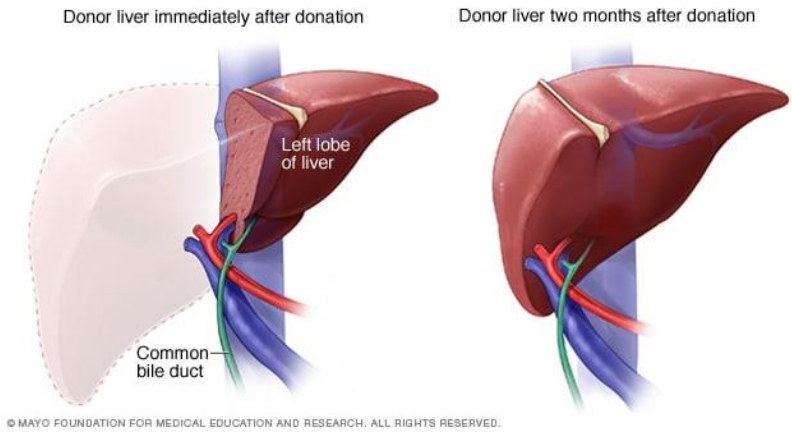
Stay in touch with your transplant team and let them know of any significant changes in your health. If you're waiting for a donated liver, make sure the transplant team knows how to reach you at all times. Keep your packed hospital bag ready and make arrangements for transportation to the transplant center in advance.

During the procedure



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Living-donor liver procedure



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Deceased-donor liver transplant

If you're notified that a liver from a deceased donor is available, you'll be asked to come to the hospital immediately. Your health care team will admit you to the hospital, and you'll undergo an exam to make sure you're healthy enough for the surgery.

Liver transplant surgery is done using general anesthesia, so you'll be in a sleep-like state during the procedure.

The transplant surgeon makes a long incision across your stomach to access your liver. The location and size of your incision varies according to your surgeon's approach and your own anatomy.

The surgeon removes your liver and places the donor liver in your body. Then the surgeon connects your blood vessels and bile ducts to the donor liver. Surgery can take up to 12 hours, depending on your situation.

Once your new liver is in place, the surgeon uses stitches and staples to close the surgical incision. You're then taken to the intensive care unit to begin recovery.

Living-donor liver transplant

If you're receiving a liver transplant from a living donor, your surgery will be scheduled in advance.

Surgeons first operate on the donor, removing the portion of the liver for transplant. Then surgeons remove your liver and place the donated liver portion in your body. They then connect your blood vessels and bile ducts to the new liver.

The transplanted liver portion in your body and the portion left behind in the donor's body regenerate rapidly, reaching normal volume within several weeks.

After your liver transplant, you can expect to:

- **Possibly stay in the intensive care unit for a few days.** Doctors and nurses will monitor your condition to watch for signs of complications. They'll also test your liver function frequently for signs that your new liver is working.
- **Spend 5 to 10 days in the hospital.** Once you're stable, you're taken to a transplant recovery area to continue recuperating.
- **Have frequent checkups as you continue recovering at home.** Your transplant team designs a checkup schedule for you. You may undergo blood tests a few times each week at first and then less often over time.
- **Take medications for the rest of your life.** You'll take a number of medications after your liver transplant. You'll need to continue taking many of them for the rest of your life. Drugs called immunosuppressants help keep your immune system from attacking your new liver. Other drugs help reduce the risk of other complications after your transplant.

Expect six months or more of recovery time before you'll feel fully healed after your liver transplant surgery. You may be able to resume normal activities or go back to work a few months after surgery. How long it takes you to recover may depend on how ill you were before your liver transplant.

Liver transplant survival rates

Your chances of a successful liver transplant and long-term survival depend on your particular situation.

In general, about 75% of people who undergo liver transplant live for at least five years. That means that for every 100 people who receive a liver transplant for any reason, about 75 will live for five years and 25 will die within five years.

People who receive a liver from a living donor often have better short-term survival rates than those who receive a deceased-donor liver. But comparing long-term results is difficult because people who have a living donor usually have a shorter wait for a transplant and aren't as sick as those who receive a deceased-donor liver.

Survival rates among liver transplant recipients also vary among U.S. transplant centers and can be found online at the Scientific Registry of Transplant Recipients.

Coping and Support

It's normal to feel anxious or overwhelmed while waiting for a transplant or to have fears about rejection, returning to work or other issues after a transplant. Seeking the support of friends and family members can help you cope during this stressful time.

Your transplant team also can assist you with other useful resources and coping strategies throughout the transplant process, such as:

- **Joining a support group for transplant recipients.** Talking with others who have shared your experience can ease fears and anxiety.
- **Sharing your experiences on social media.** Social media is another way to engage with others who have had a similar experience, which may help you adjust to your changing situation.
- **Finding rehabilitation services.** If you're returning to work, your social worker may be able to connect you with rehabilitation services provided by your home state's department of vocational rehabilitation.
- **Setting realistic goals and expectations.** Recognize that life after transplant may not be exactly the same as life before transplant. Having realistic expectations about results and recovery time can help reduce stress.
- **Educating yourself.** Learn as much as you can about your procedure and ask questions about things you don't understand. Knowledge is empowering.

Diet and nutrition

After your liver transplant, it is especially important to eat a well-balanced diet to help you recover and keep your liver healthy.

Your transplant team includes a nutrition specialist (dietitian) who can discuss your nutrition and diet needs and answer any questions you have after your transplant.

In general, your diet after liver transplant should be low in salt, cholesterol, fat and sugar.

To prevent damaging your new liver, it's important to avoid alcohol. Do not drink alcoholic beverages or use alcohol in cooking.

Your dietitian will also provide you with several healthy food options and ideas to use in your nutrition plan. Your dietitian's recommendations may include:

- Eating at least five servings of fruits and vegetables each day
- Avoiding grapefruit and grapefruit juice because of their effect on a group of immunosuppression medications
- Having enough fiber in your daily diet
- Choosing whole-grain foods over processed ones
- Drinking low-fat or fat-free dairy products, which is important to maintain optimal calcium and phosphorus levels

Your dietitian may also recommend:

- Eating lean meats, poultry and fish
- Following food safety guidelines
- Staying hydrated by drinking adequate water and other fluids each day

Exercise

Exercise and physical activity should be a regular part of your life after a liver transplant to continue improving your overall physical and mental health.

Soon after your transplant, you should walk as much as you can. Then, depending on your progress, you can start incorporating more physical activity into your daily life.

Walking, bicycling, swimming, low-impact strength training and other physical activities you enjoy can all be a part of a healthy, active lifestyle after transplant. But be sure to check in with your transplant team before starting or changing your post-transplant exercise routine.

Complications of the procedure

Liver transplant surgery carries a risk of significant complications. There are risks associated with the procedure itself and with the drugs necessary to prevent rejection of the donor liver after the transplant.

Risks associated with the procedure include:

- Bile duct complications, including bile duct leaks or shrinking of the bile ducts
- Bleeding
- Blood clots
- Failure of the donated liver
- Infection
- Rejection of the donated liver
- Mental confusion or seizures

Long-term complications may also include the liver disease returning in the transplanted liver.

Anti-rejection medication side effects

After a liver transplant, you'll take medications for the rest of your life to help prevent your body from rejecting the donated liver. These anti-rejection medications can cause a variety of side effects, including:

- Bone thinning
- Diabetes
- Diarrhea
- Headaches
- High blood pressure
- High cholesterol

Because anti-rejection drugs work by suppressing the immune system, they also increase risk of infection. Your doctor may give you medications to help you fight infections.

Center for Organ Recovery and Education
https://www.core.org/

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