



ABOUT

LIVER TRANSPLANT

Information booklet for recipients





CONTENTS

Introduction	1
Our liver transplant team	2
Functions of liver	5
Signs and symptoms of liver disease	6
Types of liver transplant	8
• Living donor liver transplant	
• Deceased donor liver transplant	
Transplant process	10
• Evaluation	
• National waiting list	
• Activation	
• Before and after surgery	
• Inpatient	
Post-transplant	20
• Clinic appointments	
• Immunosuppressants	
• Rejection	
• Infection	
• Nutrition after liver transplant	
Frequently asked questions	26
Contact us	28





INTRODUCTION

This booklet provides an overview of liver transplantation in Singapore General Hospital. Information on processes before a liver transplant and post-liver transplant are included in this booklet.

Liver transplant is a major operation, therefore thorough medical examination is conducted on every patient before he or she is considered for liver transplant.

The success rate of liver transplant has greatly improved over these years. Liver transplant can have excellent outcomes, greater chance of a longer life and improve quality of life. Recipient will be able to have more control over their daily activities and return to a more normal lifestyle.





OUR LIVER TRANSPLANT TEAM





Transplantation is a highly complex field of medicine that requires different healthcare professionals coming together as a team to provide collaborative and patient-centric approach to care planning. Our liver transplant team is here to support you and your family through this difficult period. Throughout your stay, you will come into contact with a number of staff members.





Doctors

Several doctors will be involved in your care to make medical recommendations and answer your queries.



Specialty Nurse

Specialty Nurse will provide transplant nursing education and follow-up care before and after transplant.



Pharmacist

Pharmacist will provide information and teaching on the medications that you need to take.



Medical Social Worker

Medical social worker is available to assist you with social, emotional problems and practical matters such as financial subsidies. They also provide counselling in areas such as adjustment to illness, family relationships, lifestyle changes and behavioral management.



Psychiatrist

Psychiatrist is there to ascertain if there are any psychological reasons which may influence your ability to cope with the process of transplantation and help you deal with these issues.



Physiotherapist

Physiotherapist will help you with exercise regimens to prepare you for the operation and continue to support you after your operation to assist in your recovery.



Transplant Coordinator

Transplant coordinator will provide you key information, serve as close liaison between you and the team and support you throughout your transplant journey.



Dietician

Dietician evaluates your nutritional status and works with you to provide nutritional support and diet education to ensure your nutritional goals are met.



FUNCTIONS OF LIVER

The liver has a lot of functions:

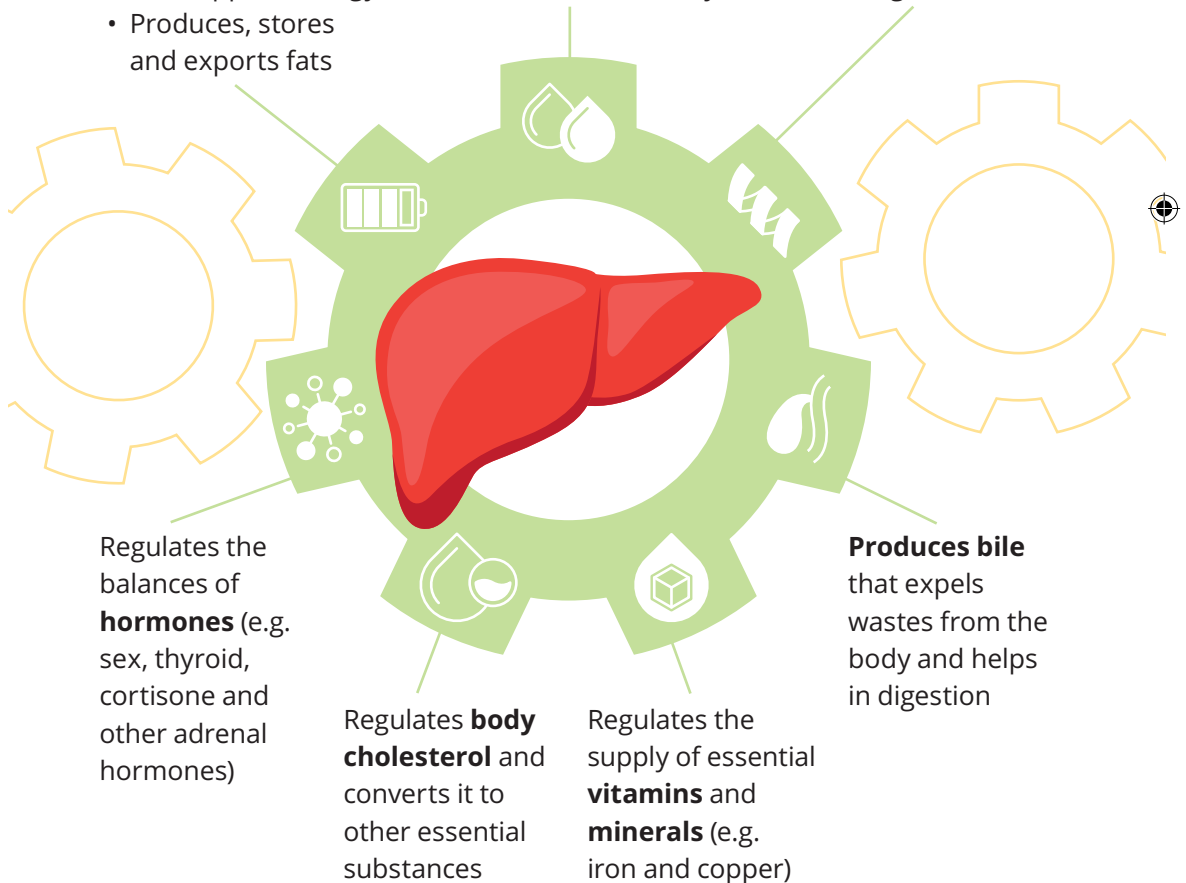
Regulates the **supply of body fuel**

- Produces, stores and supplies energy
- Produces, stores and exports fats

Cleanses blood

- Metabolizes drugs, alcohol and other chemicals in body

Manufactures essential **body proteins** e.g. blood clotting factors



Regulates the balances of **hormones** (e.g. sex, thyroid, cortisone and other adrenal hormones)

Regulates **body cholesterol** and converts it to other essential substances

Regulates the supply of essential **vitamins** and **minerals** (e.g. iron and copper)

Produces bile that expels wastes from the body and helps in digestion



SIGNS AND SYMPTOMS OF LIVER DISEASE





Unless liver damage is fairly severe or advanced, diseases of the liver are often “silent” and patients may not be aware of any problems.

Signs and symptoms of liver disease can be explained by considering the various liver functions. Different liver diseases may affect some functions more than others, resulting in variability between liver patients.

- Impairment of processing of nutrients results in **wasting of tissues**, particularly muscle.
- Impairment of the liver’s ability to excrete bile causes accumulation of its constituents including bilirubin pigment which is responsible for the **yellowing of skin (jaundice) and urine**, and bile acids which may be the culprit for the **itch** suffered by some patients.
- Decreased absorption of Vitamin K and inadequate production of blood clotting factors causes **easy bruising** and **bleeding**.
- **Massive bleeding from the gut** is usually due to blood from the gut being diverted away from the liver, to the esophagus and stomach. Signs of internal bleeding may manifest in the formation of **black stools** and **vomiting of coffee-ground substance or fresh blood**.
- The decreased production of important proteins by the liver and increased blood pressure in the veins that supply the liver contributes to the **accumulation of fluid in the abdomen and legs**.
- The failure of the liver to deal adequately with toxins in the body can cause **drowsiness, forgetfulness, lack of concentration, change in sleep pattern, confusion and coma**.
- The liver is also much slower at dealing with **alcohol** and **drugs** causing increasing **sensitivity** to their use.
- Inadequate removal of micro-organisms or “germs” from the blood coming from the gut partly explains the increased incidence of **serious infections** in patients with liver disease.





TYPES OF LIVER TRANSPLANT

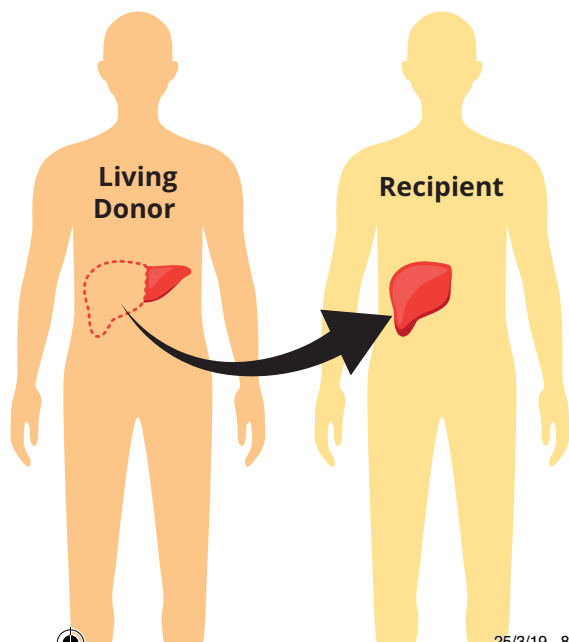
Living donor liver transplant

Living donor liver transplant is an option where a healthy and fit living person can donate a part of their liver to you.

Living donor may be blood group compatible and incompatible. He/She can be someone who is blood related or emotionally related to you.

However, living donor liver donation is a totally voluntary process and the living donor may wish to contact the liver transplant coordinator to arrange for a separate counselling session to know more about the donation process.

-  Up to 70% of liver graft from living donor
-  Planned in advance
-  Shorter waiting time - within 2-3 months
-  Criteria defined by Transplant Program





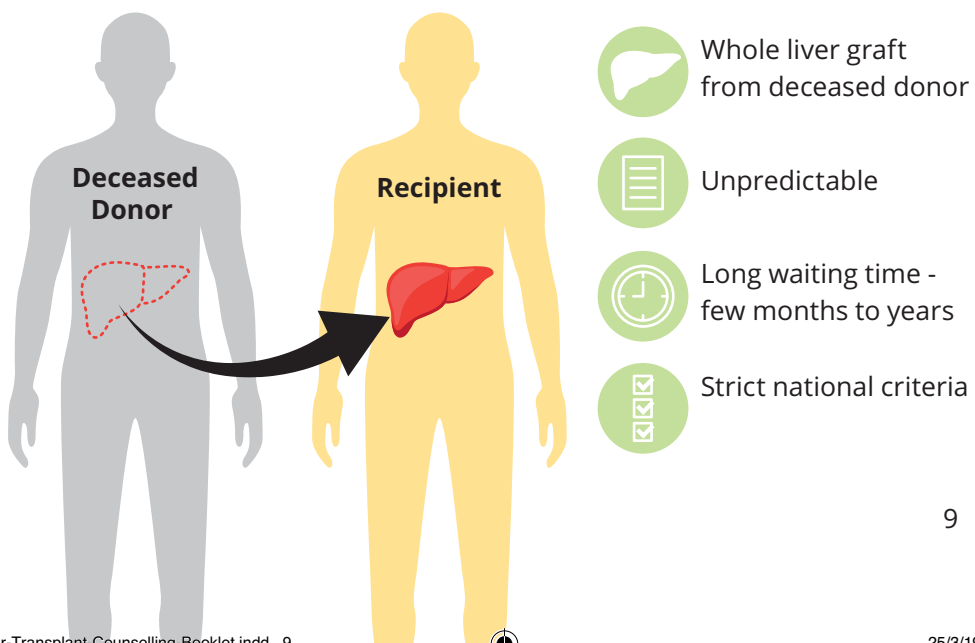
Deceased donor liver transplant

A deceased donor liver transplant is a surgical procedure that replaces the recipient's diseased liver with a partial or whole liver from a deceased donor.

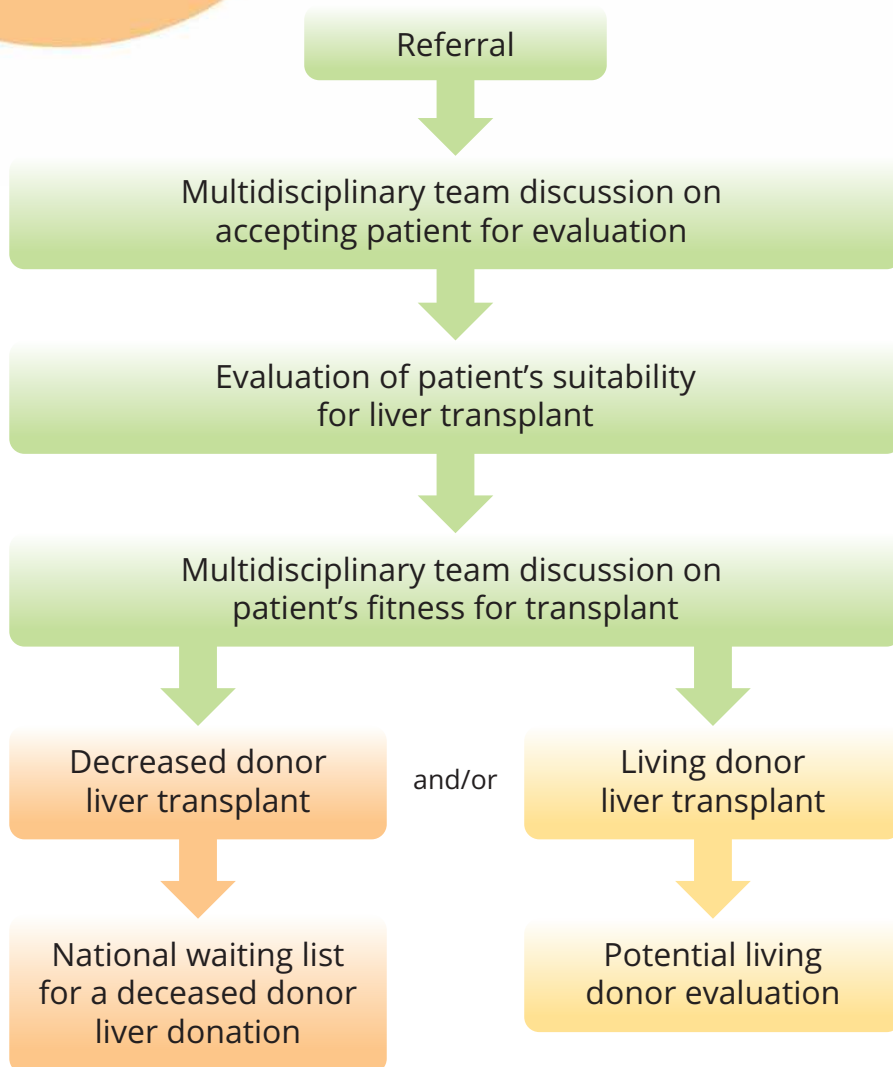
Patients who suffer from irreversible brain damage and progressively declared brain dead are identified as potential deceased donors.

Ventilator support in these patients provides mechanical blood circulation, thus allowing the possibility of organ donation. Our liver transplant team will first assess the suitability of the brain-dead patient as a liver donor. Once he or she is deemed suitable as a liver donor, a surgery to retrieve the organ from the donor is arranged. Concurrently, our transplant coordinator will notify the potential recipient via phone call.

By law, there is no exchange of information between deceased donor and recipient in Singapore.



TRANSPLANT PROCESS





Evaluation

A series of blood tests, scans and medical tests will be carried out to assess your suitability for liver transplant.

You are required to be admitted to the hospital for this assessment. It takes approximately 5-7 days, but your stay may be prolonged if further evaluation is needed. You will be interviewed by different specialty doctors during the stay to assess your suitability for liver transplant.

During the assessment period, it is important that you and your family learn about the full implications (risks/benefits) of transplantation so that you can make an informed decision. You have the right to decide if you would want to undergo liver transplantation. Your decision will be well respected by the team.

Lastly, your assessment results will be discussed among the transplant team and you will be informed by the transplant coordinator of your suitability for liver transplant.





Pre-liver transplant assessment

Chest x-ray

Determines if lungs and lower respiratory tract are healthy

Ultrasound

Examines liver and other abdominal organs and blood vessels

Computed Tomography (CT) liver

Assesses shape, size of the liver, major blood vessels and tumors of the liver

CT thorax

Assesses the lungs for signs of chest infection and metastatic disease

Bone scan

Examines the bone structure for metastatic disease

Pulmonary function test

Assesses lung capacity and function to determine any lung disease

Electrocardiogram (ECG)

Examines the rhythm of the heart

Echocardiogram (2D Echo)

Uses sound waves to study the heart and the pressure in its vessels

Stress test

Examines the heart's response to stressors through treadmill exercise or medication

Cardiac angiogram

May be necessary if stress test is abnormal to assess for blocked or narrowed coronary arteries

Endoscope

Assesses the esophagus, stomach and colon for ulcers, inflammation, varices and tumors





National waiting list

After the transplant team has decided that you are a good candidate for transplant upon completion of your evaluation, you will be registered on the national waitlist which is regulated by the Ministry of Health. Patients are listed based on their Model for End-Stage Liver Disease (MELD) score, blood type and amount of time on the waiting list.

The MELD is a numerical scale ranging from 6 (less ill) to 40 (gravely ill) for patients. It predicts the risk of mortality within the next 3 months and shows the urgency of a transplant. This number is based on 3 lab test results:

- Bilirubin, measures how effective the liver excretes bile
- INR (prothrombin time), measures liver ability to make blood clotting factors
- Creatinine, measures kidney function which is often associated with severe liver disease





Factors affecting your waiting list status include but not limited to the following situations:

- Age > 71 years old
- Non-compliance
- Poor nutritional state
- Failure to abstain from drugs/alcohol
- Active infection
- Health condition that may lead to poor transplant outcome
- Loss of contact with transplant team

Waiting for a suitable donor organ may take months or even several years. This period of uncertainty can cause frustration, anxiety and stress for patients and families. Do seek the transplant team and social worker for emotional support when faced with difficult situations.

While being on the waiting list, it is important to keep to your transplant doctors' appointment, stay healthy and active as much as possible.

Please remain contactable at all times by providing us with many contact number details. Notify the Transplant Coordinator if you are traveling abroad or have changes in your contact details.





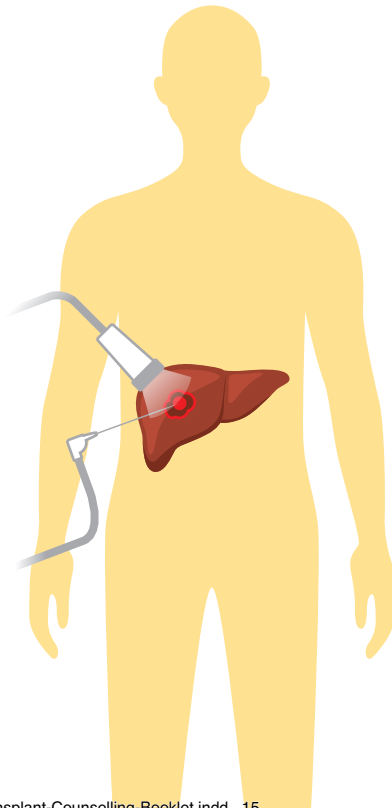
Bridging therapy while on the waiting list

In view of organ shortage resulting in long waiting time for Deceased Donor Liver Transplant in Singapore, patients with liver tumour(s) will be introduced to Bridging Therapy. The purpose of this therapy is to control the tumour(s) while patients are on the waiting list, slow down progression of liver cancer and prevent metastatic diseases.

Types of bridging therapy

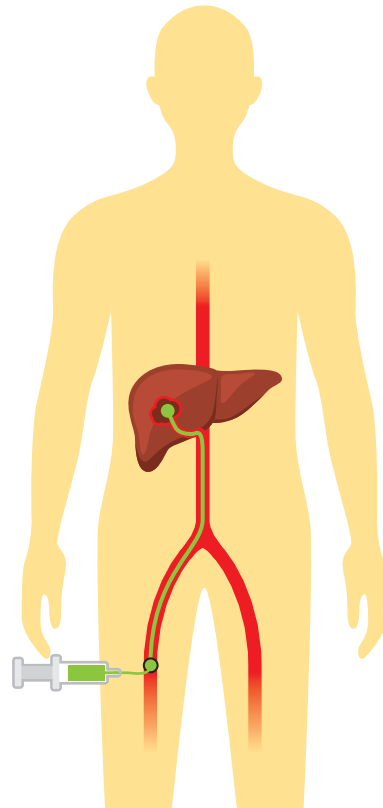
Radiofrequency Ablation (RFA) / Microwave Ablation (MWA)

Under image guidance, a needle will be inserted through the skin into the liver tumour, creating small region of heat to destroy the liver cancer cells.



Transarterial Chemoembolization (TACE)

Chemotherapy and embolic agent is delivered directly into artery feeding the tumour(s) to block or slow down blood supply thus killing the cancer cells.



15



Activation

Activation can happen at any time of the day. Therefore it is important to be contactable at all times. The transplant coordinator will contact you via home/mobile phone numbers provided. You and your caregiver will need to make your way down to the hospital as soon as possible- within 2 hours after being notified by the coordinator. You will also need to start fasting to get yourself ready for the transplant surgery.



Upon admission, you will need to undergo numerous investigations, such as physical examination by physician, blood tests, electrocardiogram, and chest X-rays to ensure you are fit for the transplant surgery.

Your consent for transplant will be taken. You will be able to take this opportunity to ask questions. Be prepared for the possible long wait for the surgery.

REMINDER

It is also important to understand that not all admission will lead to transplantation. We may cancel the transplant surgery and discharge you due to the following situations:

- You are found to have signs of active infection e.g fever
- Donor liver condition e.g fatty liver, signs of fibrosis

Finding the suitable liver for you is important and the team is committed to giving you the best transplant outcome!





Before and after surgery

You will be sedated before the commencement of the surgery. The operation can take up to 14 hours. During this time, you will be under the care of surgeons, anaesthetists and nurses involved in the operation.

After the surgery, you will be transferred to the Intensive Care Unit (ICU). You can expect :

- Throat discomfort and will not be able to talk because of the breathing tube
- Many tubes and drips attached to you. You will be monitored by various types of equipment. Each of them will make a different tone or beeping sound but you will soon become used to them.
- Abdominal pain due to surgical wound pain. You will receive pain-relief medicine and there will be a trained nurse taking care of you.



You may spend a few days in ICU depending on your progression.

During your stay in ICU, your family may visit you (two visitors at a time) during visiting hours.



Central Venous Catheter (CVC)

Large bore intravenous access for administration of medication or fluids and measuring central venous pressure.

Nasogastric Tube (NGT)

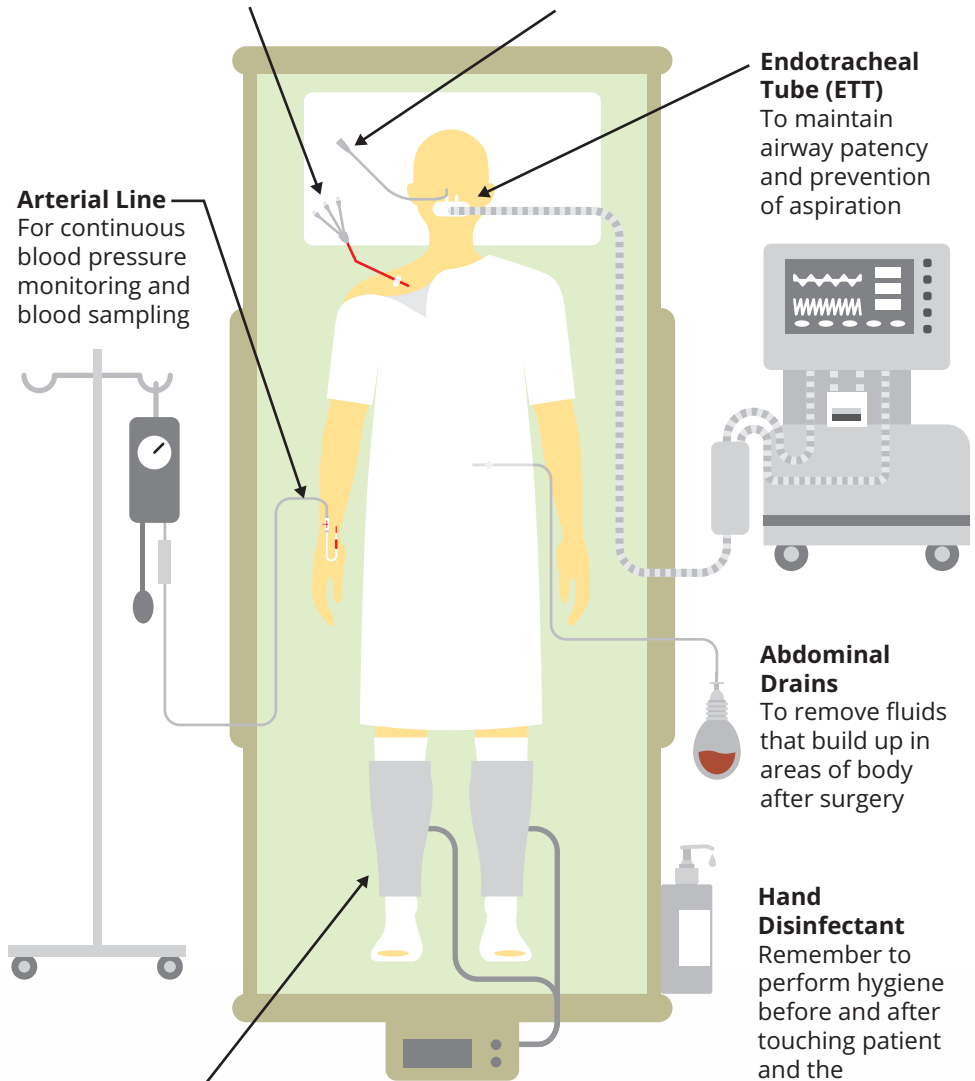
Administration of medications or enteral feeding - when the patient is unable to swallow

Endotracheal Tube (ETT)

To maintain airway patency and prevention of aspiration

Arterial Line

For continuous blood pressure monitoring and blood sampling



Abdominal Drains

To remove fluids that build up in areas of body after surgery

Hand Disinfectant

Remember to perform hygiene before and after touching patient and the surroundings

TEDS Stocking and Sequential Compression Device

Prevention of deep vein thrombosis in the lower limbs





Inpatient

Once you have stabilized and no longer depend on machines, you will be transferred to our immediate care ward where you will continue to receive intensive nursing care.

During this time, you will be closely monitored by our doctors as common complications such as infection and rejection can happen. Depending on your progression, the tubes that are attached to you will be gradually removed.

You will also start to feel much better after your operation. Your strength, weight and concentration will improve and most of the side effects of surgery would have resolved.

There is no definite time for your discharge. Doctors will have to evaluate a number of factors to determine when you can go home. These will include your overall recovery, ability to take care of yourself and ensuring that your family is prepared to welcome you home.

Prior to discharge, you will receive advice on post transplant care, medications and key things to look out for.





POST TRANSPLANT





Clinic appointments

After your discharge from the hospital, our transplant team will continue to monitor you closely. The first few months after transplant are crucial and therefore you can expect frequent appointments (blood tests, scans and doctor consultations). It is important that you go for all appointments and take your medications as instructed. The number of appointments will gradually decrease once you are stable and have recovered well.

In the clinic, our doctor will adjust your medication dosage based on your blood test results. Therefore, **it is important to ensure that your blood is taken before consultation**. You will need to repeat your blood tests whenever there is adjustment. This will allow your doctors to monitor your progression.

Immunosuppressants (anti-rejection medication)

After receiving a transplant, you will need to take Immunosuppressant for the rest of your life to prevent rejection.

This medication works by lowering your immune responses to foreign objects and thus reducing the immune system's ability to reject the new liver.

With reduced immunity, this will also mean that you are at a higher risk of infection. Your doctor will titrate the medication dosage to strike a balance and ensure that you have enough immunity to prevent overwhelming infection.



Rejection

Rejection is your body's way of recognizing your donated liver as foreign and attacks it. If rejection is diagnosed and treated early, it can usually be reversed.

Rejection can happen any time. You may be feeling perfectly fine while having rejection. It can be acute (sudden onset) or chronic (persisting for a long time). Having rejection does not always equate to losing your new liver, but that does not mean that you can ignore it.

To aid early detection of rejection:

- Have your lab tests done as recommended by the transplant team.
- Take your medications on time as prescribed.
- Keep a lookout and report signs of rejection immediately.

Signs of liver rejection

- Abnormal results for liver function tests
 - total bilirubin, ALT, AST, GGT
- Fatigue
- Fever
- Abdominal pain or tenderness
- Dark coloured urine
- Light coloured stool
- Yellow eyes
- Yellow skin
- Ascites (fluid in the abdomen)
- Itching

Elevated laboratory results can indicate a possible rejection. Often, a liver biopsy is required to confirm the rejection. Other factors such as infection may also result in elevated liver enzymes. For this reason, treatment of rejection should only be managed by your transplant physician.



Infection

Your immunosuppressant medications, which are necessary to prevent rejection of your transplanted liver, will reduce your immunity.

If you have any signs or symptoms of infection listed below, you should seek medical attention immediately and inform the transplant coordinator.

Signs and symptoms of infection

- Blisters
- Blood in the urine
- Burning sensation when urinating
- Chills
- Clammy skin
- Confusion
- Cough
- Decreased appetite
- Diarrhoea
- Difficulty swallowing
- Ear ache
- Fatigue
- Fever
- High white blood cell count
- Joint pain
- Lethargy
- Pus-like drainage
- Rash
- Shortness of breath
- Skin redness
- Sore throat
- Sputum production
- Swollen glands
- Vaginal discharge
- Vomiting
- Weight loss
- White plaque in mouth
- Any symptom you are unsure of



Preventing infection

Although immunosuppressant medications reduces your ability to fight infections, this does not mean that you should avoid going out. By making some changes to your lifestyle, you can significantly reduce your risks!

Some actions you can take to decrease your risk of infection include:

- Maintain your general health with proper nutrition, rest, exercise and stress management.
- Avoid people with infections, especially those with active infections such as chicken pox, mumps, measles, hand, foot and mouth disease, tuberculosis, colds or flu.
- Take your medication as prescribed to prevent infection.
- Take the recommended antibiotics before and after dental works or other invasive procedures.
- Avoid composts piles, construction sites, decaying fruits and vegetables.
- Wear shoes when walking outside to prevent exposing cuts on feet to micro-organisms in soil.
- Do not receive live vaccinations. Avoid anyone who has received an oral polio vaccine for 8 weeks. You may call your transplant coordinators to check if the vaccine is safe.
- Get tetanus shots as needed (animal bites, dirty cuts).
- Do not share razors, toothbrushes or eating and kitchen utensils.
- Practice safe sex.



Nutrition after liver transplant

Nutrition is a very important part of your recovery after your transplant. Eating a well-balanced diet after transplant will help with the healing of your surgical wounds.

Usually, you will not need to follow the same dietary restrictions that were necessary before your transplant. In some cases, however, the side effects of your medications may cause other temporary restrictions to be necessary. For example, certain medications e.g. steroids and tacrolimus, can cause your blood sugar to rise. This can be identified by regular blood tests at the transplant clinic and controlled by dietary intervention. Our dietician will advise you on an appropriate dietary regimen when needed.

As your immune system will be suppressed, you will be at risk of infections which includes food-borne illnesses. Your dietician will provide you information concerning food safety at home, so that you can protect yourself from unnecessary infections.

Food such as grapefruit, pomelo and pomegranates should be avoided as they will interact with your immunosuppressant.

In general, you should continue to eat healthily and introduce appropriate exercises in your lifestyle.





FREQUENTLY ASKED QUESTIONS

1. Can you describe what happens during the operation?

A healthy liver is transplanted after removing the diseased liver. This will leave you an operative wound/scar called a “Mercedes Benz” in the middle of the abdomen. The operation is complex and takes up to 14 hours. Removing the old liver can be slow, especially if you have had previous surgery.

2. What are the chances of survival after liver transplantation?

Liver transplantation is a major operation. Majority of the complications tend to occur in the first 3 months post transplantation, especially for patients who are seriously ill prior to the operation.

Some complications from liver transplantation include:

- Failure of donated liver
- Rejection
- Haemorrhage (bleeding)
- Technical complications e.g. problems with liver blood vessels and bile duct

However, more than 75% - 85% of patients who undergo liver transplantation do well.

3. How long does it take to recover?

The average stay in ICU is approximately 5 days and the average stay in the post transplant ward is 3 - 4 weeks, but this may be extended if complication arises. Most patients take months to fully recover from the surgery.



4. What drugs are required long term?

Immunosuppressants such as tacrolimus (Advagraf or Prograf®) or cyclosporine (Neoral®) are needed for life. The dosage to be taken will be dependent on the blood levels. During early days post transplant, most patients will need to take small doses of prednisolone and/or azathioprine or mycophenolate (Cellcept®, Myfortic®) to avoid rejection.

If the liver function continues to improve, the dosage of these medications will be slowly reduced. Some, but not all, may eventually be discontinued.

5. How can I prepare for transplant?

- Maintain healthy lifestyle, habits and control of health conditions e.g. hypertension, diabetes, high cholesterol. It is important to have a balanced diet and consume adequate caloric intake to keep your body in optimal nutritional state for transplant surgery.
- Stop smoking as it increases the risk of lung and heart disease and thus putting you at higher risk during the operation.
- Share your fears, feelings and questions with the transplant coordinator or medical social worker. This will help you in your mental and emotional preparation for the transplant.

6. What physical activity can I do post-transplant?

Most people return to normal physical activity within twelve months after liver transplantation. Lifting heavy objects should be avoided for the first six months. Light sports activities can be resumed but it is best to avoid contact sports. Sexual activity can be resumed when you are feeling more comfortable. Most patients are capable of returning to the work force.

7. Can the original disease recur in the new liver?

Yes, more common diseases that may recur after transplant includes viral hepatitis (Hepatitis B, C), autoimmune hepatitis and non-alcoholic steatohepatitis.





CONTACT US



Email:

liver.transplant@sgh.com.sg



On-call number:

8123 2934

Please note that the liver transplant coordinator on-call number is also meant for attending to emergency liver transplant operation.

For all non-emergency matters, kindly contact us only during working hours Monday – Friday, 0800hr to 1730hr



Singapore General Hospital Transplant Centre

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Website: www.singhealth.com.sg/Transplant/Pages/Home.aspx

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