SEPTEMBER : 2024, VOL : 06, ISSUE : 08

V-Discover

THE STUDENTS DIGITAL MAGAZINE

Theme : ORGAN TRANSPLANTATION

VIVEKANANDHA EDUCATIONAL INSTITUTIONS FOR WOMEN ★ 1992 ★ WOMEN EMPOWERMENT

SWAMY VIVEKANANDHA COLLEGE OF PHARMACY

Elayampalayam - 637 205, Tiruchengode, Namakkal Dt.,

www.svcop.ac.in

ORGAN TRANSPLANTATION

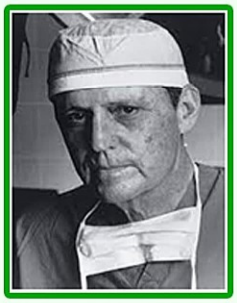
GLOBAL TRANSPLANTATION MARKET INSIGHTS FORECASTS TO 2032

Organ transplantation is a medical procedure in which an organ is removed from one body and placed in the body of a recipient, to replace a damaged or missing organ. The donor and recipient may be at the same location, or organs may be transported from a donor site to another location. Transplants can involve organs such as the heart, kidneys, liver, lungs, pancreas, and intestines, as well as tissues like corneas, bones, and skin.

GLOBAL TRANSPLANTATION MARKET INSIGHTS FORECASTS TO 2032

The Global Transplantation Market Size was valued at USD 8.5 Billion in 2022.The Market is Growing at a CAGR of 9.5% from 2022 to 2032. The Worldwide Transplantation Market Size is expected to reach USD 21.2 Billion by 2032. Asia Pacific is expected to grow the fastest during the forecast period.

HISTORY OF TRANSPLANTATION



Thomas Earl Starzl

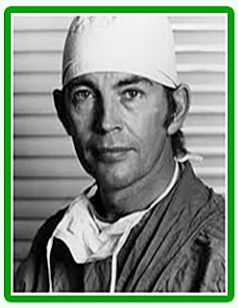
FATHER OF LIVER TRANSPLANT

Performed the first human liver transplant in 1963. Developed the clinical applications of cyclosporin and contributed to the field of immunosuppression

Scientific career

Fields: Transplantation surgery, Immunology

Institutions: University of Pittsburgh



Christiaan Neethling Barnard

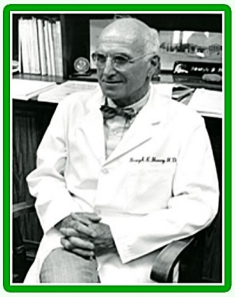
FATHER OF HEART TRANSPLANT

First successful human-to-human heart transplant Medical career

Scientific career

Fields: Sub-specialties, Cardiothoracic surgery, Heart transplantation

Institutions: Groote Schuur Hospital, University of Minnesota



Joseph Murray

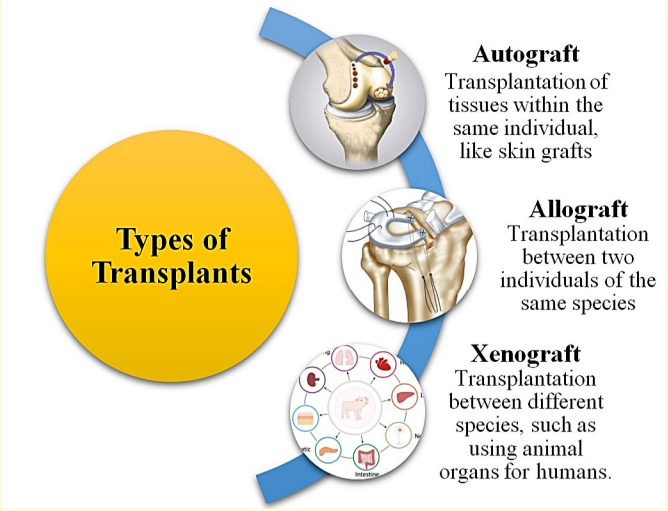
FATHER OF KIDNEY TRANSPLANT

Known for first successfulorgan transplant
Nobel Prize: Physiology or Medicine (1990), Golden Plate Award (1991), Laetare Medal (2005)

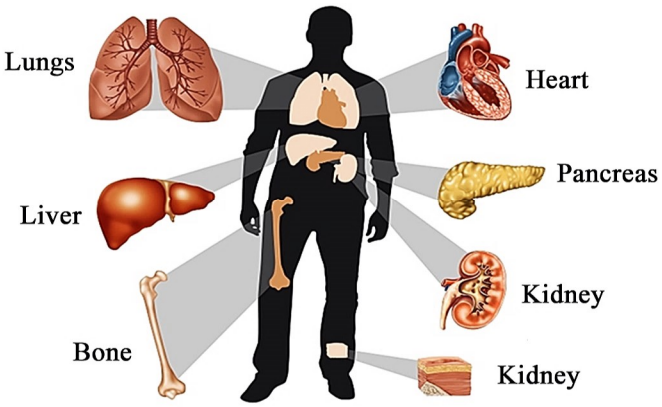
Scientific career
Fields: Plastic surgery, reconstructive surgery, transplantation

Institutions: Harvard Medical School, Mass General Brigham

KEY ASPECTS OF ORGAN TRANSPLANTATION



TYPES OF ORGAN TRANSPLANTS



An organ transplant is usually only considered after all other treatments have failed and your medical specialists believe you will benefit from a transplant. This is because there are not enough of organs available for transplant. Also, receiving an organ transplant carries risks and has lifelong consequences for your health.

- ✓ *a heart transplant if you have heart failure*
- ✓ *a lung transplant if you have cystic fibrosis or emphysema*
- ✓ *a kidney transplant if you have kidney failure*
- ✓ *a liver transplant if you have liver failure*
- ✓ *a pancreas transplant if you have diabetes*

TIMELINE OF SUCCESSFUL ORGAN TRANSPLANTS

- *1908- First transplant of a knee*
- *1909- First recorded kidney transplant, animal to human*
- *1936- First human-to-human kidney transplant*
- *1953- First successful surgery using heart-lung bypass*
- *1954- First successful kidney transplant*
- *1963- First successful lung transplant*
- *1967-First successful liver transplant*
- *1968- First successful heart transplant in the U.S*
- *1973-First successful bone marrow transplant 1998- First successful and trans*

FIRST HUMAN TRANSPLANT

Like all medical breakthroughs, this one was built on earlier advances. 1967 saw the first successful human heart transplant anywhere in the world. That patient, Louis Washkansky, 53, was terminally ill with heart failure. His surgeon at Groote Schuur Hospital in Cape Town, South Africa was Christiaan Barnard.

FIRST TRANSPLANTED ORGAN

The world's first successful organ transplant was kidney transplantation which was undertaken by David Hume and Joseph Kelly at the Peter Brigham Hospital in Boston in 1954. On June 17th 1950 Dr. Richard Lawler performed the first successful kidney transplant. The recipient was Ruth Tucker, a 44-year-old woman who had polycystic kidney disease (PKD).

FIRST ANIMAL-TO-HUMAN ORGANTRANSPLANT

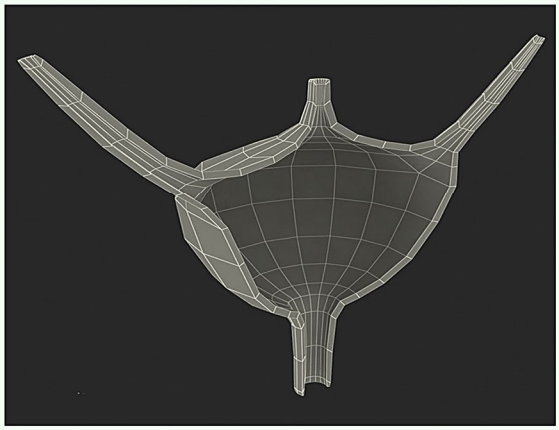
Remarkably, in 1838 the first cornealxenotransplantation (from a pig) was performed in a patient, whereas the first corneal allograft (human-to-human) was not carried out until more than 65 years later, in 1905.

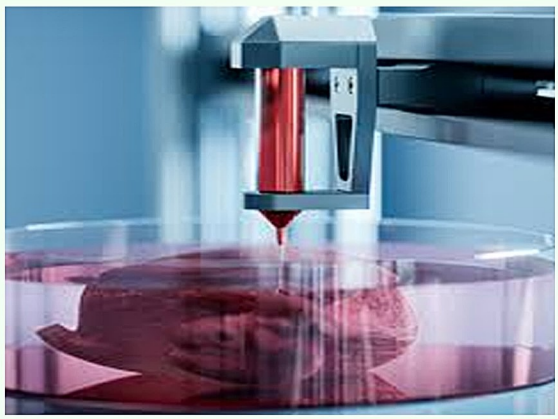
HARDEST ORGAN TO TRANSPLANT

Lungs are the most difficult organ to transplant because they are highly susceptible to infections in the late stages of the donor's life.

THE FIRST 3D ORGAN TRANSPLANT

The first 3D-printed organ that was transplanted into a human was a bladder in 1999 by scientists at the Wake Forest Institute for Regenerative Medicine. And it's still fully functioning more than a couple of decades later.





DRUGS INVOLVED IN ORGAN TRANSPLANTATION

Types of Drugs Used

S.No	Class of immunosuppressive drugs	Drugs	Mechanism of Action
01	Corticosteroids	Methylprednisolone Prednisone	Regulators of gene expression
02	Antimetabolites	Mycophenolate mofetil	Inhibitors of de novo purine synthesis in lymphocytes
03	Biologic agents	Polyclonal antibodies (ATGAM, Thymoglobulin)	Lysis of lymphocytes
		Monoclonal antibodies (Muromonab, Daclizumab, Basiliximab, Rituximab, Alemtuzumab)	Blockers of T lymphocyte activation
04	Calcineurin inhibitors	Cyclosporine A Tacrolimus	Inhibitors of an intracellular phosphatase required for interleukin 2 production in the T lymphocyte
05	Non-calcineurin inhibitors	Sirolimus Everolimus	Inhibitors of mammalian target of rapamycin (mTOR) activation in lymphocytes, resulting in cycle cell arrest and blockade of T-cell proliferation

Beaumont Hospital

Transplant Medication

Prograf (Tacrolimus)
0.5mg 1mg 5mg

Anti Rejection
Dose varies depending on levels, take at 10am and 10pm. Should be taken on an empty stomach i.e. 1 hour before or 2 hours after food. **Do not take prior to blood level being taken on day of clinic visit.**

Mycolat (Mycophenolate Mofetil) 250mg

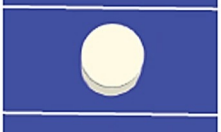
Anti Rejection
Take 2 caps at 10am and 10pm. Chemist may supply 500mg tab (purple tablet). Dose may be increased by Renal Team. The only brands you should receive are Mycolat or Cellcept if the chemist cannot supply Mycolat.

Septrin (Co-trimoxazole)
480mg

Antibacterial, used to prevent PCP Pneumonia.
Take 1 tab at night.

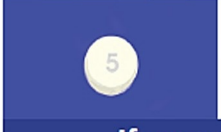
Valcyte (Valganciclovir)
450mg

Anti Viral to prevent CMV infections, not all patients will require this therapy. Dose is dependent upon renal function. Initial dose is usually 1 tablet three times a week. This may increase to one or two tablets once daily as renal function improves.



Ranitidine
150mg

To protect the stomach.
Certain patients will continue on PPI therapy eg. Lanzaprazole, Omeprazole, and not receive Ranitidine.



Prednisolone
5mg

Steroid
Anti Rejection.
Take 4 tabs at 10am. Dose will be reduced by Renal Physician after discharge. Also available in enteric coated tablets.

If unsure please confirm with Transplant Team, Renal Team or Hospital Pharmacist

DRUGS AND COMMON SIDE EFFECTS IN ORGAN TRANSPLANTATION

Drugs	Common side effect
Prednisolone	Weight gain, high blood pressure, gastric irritation, increased appetite, increased risk of diabetes, osteoporosis, cataract
Cyclosporine	High blood pressure, mild tremor, excess hair growth, swelling of gum, increased risk of diabetes, kidney damage
Azathioprine	Bone marrow suppression, increased risk of infection
MMF	Abdominal pain, nausea, vomiting and diarrhea
Tacrolimus	High blood pressure, diabetes, tremor, headache, kidney damage
Sirolimus/everolimus	High blood pressure, low blood cell count, diarrhea, acne, joint pain, increased cholesterol, triglycerides

Legal Framework

THOA 1994 (Transplantation of Human Organ Act)
June 1994-Indian Parliament
July 8,1994-President of India gave his assent
Feb 4, 1995-Came in force by Official gazette notification
(Regulates the removal of Organ from Living as well as the death)

The Transplantation of Human Organs Act (THOA), 1994	Main purpose of the Act is to regulate the removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs.
Transplantation of Human Organs (Amendment) Act 2011	The Act was amended in 2011 and has come into force on 10-1-2014 in the States of Goa, Himachal Pradesh, West Bengal, and Union Territories. Other States who have adopted the amendment Act till date are Rajasthan, Sikkim, Jharkhand, Kerala, Orissa, Punjab, Maharashtra, Assam, Haryana, Manipur, Gujarat, Bihar and Uttar Pradesh
Transplantation of Human Organs and Tissues Act (THOTA), 1994.	Brain Stem death is recognized as a legal death in India under the (THOTA) Act, since 1994 like many other countries, which has revolutionized the concept of organ donation after death. After natural cardiac death only a few organs/tissues can be donated (like cornea, bone, skin and blood vessels) whereas after brain stem death almost 37 different organs and tissues can be donated including vital organs such as kidneys, heart, liver and lungs.
Transplantation of Human Organs and Tissues Act (THOTA), 2014	In pursuance to the Amendment Act, the (THOTA)have been notified on 27th March, 2014. The amended Act and revised Rules have many provisions for promotion of organ donations from cadavers.

ORGANIZATION INVOLVED IN ORGAN TRANSPLANTATION

There are a number of organizations in India that are involved with organ transplantation research and awareness, including

NOTTO	**National Organ and Tissue Transplant Organization** The apex center for coordinating and networking organ and tissue procurement and distribution, and for registering organ and tissue donations and transplantations.
MOHAN Foundation	An organization that conducts research on the social, legal, and ethical aspects of organ donation and transplantation. Their research is published in leading Indian and international journals.
INOS	**Indian Network for Organ Sharing** An organization formed in Tamil Nadu in 1999 that includes Apollo Hospitals, Sri Ramachandra Hospital, Sundaram Medical Foundation, and Christian Medical College Hospital, Vellore
ROTTO States	**Regional Organ and Tissue Transplant Organisations (ROTTO)** Institute of PG Medical Education and Research, Kolkata (West Bengal) PGIMER Chandigarh (UT of Chandigarh)

ORGANIZATION INVOLVED IN ORGAN TRANSPLANTATION

Stem Cell Transplant (Bone Marrow Transplant)

Stem cell transplants are procedures to replace cancerous, abnormal or damaged stem cells with healthy ones. This procedure may be called a bone marrow transplant. Most transplants use peripheral blood stem cells, which are immature stem cells in your bloodstream, but some use bone marrow or umbilical cord blood stem cells. If you receive a stem cell transplant, your provider may use your own healthy stem cells or donated stem cells. Healthcare providers use this procedure to treat certain kinds of cancer, blood disorders and autoimmune diseases.

- **Organ-perfusion systems**

  These mechanical devices, like the "heart in a box" and ex vivo lung perfusion, help keep organs viable outside the body.

- **Gene editing**

  Gene editing technologies like CRISPR/Cas9 can be used to create genetically modified pigs that are more compatible with humans.

- **Artificial intelligence (AI)**

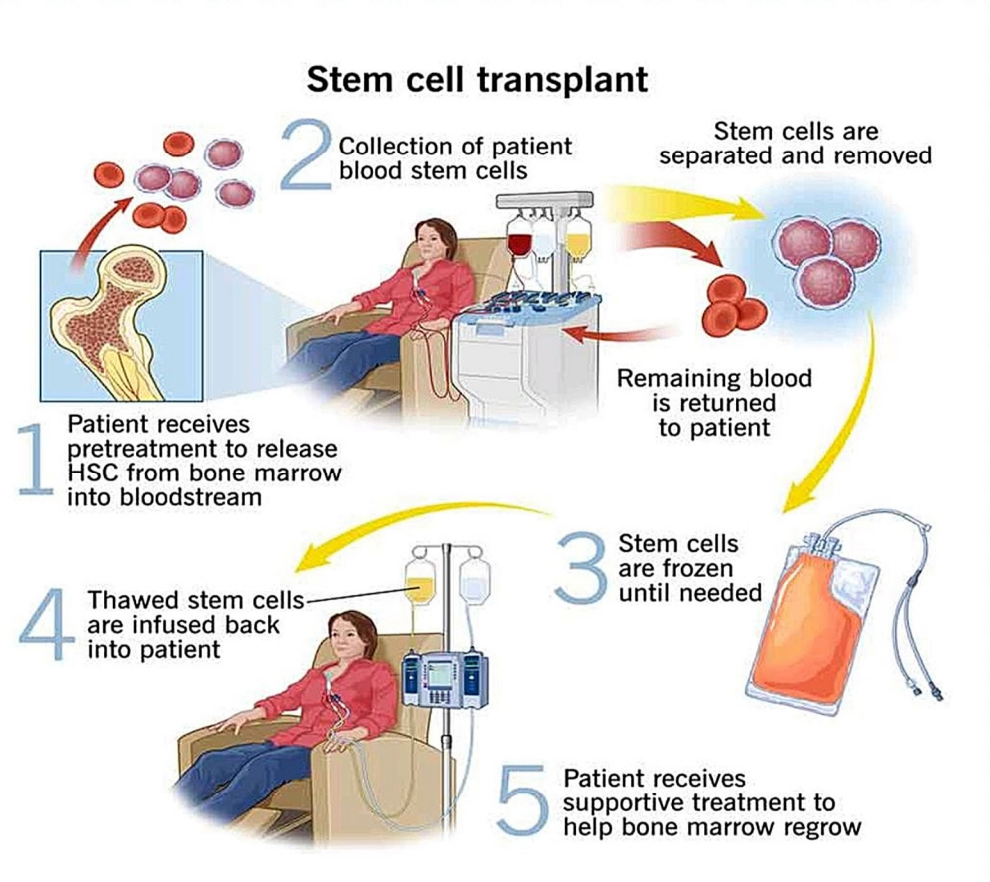
  AI can help with organ transplantation through improved donor-recipient matching, immunosup pression, and allocation algorithms.

- **Normothermic regional perfusion (NRP)**

  This technique restores blood flow and sometimes the heartbeat after a patient has been declared dead.

- **Immunomodulation**

  An individualized approach to immunomodulation is needed to minimize graft rejection, limit side effects, and combat organ shortage



SWAMY VIVEKANANDHA MEDICAL COLLEGE HOSPITAL AND RESEARCH INSTITUTE

Elayampalayam - 637 205, Tiruchengode, Namakkal Dt.,
website : svmchri.com, e-mail : svmchriadmissions@vivekanandha.ac.in

- Accident and Toxicology Emergency Care
- General Medicine
- Diabetology
- Cardiology
- Obstetrics and Gynecology
- Orthopedic Surgery
- General Surgery
- Pediatrics
- Physiotherapy & Rehabilitation
- Nephrology
- Ophthalmology
- Medical Oncology
- Radiology (CT / MRI / USG)
- ENT
- Obesity and Fitness Center
- Nutrition and Dietetics
- 24 hrs Cath Lab
- Laparoscopic Surgery
- Neurology
- Master Health Check - UP
- Dental Care

VIVEKANANDHA
MEDICAL CARE HOSPITAL

NABH Pre Accredited

Elayampalayam, Tiruchengode Taluk, Namakkal Dist, Ph : 04288 - 224422, 7373100100

24 Hours Emergency Cardiac Center

24 HOURS EMERGENCY AMBULANCE CONTACT

7373 100 100

Thiru Balaji Scan Centre, Allwin Diagnostics (P) Ltd.,

Main Campus : Elayampalayam, Tiruchengode, Namakkal Dt., Tamilnadu.
Branch : Tiruchengode Town.
Mail : care@vivekanandha.hospital / Web : vivekanandha.hospital