How many lung transplants are done each year in Canada?
The number of transplants done each year varies depending on the number of donor lungs that become available.

In 2006, there were 129 double-lung transplants, 35 single-lung transplants, and six heart-lung transplants done in Canada. (Source: International Guidelines for the Selection of Lung Transplant Candidates: 2006 Update). Of those, 38 double-lung transplants, three heart-lung transplants and a living lobar lung transplant were done at the University of Alberta Hospital (Source: University of Alberta Annual Lung Transplants 1986-2006). These numbers are continuing to increase as more research is completed and the procedure is refined.

Where do most donated lungs come from?
Most donor lungs come from the body of someone whose brain has been so severely injured that there is no chance the brain will function again, however the rest of the organs are healthy. This is called “brain death” and the body would die without machines to support breathing and medications to support the blood pressure. Brain death often happens because of serious head trauma or a sudden bleed inside the brain.
What is a living lobar lung transplant?
Lobes of a lung can also be donated by healthy individuals. This is known as a living lobar lung transplant. In this case, two different people with healthy lungs each donate a lower lobe of one of their lungs. The donor will lose approximately 20% of their lung function. This is not necessarily harmful unless the donor develops lung disease later in life. Living lobar lung transplants have advantages including a shorter wait time as well as a better match; however, due to the potential risks to the donor, this surgery is only performed as a last resort.

Living donor lung transplants are extremely complex and rare. The University of Alberta Hospital in Edmonton is one of only two centres in Canada and only a few worldwide where living-lung transplants are done, the other is located in Toronto.

What makes a donor lung a good match for me?
The two main factors that are considered for matching are the blood type of the donor and the size of the donated lung(s). Lungs that are too large for you can sometimes be trimmed down. A good blood type match is important to reduce rejection, however age, gender, and race are not important.

How long is the surgery?
The average amount of time for a lung transplant (single or double) or heart-lung transplant surgery is 6-8 hours. A double-lung or heart-lung transplant may take longer especially if complications occur. The transplant team specialists will give you more details on the actual surgery before your name is added to the waiting list.

How long is the recovery from surgery?
Recovery will vary from person to person. Most people are in the Intensive Care Unit (ICU) for a few days to a week and they remain in hospital for about three more weeks after that. The hospital stay may be longer if post-surgery complications, such as infection, occur.

After getting out of the hospital, you must remain in the area of the transplant centre for at least two more months (a minimum of three months total from the time of surgery). Your doctor will not allow you to go home until you are stable enough.

Who might need a lung transplant or a heart-lung transplant?
Transplant surgery may be considered when:

- a severe lung condition is continuing to progress and when all other available treatments and medications are no longer helping
- And your life expectancy is in the range of one to two years without a lung transplant
- And it could result in a better quality of life
Of the 1222 lung transplants done in Canada between 1997 and 2006, only 8 used lungs from living donors.

There is a long list of diseases that may lead to a lung transplant (or heart-lung), but the most common diseases for which the surgery is done include*:

- chronic obstructive pulmonary disease (COPD)
- idiopathic pulmonary fibrosis
- cystic fibrosis
- alpha-1 anti-trypsin deficiency
- primary pulmonary hypertension
- Eisenmenger’s syndrome
- sarcoidosis
- bronchiectasis

*see glossary of lung diseases for descriptions (at the end of this booklet)

**Single-lung, double-lung or heart-lung…how do they decide what someone needs?**

In most cases, the decision to replace one or both diseased lungs depends on the number of donor lungs that become available, and the medical needs of the person needing the transplant. The majority of lung transplants done in Canada are double-lung.

Those who have cystic fibrosis (CF) must have a double-lung transplant because they often have chronic lung infections that would infect a single transplanted lung.

The decision to transplant the heart and the lungs together (heart-lung transplant) depends on the underlying disease and whether or not the heart is healthy. This surgery is not done very often.
Who might not be able to have a lung transplant?

Your doctor should contact a transplant centre to determine your eligibility for a lung transplant. The information given here is from the 2006 international guidelines, but keep in mind that the guidelines may change with medical advances.

There are a number of reasons a person might not be eligible for a lung transplant and these are called absolute contraindications and they include (as of 2006):

- cancer (except some skin and lung cancers*) within the past two years; it is preferable to be cancer-free for at least five years
- other diseases of the heart, liver or kidney that can’t be treated
- non-curable chronic infections such as active hepatitis B, hepatitis C, and HIV/AIDS
- significant problems with the shape of the chest wall or spine
- not being willing or able to follow medical therapy
- not having a reliable social support system (that is: family, friends, others to help)
- using tobacco, street drugs, or excess alcohol now or within the past six months

The main medications used to prevent rejection in lung transplants are prednisone, cyclosporine, tacrolimus, and mycophenolate mofetil. Your transplant physician will decide which medications you will need and will discuss possible side effects.
People with certain primary lung cancers (such as bronchioalveolar cell cancer) can be considered for lung transplant because the cancer tends to stay within the lung. In these cases, a lung transplant is not a “cure” because the cancer can return, but it will increase the length of life.

Other factors are called “relative contraindications” and they may or may not mean that you can’t have a lung transplant. If several of the following are present at the same time, transplanting a lung or heart-lung may be too risky for you. These factors include:

- **Critical illness**—for example: being on a mechanical ventilator (breathing machine) and/or needing powerful medications to support the blood pressure
- **Severe obesity** (very overweight) or very underweight
- **Severe osteoporosis** (very brittle bones)
- **Chronic lung infections** due to a bacteria, virus or other organism that is resistant to medications, or one that can cause severe illness
- **Other medical conditions** that have not yet resulted in severe organ damage (some examples are diabetes mellitus and high blood pressure); very poor physical condition which would make the recovery after surgery extremely difficult

Your transplant doctor and other members of the transplant team will discuss how your condition and psychosocial situation might influence your eligibility for transplant.

(Source: International Guidelines for the Selection of Lung Transplant Candidates, 2006)

**What is rejection?**

Your body’s immune system tries to attack anything it thinks is an “invader”. For example, when you are exposed to a cold virus, your body works to fight off the virus. The stuffy nose and cough that usually come along with a cold are the body’s way of trying to surround and kill the virus and get it out of the body. In the same way, your body will attack any donor organ that has been transplanted into your body because your body will recognize the new lung as foreign. This attack that the body launches on the donated organ is called “rejection”.

You will be given anti-rejection medications (also called immunosuppressants) after the transplant to suppress your immune system so it does not attack the new organ.

Nearly every recipient has an episode of rejection. This is usually a temporary and reversible problem called “acute rejection” and it is treated in the hospital with medications. Acute rejection is most likely to happen in the first six months after a transplant, but it can happen at any time as long as the donated organ remains in your body.

The transplant centre will give you lots of information on how to notice the early warning signs of a rejection episode so it can be treated as soon as possible.

Chronic rejection of a donor lung happens over a longer period of time and it is called “bronchiolitis obliterans syndrome”. Chronic rejection is the most common reason for death in lung transplant recipients. When the body chronically rejects the donated lung, the smallest airways inside the lung, called the bronchioles, become swollen and then scarred. The scarring causes the airways to become very narrow, making movement of air in and out of the lungs more difficult. Chronic rejection is difficult to treat, and in very rare cases, the recipient may need to have another lung transplant.
What do anti-rejection medications do?
Anti-rejection medications lower your body’s immune response so it won’t attack the new organ. However, because the entire immune system is working at a low level, you are more at risk of becoming sick than the average person would be. You will need to take anti-rejection medications for the rest of your life, but over time the amount of these medications can often be reduced to a lower maintenance level.

Do anti-rejection medications have side effects?
Yes - all medications have some side effects. There are several anti-rejection medications that could be prescribed and their side effects will differ depending on the medication. A side effect of all anti-rejection medications is the increased risk of infection because the immune system is lowered. Some other serious side effects include kidney damage, high blood pressure, increased cholesterol levels, increased blood sugar, and increased risk of certain cancers. The transplant team will give you more information about your specific medications and their side effects.

Are there other medications I will have to take after the transplant?
You may have to take medications to treat the side effects of the anti-rejection medications. Also, you may have to take antibiotics or anti-viral medications to prevent certain lung infections for a certain amount of time after the transplant.

How close do you have to be to the transplant centre when waiting?
Because lung tissue is very fragile, a donated lung has to be transplanted very quickly or else it becomes useless. When you are on the waiting list for a lung transplant you must be within a 2 ½ hour travel distance (by land or by air) of the transplant centre so you can get to the hospital quickly when the call comes. Sometimes the transplant team will request that you and your support person re-locate to the Edmonton area, especially if you live too far away to get to the hospital in time. Other reasons might include your need for frequent clinic appointments to monitor your health while you wait.

Most transplant centres are in the downtown area of major cities. In large cities, driving and finding parking is frustrating, time-consuming, and expensive. Public transportation is not recommended because being in crowded buses, streetcars or subways will increase your risk of infection. So for these reasons, you may choose to live close to the transplant centre.

How long is the waiting time for a transplant?
The time spent waiting for a transplant varies greatly from person to person, and centre to centre. Available donor lungs are assigned based on the best match to someone waiting for a transplant and how sick that candidate is at the time. If you and someone else on the list are both a good match to an available donor lung, whoever is sicker at that time will get the transplant.

You may get a transplant just a few days after your name has been added to the list or you may wait more than two years.

The status of your condition when your name goes on the list is another factor in how long you might wait. Status 1 means your condition is stable and Status 2 means it is rapidly getting worse. Your status on the list can be changed if your condition changes.

In 2003, the average wait time for those listed as Status 1 was 11 months and for those listed as Status 2, was 38 days. At the end of June 2006, there were 252 people on active waiting lists for lung transplants across Canada (Source: Canadian Organ Replacement Register).

Do people die while on the waiting list?
Unfortunately, there are people who will die while on the waiting list for a lung transplant. In 2006, 36 people died waiting for a lung transplant down from 43 in 2005.

Sometimes candidates must withdraw from the waiting list because of some other medical condition that must be treated before they can become a transplant candidate again. As of the end of June 2006, 44 candidates who were previously on the active waiting list were placed “on-hold” due to some other medical complication (Source: Canadian Organ Replacement Register).
How long can people live after a lung transplant?
How long someone will survive after a lung transplant is impossible to predict because every person’s condition is different. Chronic rejection, infections, and side effects from anti-rejection medications affect survival.

For your particular health condition, age, and stage of disease, these survival rates may vary. The transplant team will discuss this with you in more detail during your assessment.

According to data from the Canadian Institute for Health Information (CIHI) website, “the 3 year survival rate has jumped from 60% in 1996 to 80% in 2006”. Additionally, in 2002, 4.4 transplants per million population were performed in Canada, compared to 3.7 in the US. Canada has consistently kept pace with the US in Lung Transplantation, even surpassing them from 2000-2002 and again in 2004.

Is it possible for the original lung disease to affect the transplanted lung(s)?
It is not likely to happen, but the transplant specialists will let you know whether or not this could be possible depending on your disease.

88% survive the first 3 months
85% survive the 1st year
80% survive 3 years
60% survive 5 years

(According to the Canadian Institute of Health Information; Treatment of End-Stage Organ Failure in Canada 1996-2005, 2007 Annual Report Published on February 28, 2008)