

Lung transplantation

A patient's guide

Lung transplantation has the potential to significantly improve the length and quality of life for carefully selected patients with end stage respiratory disease. Most patients return to a near normal life, including exercise, work, education and travel.

Before agreeing to being placed on the list for lung transplantation, it is important to understand the complexities and complications of the whole transplant process: choosing the donor lung, the transplant operation, the problems encountered immediately after the operation and in the subsequent weeks, months and years.

As with all forms of medical intervention, there are risks and benefits of transplantation and these have to be weighed up in the individual against the risks of no transplant. In many patients transplantation is associated with an increased risk of death in the short-term but a significantly increased chance of survival in the longer term.

Waiting list

If accepted onto the lung transplant waiting list, potential recipients will need ongoing reviews (approximately every three to 12 weeks) to ensure their suitability for transplantation. This may include blood tests, chest X-rays, six minute walks, echocardiography and lung function.

Once on the list, patients typically experience a wait of 18 months for a suitable organ. If during this time the patient's condition deteriorates such that the risk of transplantation would be too high they may be removed from the waiting list. Sadly, despite the very best efforts of our team, some patients die on the waiting list for a lung transplant.

Donor organs

Accepting a donor organ for a recipient is complex and the decision is based on many factors including the donor, organ and recipient.

Before accepting a donor lung for transplantation, extensive information is obtained about

the potential donor. This includes their general health; including alcohol and smoking history; specific diseases (diabetes, cancer); and previous or significant risk of infection (hepatitis, HIV, CJD) in order to prevent transmission to the recipient.

Despite these precautions, there is still the possibility of transmitting unknown chronic infection (usually viral) at the time of transplant surgery.

Specific details are generally only passed to the recipient when this would increase the risk or complicate the outcome of the transplant. This could include whether the donor poses a greater risk of transmission of infection or malignancy or whether the donor organ has a particular risk of poor function.

No organ is free of risk but the recipient has the right to decline offered organs where there is evidence of significant increased risk (which may be difficult to quantify) or there are factors they find unacceptable.

Organs from a donor who is a current or recent ex-smoker

Half of the potential donors we are offered have a smoking history.

Finding out the extent of this history can sometimes be difficult, however we are very careful to ensure that the lungs are functioning well, undergoing vigorous examination and assessment by the donor retrieval surgeon prior to the transplant proceeding.

Looking at our results, the short-term (under three months) outcomes are not as good for a smoking donor but the longer-term outcomes (greater than three years) are the same.

For these reasons we will consider carefully donors with a smoking history and we would ask that you do the same. Declining such lungs may limit your chance of survival, the transmission of a smoking related lung cancer being small.^{1,2,3}

Organs from a donor with a brain tumour

Occasionally we are offered organs from patients with either known or possible tumours. Usually these are isolated brain tumours with a very low-risk of spread and as a result would be considered a low-risk for transplantation.

Even in patients with a brain tumour classified as high grade there is less than 3% risk of transmission of cancer, a risk which needs to be balanced against the likely mortality for potential recipients who remain on the transplant waiting list.⁴

Organs from an older donor (greater than 60 years of age)

We are often offered organs from donors who are over the age of 60. In older donors, age alone should not be a strict criterion to reject older lungs as their appearance often suggests better quality in donors who have never smoked compared with smokers of a younger age.

These donors will be assessed thoroughly for their suitability

for organ donation. There is a slight but progressive increase in risk of death for patients who receive organs from older donors, with a lower ten year survival related to older donor age.⁵

Organs from a donor who may have taken intravenous drugs or had high risk sexual behaviour

All organ donors are screened at time of donation for infective viruses like HIV and those which cause hepatitis.

Where the donor may have taken intravenous drugs or had high-risk sexual behaviour there is a small risk of them being infected at a stage before the blood test will pick up the virus.

In practice, the risk of infection from such donors is very small, around 1 in 5-10,000. High-risk behaviour is where either the donor has injected, been paid for sex or paid for sex, had unprotected vaginal, oral or anal sex with a high-risk partner in the three months before death.

A high-risk partner includes someone who comes from a country with a prevalence of HIV, hepatitis, has injected drugs, is paid for sex or is a bisexual or gay man.⁶

Organs from a donation after cardiac death

Organ donation after cardiac death (DCD), also known as Donation after Circulatory Death, is the type of donation that was used in the early years of organ donation. Before brain death criteria were established, DCD donation was the only option.

This type of donation occurs when a patient has an illness from which he or she cannot recover and the patient is being kept alive by artificial means, including ventilators and supportive drugs. The patient is not brain dead but has no hope of recovery.

Only once the family makes a decision to withdraw artificial support, is the possibility of organ donation discussed. In this way the decision to withdraw support is made independently of the decision

to donate and if the donation falls through, the family has still made the correct decision for their loved one.

If the family is interested in donation and has made the decision to withdraw support, the patient will be taken to the operating room for this process of withdrawal to occur.

Once treatment has been withdrawn, if the patient's heart stops within the designated time frame for donation, the team waits for several minutes to ensure that the heart does not function. At this time, a physician from the hospital will pronounce the patient dead and the organ retrieval team can begin the assessment of the organs.

As a recipient of lungs from a DCD donor the arrangements will be the same. You will be admitted to the ward and prepared for theatre. The coordinator may ask you to shower and change into a gown earlier than with a brain stem dead donor and the time from finding out about the condition of the donor organs

and the transplant proceeding may be less.

You may find yourself being transferred to the operating room within a few minutes of finding out that the organs are suitable. This is to minimise the time organs are without a blood flow. Since not all the donors will reach suitable criteria after withdrawal of treatment the false alarm rate is higher with a DCD donor than with a brain stem dead donor.

Ex-Vivo Lung Perfusion (EVLP)

Many donor organs deteriorate in the donor prior to transplantation. However, techniques have been developed to try and improve their function - lungs are placed on a machine to be assessed. Only if the function is then deemed acceptable are the lungs used for transplantation. Studies have shown that EVLP has comparable outcomes to standard transplantation.

We believe that this method will improve the number of donor organs available for transplantation and we

strongly recommend that you read carefully the information given to you at the time you are listed on the DEVELOP Study and the Organ Care System (INSPIRE). Each of these potential options needs to be considered carefully in the context of a severe life threatening illness.

Please note that at the time of transplant or afterwards, the recipient may feel he or she would like to know more about the donor. However, due to confidentiality information is limited to: age range (by decade), gender and how the donor died.

Transplant operation

The transplant procedure itself carries a significant risk (approximately 10% risk of dying in the first month following the operation).

The main contributors to this are the function of the donor lung, the failure of other organs and infection. Some evidence of reduced function of the lung, heart or kidney in the early post-operative period is common, but this usually

resolves with appropriate support including temporary kidney dialysis. Patients may have to return to theatre if problems such as bleeding occur.

Occasionally a lung may appear to function well when studied in the donor but very poorly after transplantation. In this situation, support with an artificial circulation may be necessary, and most patients are not suitable for a second transplant.

During a lung transplant the blood supply to the airways is interrupted leaving them vulnerable to injury. Some patients will need multiple procedures and possibly dilatation or stenting of the airways to deal with this. Recipients who develop this complication have a poorer outcome overall.

Long-term care

Transplant patients are cared for life-long by the transplant team. Patients and their carers may contact the team at any time for advice.

Internationally and nationally, overall survival after lung transplantation is approximately 80% at one year, 50% at five years, and 35% at 10 years. The one year survival at Papworth Hospital during 2007 was approximately 90% but individual centre results may vary over time.

Frequent follow-up at the transplant centre is important during the first year, but this may be no more than every three months after the second year.

During the first three months patients will need planned re-admission for scheduled bronchoscopies to exclude infection or rejection. Re-admission to hospital is not uncommon after this for a variety of reasons - mostly infection.

Gastro-oesophageal reflux is very common post-lung transplantation and if left uncorrected associated with poorer outcomes. All patients post-lung transplantation will need investigation for this and if found may require a

second operation. The second operation is significantly smaller and if required is usually performed at six to nine months after transplantation.

Drugs and side-effects

Transplant recipients need to take immunosuppressant drugs to suppress the immune system and prevent rejection from the time they have the operation and for the rest of their lives.

We monitor recipients regularly after surgery to look for evidence of acute rejection (damage to the lung by the immune system) and side-effects of therapy including infection.

Rejection is looked for by taking small samples of lung under sedation and local anaesthesia; this is known as a transbronchial biopsy of the lung. Biopsies are performed routinely during the first three months after a transplant at (three, six and 12 weeks). Rejection is usually successfully treated by increasing your immunosuppression.

Patients normally take three immunosuppression drugs, each of which has specific side effects. The number of drugs and the dose usually decrease significantly between three and 12 months after transplantation. The specific side effects will be discussed following the transplant, dependent on which drugs are used.

There are a number of long-term side effects common to all of the drugs which include:

1. An increased incidence of cancer in patients on long-term immunosuppression. Approximately 30% of patients over 10 years will develop a cancer; over half of these are skin cancers which are rarely fatal. Lymph gland cancers (lymphoma) are also related to immunosuppression. They can occur at any time after the transplant and may require chemotherapy. Many of these are curable with appropriate treatment. Cancers successfully treated before transplant may also recur.

2. Reduced kidney function is seen in most patients who receive the commonly used immunosuppressive drugs. Approximately 15% have severe kidney failure after 10 years and a minority (5% over 10 years) require dialysis.
3. Infection including bacterial and viral infections. Cytomegalovirus (CMV) is commonly transmitted from the donor. Preventative drugs against infection are commonly given during the first three to 12 months but CMV disease can occur later after the transplant.
4. Very common but less serious side effects include high blood pressure, raised cholesterol, diabetes, weight gain, gout and osteoporosis.

Chronic rejection

The other major long-term problem associated with a lung transplant is chronic rejection which is damage to the airways presumed to be by the immune system. This gradual blocking of the airways can result in a

reappearance of breathlessness.

The diagnosis is established on lung function with confirmatory evidence on CT scanning and bronchoscopy.

Despite careful treatment this form of airway disease is seen in approximately 50% of patients after five years. Sadly, treatment of this disease is very unsatisfactory and many patients will succumb to this complication.

Conclusions

It is important to remember that despite these potential problems most patients have an excellent quality of life after a lung transplant.

The best outcomes after transplantation are in patients who have a healthy lifestyle including; maintaining a healthy diet and weight; not smoking or taking illegal drugs; drinking alcohol in moderation; exercising; taking all medication as suggested by the transplant centre; and attending outpatient visits and tests as necessary to monitor the success of the transplant.

Please feel free to ask a member of the transplant team if you have further questions or concerns about the procedure.

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Papworth Hospital NHS Foundation Trust
Papworth Everard, Cambridge, CB23 3RE

Tel: 01480 830541

Fax: 01480 831315

www.papworthhospital.nhs.uk

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Tel: 01480 364657

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Department: Transplant
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