

ORGAN TRANSPLANT



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WHAT IS ORGAN TRANSPLANT?

- The moving of an organ from one body to another, for the purpose of replacing the recipient's damaged or failing organ with a working one from the donor site.
- Organ donors can be *living* or *deceased*.

TYPES OF TRANSPLANTS:

- **Autograft**
- **Allograft**
- **Isograft**
- **Xenograft and Xenotransplantation**
- **Split transplants**
- **Domino transplants**



Autograft

A transplant of tissue from one to oneself. Sometimes this is done with surplus tissue, or tissue that can regenerate, or tissues more desperately needed elsewhere.

- Sometimes an autograft is done to remove the tissue and then treat it or the person, before returning it.
- >skin grafts, vein extraction
- >storing blood in advance of surgery

Allograft

- An allograft is a transplanted organ or tissue from a genetically non-identical member of the same species. Most human tissue and organ transplants are allografts.



Isograft

- A subset of allografts in which organs or tissues are transplanted from a donor to a genetically identical recipient (such as an identical twin).
- Isografts are differentiated from other types of transplants because while they are anatomically identical to allografts, they don't trigger an immune response.



Xenograft and Xenotransplantation

A transplant of organs or tissue from one species to another. Xenotransplantation is often an extremely dangerous type of transplant.

- ❖ Examples include porcine heart valves, which are quite common and successful, a baboon-to-human heart (failed), and piscine-primate (fish to non-human primate) islet (i.e. pancreatic or insular tissue), the latter's research study directed for potential human use if successful.

Split transplants

- Sometimes a deceased-donor organ, usually a liver, may be divided between two recipients, especially an adult and a child.
- This is not usually a preferred option because the transplantation of a whole organ is more successful.

Domino transplants

- This operation is usually performed on patients with cystic fibrosis because both lungs need to be replaced and it is a technically easier operation to replace the heart and lungs at the same time.
- As the recipient's native heart is usually healthy, it can be transplanted into someone else needing a heart transplant.
- That term is also used for a special form of liver transplant in which the recipient suffers from familial amyloidotic polyneuropathy, a disease where the liver slowly produces a protein that damages other organs. This patient's liver can be transplanted into an older patient who is likely to die from other causes before a problem arises.

Major organs and tissues transplanted

Thoracic organs

- Heart (Deceased-donor only)
- Lung (Deceased-donor and Living-Donor)
- Heart/Lung (Deceased-donor and Domino transplant)

Abdominal organs

- Kidney (Deceased-donor and Living-Donor)
- Liver (Deceased-donor and Living-Donor)
- Pancreas (Deceased-donor only)
- Intestine (Deceased-donor and Living-Donor)
- Stomach (Deceased-donor only)

Tissues, cells, fluids

- Hand (Deceased-donor only)
- Cornea (Deceased-donor only)
- Skin including Face replant (autograft) and Face transplant (extremely rare)
- Islets of Langerhans (Pancreas Islet Cells) (Deceased-donor and Living-Donor)
- Bone marrow/Adult stem cell (Living-Donor and Autograft)
- Blood transfusion/Blood Parts Transfusion (Living-Donor and Autograft)
- Blood vessels (Autograft and Deceased-Donor)
- Heart valve (Deceased-Donor, Living-Donor and Xenograft[Porcine/bovine])
- Bone (Deceased-Donor and Living-Donor)

Living or deceased

- In **living donors**, the donor remains alive and donates a renewable tissue, cell, or fluid (e.g. blood, skin); or donates an organ or part of an organ in which the remaining organ can regenerate or take on the workload of the rest of the organ (primarily single kidney donation, partial donation of liver, small bowel).

- **Deceased (formerly cadaveric)** are donors who have been declared brain-dead and whose organs are kept viable by ventilators or other mechanical mechanisms until they can be excised for transplantation.
- There is increasing use of Donation after Cardiac Death - DCD- Donors (formerly non-heart beating donors) to increase the potential pool of donors as demand for transplants continues to grow.

Timeline of successful transplants

- 1905: First successful cornea transplant by Eduard Zirm
- 1954: First successful kidney transplant by Joseph Murray (Boston, U.S.A.)
- 1966: First successful pancreas transplant by Richard Lillehei and William Kelly (Minnesota, U.S.A.)
- 1967: First successful liver transplant by Thomas Starzl (Denver, U.S.A.)
- 1967: First successful heart transplant by Christiaan Barnard (Cape Town, South Africa)
- 1970: First successful monkey head transplant by Robert White (Cleveland, U.S.A.)
- 1981: First successful heart/lung transplant by Bruce Reitz (Stanford, U.S.A.)
- 1983: First successful lung lobe transplant by Joel Cooper (Toronto, Canada)
- 1986: First successful double-lung transplant (Ann Harrison) by Joel Cooper (Toronto, Canada)
- 1987: First successful whole lung transplant by Joel Cooper (St. Louis, U.S.A.)
- 1995: First successful laparoscopic live-donor nephrectomy by Lloyd Ratner and Louis Kavoussi (Baltimore, U.S.A.)
- 1998: First successful live-donor partial pancreas transplant by David Sutherland (Minnesota, U.S.A.)
- 1998: First successful hand transplant (France)
- 2005: First successful partial face transplant (France)
- 2006: First successful penis transplant (China)
- 2014: First successful uterine transplant resulting in live birth (Sweden)

What Is The Maximum Time Span Between Recovering Organs/Tissues and Transplantation?

Span Between Recovering

- Lung (4-6 hours)
- Heart (4-6 hours)
- Liver (24 hours)
- Pancreas (24 hours)
- Kidney (72 hours)
- Corneas (14 days)
- Bone (5 years)
- Skin (5 years)
- Heart valves (10 years).



How are organs allocated?

- ABO blood type
- Medical urgency
- Time on the waiting list
- Geographic location

Transplant Rejection

Transplant rejection

- Hyperacute
 - Occurs minutes to hours after transplantation
 - No treatment (organ must be removed)
- Acute
 - Occurs days (one week) to months after transplantation
 - T- cytotoxic lymphocytes attack the transplanted organ
- Chronic
 - Occurs over months to years
 - Most common in lung transplants

Some Common Signs & Symptoms

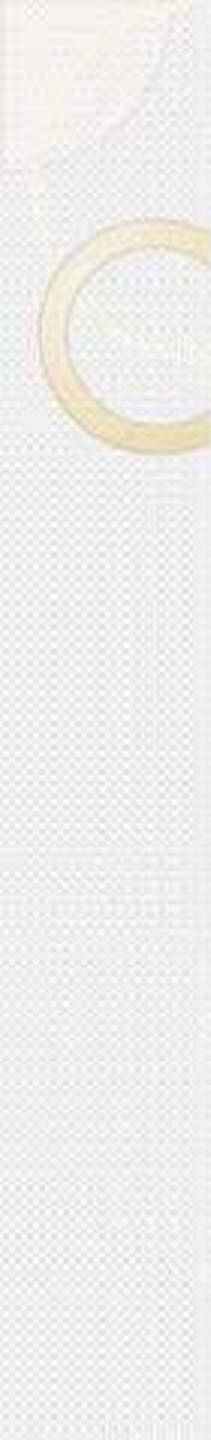
- Pain at the site of the transplant
- Feeling ill
- Flu-like symptoms
 - Fever
- Weight change
 - Swelling
- Decreased urine output

Immunosuppressive Therapy

- Triple therapy (all PO/IV)
 - Cyclosporine
 - Prevent a cell-mediated attack (helper T-cells) against the organ
 - Corticosteroid: prednisone-methylprednisolone (Solu-Medrol)
 - Suppress inflammatory response
 - Cytotoxic drug: mycophenolate mofetil (CellCept) or cyclophosphamide (Cytoxan)
 - Suppress immune response by inhibiting proliferation of T and B cells
- Monoclonal Antibodies: muromonab-CD3
 - Used for preventing and treating acute rejection episodes
- Polyclonal Antibodies: Atgam
 - Used as induction therapy or to treat acute rejection

Immunosuppressive Therapy: Side Effects

- Nephrotoxicity
- Increased risk of infection
- Lymphoma
- Hepatotoxicity
- Neutropenia
- Thrombocytopenia
- Diarrhea/nausea/vomiting

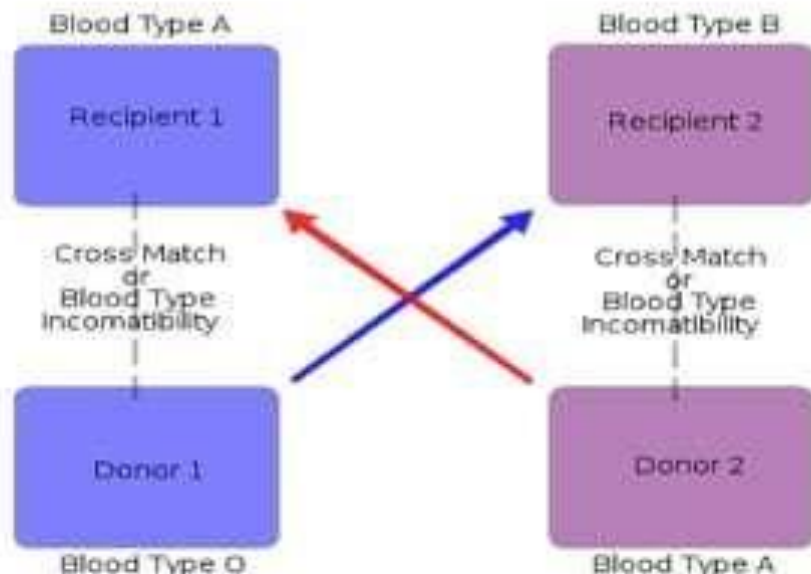


REASON FOR DONATION

Living related donors

Living related donors donate to family members or friends in whom they have an emotional investment. The risk of surgery is offset by the psychological benefit of not losing someone related to them, or not seeing them suffer the ill effects of waiting on a list.

Paired-exchange



Good Samaritan

- "Good Samaritan" or "altruistic" donation is giving a donation to someone not well-known to the donor. Some people choose to do this out of a need to donate.



Forced donation

- There have been various accusations that certain authorities are harvesting organs from those the authorities deem undesirable, such as prison populations.



Allocation of donated organs

- The overwhelming majority of deceased-donor organs in India are allocated by National Organ and Tissue Transplant Organization (NOTTO).
- It Functions as apex centre for All India activities of coordination and networking for procurement and distribution of Organs and Tissues and registry of Organs and Tissues Donation and Transplantation in the country. The following activities would be undertaken to facilitate Organ Transplantation in the safest way in shortest possible time



Ethical Issues Regarding Procurement of Organs and Tissues.

- Buying and Selling Human Organs and Tissues
- Media Publicity
- Types of Consent (Voluntary or Expressed, Family, Presumed, Required Request, Routine Inquiry).



STATES WITH DECEASED ORGAN DONATION ACTIVITY



ORGAN DONATION

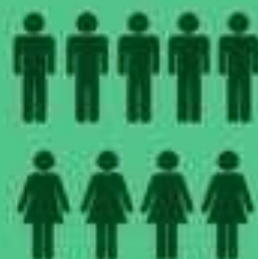
ORGANS THAT CAN BE DONATED



Tissues that can be donated following death:
i.e. corneas, heart valve, eardrum, ear bones, tendons and skin



1 donor can save upto 9 lives



DEMAND SUPPLY GAP



5,000

kidney transplants are carried out against a requirement of over 1,75,000



1,000

liver transplants are done while over 50,000 perish due to end stage liver disease



The annual requirement of heart is estimated to be around 50,000 and lungs about 20,000.



Organ donation rate in India after brain death increased from **0.05** per million population in 2006 to **0.34** million population in 2014.

2014

There were **411** donations after brain death in country. This resulted in the transplantation of **720** kidneys, **354** livers, **54** hearts and **16** lungs.

DONOR CRISIS

Need vs availability of organ donors in India (annually)

KIDNEY

Needed per year

175,000



Availability
of donors | 5,000

HEART

Needed

50,000



No. of transplants
carried out | 30

LIVER

Needed

50,000



No. of transplants
carried out | 700

CORNEA

Needed

1 Lakh



No. of transplants
done | 25,000

► First kidney transplant in India carried out in 1972. Only 20,952 renal transplants have taken place between 1972 and 2011

► First heart transplant took place in August 1994, at AIIMS



Table 5

State / UT	No. of Deceased Multi-Organ Donors		
	2012	2013	2014
Tamil Nadu	83	131	136
Kerala	12	35	58
Maharashtra	29	35	52
Andhra Pradesh	13	40	52
Karnataka	17	18	39
Gujarat	18	25	28
Delhi-NCR	12	27	20
Puducherry	-	2	13
Uttar Pradesh	-	-	7
Chandigarh	12	-	6
Total	196	313	411



Why Donate?

Each year, thousands of people die while waiting for a transplant, because no suitable donor can be found for them. The need for organ donors has never been greater.

Did you know In India every year nearly:

- 500,000 people die because of non-availability of organs
- 200,000 people die of liver disease
- 50,000 people die from heart disease
- 150,000 people await a kidney transplant but only 5,000 get one
- 1,000,000 lakh people suffer from corneal blindness and await transplant

Nationally, with a population of 1.2 billion people, the statistic stands at 0.34 persons as organ donors per million population (PMP). This is an incredibly small and insignificant number compared to the statistics around the world.

It is difficult to think about organ donation when you have just lost a loved one; however organ donation is a generous and worthwhile decision that can save many lives. By donating, each person can save the lives of upto 7 individuals by way of organ donation and enhance the lives of over 50 people by way of tissue donation.

Gift an organ, **save a life**



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