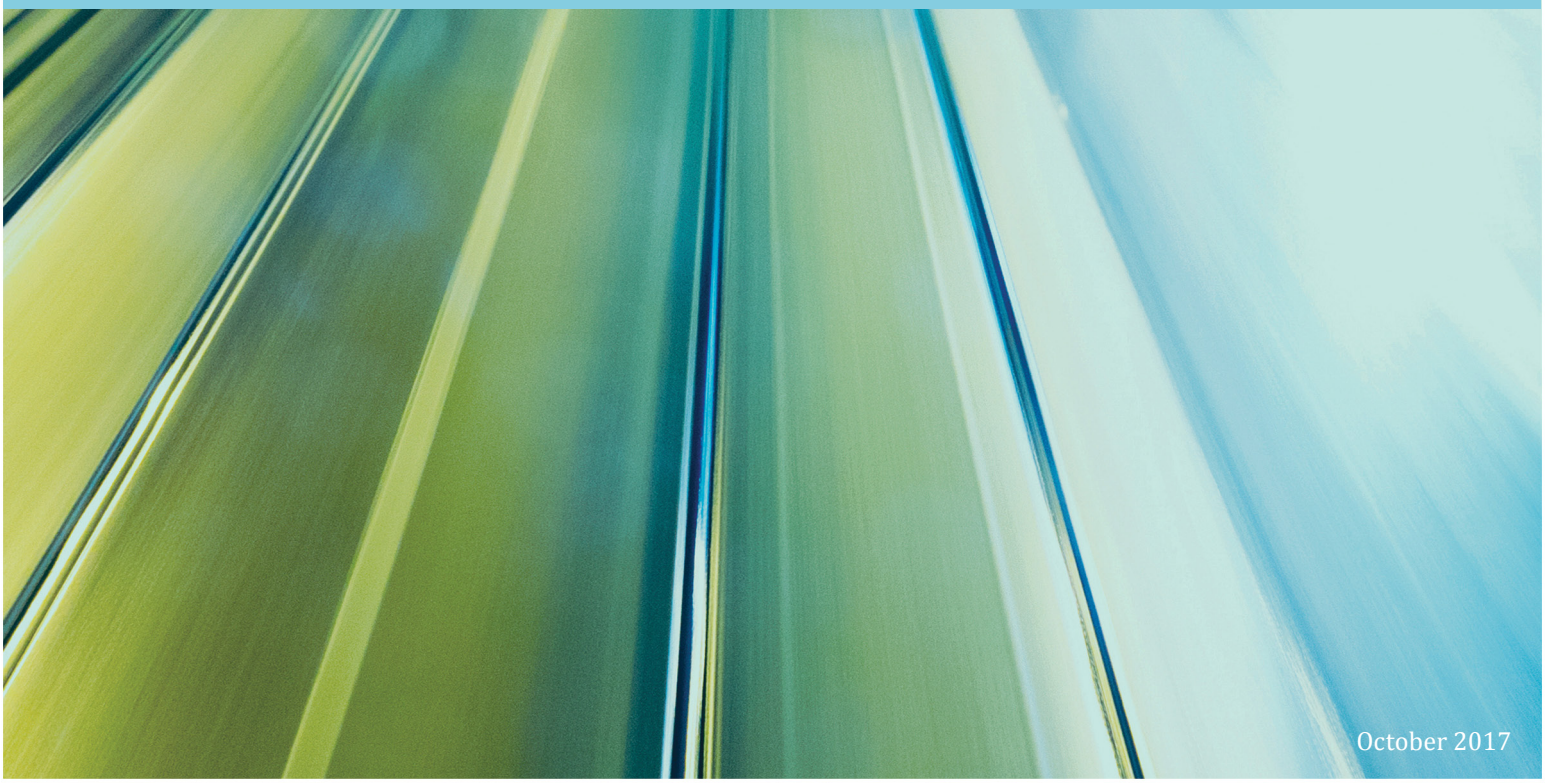
YOUTH EDUCATIONAL GUIDE

ORGAN, EYE AND TISSUE DONATION SAMPLE LESSON PLANS COMPILED BY THE DONATE LIFE YOUTH EDUCATION COMMITTEE



October 2017

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Donate Life America is a 501(c)3 nonprofit alliance of national organizations and Donate Life State Teams across the United States committed to increasing the number of donated organs, eyes and tissue available for transplant to save and heal lives, while continuing to develop a culture where donation is embraced as a fundamental human responsibility.

DONATE LIFE AMERICA:

- Manages and promotes the national brand for donation, *Donate Life*[SM]
- Develops and executes effective multi-media donor education programs
- Motivates the American public to register now as organ, eye and tissue donors
- Maintains the National Donate Life Registry, **RegisterMe.org**
- Assists Donate Life State Teams and national partners in facilitating high-performing donor registries and promoting the option of being living donors

Driver's Education

Subject Area: Driver's Education

Grade Level: 9-12 (ages 14 - 18)
Time: 30 minutes

Overview: This lesson will use a short reading, videos and discussion to introduce students to the civic and health aspects of organ, eye and tissue donation, the concept of registration, and the importance of talking to one's family about donation.

Preparation:

- Make copies of handouts for students:
  - *Organ, Eye and Tissue Donation (page 10)*

Lesson:

1. 5 minute warm-up: ask students to share with a partner their thoughts and opinions on organ, eye and tissue donation.
2. Distribute handouts. Ask students to independently read the text.
3. Show the 5-minute video from the U.S. Department of Health and Services.

"Donation and Transplantation: How does it work?"
https://youtu.be/EotfVEtV7CM

4. 10 minute class discussion to check for understanding. Some questions to spark conversation:
   a. How does one become an organ, eye and tissue donor?
   b. How is the medical system set up to prevent doctors from having to decide between treating one patient and losing another?
   c. What do you think stops people from deciding to be organ, eye and tissue donors?
   d. What is the difference between a living donor and a deceased donor?
   e. What is the difference between brain death and a coma? Can you become a donor if you are in a coma?
5. Ask students to discuss their decision about donation with their family tonight.

Donation Basics

Subject Areas: Health

Grade Level: 7-12

Time: One to two class sessions, 45-60 minutes

Overview: This lesson introduces students to the concept of organ, eye and tissue donation in the United States, emphasizing anatomical and philanthropic vocabulary.

Lesson Objective: Students will use texts and multimedia resources to understand the meaning of and apply key vocabulary in order to organize, summarize and present main ideas in both written and oral form.

Preparation:

- Make photocopies of handouts for students
  - *Story of Hope* (several) (page 36)
  - *Organ and Tissue Donation* (handout completing Driver's Education lesson) (page 10)

Lesson:

1. Place key vocabulary on the board. Assign students to create flashcards with either textual or pictorial representations.

   The Body: Organ – Heart, Liver, Kidneys, Lungs, Pancreas, Intestine; *Tissue* – skin, bone, tendon, ligament, vein, heart valve; *Eye* – Cornea
   Donation – Deceased Donor, Living Donor, registration, lifesaving, life-enhancing, gift of life, hope, death, pass away, stranger
   Transplant – second chance, health, mobility, sight, survive
   Donation in the United States – federal law, waiting list, national allocation system, altruism

2. Distribute photocopies of one or several *Stories of Hope*. Encourage students to read their stories and summarize them in their own words. Then, find a student who has a different story, and take turns sharing the stories.
3. Distribute the one-page handout *Organ, Eye and Tissue Donation*.
4. Emphasize that in the United States, it is illegal to buy or sell human organs. Ask students if this is true or false in their own countries.
5. Writing/Reading exercise: Pose students the following questions:
   a. If you were sick and needed a transplant to survive, would you accept a donated organ?
   b. Do you think organ transplants are a good thing or a bad thing? Why?
   c. Would you allow the organs of a loved one to be donated after they die?
   d. Would you donate a kidney to save the life of a friend? A family member?
   e. How would you feel if you were told you needed an organ transplant to live?
   f. How would you feel if you were told you needed a cornea transplant in order to see?
   g. How would you feel if you were told you needed a bone transplant in order to save your arm from cancer?

Assessment:

- Oral and written responses to questions
- Encourage students to make posters, brochures and flyers in their primary language; seek proofreaders from the community

Cellular Identity: How Does the Body Detect which Cells Belong?

Subject Areas: Science, Health Careers

Grade Level: 10-12 (ages 16 - 18)

Time: At least one full class period, 45 - 90 minutes; time outside of class as necessary

Overview: This lesson reinforces the students' understanding of how the body recognizes its own cells and knows to attack foreign cells. It asks students to relate this recognition to the importance of matching donor tissue with recipient tissue in organ transplants. Students will describe the cell membrane, define cell surface markers, and explain the matching process for organ transplants.

Lesson Objective: Students will understand how the body recognizes its own cells and knows to attack foreign cells. They will be able articulate the importance of matching donor tissue with recipient tissue in organ transplants.

Preparation:

- Biology or Anatomy resource reviewing cell structures
- Photocopies of "In Focus: Organ Transplants", found in *Advanced Readings (page 14)*
- Index cards, prepared in advance with the following (scale to class size) and placed in large envelope
    - 5 blue triangles, 5 red triangles; 5 blue circles, 5 red circles; 5 "Donor" cards, 5 "Antibody" cards

Lesson:

1. Introduce the topic by asking students to write/discuss an anticipatory set of questions:

    a) Assume you are the referee at a football game. How would you know which players belong on the field when the game starts? (Color of the jerseys)
    b) If a player didn't have the correct jersey, what would you do? (Get rid of him!)
    c) How do you know where the player should be? (By the number on his jersey, certain numbers are allowed to be in certain areas and do certain things.)
    d) Relate this to the human body. The body must be able to recognize which cells belong to it (good), which cells don't (bad), where the cells should be and which job the cell should be doing.

2. Utilize biology or anatomy references to review the structure of the cell membrane. The proteins in the cell membrane have several functions. One of these is to act as a cell marker, identifying each cell as belonging to your body. These markers, organized before you were even born, tell your cells where to go and which cells to join. If a cell has a different marker, the body's defenses recognize it as being foreign and attack and destroy it.

3. Distribute *In Focus: Organ Transplants* reading section to review the role which cell surface markers play in transplantation, ABO compatibility, HLA compatibility and crossmatching.

4. Have students complete Activity #1.

   Students draw a card that has a specific shape and color out of an envelope. At the signal, all students (cells) with the same shape and color on their card cluster together. Students with the word “donor” on their card join the different groups. As the students are in the groups, the students playing “antibodies” move around the room and remove any “cells” that don’t have the correct marker on them. They are “destroyed”. “Antibody” students explain what they are looking for and how they recognize “foreign” cells.

5. Have students complete Activity #2.

   Using readings and online research as necessary, students will design a Compatibility Flowchart following the steps in selecting an appropriate donor for a recipient of a new heart.
   - The role of antigens
   - Blood type compatibility
   - HLA compatibility
   - Crossmatching

Donation Debate

Subject Areas: Health, Science, Health Careers

Grade Level: 10-12 (ages 16 - 18)

Time: One to two full class periods, 45 - 90 minutes. It is recommended that this lesson follow a basic introduction to donation.

Overview: This lesson offers five different scenarios in which two people – both in need of a lifesaving organ transplant – would each be a compatible recipient for the same donated organ. The question posed to students in each scenario is: Who should receive the donated organ and why?

Lesson Objective: Students will produce rigorous evidence-based group discussions and individual writing through a sequence of specific, thought-provoking and policy-based scenarios and resources.

Preparation:

- Make photocopies of handouts for students
  - "In Focus: Deceased Organ Donation" section of *Advanced Readings (page 14)*
  - Donation Debate Organizer handout (page 11)
  - Donation Scenarios (next page)

Lesson:

1. Distribute "In Focus: Deceased Organ Donation" section of *Advanced Readings*, paying special attention to organ allocation and ethics.

2. Use the following questions to guide class discussion; can be adapted as a writing exercise:

   - What would happen if people were allowed to buy organs from organ procurement organizations or individuals?
   - Why has the Federal government created an entity to set policies on how scarce organs will be allocated?
   - Do wealthy or famous individuals have ways of obtaining donated organs that are unavailable to most Americans?
   - Would it be an infringement of individual rights if we changed the donation policy so that all people are donors unless they sign a card saying they do not want to donate?
   - If more or fewer organs were available for transplantation, do you think current organ allocation polices would be changed?

3. Below are three options for structuring your class debate:

   Option #1: Divide the class into ten groups. Assign one of the ten people depicted in the five scenarios to each group, so that for each scenario there is one group defending each position. Provide a Debate Organizer to each student and an additional debate organizer for the group. Explain to students that they are to use the organizer to formulate and support an argument supporting their choice. After students complete their group's organizer, have them conduct a short debate in front of the class with the group with the opposing position. After each debate, use Scenario Outcomes to explain to students how such a case would be decided under current policies. Engage students in a discussion of whether they think these policies are effective in ensuring that donated organs go to the most appropriate candidates or if these policies should be changed.

   Option #2: Divide the class into five groups and assign each group to a different scenario. Provide a Debate Organizer to each student and one Debate Organizer to the group. Have each group decide collectively who they think should receive the donated organ and fill out their organizer to justify their position. Display the group's position using a projector and have students present the position they took and their arguments in support of their position. After each presentation, inform students which way each case would be decided under current policies. Engage students in a discussion of whether they think these policies are effective in ensuring that donated organs go to the most appropriate candidates or if these policies should be changed.

   Option 3: Randomly assign each student to one of the five scenarios. Provide students with a Debate Organizer and ask each student to formulate their own opposition and individually fill out the organizer. For each person depicted in the scenarios, ask a student who has taken the position for that person to read the scenario aloud and explain his or her decision (and justifications for that decision) to the class. Share the Donation Scenario Outcomes so students can see how these difficult decisions would be decided under current policies.

Assessment:
As an in-class or homework assignment, ask students to write a persuasive essay evaluating the way these policies determine the allocation of donated organs.

Organ, Eye and Tissue Donation

When you receive your license or permit, you will be asked if you want to be a donor. What does it mean to be a registered donor?

Why Register?
There are nearly 120,000 patients on the national organ transplant waiting list, each one reliant on the compassion and generosity of another for a lifesaving gift of organ, eye or tissue donation from a deceased donor. While many will be transplanted, there are some who sadly will not. An average of 22 people die each day because the organs they need are not donated in time.

Should the Unthinkable Happen…
Registering as a donor indicates that you wish to donate any viable organs or tissues that could save someone else's life or restore someone's vision or mobility, through transplantation after you pass away. When individuals document this decision by registering – whether at DMV or directly on the National Donate Life Registry – their family can take comfort in knowing that their loved one's wishes. One organ, eye and tissue donor can save and heal more than 75 people!

Registering as a donor does not necessarily mean you will **become** a donor after you pass away. In fact, less than 1% of the American population die under the specific, and rare, medical circumstances necessary to support organ donation. This video explains why:

"Donation and Transplantation: How does it work?"
U.S. Department of Health and Human Services

Talk to Your Family.
If you are under the age of 18, donation never occurs without family authorization. This is why it is important to talk to your family about your decision – whether or not you wish to be a donor, you and your family should know what everyone's wishes are. Do you know what *your* loved ones think about organ, eye and tissue donation?

If you wish to document your decision to be an organ, eye and tissue donor, you can say "yes" when getting your driver's permit/license at DMV, or register directly on the National Donate Life Registry (see below). You do *not* need parental permission to register.

More Information about the National Donate Life Registry and Donation:
Donatelife.net
RegisterMe.org

Donation Debate Organizer

Three reasons we/I support this position:	*People who disagree with this position would probably argue these three points:*	*We/I would respond to their three points by arguing:*
1.		
2.		
3.		

ABOUT ORGAN, EYE AND TISSUE DONATION

WHAT IS ORGAN, EYE AND TISSUE DONATION?

When you sign up to be an organ, eye and tissue donor on the National Donate Life Registry – RegisterMe.org – or with a state registry, you are registering your decision to become a donor upon your death. This document of gift provides legal authorization to have your organs, corneas and/or tissue made available for those in need of lifesaving and healing transplants.

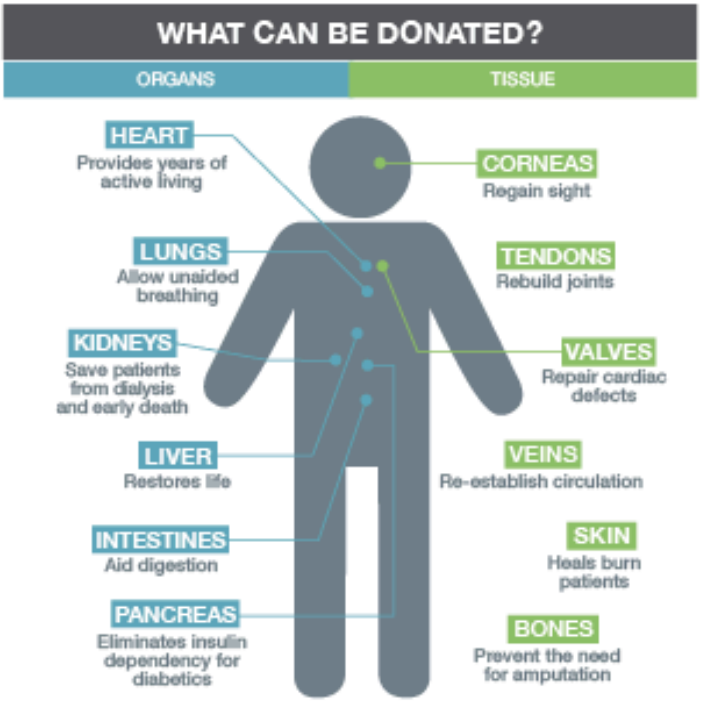
Donors are often people who died suddenly and unexpectedly. Their families are then faced with making the decision at a time of shock and grief. Registering now relieves your family of this burden and serves as a real gift to them, as well as to the grateful recipients of your donation.

WHAT ABOUT LIVING DONATION?

When a person registers as a donor with the National Donate Life Registry or a state registry, they are registering for deceased donation. Living donation is not included in your donor registration.

A kidney from a living donor offers patients an alternative to years of dialysis and time on the national transplant waiting list. The living donor's remaining kidney will enlarge, doing the work of two healthy kidneys. A part of the liver may also be donated. The remaining portion will regenerate and regain full function. Partial lung, intestine and pancreas donation is possible as well.

WHAT CAN BE DONATED?



Living donation is coordinated through individual transplant centers. To help someone by becoming a living donor, talk to him or her about the transplant program where the person is listed. To be a non-directed living donor, contact a transplant center (https://transplantliving.org/living-donation/being-a-living-donor/first-steps/) to find out if they have this type of donation program.

To learn more about the different organs and tissues for transplant and the different types of donation, visit https://www.donatelife.net/types-of-donation/.

THE NEED IS GREAT

118,000 men, women and children await lifesaving organ transplants

Even the largest football stadium in the US could not fit the number of patients on the national transplant waiting list

Another person is added to the waiting list every 10 minutes

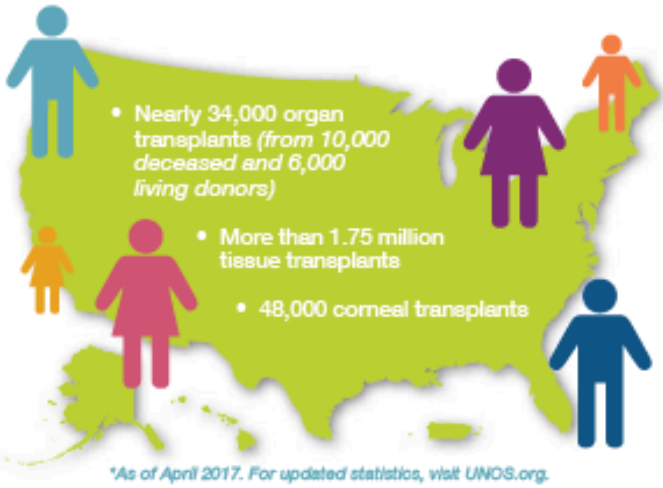
8,000 people die each year because the organs they need are not donated in time

80% of patients waiting are in need of a kidney*

12% of patients waiting are in need of a liver*

*A living donor is an option for these patients.

LIVES SAVED AND HEALED EACH YEAR



*As of April 2017. For updated statistics, visit UNOS.org.

ONE ORGAN, EYE AND TISSUE DONOR CAN HEAL MORE THAN 75 LIVES.

ABOUT ORGAN, EYE AND TISSUE DONATION

There are specific circumstances that must occur for someone to become an organ donor after they die. Although cases vary, there are general steps that lead to donation.

HOW DOES THE PROCESS WORK?

WAITING FOR A TRANSPLANT

When someone's organ fails, he or she may be evaluated for a potential transplant and placed on the national organ transplant waiting list.

The list is very long and not everyone survives while waiting for a donor.

Donors of all ages are needed.

In the United States, it is illegal to buy or sell organs and tissue for transplantation.

BECOMING A DONOR

A person who has sustained a severe brain injury, such as from an accident, stroke or lack of oxygen, is put on artificial support.

There is no cost to the donor's family or estate for donation.

Doctors work hard to save the patient's life, but sometimes there is a complete and irreversible loss of brain function. The patient is declared clinically and legally dead. Only then is donation an option.

The hospital contacts the organ procurement organization (OPO), which checks the donor registry. If the person is registered, the OPO will inform the family. If not, the family will be asked to authorize donation.

FINDING A MATCH

A national system matches available organs from the donor with people on the waiting list.

Race, income, gender, celebrity and social status are never considered.

Donation can provide solace to a grieving family.

All major religions support donation as a final act of compassion and generosity.

SAVING LIVES

Once matches are found, the wait-listed patients are contacted by their transplant teams.

Organs are recovered from the donor with care and respect, and sent to hospitals for transplantation.

Transplants restore lives and return patients as active members of their families and communities.

**Entire section taken from Donate Life Northwest's Go Recycle Yourself Curriculum.*

Sample Advanced Readings

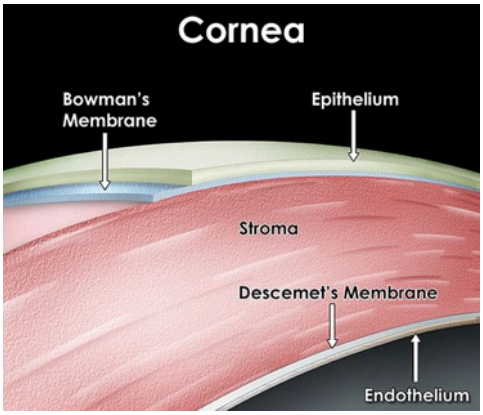
In Focus: Cornea Donation & Transplantation

Cornea Donation: Advanced Vocabulary

Cornea (*layers, anterior to posterior)*: Epithelium, Bowman's Layer, Stroma, Descemet's Membrane, Endothelium
Transplant Types (or Keratoplasty): Penetrating Keratoplasty, DSEK (Descemet's Stripping Endothelial Keratoplasty), DMEK (Descemet's Membrane Endothelial Keratoplasty)
Surgery Components: Trephine, Sterile Field, Aseptic Technique, Graft, Inserter, Forceps, Running Suture,
Surgery Indications: Keratoconus, Trauma, Fuch's Dystrophy, Keratitis, Bolus Keratopathy, Ulcerative Keratitis,
Cornea Characteristics: Avascular, Immuno-privileged
Other Terms: allocation, contraindications, micron, allograft, xenograft, keratocytes, intra-ocular lens (IOL), rejection, specular microscope, slit lamp, Optical Coherence Tomography (OCT)

A Closer Look at the Cornea

Although it appears to be one clear membrane, the cornea is actually composed of five distinct layers of tissue. Each layer has its own function:



- **Epithelium** is the thin outermost layer of fast-growing and easily-regenerated cells. This layer is often scraped off by technicians before corneas are processed, but the cells grow back (from the stem-cells in the recipient's limbus) once a transplant has been completed.
- **Bowman's Membrane** was originally considered part of the stroma, because they are both made of collagen fibers. However, Bowman's Layer consists of irregularly-arranged collagen fibers – visually similar to tangled hair, as opposed to combed hair – and protects the corneal stroma. It is only 7 to 14 microns thick.
- **Stroma**, the transparent middle and thickest layer of the cornea, is made up of regularly-arranged collagen fibers and keratocytes. The layered nature of collagen fibers in the stroma makes dissecting it easier. Keratocytes are specialized cells that secrete the collagen and proteoglycans needed to maintain the clarity and curvature of the cornea.
- **Descamet's Membrane** is a thin layer that serves as the modified "basement" membrane to which endothelial cells adhere.
- **Endothelium** is a single layer of cells responsible for maintaining proper fluid balance, keeping the cornea transparent. Healthy endothelial cells have similarly sized, hexagonal cells, arranged in flower petal-like patterns. Endothelial cell count is the primary measure by which Eye Donation Specialists determine donor tissue quality.

The cornea is avascular, meaning it has no blood supply. This is important because of the way it impacts the capacity to allocate donated corneas.

When it comes to *organ* donation, matching blood and tissue types is critical, so as not to trigger the body's typical autoimmune response to foreign tissue: rejection. Rejection is not as much of a concern

in cornea donation. Since the tissue is avascular, there is no need to find a blood type “match” between donors and recipients. The same is true when it comes to disease transmission. With no blood supply, transferable diseases have a very hard time spreading through corneal transplants. This is why corneas are referred to as immune-privileged tissue.

The avascular and immune-privileged attributes of the cornea contribute to the commonality of corneal transplants, and the lack of a waiting list for those who need corneas.

What is an Eye Bank?

An eye bank is a not-for-profit organization that obtains, medically evaluates, and distributes eyes donated for use in cornea transplantation, research and education.

In the Lab

The process of medically evaluating donated corneas begins in the lab. Eye bank technicians must carefully analyze and evaluate donated corneas to ensure that the corneas are healthy enough for transplant and that the tissue is free of any disease or virus that could harm the recipient. Tests performed include:

1. Specular Microscopy

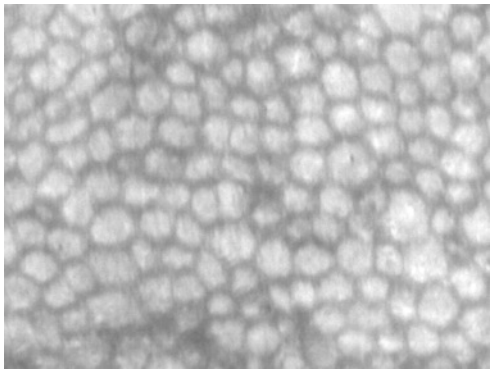
A specular microscope uses light refraction to display the endothelium to eye bank technicians. Technicians count cells on a computer program that runs an algorithm to determine the cell density. A cornea needs to have a cell density of 2,000 cells per square millimeter to be transplantable. Endothelial cells degrade with age and do not regenerate, so older donors typically have fewer cells than younger ones.

2. Slit Lamp Evaluation

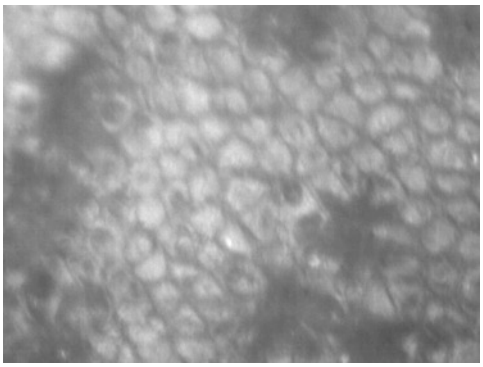
The second microscopy technique used is the slit-lamp examination. If you have ever had an eye examination, an ophthalmologist has used this instrument to inspect your eye health. The slit lamp uses a narrow beam of light, and an off-set optic viewpoint to create a figurative ‘cross-section’ of the cornea.
Imagine your cupped hand is a cornea. If you slide the fingers of your opposite hand between your middle and ring fingers of the cupped hand, you can imagine the now exposed side surface of your middle finger to be the different layers of the cornea. In this way, eye bank technicians can examine the entire depth of the cornea for hard-to-see scarring or dysfunction.

3. Optical Coherence Tomography (OCT)

The OCT is the final microscopy tool used to evaluate corneas. Light beams are scanned across the cornea in a systematic fashion, creating hundreds of ‘slices’. A computer program then converts them to an image, which can be used to visualize the interior of the tissue. OCT is also very helpful to evaluate tissue that technicians have cut in the lab, to ensure thickness and adherence of the graft.



Healthy Endothelial Layer



Unhealthy Endothelial Layer

Images courtesy Lions Vision Gift

What is a Corneal Transplant?

Nearly 48,000 Americans receive corneal transplants every year, making it the most common transplant surgery. Corneal transplant (keratoplasty) is the process of removing and replacing damaged cornea tissue with healthy donor tissue.

During a corneal transplant, a specially trained surgeon removes the damaged or diseased cornea – or portion of cornea – from the patient's eye. The patient's cornea is then replaced with the healthy, donated cornea, which is prepared to fit perfectly into the patient's eye.

The Development of Corneal Transplant Surgery

Blindness from corneal damage has been known since the earliest times of human history. Ancient Egyptians and Greeks wrote about theoretical cures and treatments for the condition. Legends and myths about receiving "new eyes" can be found across the centuries.

It was not until the 19th century that doctors began in earnest to attempt corneal transplants. In 1818, Franz Riesinger experimented replacing opaque human corneas with transparent animal corneas (a xenograft). Although the technique ultimately failed, Riesinger coined the procedure a *keratoplasty (kerato* is Greek for cornea*; plasty* means formation*)*, a term which is still used today. Research in medical science continued, producing new tools ranging from anesthesia to the trephine (a cylindrical surgical instrument; see photo courtesy Lions VisionGift).

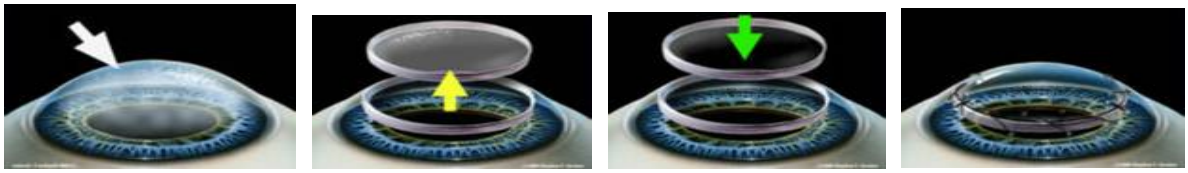
The first successful corneal transplant took place in Austria, in 1905. Eduard Konrad Zirm utilized human donor corneas to replace the damaged tissues of Alois Glogar (an allograft). Glogar had received chemical burns from lime while cleaning out his chicken coop. The use of allografts, as opposed to xenografts, was determined to be essential for the success of keratoplasty procedures.

Although the procedure now worked, there was an extremely limited supply of donor tissue. This did not change until the 1940's, which saw the development of advanced antibiotics. The world's first eye bank opened in New York in 1944, and along with it the world's first "anatomical gift" donation program, in

which people could pledge their corneas to help others after their death. An eye bank recovers, processes, stores, and brokers eye tissue for transplant and research purposes.

Surgical Techniques: Penetrating Keratoplasty

A full-thickness cornea transplant, or penetrating keratoplasty, is a modern surgical technique in which the entire thickness – all five layers – of a damaged cornea is replaced with a healthy donor cornea. This is an effective technique when all five layers are damaged (for example, in the case of a Kerataconus, severe chemical burns or a penetrating trauma).



Surgeons use a trephine (pronounced tree-fine) to remove the donor cornea, and make a corresponding hole in the recipient. Think of a trephine as a cookie cutter, punching through all five layers of the cornea. The donor 'button' is then sewn into the corresponding trephinated space in the recipient's cornea with a running suture. Sutures are thinner than a human hair, so this is performed under a microscope. Complete visual recovery can take up to a year.

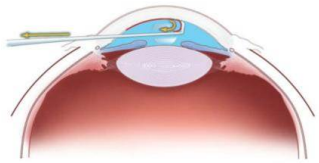
Surgical Techniques: DSEK / DMEK

While it was once common for every corneal transplant to be a Penetrating Keratoplasty, techniques pioneered over the past 20 years are allowing surgeons to target specific layers within the cornea. This means that if only a single layer of the cornea is damaged, it alone can be replaced with a corresponding layer from a donor cornea.

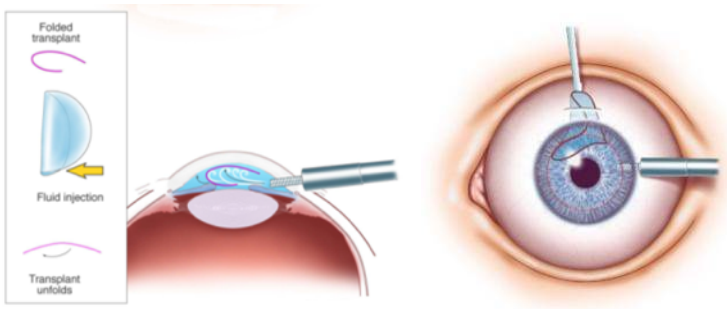
For example, someone suffering from Fuch's Dystrophy is a likely candidate for a DSEK or DMEK surgery. Fuch's Dystrophy is a hereditary condition wherein the endothelial layer of the cornea has cell death and subsequent dysfunction.

Descemet Stripping Automated Endothelial Keratoplasty (DSAEK)

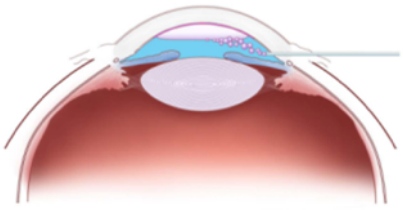
1. A tiny incision is made in the sclera.
2. A small tool is inserted to scrape off the diseased or damaged endothelium layer. This layer can be removed without disrupting the other layers.



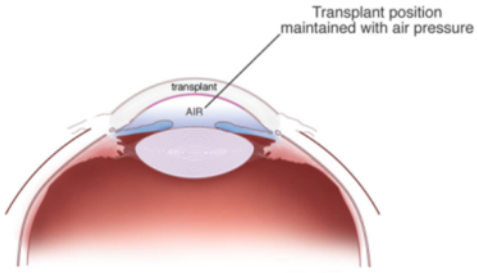
3. The donor cornea is folded in half prior to insertion. Because the folded cornea resembles a tiny taco, this is referred to as the 'taco technique.'



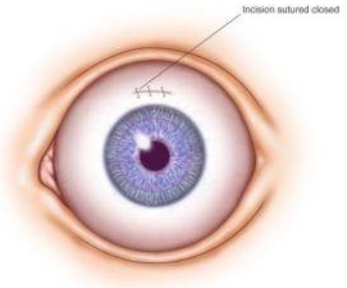
4. Air bubbles are inserted behind the transplanted tissue. The ‘taco’ pops open; it floats up and adheres itself to the stroma.



5. The transplant is held in place by this small pocket of air.



6. Stitches may not be necessary, but one or two is common.



7. After the procedure, patients must remain on their back for 24 hours so that the new cornea will not dislocate. If the graft detaches, a repeated air injection can reattach the graft.

Descamet’s Membrane Endothelial Keratoplasty (DMEK) is an even newer technique: an even thinner piece of tissue being transplanted.

In Focus: Cornea Donation & Transplantation – Questions for Reading Comprehension

1. Name the five layers of the cornea, in order from external to internal.
2. Why are donated corneas inspected for their cell count?
3. Name three advances in medical technology which assisted with the development of corneal transplant surgery.
4. Describe a penetrating keratoplasty procedure.
5. What is the key difference between penetrating keratoplasty and a DSEK or DMEK?
6. Describe a scenario of why a person may need a corneal transplant. Include a short summary of the transplant process this person will undergo in 3-5 sentences using key vocabulary from this chapter.

In Focus: Tissue Donation

Tissue Donation: Advanced Vocabulary

Allograft, autograft, xenograft

Lifesaving and Healing Gifts

Allograft tissue is voluntarily donated by deceased donors who, prior to death, made the decision to donate by registering as a donor. Allografts can be used in many ways and for many surgical procedures, so a single donor can potentially heal or save the lives of up to 50 or more recipients.

Allografts are a common option for patients who suffer from a wide variety of conditions and injuries. In some cases (but not always), the treatment options can include allograft, autograft, mechanical or xenograft options. The advantage of opting for an allograft is that the patient's body accepts and heals the tissue in a way which synthetic grafts cannot imitate.

For example, someone living with a congenital and degenerative heart valve condition may be offered the choice between a mechanical or allograft heart valve. Choosing a mechanical heart valve means the patient must take blood-thinning medications for the rest of their life. This would be problematic if the patient were, say, a female who wants to one day have children. Physicians discuss the advantages and disadvantages of all options with their patients.

Types of Grafts

- An allograft is when cells, tissues or organs come from another person (same species).
- An autograft is when cells or tissues are transplanted from one place to another on the same person. There is more potential for pain and infection compared to an allograft.
- A transplant from another species, like a pig to a human, is called a xenograft. According to the World Health Organization, this type of transplant carries many risks. It is a topic for research and clinical trials.

Adapted from Donate Life Colorado

What Tissues Can Be Donated?

Heart Valves

Blood is pumped through the heart's four chambers, aided by four heart valves that open and close and prevent blood from flowing backward.

- Infections and age-related diseases can damage heart valves. Some children are born with malformed valves.
- Heart valves can be recovered when the whole heart is determined not to be viable for transplant.
- Donated human vessels and valves are used as replacements that can mean the difference between life and death to recipients.

Veins

Arteries carry oxygenated blood from the heart to the rest of the body, and veins bring the deoxygenated blood back.

- Many people lose circulation in their legs, or even in their heart, due to disease or trauma.
- Donated femoral and saphenous veins are used to restore circulation and avoid leg amputation for people suffering poor circulation, such as diabetics.

Bone

Bones consist of living protein fibers that constantly rebuild themselves.

- The humerus, radius and ulna are the bones in the arm that can be recovered.
- The femur, tibia and fibula (leg bones) and the pelvis can be recovered.
- Bones can be transplanted in order to prevent amputation, promote healing and maintain mobility and structure.
- After the bone is recovered, trained professionals replace the bone with prosthetics for funeral viewing arrangements.

Soft Tissue

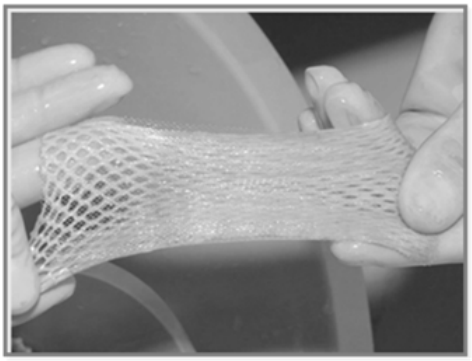
Soft tissue includes tendons, ligaments and cartilage.

- Soft tissue helps individuals with various orthopedic and neurological conditions. Common examples include back, joint and leg surgeries, such as hip replacement, knee reconstruction and spinal fusion.
- Torn ACLs in athletes are one of the most common reasons for which allografts are needed.

Skin

At about 21 square feet of skin, weighing up to 15 pounds, cover the average adult. Not only is skin the body's first line of defense against microbes, but it also regulates heat and fluids in the body.

- Skin can be used to aid in the healing process for severe burn victims and people who suffer from a disfiguring injury or disease, acting as a biological bandage until the patient can heal.
- Skin can help regenerate new soft tissue for cancer patients, trauma victims and patients with severe abdominal defects. Skin also helps reconstruction from mastectomy procedures and to repair hernias.
- Donated skin grafts protect recipients from infection while promoting regeneration of their own skin.
- Skin from donors is removed from the trunk and the back and front of the legs.
- Recovered skin is about the thickness of a piece of paper.
- Donation of skin does not affect the appearance of a donor nor viewing at funeral services.



A skin graft recovered from a donor is 18/100th of an inch thick, and run through a mesher to double its surface area and make it more pliable. Image courtesy Donate Life Northwest.

Pericardium
A double-layered connective tissue lining the heart.

- Used as a patch to help cardiac, bladder, brain and dental surgeries.

How Tissue Donation Works
Tissue banks oversee the tissue donation process.

Referral
There are many variables that matter when it comes to tissue donation: age, timelines, certain diseases or injuries, but nearly anyone can be an eye and/or tissue donor. Hospitals are required to report all deaths to tissue and eye banks.

Authorization for Donation
A Tissue Donation Specialist will check the Registry, to see if the deceased has already registered as a donor. If the individual's wishes are unknown, the Specialist will discuss the option of donation with the family.

Evaluation
Once authorization is verified, or authorization is given by the potential donor's family, the donor is thoroughly evaluated using a medical/social history questionnaire, medical records, blood tests, and physical examinations.

Transport and Tissue Recovery
A medical team is dispatched to recover the medically suitable tissue. The donor is treated with the utmost respect and dignity. Once tissue recovery has been completed, the team performs any necessary reconstruction, and sutures all incisions to restore the appearance of every donor.

Following the recovery process, a funeral can be held with minimal delay. There can be an open casket funeral, viewing or other standard memorial.

Processing and Transplant
Recovered grafts are rigorously screened, tested and prepared for use in surgical procedures. Once the tissues are prepared, surgeons throughout the United States request tissue in order to perform a wide variety of surgical procedures which require allografts.

Follow Up with Family
The families of tissue donors receive non-identifying information about the patients whose lives have been saved or healed thanks to their loved one's gift.

In Focus: Tissue Donation – Questions for Reading Comprehension
1. Why might a patient require an allograft over a mechanical graft? Over an autograft?
2. Name two specific ways tissue donations save lives.
3. How might a diabetic patient benefit from a tissue transplant?
4. How might a patient with a cancerous bone growth benefit from a tissue transplant?
5. How might a patient with a torn ACL benefit from a tissue transplant?
6. Who can be a tissue donor?
7. Why is it important to talk to your family about your decision to be/not to be a tissue donor?

In Focus: Organs That Can Be Donated

Heart

The heart is a muscular pump about the size of a fist that circulates blood carrying oxygen and nutrients to, and wastes from, the body's cells. The right side of the heart circulates blood to the lungs. The left side circulates blood to the rest of the body and back to the heart.

Common diseases that may lead to transplantation:

Coronary Heart Disease: A narrowing or blockage of the coronary arteries, which provide the heart muscle with blood. The disease occurs when these arteries become hardened and narrowed. A plaque builds up along the inner walls of the arteries, known as atherosclerosis. As the coronary arteries narrow and harden, less blood can flow through them to the heart. As a result, the heart receives less oxygen than it needs.

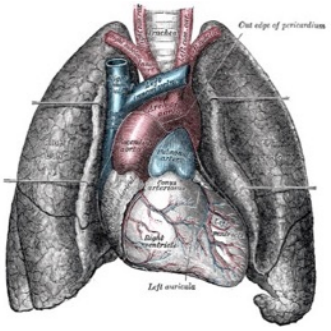
- Causes of coronary heart disease include, but are not limited to, obesity, smoking, excessive alcohol consumption, high sodium diets and a sedentary lifestyle.

Cardiomyopathy: An abnormality of the heart muscle, which affects the heart's ability to pump blood and deliver it to the rest of the body.

- There are many causes, which may include coronary heart disease, heart valve disease, or rarely viruses.

Lungs

The lungs are a pair of highly elastic and spongy organs in the chest. They are the main organs involved in breathing: oxygen passes into the bloodstream through microscopic air sacs in the lungs, while waste carbon dioxide passes out of the bloodstream into the lungs.

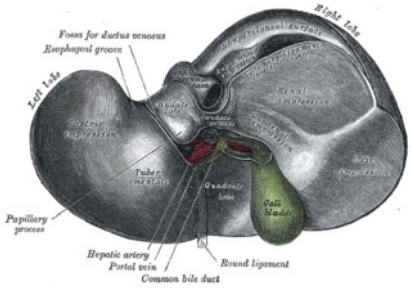


Common diseases that may lead to transplantation:

Cystic Fibrosis: An inherited disease that can cause respiratory failure. Cystic fibrosis affects the cells that produce mucus, sweat, saliva and digestive juices. Normally, these secretions are thin and slippery; but with cystic fibrosis, the secretions become thick and sticky. Instead of acting as a lubricant, the secretions plug up tubes, ducts and passageways, especially in the pancreas and lungs.

Liver

This large organ is made up of a spongy mass of wedge-shaped lobes. It performs over 500 individual functions vital to survival. For example, the liver helps process carbohydrates, fats, and proteins, and stores vitamins. It processes nutrients absorbed from food in the intestines and turns them into materials that the body needs. It makes the factors that the blood needs for clotting. It also secretes bile to help digest fats and to break down toxic substances in the blood, like drugs and alcohol.



Common diseases that may lead to transplantation:

Non-Alcoholic Fatty Liver Disease: The buildup of extra fat in liver cells that is not caused by alcohol. The liver swells, leading to scarring (cirrhosis) over time.

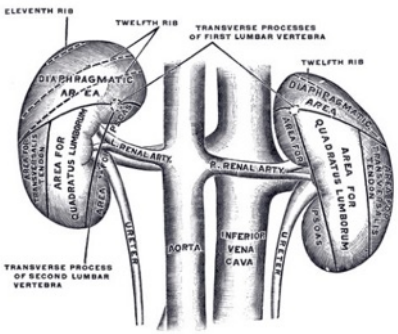
- This condition, the most common reason for liver transplants in the United States, tends to develop in people who are overweight or obese, or have diabetes, high cholesterol or high triglycerides.

Hepatitis: An inflammation of the liver, characterized by the destruction of a number of liver cells.

- Hepatitis A is most commonly transmitted by consuming food or water contaminated by infected feces.
- Hepatitis B is spread through having contact with blood or body fluids with someone who already has a hepatitis B infection.
- Hepatitis C is contracted sexually, through blood transfusions or shared needles in drug use.

Kidneys

Kidneys are a pair of reddish-brown organs whose primary function is to remove waste from the body through the production of urine. They also help to regulate blood pressure, blood volume and the chemical (electrolyte) composition of the blood.



Common diseases that may lead to transplantation:

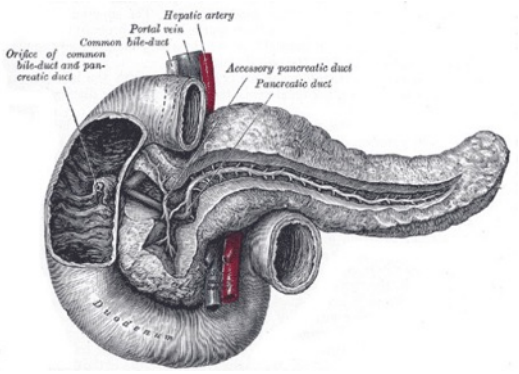
High Blood Pressure (hypertension): Occurs when the pressure of your blood against the walls of your blood vessels increases. Obesity, smoking, excessive alcohol consumption, high sodium diets and sedentary lifestyle are all factors that can lead to hypertension.

Diabetes: When your blood sugar is too high, the kidneys are forced to overwork. Over time, this causes kidneys to lose their filtering ability.

- Type 1 Diabetes: Often diagnosed in children. Occurs more often in African Americans, Native Americans, Hispanic Americans and women with a family history of diabetes.
- Type 2 Diabetes: Typically occurs in adults. Occurs more often in African Americans, Native Americans, Hispanic Americans and women with a family history of diabetes.
- Gestational Diabetes: Develops only during pregnancy.

Pancreas

The pancreas produces enzymes that are used for digestion and insulin, which regulates blood sugar throughout the body. Pancreatic transplants are rare. Only 215 pancreas transplants take place in the United States in 2016, and 798 pancreas/kidney transplants.



Common diseases that may lead to transplantation:
Diabetes: *see **Diabetes** section above.*

Small Intestine

The intestine is the lower part of the digestive tract, which extends from the stomach to the anus. The first part is a long, narrow, and convoluted section referred to as the small intestine. Its function is to complete the digestion and absorption of nutrients into the bloodstream. The second part – the large intestine – is not usually transplanted. Intestinal transplants are extremely rare. Only 147 intestinal transplants took place in the United States in 2016.

Common need for transplantation: Some persons are born with or develop irreversible intestinal failure, preventing them from digesting food or fluids. The majority of intestinal transplants are performed in infants and children.

In Focus: Deceased Organ Donation

Deceased Organ Donation: Advanced Vocabulary

Allocation, anoxia, artificial support, brain stem, brain death, cell metabolism, cerebrovascular injury, coma, mechanical ventilation, medical urgency, persistent vegetative state, window of viability, United Network of Organ Sharing, Organ Procurement and Transplantation Network

Of the 2.2 million people who die in the United States each year, relatively few die under circumstances that make them medically eligible to be either organ or tissue donors. In this section, we'll take a closer look at some of the medical science and ethics behind organ donation and allocation.

Intensive Care

When a patient enters emergency care in critical condition, advanced measures are taken to support his or her failing bodily functions. When patients are treatable or curable, artificial support is temporary until the body recovers and can resume its normal functioning. Examples of common artificial support include:

- *Artificial hydration*
- *Artificial nutrition*
- *Mechanical ventilation*

The main job of our lungs is to get oxygen into the body and to get rid of carbon dioxide. Like a pump, mechanical ventilation accomplishes both of these functions for a patient who cannot breathe on their own.

When someone on a mechanical ventilator dies, the machine ensures that oxygen and blood continue to circulate through their vital organs and cells. Mechanical ventilation can remain in place right up until the organ recovery surgery begins – for a few hours or even a few days – giving their family time to discuss the possibility of organ, eye and tissue donation, and to say goodbye.

What is Brain Death?

Brain death is usually the result of a severe trauma, which causes brain tissues to swell.

- Trauma: for example, a severe head injury during a motor vehicle accident
- Cerebrovascular injury: massive bleeding caused by a stroke or ruptured aneurysm
- Anoxia: loss of oxygen to the brain caused by drowning, a heart attack or drug overdose
- Uncontrollable growth of a brain tumor that causes permanent loss of blood flow and oxygen to the brain

When the brain is injured, it responds in much the same way as an injury like a twisted ankle: it swells. Unlike the muscles and tissues of the ankle, however, the brain is in a confined space – the skull – and has no room to swell.

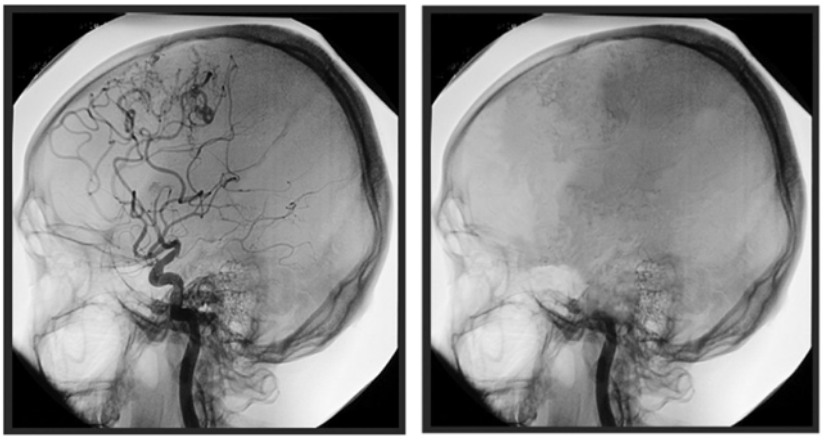
As the brain swells inside the skull, it pushes downward toward the brain stem blocking all upward flow of blood. Depending on the type of injury, this may happen within minutes or over a period of days. Even while the heart is still beating and supplying blood to the rest of the body, blood that carries oxygen cannot reach the brain or the brain stem, which controls heart rate and breathing. The result is that the brain, and therefore the person, dies.

The physicians who test for brain death are not a part of the donation or transplantation team. They are focused only on trying to save the patient's life, and once that is not possible, on providing an accurate diagnosis of death.

To avoid even the smallest chance of mistake, the physician must conduct an in-depth range of standardized tests showing that there is absolutely no brain function before declaring the patient dead.

Brain Death vs. Coma

Brain death can be a confusing concept, because a brain dead person on a ventilator can feel warm to the touch and can look "alive." Their heart beats, and it appears as though they are breathing. Why is this? Since the individual was placed on a mechanical ventilator prior to death, the ventilator is pushing air into the lungs, making the person's chest rise and fall, allowing the heart to continue to beat. However, once the mechanical ventilator is removed, the heart will stop due to lack of oxygen.



L: healthy brain vs. R: brain death; showing no blood flow within the brain or brain stem.

Brain death is not a coma. When brain death occurs, *all* brain tissue is dead, no blood flows to the brain, and no electrical activity is present in the brain. Both the lower and upper part of the brain has stopped functioning. In a coma, only *a portion* of the brain is injured; the brain still receives blood flow and electrical activity is present. Someone in a coma or persistent vegetative state is still alive: they retain neurological function and may, with time, recover.

Because someone who has died of brain death may *appear* as though they are simply sleeping or in a coma, some families tragically expect that the person they love can simply be kept on the ventilator in hopes that their condition will improve. To be brain dead is to be dead, though, and no improvement or recovery is possible. There is no method to jump-start or revive a brain that has been deprived of blood and whose cells have died.

Organ Recovery

Once the family of a deceased donor has been given time to say their goodbyes, and all the transplantable organs have been accepted by transplant surgeons for their potential recipients, surgical recovery begins.

A transplant surgical team arrives at the deceased donor's hospital. The patient is taken to an operating room, where organs, corneas and tissues are recovered in the same sterile and careful way as in any

surgery. All incisions are surgically closed. Organ, eye and tissue donation does not interfere with funeral arrangements, including open-casket funerals.

Preservation and Transport

Donated organs require special methods of preservation to keep them viable between the time of procurement and transplantation. Without preservation, the organ will die.

For organs to be recovered and work in a recipient they must be cooled and the blood must be removed within minutes of the cessation of blood flow. Cooling the organs during the recovery surgery slows down cell metabolism.

This conserves the oxygen stored within the cells and slows down cell death. The blood is removed to prevent the formation of clots that would damage the organ and prevent its use in a recipient.

Different organs have different “windows of viability.” The window of viability restricts the geographic distance a donor organ can travel.

Organ	Window of Viability
Heart	4 - 6 hours
Lungs	4 - 6 hours
Liver	8 - 12 hours
Pancreas	Up to 18 hours
Kidney	Up to 36 hours

Cold storage, in which donor organs are literally placed on ice in a small cooler, has been the standard for transporting organs since the 1970’s. However, it is not a foolproof method. Traffic, bad weather and mechanical problems can cause serious delays, whether the organs are transported by air or by car. Sometimes, despite the best efforts, organs deteriorate during transport. They sometimes do not survive the cold preservation process, and so ultimately cannot be transplanted.

Advances in Transplant Technology

Advances in technology may have a dramatic impact on the availability of organs for donation. By improving the cold storage system, organ function may be improved and the windows of viability can be lengthened, in turn, saving more lives.

Devices are currently being tested to pump hearts, lungs and livers after they are recovered from the donor. Kidney pumps are already in wide use. These devices pump preservation solution through the organ, which means cells continue to function and the organ can be better monitored. This may significantly lengthen the window of viability and improve the function of the organ once it is transplanted.

Allocation

Objective medical criteria determine who receives a donated organ. The allocation process is governed by national policy, created by a community of transplant professionals and patient representatives.

1. **An organ is donated**. An OPO Donation Specialist enters medical information about the donor – including organ size and condition, blood type, and tissue type – into the national UNOS database.
2. The UNOS database **generates a list of candidates** on the waiting list who have medical profiles compatible with the donor's.
    a. *Medical urgency*. For organs such as the heart, liver and lung, people who are in the sickest condition get priority for the next available organ.
    b. *Geography and distance*. The computer uses a radius from the donor hospital to help allocate organs to matching recipients who have time to travel to their transplant hospital.
    c. *Size*. For example, children respond better to child-sized organs, so pediatric candidates are first in line for other children's organs.
3. **Transplant centers are notified** and offered the organ which matches their patient.
4. **Transplant teams** consider the organ, and whether it is in the patient's best interest to undergo surgery.
5. **The organ is accepted or declined**. If an organ is turned down for one patient, it will be offered to the next patient on the list who is a match for that organ. This continues until the organ is placed.

Why would a transplant team turn down an organ? They may feel that the donor and recipient are not a close enough match. For example, if the donor is much larger or smaller than the recipient, the size of the organ could literally make it a "bad fit."

The Ethics of Organ Allocation

Because there are not enough donated organs to transplant everyone in need, organs must be allocated in the most equitable way possible while making the best use of the organ. That means balancing factors of justice (fair consideration of candidates' circumstances and medical needs) with factors of medical utility (optimizing the number of transplants performed as well as how long the patients and organs survive).

Several countries around the world have developed national systems to oversee the development, monitoring and enforcement of policies which govern organ allocation as ethically as possible. In the United States, the non-profit organization United Network for Organ Sharing (UNOS) has been contracted by the U.S. Department of Health and Human Services to administer this service since 1984.

Organ donation is one of the most regulated areas of health care in the United States. This means that all organ, eye and tissue agencies, hospitals and transplant centers in the nation follow specific parameters and guidelines. Failure to follow regulations entails heavy penalties. One of the most famous federal regulations regarding organ donation was passed by Congress in 1984:

The National Organ Transplant Act

- Made the buying or selling of human organs a federal crime
- Established the Organ Procurement and Transplantation Network (OPTN), to maintain a national registry for matching and allocating organs (administered by the non-profit organization UNOS)

You can read about the specific policies which direct American organ donation online at unos.org

In Focus: Deceased Organ Donation – Questions for Reading Comprehension

Close Reading

1. What role does mechanical ventilation play in organ donation?
2. What is the difference between brain death and a coma?
3. Name three criteria that can impact who will receive an organ transplant.
4. What impact do the windows of viability have on organ donation?
5. Can you buy or sell an organ in the United States? Why or why not?

Think Critically

1. Do you think that organ donation is common? What specific evidence can you find in the reading to support your opinion?
2. News reports – online, on the TV or radio – often confuse brain death and coma. Why do you think this may be?
3. Why do you think the National Organ Transplant Act specifically mentions the buying or selling or organs?
4. Do you think there is a "black market" for organ donations in the United States? Go online to research the topic. Carefully note the source of your information, including the country, date, the author's credentials, and the institution or organization with which the author is associated.

In Focus: Organ Transplants

Organ Transplants: Advanced Vocabulary

Antibodies, antigens, compatibility, crossmatching, microorganism, human leukocyte antigens, immune system, immunosuppression, rejection

While organ transplants can restore someone's health, and greatly improve their quality of life, they are not a cure. There will always be some risk of rejection, and a lifetime of special care will be required to support the donated organ.

Compatible or Incompatible?

Each person has thousands of genes. The expression of these genes is what makes us unique. Some of the effects of these genes are visible – displayed in features like hair and eye color. However, many are not so obvious, expressed within our bodies in blood and tissue proteins. These inherited proteins, called antigens, determine a person's blood and tissue types. Organized before you were even born, they act as cell markers, telling your cells where to go and which cells to join. Antigens are markers on the surface of blood and tissue cells which identify the cell as "self."

The uniqueness of an individual's cell surface markers explains why organ donor tissue and recipient tissue must be carefully matched. If a "non-self" antigen is detected within the body – say, because bacteria, virus, or a transplanted organ has been introduced into the body – antibodies are summoned to attack it.

Antibodies are small proteins that circulate throughout the body, used by the immune system to identify and destroy foreign objects. Antibodies protect us from infection, by effectively creating and mobilizing a virtual army to defend us from any foreign antigens they encounter. While this is beneficial in keeping us healthy, it poses a special challenge for transplant recipients.

Ethnicity and gender do *not* impact whether two people can be a match. At the same time, people of different ethnicities frequently match one another, carrying compatible blood types and tissue markers. A greater diversity of donors means a better chance for everyone to find their match.

If you place an organ with an incompatible blood or tissue type into a recipient's body, the recipient's immune system goes on the offensive. Incompatible, or "mismatched," antigens on the surface of the transplanted organ can stimulate the production of antibodies. Antibodies may attack the organ and attempt to kill the organ's cells. This process is called rejection, and it may eventually destroy the organ.

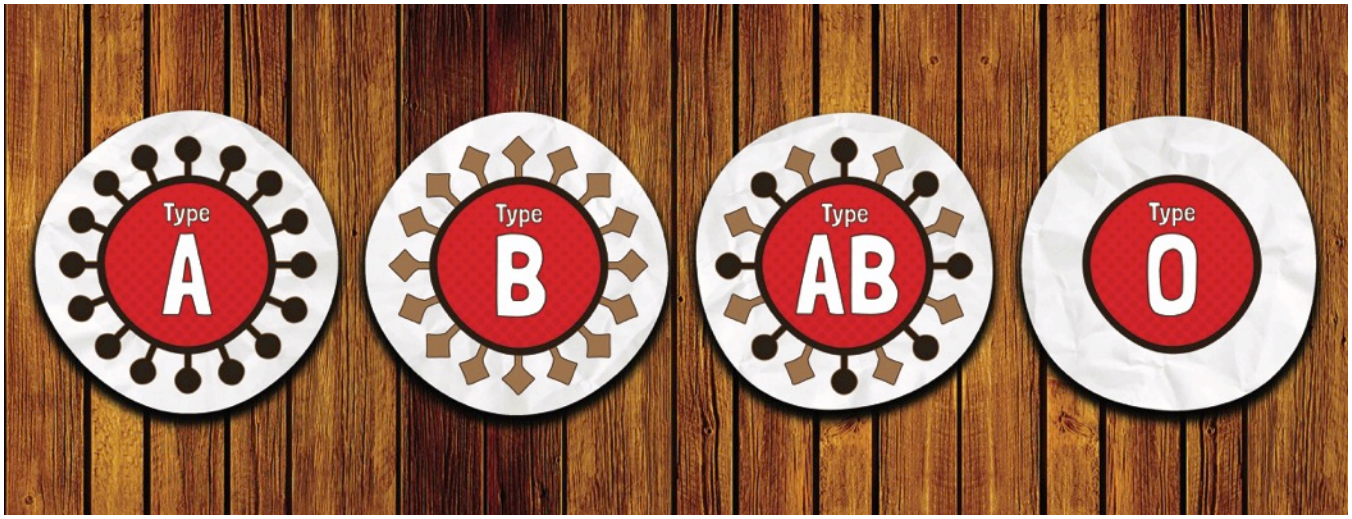
Since antigens and antibodies can play an important role in transplantation, we'll take a closer look at the two systems of antigens which impact the ability the matching of donated organs with potential recipients: ABO (blood type) antigens, and HLA (tissue) antigens.

ABO Compatibility

All blood is made of the same basic elements, but not all blood is alike. There are four major blood types, which are determined by the presence or absence of particular antigens. While the Rh factor (what makes blood "positive" or "negative") matters if you are receiving a blood transfusion, it does not need to be matched if you are receiving a solid organ transplant (heart, kidney, liver, etc.). That is because the Rh factor is not expressed on solid organs.

Your red blood cells have antigens on their surface, which determine what blood type you are:

- Group A: has only A antigens
- Group B: has only B antigens
- Group AB: has both A and B antigens
- Group O: has neither A nor B antigens; red blood cells are “bare” in people with blood type O



For transplant purposes, it is critical that blood types are compatible. If a patient were to receive an organ from someone with an incompatible blood type, his or her body would recognize the organ as foreign and try to destroy it.

For example, if you are blood type A, the cells in your body trigger an army of antibodies when they encounter type B antigens. Your body kills off any cells which contain type B antigens.

Patient Blood Type	Compatible Donor Blood Type
O	O
A	A,O
B	B, O
AB	A, B, AB, O

To learn more about blood types and matching, visit redcrossblood.org.

HLAs: Human Leukocyte Antigens

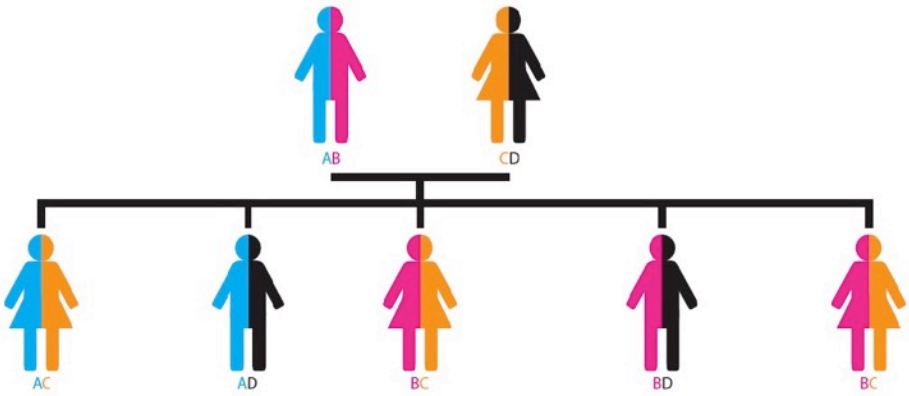
There is a second set of antigens that is important for organ transplant, called the HLA System.

Human leukocyte antigens (HLAs) are proteins which form your unique “genetic social security number”. Identifiable as genetic markers on the surface of almost all the cells in your body (except red blood cells), they are inherited from your parents. You are always a half tissue match with your biological parents, because you receive 50% of your genetic material from your mother, and 50% from your father. No two people – except identical twins – have identical HLAs.

For transplant purposes, six major HLA antigens are identified in both the recipient and their donor (living or deceased). These six major HLA antigens come from a pool of over 150 HLA antigens that

have been identified in the human population. It is fairly unusual for people who are not blood relatives to share more than one or two HLA antigens in common. While it is not necessary to share *any* HLA antigens in common for a transplant to be successful, studies show that well matched organ transplants do last longer.

Below is a graphic representation of inheritance of HLA antigens within a family. As noted, you are a half match (3 of 6 antigens) with your parents, but you can share zero, three or six antigens in common with your siblings.



HLA matching has become less important because today's immunosuppressive drugs – medicines that can subdue the body's response to a transplanted organ – have improved greatly since the early days of transplant science. In fact, thanks to advances in transplant science, a recipient may receive a transplant even when HLA antigens are a total mismatch as long as their blood type is compatible with that of the organ donor, and the crossmatch test is also compatible.

"Transplants in a Test Tube"

The crossmatch is the final test, which determines if the recipient and donor can be safely transplanted. It involves mixing white cells from a potential donor with serum from the recipient's blood. Crossmatches are "transplants in a test tube," allowing the transplant team to determine if a recipient has "preformed" or already existing antibodies against a particular donor.

Think back to the function of antibodies. Once we have been infected with a particular germ, the immune system remembers the particular antigen, which identifies that germ. So, if you contact that germ again, the body will know to quickly mobilize its army of antibodies to block and destroy the germ, before it can cause another infection.

A similar scenario can occur when someone has been exposed to foreign tissue. People can be exposed to foreign antigen markers through transfusions, pregnancy or previous transplants. Their body can 'remember' those foreign antigens, and attack with its pre-formed team of antibodies. Interestingly, we all can have very different reactions to exposure: some people make a lot of antibodies after an exposure, and those antibodies remain active for a very long time, while others do not make antibodies, or the antibodies they do make can weaken or disappear over time.

The recipient's serum contains any active pre-formed antibodies that the recipient has made as a result of previous exposure to foreign human tissue. The goal is to determine whether the recipient's body will respond to the transplanted organ by attempting to reject it.

Positive Crossmatch	There are antibodies in the recipient's blood, ready to attack the donated organ.	Transplantation should not be carried out.
Negative Crossmatch	There is no reaction.	Transplantation is safe.

After the Transplant

The way to prevent or reduce rejection (other than getting a kidney from an identical twin) is to use immunosuppressive drugs – medicines that interfere with our immune system's ability to recognize "foreigners."

The Pros of Transplant

- Improved quality and length of life
- Freedom to travel
- Fewer dietary and fluid restrictions
- Able to return to work or school

The Cons of Transplant

- The patient must take daily anti-rejection medications for the rest of his or her life
- Risk of rejection is always there; however, as medicines and treatment have improved, this risk has reduced considerably in recent years
- Because the immune system is suppressed by medications, transplant recipients are more susceptible to infections and cancer

In Focus: Organ Transplants – Questions for Reading Comprehension

Close Reading

1. Describe the concept of compatibility and the role which antigens play in its determination.
2. In your own words, describe the process of rejection.
3. Compare blood type and tissue markers. Which is more critical for organ donation, and why?
4. Is transplant a "cure"? Why or why not?

In Focus: Kidneys

Nationally, over 80% of the U.S. organ transplant waiting list is comprised of individuals waiting for a kidney transplant. This is due to various conditions leading to kidney failure, such as congenital kidney disease, autoimmune kidney disease, hypertension and diabetes.

There is a chronic shortage of kidney donations in the United States. According to UNOS, the number of people waiting has increased, while the number of both deceased and living donors has remained relatively flat.

Because more people are waiting, the amount of time individuals spend on the waiting list is also rising. The average waiting time for a kidney is 3-5 years.

If you or someone you loved were diagnosed as needing a kidney transplant, what options are available?

Treatment Options

When someone suffers from chronic kidney disease, his or her kidneys do not usually fail all at once. Kidney disease often progresses slowly, over a period of years. It is not until a person's kidney function declines to only 10 to 15 percent that lifesaving treatment – either transplant or dialysis – becomes necessary. Alternatively, patients may opt for no treatment. Without dialysis or transplant, survival will be limited to 1 to 2 weeks.

Dialysis

Unlike those who are in imminent need of a heart, lung or liver transplant, a patient's life can be maintained through dialysis treatments. Dialysis is *not* a cure for those with kidney failure. Dialysis performs the work of the damaged kidneys, cleaning the patient's blood of waste and excess fluid.

Hemodialysis treatment

There are two kinds of dialysis:

- Hemodialysis: This usually requires patients to travel to a clinic three times a week for an average of four hour treatments each time. A patient's blood is pumped, a few ounces at a time, through a large hemodialysis machine. There are significant dietary restrictions, as well as time constraints, making it difficult to work, go to school or travel.
- Peritoneal dialysis: This type of dialysis is usually done multiple times each day or overnight, and does not require the patient to go to a center. A catheter is placed inside the peritoneum, a membrane in the abdomen. Then, fluid is inserted into the membrane and "dwells" or stays there for several hours. During the dwell time excess fluid and toxins are drawn into the membrane. The fluid is then drained out through the catheter.

More than 400,000 Americans are currently undergoing some kind of dialysis treatment. As you can imagine, the time and cost of long-term medical care accumulates, impacting a patient's social, emotional, financial and physical well-being.

Deceased Kidney Donation

Patients who meet the necessary medical criteria may join the national organ transplant waiting list. They may wait days, weeks, months or years until they are matched with a deceased organ donor. Typically, the wait time ranges from between two and ten years, depending on where they live, and issues of blood and tissue compatibility.

Living Kidney Donation

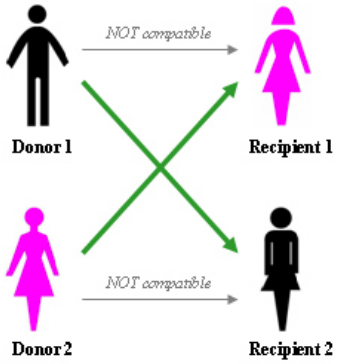
A healthy living person can donate one kidney for transplantation to another person. This eliminates the recipient's need to be placed on the national waiting list. Since the need for kidney donations is a life or death issue for so many Americans, there are several kinds of living kidney donation programs, which aim to facilitate the matching of recipients and living donors. Not all programs are available at all transplant centers.

Directed Donation

This refers to donating a kidney to someone you know, and for whom you are a blood and tissue type match: a family member, friend, coworker, neighbor, etc. The challenge with direct donation is that, in the majority of cases, direct donors are incompatible with their intended recipients.

Non-Directed / Anonymous Donation

If someone is not a match with their intended recipient, they may still wish to donate, and can do so to a stranger on the waiting list with whom they are a match. They could also start a donor chain (see below). The donor and recipient will remain anonymous to each other unless both parties express a desire to meet one day.

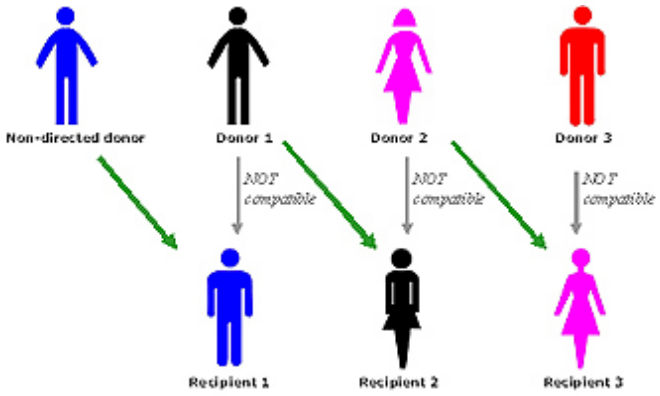


Paired Donation

If a donor and recipient do not match blood or tissue types, they can agree to "swap" with another donor/recipient pair with whom they are compatible.

Donor Chains

Donor chains begin with a non-directed donor, whose wish to donate initiates a string of kidney transplants for incompatible donors and recipients. Essentially, for each patient who needs a transplant, a family member, friend or acquaintance of that patient agrees to donate their kidney to someone else in need. The largest kidney donor chain in the United States to date took place in 2015, and touched 34 lives (UW Health, 2015).



Images courtesy of National Kidney Foundation.

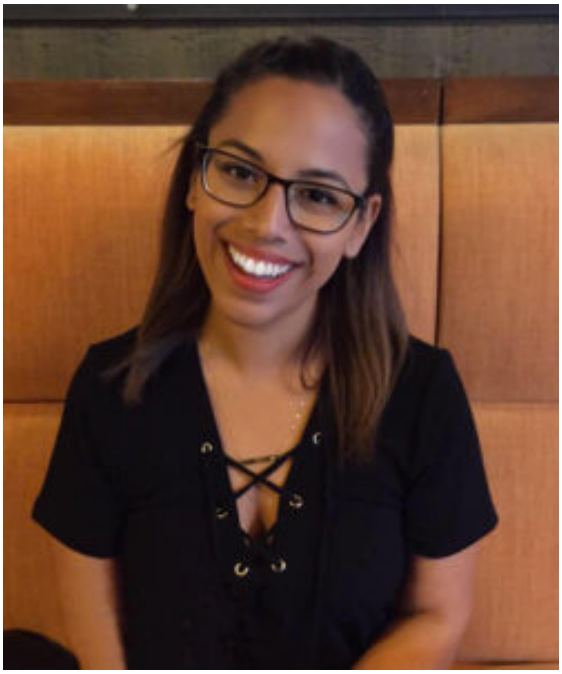
In Focus: Careers in Donation and Transplantation

Students who pursue a career in organ, eye and tissue donation or transplant enter one of the most rapidly changing and most challenging areas of medicine. Below is a brief description of *some* of the roles different healthcare professionals play in relation to donation and transplantation.

Career	Description
Chemists	Chemists are scientists who study chemicals and how they react with one another. Chemists can be involved in developing medications to treat organ recipients.
Dialysis Technicians	Dialysis technicians oversee the process of safely administering dialysis to kidney patients. Patients with failing kidneys who are waiting for a transplant must have dialysis to keep their bodies cleansed of impurities that the kidneys would normally help eliminate.
Immunologists	Immunologists are medical professionals who study and research the body's immune system, and who help develop ways for the body to more effectively accept a transplanted organ with fewer side effects.
Lab Technicians	Lab technicians, trained in the life sciences, help catalog, store, and test tissues, blood samples, and other important information.
Nephrologists	Nephrologists are medical doctors who specialize in kidney care and treatment.
Nurses	Nurses assist physician in treating organ transplant recipients and donors, and assist in surgery during organ and tissue recovery and transplantation. These nurses typically have critical care experience.
Nutritionists	Nutritionists study how diet affects overall health. Nutritionists can help organ recipients maintain a diet that will help them regain their health during the recovery period, and through the rest of their life.
Pharmacist	Pharmacists work closely with a patient's medical team, the patient and family members to minimize side effects and organ rejection and maximize quality of life.
Pharmacologists	Pharmacologists are scientists who deal with the preparation, uses, and effects of medications.
Physical Therapists	Physical therapists develop and help administer exercise programs that help organ recipients recover their physical strength and resume their normal activities as much as possible.
Physicians	Physicians diagnose and treat disease that may result in organ failure, and provide treatment and prescribe medication for individuals who are waiting for an organ transplant or have undergone organ transplantation.
Radiologist	Radiologists are medical professionals who understand x-rays and x-ray therapies, and who determine the best use of these technologies in the medical care of donors and transplant recipients.
Researchers	Researchers in the field of medicine – chemists, biologists, radiologists, and others with training and/or experience in the life sciences-help develop new drug treatments, methods of transplantation, and ways of treating organ recipients.
Social Worker	Social workers work with transplant patients and living donors, to provide counseling and education, provide information on services and resources, and perform psychosocial evaluations as needed.
Transplant Coordinators	Transplant coordinators – a vital link in the donation and transplantation and process – counsel the family of a recently deceased person about the option of donation, and help oversee the medical management of the donor and placement of the organs. They educate transplant candidates about the donation process and options.
Transplant Surgeons	Transplant surgeons specialize in the transplantation of particular organs. They also remove organs from donors.

Adapted from U.S. Department of Health and Human Resources

Donate Life Stories of Hope



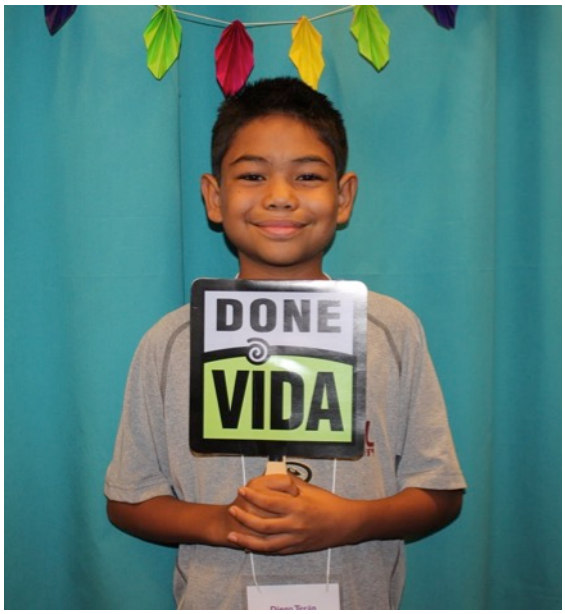
Angie, cornea recipient

Angie was a 19-year-old college student in New York City when she accidentally scratched the cornea in her left eye while removing her contact lens. Assuming that her eye would heal on its own, Angie went to bed, only to discover the next morning that she could barely see through her injured eye. Treatment with an antibiotic healed the infection, but scar tissue resulted in permanent damage to Angie's cornea and caused a sudden, rapid decline in her eyesight.

Angie struggled to keep up with the large amount of reading for classes, and she needed to sit in a specially lit room in order to take her exams. Angie could no longer ride the subway to school because she could not read the numbers on approaching trains in the dark, underground lighting. In pain and overwhelmed, Angie's fears of permanent blindness gave way to hope when her doctor told her that a corneal transplant from a donor could restore her sight.

In the five years since Angie's surgery, she has not only completed her undergraduate studies, but gone on to obtain her master's degree and is now working as a school social worker helping children in crisis. Angie spends her free time volunteering to aid youth in underserved communities and is currently pursuing another master's degree in order to become a nurse practitioner.

Angie is grateful for the opportunity she has to pursue her dreams because of what her donor made possible.



Diego, kidney recipient

In early 2014, 10-year-old Diego told his mother Lupita that he would like to attend a two-day summer camp, but he was afraid to go because he had a problem with wetting the bed at night. Lupita took Diego to his pediatrician, who referred him to an urologist. Lupita never could have imagined the news she was about to hear from the specialist: Diego's kidneys were functioning at just 12 percent, and he needed to start dialysis immediately.

Over the course of the next year, Diego endured 10 hours of home dialysis every night, but he stayed positive and was determined not to let his condition slow him down. Diego even attended that summer camp with his dialysis machine in tow. Unfortunately, Diego's condition eventually became so serious that his doctors determined he would need a kidney transplant.

Diego was added to the national transplant waiting list; and in August of 2015, Lupita received the call she had been desperately hoping for: a kidney that was a perfect match for Diego had been donated. The relief that Diego and his entire family felt when they received this news also brought heartache. Devastated to know that Diego's chance at life meant that another family was grieving the loss of a loved one, Diego and his family grieved with them and prayed for them.

Diego's surgery was a success, and today he is thriving. His renewed health has resulted in changes that have shown up in many different ways than being able to attend summer camp without worry or limitation. Once a "picky eater", Diego has developed a voracious appetite since receiving his new kidney.

"Thanks to the generosity of his donor, my son is now able to have a healthy life," says Lupita. "Words will never be enough to thank Diego's donor. Hopefully we can meet the family someday and express our appreciation for this indescribable gift."

Makenzie, tissue recipient

Working out and staying healthy have always been two of Makenzie's passions. A natural athlete, Makenzie made both the field hockey and softball teams her freshman year of high school. When she was not playing organized sports, Makenzie was active in other ways: running, hiking, swimming, participating in school clubs, hanging out with friends and spending quality time with her parents and older brother. She never imagined a life without sports, but everything was about to change.

Makenzie was 14 years old and just finishing her first 5k race when she hyperextended her knee. Because the initial soreness she experienced did not seem to indicate a serious injury, Makenzie continued to play sports and work out regularly over the next few months. She soon found, however, that a terrible pain developed that was constantly there whenever she was moving – on or off the playing field.

Her doctor performed exploratory surgery during her sophomore year with shocking results: Makenzie's ACL was 98% torn. Because of a donor's gift, her doctor was able to immediately perform a tissue transplant to help Makenzie begin her return to fully participating in life again.

Donor tissue made it possible for Makenzie to resume the healthy lifestyle that she loves and to continue to excel in sports. Not only did Makenzie play field hockey again, she also achieved her big dream of becoming team captain. Makenzie treasures her donor's gift as the greatest she has ever received. Without it, she knows that her life would never have been same, and she strives each day to honor the person who gave her the opportunity to live her life to the fullest.

Ryan, donor

In 2004, Alison received the call that no mother is prepared for. Her son Ryan, 16 years old and a star athlete, had been in a car crash. Alison was told that Ryan had many injuries, but the most serious was massive head trauma. His brain was swelling and they had to wait to see if there would be a change. After a week, Ryan was pronounced brain dead.

Just a month before Ryan's fatal crash, he passed his driving test and received his license. He made the decision to register as an organ, eye and tissue donor, a choice that no one thought would affect him so soon. Alison said, "Ryan was active in our church's youth group and they had a speaker come and talk about donation. A kidney recipient shared his story and it inspired Ryan to register. He also encouraged friends at school to register after he heard the recipient's story."

Ryan was able to save many others by donating his kidneys, liver, pancreas, heart and lungs. He was also able to heal the lives of more than 50 people through tissue donation. Alison said, "So much good has come out of this tragedy. I believe that God works for all things good, and I see it. Just knowing that Ryan lives on through other people is comforting."

Alison shares her story in her church and community, sharing the lifesaving benefits of donation and the pride that she has knowing that her son's legacy is one of selflessness.

State Mandates

Updated August 2017

As of October 2017, 24 out of the 52 U.S. states and territories (47%) have state mandates for organ, eye and tissue donation education.

Arkansas

Subject: Driver's Education, Health (high school)
Year Start: 2003
Active: Yes
Language: Act 546 of the Arkansas State Legislature 84th General Assembly

California

Subject: Driver's Education
Year Start: 2003
Active: Yes
Language: SEC. 2. Section 33542 is added to the Education Code, to read:
33542. The commission and the state board shall ensure that the health and science curriculum frameworks adopted in the course of the next submission cycle following the date that this section becomes effective include the subject of organ procurement and tissue donation, as appropriate.

Connecticut

Subject: Driver's Education
Year Start: 2004
Active: Yes
Language: Sec. 14-42a. Agreement with procurement organizations. Inclusion of information re procurement organizations in driver education programs.
(a) The Commissioner of Motor Vehicles and the Commissioner of Administrative Services shall enter into an agreement with one or more federally designated organ and tissue procurement organizations to provide to such organizations access to the names, dates of birth and other pertinent information of holders of operator's licenses and identity cards issued pursuant to section 1-1h who have registered with the Department of Motor Vehicles an intent to become organ and tissue donors. Such access shall be provided in a manner and form to be determined by the commissioners, following consultation with such organizations, and may include electronic transmission of initial information and periodic updating of information. The Commissioner of Motor Vehicles shall not charge a fee for such access pursuant to section 14-50a, but may charge such organizations reasonable administrative costs. Information provided to such organizations shall be used solely for identifying such license holders as organ and tissue donors.
(b) The Commissioner of Motor Vehicles shall include in regulations adopted pursuant to sections 14-36f and 14-78 a requirement that a description of the purposes and procedures of procurement organizations, as defined in section 19a-289a, be included in driver education programs. (https://www.cga.ct.gov/current/pub/chap_246.htm#sec_14-42a)

Delaware

Subject: Health
Year Start: 2015/2016 school year
Active: Yes
Language: 1.1.3.4. In grades 9 to 12, one half (1/2) credit of comprehensive health education is required for graduation of which fifteen (15) hours of this 1/2 credit course must address drug and alcohol education. In addition, no less than two (2) hours of this 1/2 credit course shall include a cardiopulmonary resuscitation (CPR) instructional program which uses the most current evidence based emergency cardiovascular care guidelines, and incorporates psychomotor skills learning into the instruction, use of an Automated External Defibrillator (AED) as well as a component on the life saving and life enhancing effects of organ and tissue donation. This 1/2 credit course may be provided in the 9th, 10th, 11th or 12th grade. In each of the remaining three grades, fifteen (15) hours of drug and alcohol education must be provided for all students. CPR instruction, use of an AED and organ/tissue donation awareness shall be integrated into each high school Health Education Program no later than the 2015-2016 school year.

Iowa

Subject: Driver's Education
Year Start: Not provided.
Active: Yes
Language: Instruction relating to becoming an organ donor under the revised uniform anatomical gift Act as provided in chapter 142C

Illinois

Subject: Driver's Education, Health or Science class
Year Start: 1998
Active: No
Language: (105 ILCS 5/27-23.5) Sec. 27-23.5. Organ/tissue and blood donor and transplantation programs. Each school district that maintains grades 9 and 10 may include in its curriculum and teach to the students of either such grade one unit of instruction on organ/tissue and blood donor and transplantation programs. No student shall be required to take or participate in instruction on organ/tissue and blood donor and transplantation programs if a parent or guardian files written objection thereto on constitutional grounds, and refusal to take or participate in such instruction on those grounds shall not be reason for suspension or expulsion of a student or result in any academic penalty. The regional superintendent of schools in which a school district that maintains grades 9 and 10 is located shall obtain and distribute to each school that maintains grades 9 and 10 in the district information and data, including instructional materials provided at no cost by America's Blood Centers, the American Red Cross, and Gift of Hope, that may be used by the school in developing a unit of instruction under this Section. However, each school board shall determine the minimum amount of instructional time that shall qualify as a unit of instruction satisfying the requirements of this Section. (Source: P.A. 90-635, eff. 7-24-98.)
http://www.ilga.gov/legislation/publicacts/fulltext.asp?Name=093-0547

Indiana

Subject: Driver's Education, Health
Year Start: 1993
Active: Yes
Language: (7) The establishment and maintenance of minimum standards for drive education programs (including classroom instruction and practice driving) and equipment and the licensing of driver training instructors. Beginning with classroom instruction for the 1993-1994 school year, classroom instruction standards established under this subdivision must include instruction about: (A) railroad-highway grade crossing safety; and (B) the procedure for participation in the human organ donor program.
Sec. 14. (a) Each school corporation shall include in the school corporation's high school health education curriculum instruction regarding the human organ donor program and blood donor program as adopted by the stat board, including: (1) the purpose of the human organ donor program and blood donor program; (2) the statewide and nationwide need for human organ and blood donations; and (3) the procedure fro participation in the human organ donor program and blood donor program. (b) The department shall, in consultation with the state department of health or any other appropriate organization, develop human organ donor program and blood donor program educational materials to be made available to school corporations to assist teachers assigned to teach the materials described in this section. (c) The department shall develop guidelines and the state board shall adopt rules under IC 4-22-2 with regard to the instruction required under this section to assist teachers assigned to teach the material described in this section. SECTION 3. An emergency is declared for this act.

Louisiana

Subject: Driver's Education
Year Start: Not provided.
Active: Yes
Language: *Louisiana's driving schools must fulfill state mandated LARS 32:402.1, which requires all students preparing for a driver's license to receive 30 minutes of organ donation education. LDF has created a specialized curriculum for educating youth, produced a youth video, and additional materials that can be utilized by the driving schools.*

Massachusetts

Subject: Driver's Education
Year Start: Not provided.
Active: Yes
Language: *Written in the law, but no mandated curriculum. They provide a program for the schools to use.*

Maine

Subject: Driver's Education
Year Start: Not provided.
Active: Yes
Language: *Written in the law, but no mandated curriculum. They provide a program for the schools to use.*

Michigan
Subject: Driver's Education
Year Start: Not provided.
Active: No
Language: *Required in Driver's Education, but not in high schools*

Minnesota
Subject: Driver's Education
Year Start: early 2000's
Active: Yes
Language: 171.0701 DRIVER EDUCATION CONTENT.
Subdivision 1.Driver education requirements.
(a) The commissioner shall adopt rules requiring a minimum of 30 minutes of instruction, beginning January 1, 2007, relating to organ and tissue donations and the provisions of section 171.07, subdivision 5, for persons enrolled in driver education programs offered at public schools, private schools, and commercial driver training schools.
https://www.revisor.mn.gov/statutes/?id=171.0701&year=2013

Mississippi
Subject: Driver's Education, Health or Science class
Year Start: 2014
Active: Yes
Language: *2014 Mississippi Code Chapter 25 – Driver Education and Training – 37-25-5 The State Superintendent of Public Education shall prepare and recommend to the State Board of Education, and the board shall adopt rules and regulations governing the establishment, conduct and scope of driver education and training programs in secondary schools of this state, subject to the requirements and exceptions set forth in this chapter. Said program shall be established and maintained only in accordance with such rules and regulations. The state driver education and training program in secondary schools of this state shall include a program of study for alcohol and safety education as it pertains to driver and highway safety and shall also include instruction relating to organ and tissue donation and organ and tissue donation procedures…

New Jersey
Subject: Not specified in mandate
Year Start: 2008
Active: Yes
Language: C.26:6-66 Short title. 1.This act shall be known and may be cited as the "New Jersey Hero Act," referring to individuals who donate life-saving and life-enhancing organs and tissues.
Refer to entire New Jersey Hero Act: ftp://www.njleg.state.nj.us/20082009/PL08/48_.PDF

New Mexico

Subject: Driver's Education
Year Start: 2006
Active: Yes
Language: 66-7-506.1. DWI prevention and education program; organ donation. DWI prevention and education programs for instruction permits and driver's licenses shall include information on organ donation and the provisions of the Jonathan Spradling Revised Uniform Anatomical Gift Act [24-6B-1 NMSA 1978].

Nevada

Subject: Driver's Education
Year Start: 2017
Active: Yes
Language: https://www.leg.state.nv.us/Session/79th2017/Bills/SB/SB112.pdf

Section 1. NRS 389.021 is hereby amended to read as follows:
389.021 1. The State Board shall adopt regulations establishing courses of study and the grade levels for which the courses of study apply for:
– 2 –
- *SB112*
(a) The academic subjects set forth in NRS 389.018. A course of study in health prescribed pursuant to paragraph (c) of subsection 3 of NRS 389.018 must, [to the extent money is available for this purpose,] for pupils enrolled in middle school, junior high school or high school, including, without limitation, pupils enrolled in those grade levels at a charter school, include instruction in:

(1) To the extent money is available for this purpose:

(I) The administration of hands-only or compression-only cardiopulmonary resuscitation, including a psychomotor skill-based component, according to the guidelines of the American Red Cross or American Heart Association; and

(II) The use of an automated external defibrillator [.] ;

and

(2) Organ and tissue donation, including, without limitation:

(I) How to register as a donor and the rules governing donor gifts in this State pursuant to NRS 451.500 to 451.598, inclusive;

(II) The societal and individual benefits of organ and tissue donation; and

(III) Facts about organ and tissue donation.

Ohio

Subject: Health
Year Start: 2017/2018 school year
Active: Yes
Language: (g) The process of making an anatomical gift under Chapter2108. of the Revised Code, with an emphasis on the life-saving and life-enhancing effects of organ and tissue donation.

South Carolina
Subject: Health (Middle School)
Year Start: 2016
Active: Yes
Language: Not provided.

Tennessee
Subject: Not specified in mandate.
Year Start: Not provided.
Active: No.
Language: Every LEA is encouraged to promote educational opportunities to inform students about organ and tissue donation and transplantation. These opportunities should include curricula content as appropriate to provide: (1) Information about the need for organ and tissue donation and the benefits of donation to recipients; and (2) Information about Tennessee law relative to organ and tissue donation, including how to become a donor.

Texas
Subject: Driver's Education
Year Start: 2003, undated in 2015
Active: Yes
Language: Texas Education Code, Title 5, Sec. 1001.108. INFORMATION RELATING TO ANATOMICAL GIFTS.
(a) The commission by rule shall require that information relating to anatomical gifts be included in the curriculum of each driver education course and driving safety course.
(b) The curriculum must include information about each matter listed in Section 49.001(a), Health and Safety Code.
(c) In developing rules under this section, the commission shall consult with the Department of State Health Services.

Virginia
Subject: Driver's Education, Health (9th Grade)
Year Start: Not provided.
Active: Yes
Language: The student will demonstrate an understanding of Virginia traffic laws, licensing procedures, and other responsibilities associated with the driving vilege. Key concepts include...the organ- and tissue-donation designation process. Language from the Driver's Education SOL's for Virginia 2015. Describe the benefits of organ donation. Identify health-related social issues, such as organ donation, homelessness, the spread of infectious diseases, underage drinking, substance abuse, and violence, and their impact on the community. Describe how and where to access community resources related to organ donation, homelessness, underage drinking, and/or substance abuse. Identify and create a plan to address a community health-related social issue such as organ donation, homelessness, underage drinking, or substance abuse. Language from Health Education SOL's for Virginia 2015.

Washington

Subject: Driver's Education
Year Start: Not provided.
Active: Yes
Language: WAC 308-108-150 – Curriculum schedule.
A driver training school may offer classroom and behind the wheel instruction to students throughout the year. In order to be approved by the director, a curriculum schedule must satisfy or include the following requirements:
(7) Distributing to students instructional material developed by the department and the federally designated organ procurement organization for Washington state relating to organ and tissue donation awareness education; and

Wisconsin

Subject: Driver's Education
Year Start: 2001
Active: Yes
Language: Mentioned several places in the state statutes –

State stat. sec. 115.28 defines the duties of the state superintendent of schools to include oversight of driver's education programs in schools, education boards and technical colleges:

> 11) Driver education courses. Approve driver education courses offered by school districts, county children with disabilities education boards, and technical college districts for the purposes of s. 343.16 (1) (c) 1. and establish minimum standards for driver education courses offered in private schools and tribal schools for the purposes of s. 343.16 (1) (c) 3. All driver education courses approved or for which standards are established under this subsection shall do all of the following:
>
> > 115.28(11)(b) (b) Provide at least 30 minutes of instruction relating to organ and tissue donation and organ and tissue donation procedures.

State stat. sec. 343.72 governs rules for licensing driver's schools:

> (5) The department may not license a driver school unless its approved course of instruction does all of the following:
>
> > 343.71(5)(b) (b) Provides at least 30 minutes of instruction relating to organ and tissue donation and organ and tissue donation procedures.

State stat sec. 38.04 governs the technical college system board.

> (e) No driver education course may be approved by the board unless it does all of the following:
>
> > 38.04(4)(e)2. 2. Provides at least 30 minutes of instruction relating to organ and tissue donation and organ and tissue donation procedures.

IMPORTANT LINKS

DONATE LIFE AMERICA

- Donate Life Representative List: **https://www.donatelife.net/get-involved-locally/**
- Additional Educational Resources: **https://www.donatelife.net/education-resources/**
- National Celebrations & Observances (with resources): **https://www.donatelife.net/celebrations/**
- Extend Your Reach Resources: **https://www.donatelife.net/things-you-can-do/**

OTHER DONATION & TRANSPLANTATION ORGANIZATIONS

The following organizations are related to donation and transplantation. Their websites contain more helpful resources for your educational needs.

- **UNITED NETWORK FOR ORGAN SHARING** (**http://www.unos.org/**) (UNOS) – UNOS is the government-contracted nonprofit that manages the United State's organ system, including the waiting list and the distribution of donated organs.

- **ORGAN PROCUREMENT AND TRANSPLANTATION NETWORK** (**http://optn.transplant.hrsa.gov/**) (OPTN) – UNOS currently serves as the OPTN, linking professionals with the donation and transplantation system. All of the current national waiting list, donation and transplantation data (sorted by state, organ, donor type, etc.) is housed this website.

- **HEALTH RESOURCES AND SERVICES ADMINISTRATION** (**http://www.hrsa.gov/index.html**) (HRSA) & **ORGANDONOR.GOV** (**http://organdonor.gov/index.html**) – In the United States, the Health Resources and Services Administration of the U.S. Department of Health and Human Services has oversight of the OPTN (see above). OrganDonor.gov is the official U.S. Government website for organ donation and transplantation, managed by HRSA.

- **SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS** (**http://www.srtr.org/**) (SRTR) – This organization is responsible for research and analysis of transplantation outcome data. This website contains high-level reports on national transplant data, transplantation programs and organ procurement organizations.