Decision: Donation

A School Program that Gives the Gift Of Life

Organ/Tissue Donation Program for Schools

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Acknowledgements

This model organ and tissue donation education project is a part of the U. S. Department of Health and Human Services Secretary Tommy G. Thompson's Gift of Life Donation Initiative to encourage and enable Americans to donate the gift of life.

Special appreciation is extended to members of the Expert Panel on Organ and Tissue Donation that was convened in February 2002 to review existing instructional materials and offer recommendations on developing these model materials. These dedicated individuals have repeatedly and generously offered their time and their expertise to this project.

Gloria Garcia Bohrer – Former Director, Public Relations, OneLegacy, A Transplant Donor Network, Los Angeles, California
A.O. Brad Bradshaw – Executive Director, American Driver and Traffic Safety Education Association, Indiana University of Pennsylvania, Indiana, Pennsylvania
Kay Butler – Project Director, Say Yes – An organ and tissue transplant education program, Howard University, Washington, DC
Gary Childress – Chairman, Lisa Landry Childress Foundation, Dallas, Texas
Rhonda Gaines – Community Education Specialist, Washington Regional Transplant Consortium, Falls Church, Virginia
Carol D. Hardin – Middle School Coordinator, Fairfax County Public Schools, Annandale, Virginia
Fred Johnson – Former President, National Science Teachers Association, Cordova, Tennessee
Jason King – Manager, Public Affairs, American Association of Motor Vehicles Administrators, Arlington, Virginia
Diane M. Lewis – Director, Project Team Life, Oklahoma Organ Sharing Network, Oklahoma City, Oklahoma
Lin Johnson McGaw – Director, Professional Services, United Network for Organ Sharing, Richmond, Virginia
Susan B. McHenry – Former President, National Association of Emergency Medical Services Directors; Emergency Medical Services Specialist, National Highway Traffic Safety Administration, Washington, DC
Henry Milne – Curriculum Developer, National Science Resources Center, Smithsonian Institution, Washington, DC
Mary Nachreiner – Physical Therapist, donor mother of daughter for whom Wisconsin's "Kelly's Law" is named, Sauk City, Wisconsin
William D. Pullen – Driver Education Consultant, Baltimore County Public Schools, Towson, Maryland
Margaret J. Schaeffer – Former Director of Organ Procurement, Washington Regional Transplant Consortium, Washington, DC, donor mother
Merry L. Smith – Community Affairs Coordinator, Mid-America Transplant Services, donor mother, St. Louis, Missouri
Lois J. Teesdale – Supervising Editor for Careers and Technology, Prentice Hall, Glenview, Illinois
Randall R. Thiel – Alcohol and Traffic Consultant, Wisconsin Department of Public Instruction, Madison, Wisconsin
Joseph Villani – Deputy Executive Director, National School Boards Association, Arlington, Virginia; former Associate Superintendent, Montgomery County Public Schools, Rockville, Maryland

Acknowledgements

Many from the field of organ and tissue donation and transplantation have provided inspiration and support for this project. Appreciation is extended to the following organizations for their creativity in the field of donor education and their generosity in sharing materials with the developers of this guide:

Lisa Landry Childress Foundation

The Lisa Landry Childress Foundation was established in 1995 to honor the memory of Lisa, wife of Gary Childress and mother of Christina, and youngest daughter of the late Dallas Cowboy Coach Tom Landry and Mrs. Tom Landry. The Foundation has developed a comprehensive curriculum—Pass It On®—that provides an in-depth study of organ and tissue donation and transplantation in a user-friendly format that enables teachers to quickly locate information appropriate to the age level of their students and their content area. This curriculum includes the award-winning videos *Pass It On I and II*.

www.passitonforlife.org

Wisconsin Donor Network

The Wisconsin Donor Network is the organ procurement organization supporting the transplant community in eastern Wisconsin. Guided by an advisory board consisting of members drawn from the community and affiliated transplant centers, the network serves 2.2 million people in a 10-county region. In addition to recovering organs for transplant, the Wisconsin Donor Network provides public and professional education about the tremendous need for organ and tissue donors.

www.wisdonornetwork.org

OneLegacy, A Transplant Donor Network

OneLegacy, A Transplant Donor Network is an organ procurement organization working with the 14 transplant centers and 225 donor hospitals of Southern California. OneLegacy has developed an organ and tissue donation education curriculum—Discoveries—an innovative, award-winning multidisciplinary school program designed to expose students in grades 7-12 to scientific advances in the field of organ donation and transplantation. Designed and created by accredited educators, Discoveries complements and enhances existing school curricula and includes a comprehensive educational video and teaching guide.

www.onelegacy.org

Acknowledgements

Oklahoma Donor Coalition

Project Team Life is a curriculum program on organ and tissue donation and transplantation sponsored by the Oklahoma Donor Coalition. The curriculum development, underwritten by the Oklahoma Organ Sharing Network, was done by a team of Oklahoma educators and representatives from the Oklahoma Organ Sharing Network, American Red Cross Tissue Services, and the Oklahoma Lions Eye Bank. The project was awarded a three-year Federal grant by the Health Resources and Services Administration of the U.S. Department of Health and Human Services. The Project Team Life curriculum kit consists of a comprehensive curriculum guide containing teaching materials for grades K-12, videotapes, an interactive computer program, story books, transparencies, a music CD, and hands-on material such as anatomy aprons and cornea blindness glasses. The materials were created to meet the requirements for the Oklahoma State-mandated curriculum. Project Team Life utilizes multiple intelligences and is grounded in brain-based research design.

www.oosn.com

Gift of Hope Organ & Tissue Donor Network

Gift of Hope Organ & Tissue Donor Network is an organ procurement organization that coordinates organ and tissue donation in the northern three quarters of Illinois and northwest Indiana, serving 185 hospitals and more than 11 million residents. Gift of Hope Organ & Tissue Donor Network, the National Kidney Foundation of Illinois and their partners with the Illinois Coalition on Donation educate more than 25,000 Illinois high school students each year through the *Share Your Life. Share Your Decision* curriculum. Developed in 1999 and taught in the classroom by specially trained volunteer speakers, Share Your Life. Share Your Decision is a 16-minute video with accompanying teacher's discussion guide and student workbook. The video shares the stories of four teens, their families, and their life-changing personal experiences with organ donation or transplantation.

www.robi.org

State of Missouri Organ Donation Advisory Committee

The Organ Donation Advisory Committee assists the Missouri Department of Health and the Department of Elementary and Secondary Education in the development of an organ donor awareness programs to educate the general public on the importance of organ donation and establishes a statewide organ donor registry within the Department of Health. The Organ Donation Advisory Committee works to reduce the gap between the need for donated organs and the available supply.

www.gov.state.mo.us/boards/cgi/boards.cgi?FUNCTION=DESC&BOARD=ORGAN

Acknowledgements

Indiana Organ Procurement Organization

The Indiana Organ Procurement Organization (IOPO) provides informational, educational materials about organ, tissue, and eye donation. Indiana law requires teens to be taught about organ donation in school. With the help of educators, IOPO has created a comprehensive guide for teaching teens about organ, tissue, and eye donation: the Chalk One Up for Life education package. IOPO provides teacher's guides, complete with a video, lesson plans, and suggested activities. In conjunction with a Fort Wayne, Indiana, TV station, IOPO has developed the widely-distributed video *Christopher*. IOPO also seeks to educate the general public about organ donation through newspaper articles and inserts, radio commercials, and informational sheets.

www.iopo.org

New Mexico Donor Services

New Mexico Donor Services is an organ procurement organization serving the State of New Mexico and is the link between donors and patients awaiting life-saving transplants.

www.nmdonor.org

LifeGift Organ Donation Center

LifeGift Organ Donation Center recovers tissues and organs for individuals needing transplants in west, north, and southeast Texas. LifeGift staff members and volunteers work with donor families and transplant recipients as well as educate the public about the importance of organ and tissue donation.

www.lifegift.org

James Redford Institute for Transplant Awareness

The James Redford Institute is a nonprofit organization dedicated to educating the public about the need for organ and tissue donation through film, educational outreach, and the web.

www.jrifilms.org

Gratitude also is extended to the organ procurement organization community and other organizations dedicated to the goal of providing donation education in communities throughout the country. Special thanks to Pat Kornick of CORE (Center for Organ Recovery & Education)—www.core.org—and Alex McDonald of Intermountain Donor Services—www.idslife.org—for their willingness to spend time sharing their perspectives on educating high school students about organ and tissue donation.

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Introduction

Why teach about organ and tissue donation and transplantation?

Because donation saves lives. . .

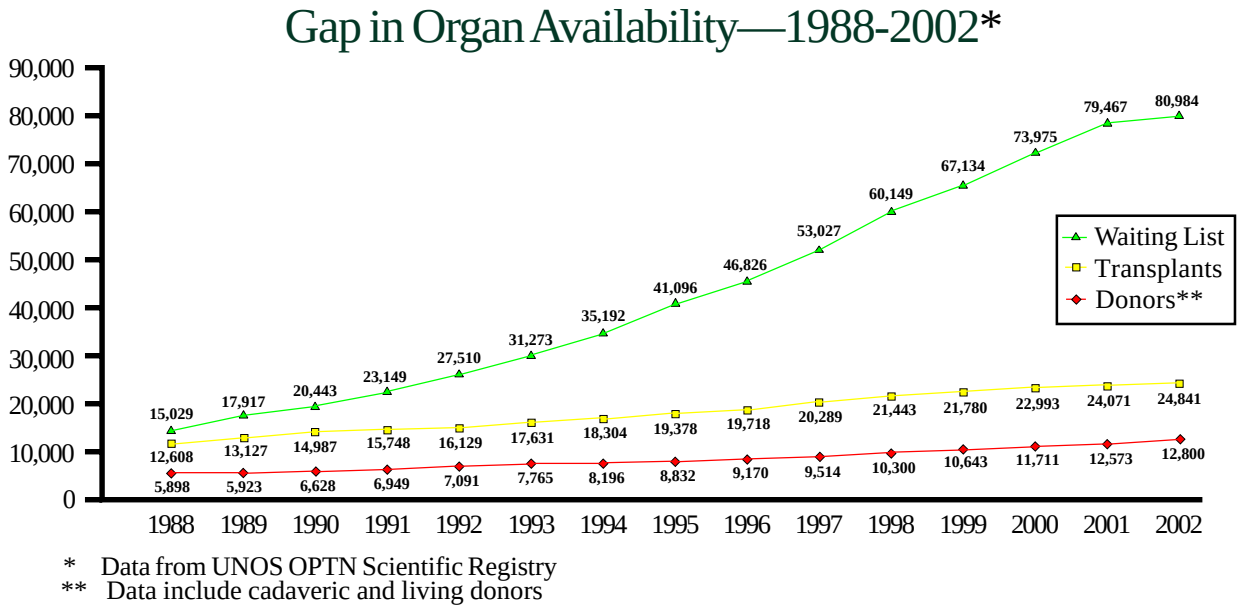
Just one organ donor can save the lives of five of the nearly 84,000 men, women, and children who were on the national waiting list for organ transplants as of January 2004. Just one organ and tissue donor can provide life-saving or life-enhancing transplants to more than 50 people.

Because each day Americans die waiting for an organ transplant. . .

Thousands of people on the national organ transplant waiting list die every year—not because there's no treatment—but because there are too few organ donors. Advances in medicine have resulted in greater numbers of terminally-ill patients being wait-listed for an organ transplant. However, with only modest increases in the number of organ donors over the past decade, the number of available organs remains woefully inadequate to meet the needs of those waiting.

Because education and awareness are the keys to increasing donation and providing these life-saving transplants. . .

It is a public health crisis and a modern-day tragedy that we know how to save lives, but we often are unable to do so. Learning about donation can encourage young Americans to be organ and tissue donors and to share their decisions with their families and friends. Accordingly, the miracles of donation and transplantation have a place in every classroom in America.



* Data from UNOS OPTN Scientific Registry
** Data include cadaveric and living donors

This graph clearly shows the continually widening gap between the number of patients on the waiting list and the number of donors. You can see that the number of transplants parallels and is limited by the number of donors.

I. Introduction

Why is it important to talk about donation?

Some states recover organs based on a deceased adult's legally documented consent to donate; other states require family consent (See **Common Questions and Misconceptions** for discussion of minors). In all instances, family members can best serve as your advocate if you have shared your donation decision with them. While data indicate that a large majority of Americans say they support organ and tissue donation, when asked to donate a deceased relative's organs and tissues, only about 50 percent of families consent. One reason for this disparity is that families often do not know of the deceased's donation intentions. A recent study supported by the Agency for Healthcare Research and Quality of the U.S. Department of Health and Human Services found that:

- 95 percent of families surveyed said that knowing their loved one's wishes would have a substantial influence on their decision to donate that family member's organs and tissues.
- Only 43 percent of respondents had ever discussed donation with their loved ones.
- Less than 25 percent knew if their loved ones carried a donor card.

Why has the United States Department of Health and Human Services created a program on donation for high school students?

On April 17, 2001, Health and Human Services Secretary Tommy G. Thompson announced a new national initiative to increase organ, tissue, marrow, and blood donation. *Decision: Donation—A School Program That Gives the Gift of Life* partially fulfills one goal of the Secretary's initiative to increase donation by creating an organ and tissue donation education program, informing the Nation's youth about donation, and encouraging them to consider becoming donors. As the educators of this country, you can help to fully accomplish this goal. By using these materials to integrate organ and tissue donation into your existing curriculum and training programs, you will help those waiting for a life-saving transplant to realize their goal.

According to Secretary Thompson, educating the nation's youth about organ and tissue donation can result in two important outcomes:

- Young people will be able to make an informed decision when asked to indicate their donation decision on their driver's license or State donor registry.
- The youth of this Nation will be able to educate their families about the importance of organ and tissue donation.

This high school education component of Secretary Thompson's national Gift of Life Donation Initiative evolved from his commitment to donation while governor of Wisconsin. As Governor, he supported the passage of *Kelly's Law*—legislation requiring all Wisconsin driver's education classes to provide at least 30 minutes of instruction on organ and tissue donation. Kelly was a high school student who said yes to donation on her driver's license. A short time later she died as a result of an auto accident. Kelly's organs saved the lives of three people.

Introduction I.

What is the purpose of this educational program?

Decision: Donation provides a multifaceted set of materials—print, video, CD-ROM, and Web-based—that teachers throughout the country can use in a variety of subject areas to educate students and encourage them to consider organ and tissue donation.

How can I possibly add this into my already cramped curriculum?

This package was developed with you in mind. We know the workload that most teachers juggle, so this package contains a basic stand-alone **Core Lesson** that can be taught in one 45-minute class in any curriculum setting. Additional lessons and activities can stand alone as special topics or be integrated into the existing curriculum. The next section—**How to Use This Guide**—outlines the educational materials in this package and how they can be incorporated into your curriculum.

Which teachers should use these materials?

Since repetition is a critical element in learning, it would be ideal to integrate donation instruction into multiple curriculum areas, such as driver's education, health education, biology, English, mathematics, and social studies. We encourage you to discuss this approach with other members of your teaching staff and provide students with as many opportunities as possible to learn about donation.

NOTE: *Your school may already participate in an educational program on donation provided by an organ procurement organization (OPO), a local Coalition on Donation (Coalition), or another donation organization. These materials are not intended to replace, but rather to supplement, ongoing programs where they exist. We suggest that you collaborate with your local OPO, Coalition, and other donation organizations to provide the best possible program for your students. These organizations can provide expertise and additional information relevant to your area, and often have trained speakers whose presentations can enhance your program.*

A final word….

If you and your students become educated about donation and share that education with others, you will almost certainly, someday, somewhere, save a life.

Thank you

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How to Use This Guide

Decision: Donation provides teachers and schools with a guide to help high school students make an informed decision as to whether to become an organ and tissue donor *and* to encourage students to then communicate their donation wishes to immediate family members. We suggest that you review all the materials before deciding what to use with your classes and that you share these materials with other teachers in your school. An on-line version of this guide is available in PDF format at www.organdonor.gov.

The materials in this package are designed to allow teachers and schools to integrate the topic of organ and tissue donation into their subject curriculum. However, the most effective approach to teaching this topic is to integrate it into *all* curriculum areas in your school, so you are strongly encouraged to discuss this approach with your colleagues. (See Appendix A for a list of national education standards relevant to organ and tissue donation.)

Opportunities for integration are provided through activities suitable for use in driver's education, health education, biology, social studies, English, and mathematics classes. Some of these materials can be used in any of these subject areas while others are intended for specific subject areas. A list identifying materials by subject area is provided at the end of this section. In addition, the following icons are used at the upper corner of the first page of each component to indicate appropriate subject area:

Driver's Education

Science / Biology

Social Studies

Health Education

Mathematics

English

This package consists of both print and video materials. The videos are intended to be used in the core lesson for all students—**Share Your Life. Share Your Decision**. The print materials are divided into the following sections:

- Background
- Web Activities
- Lesson Activities
- Appendices
- Supplementary Materials
- Glossary

NOTE: Your local organ procurement organization (OPO)—a Federally designated nonprofit organization responsible for coordinating organ donation in your area—may have an ongoing relationship with your school. OPOs often have experienced and talented community educators and speakers who provide valuable educational programs on donation and transplantation.

We encourage you to continue these activities if you presently have such a relationship with your local OPO. We also encourage you to use materials in this guide to support those ongoing education programs. You can locate your local OPO at: www.organdonor.gov/OPO.htm

NOTE: Many of the materials are suitable for use in a number of different subject areas and therefore are designated with more than one icon.

II. How to Use This Guide

Background

The **Background** contains information targeted primarily at you, the teacher. However, much of the background information may also be used by your students. We encourage you to duplicate those components for use in your classroom. We recommend you carefully read all the information provided to determine which materials are appropriate for your students. The Background is divided into three sections:

Overview of Organ and Tissue Donation: Reading this section before you start teaching this topic is essential. It provides the *minimum* information needed to understand the transplant process and to address common student questions and concerns about organ and tissue donation.

Science: This section provides information on the science of organ transplantation and the problems of rejection and matching donors and recipients. Biology and health teachers might find this section especially useful. Included are illustrations and information on the medical applications of organs and tissues that are commonly transplanted. These pages can be used to make transparencies.

Donation Issues: This section contains information on religious views on organ and tissue donation. Because the issue of religious considerations often arises in discussions with students, this material is important reading for the teacher. This section also provides important information on the impact of health conditions in minority populations on the donation and transplantation process.

Lesson Activities

NOTE: Be sure to plan ahead to get necessary administrative approval for sending this letter home.

This section provides you with specific materials for conducting your lesson activities on organ and tissue donation. Donation can be a sensitive topic for students and families. A sample letter informing parent and guardians that you plan to teach this topic is provided (see black-line master at the end of this section). It is recommended that you send this letter home with students about one week before beginning these donation lessons and activities.

The folder in the center of this guide contains the 45-minute **Core Lesson—Share Your Life. Share Your Decision.** This lesson can be used in any curriculum setting either as a stand-alone lesson for classes that have only one class period available for the topic or as an introductory lesson that leads into additional lessons and activities.

Also included in the folder is a summary of some important information from the Background, a flowchart of how the additional lessons and activities in this guide can be integrated into different subject-matter instruction in your school, and a chart outlining the transplant process.

NOTE: These videos are preceded by a 3-minute edition of the Emmy- and Freddie-winning video, *No Greater Love*, which includes a message from HHS Secretary Tommy G. Thompson.

Videos: The videos included in this package are an integral part of the core lesson. The videos are provided to help you tailor the video component to the needs of your students:

- *Share Your Life. Share Your Decision* (16 minutes) is designed to be used with students who only have a short time to study the topic. It provides a nontechnical review of the donation and transplant process from the viewpoint both of donor families and recipients.

- *Medicine's Modern Miracle* (23 minutes) reviews the same issues, but provides slightly more technical information appropriate for students either currently studying or with some knowledge of biology.

- *No Greater Love* (15 minutes) Clip from the hour-long documentary narrated by Angela Lansbury and featuring Health and Human Services Secretary Tommy Thompson. The film shows the healing that may come through the act of donation. The goal is to encourage families to discuss the issue of donation, as well as make their wishes known to their loved ones.

We urge you to view all of the videos. In addition to helping you select the one best suited to your students, viewing both will provide you with additional information useful in teaching organ and tissue donation.

The Core Lesson contains a preassessment activity that will give you an understanding of your students' knowledge about donation before you teach the materials included in this guide. If this is the only lesson dedicated to the topic, the closing activity (see below) should be done at the end of this lesson. Full details on how to conduct this lesson are provided in the core lesson plan.

The remaining lessons in this section target different subject areas (**Biology**, **English**, **Social Studies**, and **Mathematics**) and each lesson includes a comprehensive lesson plan that can be supplemented with additional materials from the Background or Supplementary Materials. Some can be used in more than one place in the school curriculum. Refer to the flowchart in the Core Lesson folder for suggestions as to where these lessons can be used.

The closing activity of the core lesson should be done by all students as they complete the topic. An important instructional goal is to encourage students to share their views on donation with family members. Therefore, the closing activity is a private, reflective activity in which students draft a letter to their parents/guardians. Students are encouraged to take the letter home to share and discuss with their families.

Supplementary Materials

This section contains print resources for enhancing the lesson activities. Many are suitable for use as homework exercises. Additional suggestions for their use are provided at the beginning of this section.

Web Activities and Resources

This section describes companion resources and activities available at www.organdonor.gov—the official donation Website of the U.S. Department of Health and Human Services.

Appendices and Glossary

The appendices contain references to subject-specific national education standards relevant to the materials in this guide and also provide additional video and web resources and a glossary of terms associated with organ and tissue donation and transplantation.

NOTE: While the core lesson has been designed for a 45-minute class period, the topic of organ and tissue donation is an important one. You are strongly urged to consider spending two 45-minute periods or one block-schedule period to teach the core lesson.

This extra class time would allow a fuller discussion of student questions and concerns and would allow students to use class time to complete a reflective piece on their views on donation to be shared with family members rather than do this important step of the curriculum as a homework assignment.

II. How to Use This Guide: Materials by Subject Area

NOTE: Many of the materials and lessons in this guide can be used in a variety of subject areas. This chart lists the specific materials that may be used in respective subject areas.

Driver's Education

The Transplant Process
Common Questions and Misconceptions
Brain Death
A Decision to Share
Careers Associated With Transplantation
Community/Service Learning Activities

Science / Biology

Biology Lesson: Finding a Match
The Transplant Process
Common Questions and Misconceptions
Transplantable Organs
Transplantable Tissues
Medical Applications of Donated Tissues
Brain Death
Types of Donors
Rejection
Matching Donors With Recipients
The Waiting List
Minority Health Issues
Donation Crossword
A Decision to Share
Transplantation Timeline
Follow-up Questions for *Medicine's Modern Miracle* Video
Careers Associated With Transplantation
Community/Service Learning Activities

English

English Lesson: The Ultimate Gift
The Transplant Process
Common Questions and Misconceptions
Donation Crossword
A Decision to Share
Transplantation Timeline
Careers Associated With Transplantation
Community/Service Learning Activities

Health Education

The Transplant Process
Common Questions and Misconceptions
Brain Death
Transplantable Organs
Transplantable Tissues
Medical Applications of Donated Tissues
Types of Donors
The Waiting List
Minority Health Issues
A Decision to Share
Donation Crossword
Transplantation Timeline
Follow-up Questions for *Medicine's Modern Miracle* Video
Careers Associated With Transplantation
Community/Service Learning Activities

Social Studies

Social Studies Lesson: Donation Debate
The Transplant Process
Common Questions and Misconceptions
Transplantation Timeline
Religious Views on Donation
Minority Health Issues
The Waiting List
A Decision to Share
Transplantation Timeline
Careers Associated With Transplantation
Community/Service Learning Activities

Mathematics

Mathematics Lesson: Are Things Getting Better?
The Transplant Process
Common Questions and Misconceptions
A Decision to Share
Careers Associated With Transplantation
Community/Service Learning Activities

Dear Parent/Guardian:

Your son/daughter's _____class will be learning about organ and tissue donation and transplantation. The goals of this lesson are:

- to provide students with basic information for making an informed decision as to whether to be an organ and tissue donor.
- to encourage students to discuss this important topic with their parent(s) or guardian(s).
- to raise awareness of organ and tissue donation and the ability of transplants to save lives in the hope of increasing the number of individuals who consider the option of donation.

In the next few days, your son/daughter will probably express a wish to discuss these issues with you. Please take some time as a family to discuss this issue and review any information your son/daughter brings home. It is very important for family members to be aware of one another's donation wishes because the legal next-of-kin may be asked for consent at the time of a loved one's death.

Even though it may feel a little uncomfortable, a family discussion about organ and tissue donation now could someday make a decision about donation easier for your family. Many families faced with this decision have shared that they wished they had known how their loved one felt about organ and tissue donation. A brief family discussion will allow each member of your family to share his or her wishes regarding donation.

After a family discussion, each person who wants to be a donor can indicate his or her specific wishes by completing a donor card, indicating his or her intent on a driver's license, or joining a donor registry if one is available in your State.

You are welcome to contact me for further information by phone at _____

or by e-mail at_____.

_____ _____

Teacher's Signature Date

The Transplant Process

The Recipient

Diagnosis

The body's organs or tissues can be formed abnormally at birth, or can be damaged as a result of accidental injury or disease. When vital organs, such as the liver, kidneys, lungs, pancreas, or heart are severely damaged, they may need to be replaced for a person to survive. Replacing some damaged tissues may allow a person to return to a normal life—a cornea to renew sight or a bone or tendon to restore the ability to walk or move without pain. Organs can be donated by two types of donors: deceased and living, with the exception of bone marrow which can only be donated by living donors. Tissues can only be donated by deceased donors. The transplant process described in this section deals mainly with organs donated by deceased donors. (See **Types of Donors**) Bone marrow transplantation will not be covered extensively in these educational materials (for additional information about bone marrow transplantation see: www.hhs.gov/diseases).

Referral and Evaluation

Once a doctor determines the need for an organ transplant, the individual is referred to a transplant center—a hospital that performs transplants—for evaluation. If certain criteria are met, the individual is accepted into the transplant program at that center. The individual's blood and tissue types are determined and he or she is placed on a national transplant waiting list.

Waiting

The period of time a patient may be on a waiting list before receiving a transplant depends on a number of factors: How sick is the person? What is the person's blood type? Is a suitably matched organ available? Unfortunately, because of the shortage of donated organs, many people die before a compatible organ becomes available. If an organ does become available for a particular patient on the waiting list, the patient's doctor is notified. If the doctor concludes that the donated organ is compatible, and that the patient is in suitable condition to undergo the transplant operation, preparations for surgery begin. (See **Matching Donors with Recipients** and **The Waiting List**.)

The Transplant

The donated organ is often surgically removed from the deceased donor at the same time as the recipient is prepared for surgery to reduce the time that the donated organ has to survive outside the body. Since the recipient is often at a different hospital than the donor, a member of the recipient's transplant team may have to travel to the donor's location to remove and transport the donated organ.

Recovery

After surgery, the recipient undergoes a period of recovery—sometimes only a few weeks. However, if the recipient's immune system rejects the donated organ, the recovery period could be much longer. To combat rejection, doctors administer immunosuppressive drugs. (See **Rejection** and **Matching Donors with Recipients**.)

Background: The Transplant Process

NOTE: To learn more about the ways to declare an intention to be a donor in your area and your state's requirements for minors wishing to be a donor, visit www.organdonor.gov/opo.htm to locate your local organ procurement organization.

A Better Life

If the transplant is successful, the recipient may return to a normal and active life, but must have regular check-ups and continue to take medicine for the rest of his or her life. While transplantation is not a "cure," when successful it provides an increase in the quantity and/or quality of life

The Donor

Becoming a Donor

Many people express a wish to be a donor when they die and take steps during their lifetime to designate themselves as a donor. A person may use one of a variety of methods to express an intention to be an organ and tissue donor: signing a donor card, indicating intent to donate when applying for or renewing a driver's license, or joining a donor registry.

Minors generally may indicate an intention to be a donor. While State laws on requirements for minors vary, those States that allow a minor (often minors over the age of 16) to consent to donation generally require the signature of a parent or legal guardian.

Trauma and Death

Most organ donors are accident victims who have suffered severe and eventually fatal injuries—often a severe head injury. After arriving at the scene of such an accident, emergency medical personnel immediately begin life-saving procedures while the patient is transported to a hospital.

In the Emergency Room

When the ambulance arrives at the hospital, the patient is met by doctors and nurses ready to employ all possible measures to save the victim's life.

The Intensive Care Unit

If the injuries are severe, the patient is usually on a life-support system. Doctors perform tests to determine the extent to which the brain and other organs and tissues have been damaged as a result of the injury. If tests show the brain is no longer alive, the patient's family is informed that the patient is brain dead—that is, the brain has ceased to function, and the patient is dead. (See **Brain Death**.)

The Organ Procurement Organization

The organizations responsible for coordinating organ donation and transplantation are the organ procurement organizations (OPOs). Each of the 59 OPOs across the country is a Federally designated nonprofit organization that works with the hospitals in their designated geographic area to identify potential donors. These service areas may cover a single State or parts of adjoining States. In addition to identifying donors and obtaining consent where necessary, the OPOs are responsible for the evaluation, preservation, allocation, recovery, and transport of donated organs. The crucial role of the OPO in the organ donation and transplantation process is described below.

Hospital Referral and Evaluation by the OPO

Federal law requires that hospitals report all deaths and imminent deaths (a person who is near death) to the local organ procurement organization. Notification by the hospital allows an OPO coordinator to go to the hospital to determine if the deceased person is medically

suitable to be a donor and to discuss donation with family members. The vital organs of the brain dead person are kept oxygenated by a mechanical support system until it is determined whether the deceased will be a donor. If it is determined that the deceased is not going to be a donor, the mechanical support system is discontinued. If the deceased is able to be a donor, the OPO coordinator arranges for the evaluation, surgical removal, and the preservation of donated organs and transport of each organ to the transplant center where the recipient is waiting. Mechanical support of the donor's organ is maintained until the organs are surgically removed.

Consent for Donation

Some States have passed laws providing that when a person signs a donor card, indicates an intention to be a donor on a driver's license, or joins a donor registry, this is a legal form of consent and must be honored. Family consent is not necessary for that deceased person's organs and tissues to be donated. These laws are often popularly referred to as "first person consent" and are based on the belief that the donor's wishes should be paramount and should not be overridden by family members. If the deceased person had not designated him or herself as a donor, the family is asked to make the decision whether to donate. (Generally, even if a deceased minor had indicated an intention to be a donor, the family is asked to consent to the donation.) In States with first person consent, OPO representatives take care to talk to the family before the removal of organs to make sure the family understands and appreciates their loved one's decision to save the lives of other people through organ donation.

In other States, even if a deceased person had signed a donor card, indicated an intention to be a donor on a driver's license, or joined a donor registry, the deceased's family will still be asked for their consent before organs and tissues are donated. A specially trained OPO representative offers the family the option of donating the deceased's organs and explains the donation procedures. The family is given time to consider and discuss their decision. If the deceased had indicated a wish to be a donor, it is often much easier for the family members to make a decision to donate their loved one's organs. The decision becomes even easier if the deceased had discussed donation with family members.

No matter what State you live in, it is important to indicate your intention to be a donor through the various methods available—*and just as important*—to convey those wishes to your family to increase the likelihood that your organs or tissues will be donated or not according to your wishes. A family's decision to donate or their acceptance of a loved one's decision to donate is made much easier if the deceased had told them of his or her desire to be a donor.

Organ Placement

Immediately following the identification of the deceased as a donor, the process of organ placement begins. Information about the donor, such as body size, blood type, and geographic location of the donor, is entered into the computer system of a national network—the Organ Procurement and Transplant Network (OPTN). This computer system identifies potential recipients on the national waiting list who best match the available organs. Based on medical and scientific criteria, a list of potential recipients is generated for each of the donor's organs. One donor may be able to supply organs and tissues for many recipients. (See **Matching Donors With Recipients** and **The Waiting List**.)

Background: The Transplant Process

Organ Recovery and Transportation

A specific recipient for each organ to be donated is identified. In some cases a surgeon from each recipient's transplant team comes to the hospital to surgically remove the organ to be donated to that recipient. In other cases surgeons at the donor's hospital remove the organs. In either case, organs are quickly preserved and transported to the transplant centers where the recipients are waiting. Tissues are often removed from the body a short time later, but both organ and tissue procedures are conducted rapidly so as to reduce the chance of organ or tissue deterioration.

Funeral Arrangements

The usually quick removal of organs or tissues minimizes any delay in funeral arrangements. Organ and tissue removal also is done in such a way that an open-casket funeral is still possible.

Follow-Up

OPOs ensure that the names of donors and recipients remain confidential, but most donor families appreciate knowing that a gift of life came from their tragedy. After a few weeks, the OPO sends the donor's family a letter informing them how their loved one's organs and tissues were used. While the names of the recipients remain confidential, donor families can request updates about recipients by contacting their OPO. Often recipients ask OPOs to pass letters on to a donor's family expressing their gratitude. This can be a great comfort to donor families. Recipients may eventually meet donor families if both parties agree to this meeting.

Common Questions and Misconceptions

How are organs and tissues for transplantation obtained?

Many organs and all tissues are donated by deceased donors—most often a person who has been declared brain dead. A kidney, parts of some other organs, and bone marrow can be transplanted from living individuals—relatives or friends of the recipient or people who choose to be anonymous donors. (See **Types of Donors**.)

Is brain death the same as being in a coma? I have heard that people can recover from a coma. Can people recover from brain death?

A coma and brain death are completely different. A person in a coma still has brain activity and is alive. The person may recover from a coma and possibly regain normal brain function. People who are brain dead have no brain activity. They are dead. Their brain can never recover, but the rest of their body may be kept functioning for a short time by a mechanical support system. (See **Brain Death**.)

Is there an age limitation on whose organs can be transplanted?

There are no age limitations on who can donate. Both newborns and senior citizens have been donors. Physical condition, not a person's age, determines suitability to be a donor. Because of disease or other problems, some people wishing to donate may be ruled medically unsuitable. This determination is best made by transplant specialists at the time someone wishing to be a donor has died.

If I am in an accident, and the doctors know I wish to be a donor, will they still do everything possible to try to save my life?

Yes. Doctors always try everything possible to save a life. In fact, the medical personnel treating an accident victim are not the same as the medical personnel involved in organ donation and transplantation. Organ donation becomes a consideration—and the local organ procurement organization (OPO) is contacted—only when *all life-saving efforts* have been exhausted.

What is an OPO?

An OPO is a Federally designated nonprofit organization responsible for coordinating organ donation and transplantation in a specific geographic area. There are currently 59 OPOs serving the United States and Puerto Rico. In addition to identifying potential donors and obtaining consent where necessary, the OPOs are responsible for the evaluation, preservation, allocation, recovery, and transport of donated organs.

Can anyone declare intent to become an organ or tissue donor?

Anyone can express a wish to become a donor by joining a donor registry, signing a donor card, or indicating intent to donate on a driver's license application. A family may decide to donate the organs of a deceased loved one who has not indicated a choice about donation or who is under age—a child, for example.

A minor usually has to take additional steps to declare his or her decision to be a donor. While requirements vary from State to State, most States require the written consent of

the minor's parent or guardian. Many States will only honor the decision of minors over a certain age (for example, minors over the age of 16). Most States consider an 18-year-old to be an adult with respect to the decision to donate; however, this also varies by State. Your local OPO is the best source of information on the requirements in your State.

NOTE: Locate your OPO by visiting the official donor Website of the U.S. Department of Health and Human Services and clicking on www.organdonor.gov/opo.htm.

How do I indicate my wish to be a donor?

You may designate yourself as a donor when you apply for or renew a driver's license or by signing a donor card or joining a donor registry where available. Your local OPO can tell you how to document your donation intentions in your area or State.

What is a donor registry and how do I know whether there is one where I live?

A donor registry is a computerized database of people who wish to be donors when they die. The importance of a registry is that donation intentions can be quickly retrieved 24 hours a day/7 days a week, whereas a donor card or driver's license may not always be available when someone dies. A registry, therefore, provides a reliable way of conveying donation wishes. Donor registries are available in over 20 States. Most, although not all, State registries are operated by divisions of motor vehicles. Ways of joining a registry might include the following: donor card, driver's license, on-line or telephone access, or at public events such as health fairs. Donor registries also provide easy access for people who want to remove their donor designation or place restrictions of the type of organs or tissues they wish to donate. Your local OPO can tell you whether your State or area has a donor registry and how you can join.

Are families of individuals who have just died but who had not declared an intention to be a donor given the option of donating their loved one's organs and tissues?

Yes. Federal law requires hospitals to report all deaths and imminent deaths to the local OPO. Each OPO works with hospitals in its area to coordinate identification, evaluation, removal, and transport of donated organs. This notification from the hospital allows OPO personnel to determine whether a person who has died is medically suitable to be a donor and to approach family members of potential donors to offer them the option of donating their loved one's organs and tissues.

Can my family be paid for my organs?

No. Organ donation is considered an act of charity by the donor and/or the donor's family, and buying or selling human organs is against Federal law.

If I have already decided to be a donor, will my family still get to decide whether my organs will be donated?

In many States, families are asked to provide consent for donation even if the deceased person had indicated an intention to be a donor. Although the decision of a deceased person to designate him or herself as a donor—through a donor card, driver's license, or donor registry—is sufficient consent in all States to allow the donor's organs and tissues to be donated without asking for the family's consent, OPOs in most States ask the donor's family to consent to the donation before proceeding. However, an increasing number of States are passing laws that provide that OPOs must honor the decision of a deceased person to designate him or herself as a donor.

This concept is often popularly referred to as "first person consent" and is based on the belief that the donor's wishes should be paramount and not be overridden by his or her family after the person's death. If the deceased person had not designated him or herself as a donor, the family is asked to make the decision whether to donate. (Generally, even if a deceased minor had indicated an intention to be a donor, the family is asked to consent to the donation.) In first person consent situations, OPO coordinators take great care to talk to the family before the removal of organs to make sure that the family understands and appreciates the donor's desire to save the lives of other people through organ donation.

Does organ donation preclude an open-casket funeral?

No. People who donate organs and tissues can have an open-casket funeral. The surgeons who remove the organs and tissues handle the body in a sensitive way, as they would in any surgery.

Do any religions oppose organ or tissue donation?

Most major religions or religious organizations either actively support organ and tissue donation or leave the decision up to the individual. (See **Religious Views on Donation**.) Those in doubt about their religion's views should talk with their faith leaders.

If I need an organ in order to live, will I be able to get one?

Maybe. Many people who need transplants cannot obtain them because of a shortage of donated organs. There are many more people on the waiting list than there are available organs. As of early-2004, there were nearly 84,000 people on the national waiting list. Every day, an average of 18 people on the list die waiting for a compatible organ, while an average of 68 receive a life-saving organ transplant.

If my organs are donated, who decides who receives them?

A nonprofit organization under a contract with the U.S. Department of Health and Human Services operates a computerized national waiting list of people who need a life-saving organ transplant. This system matches each wait-listed patient against a donated organ to see which patient is the best match based on factors such as body size, weight, and blood type of the donor and recipient, how sick the patient is, how long the patient has been waiting for a transplant, and where they live in relation to the donor.

Can celebrities or rich or well-connected people jump over others on the waiting list or pay people for their organs?

No. In the U.S., the allocation of organs to recipients on the waiting list is based solely on medical and scientific criteria, and on waiting time. The principles of organ allocation are based on equity, urgency, and efficacy—the wealth, age, race, or gender of a person on the waiting list has no effect on when a person will receive a donated organ. In addition, the National Organ Transplant Act of 1984 makes it illegal to buy or sell human organs in the U.S.

Background: Common Questions and Misconceptions

If I become a donor, will all my organs and tissues be donated?

You may specify the organs and tissues you wish to donate. Your wishes will be followed. However, if any of your organs are diseased or injured, those organs will not be donated.

I have a history of illness. Are my organs and tissues likely to be of any use to anyone?

At the time of death, OPO personnel will review your medical history and decide whether your organs are suitable for donation. Advances in transplantation and medicines have allowed more people than ever to become donors.

Why is there a disproportionately large number of minority patients on the waiting list?

Minorities are disproportionately represented on the waiting list because certain minority groups are more likely to suffer from diseases that may result in organ failure and require a life-saving organ transplant. (See **Minority Health Issues**.)

Is there a cost associated with being a donor?

There is no cost to the donor's family or a deceased donor's estate. All costs of removal and preservation of the donated organs are borne by OPOs and are usually passed on to the transplant center and the recipient's insurance company. However, medical costs incurred while attempting to save the life of a potential donor are the responsibility of the donor's insurance company or the donor's family. Costs incurred after a person is determined to be a donor become the responsibility of the OPO.

If I don't have adequate health insurance, can I still be placed on the waiting list?

Given the scarcity of donor organs, transplant surgeons are concerned about transplanting patients who do not have the financial resources to pay for the transplant procedure and follow-up care needed to maintain the organ. In some cases, you might not be placed on the waiting list. However, transplant centers have social workers and financial counselors who work with people being evaluated for a transplant to help them find the necessary financial resources.

Why do I need to tell my family of my decision if I have already recorded my wish to become a donor?

In the event of your death, documentation of your wish to become a donor will increase the chance that you will be a donor. If your family is asked for consent, telling them about your decision to be a donor is the best way to ensure that your wishes are carried out. The death of a loved one is a very difficult time for a family, and knowing the wishes of the deceased makes it easier for them to decide about or accept donation.

Brain Death

You may have heard stories of people suddenly "coming to" in the morgue or at their own funeral.

Is it possible to be alive after being officially pronounced dead? If so, why would you want to take the risk of donating your organs? This may be a concern for some people—it shouldn't be for two reasons. First, the goal of the medical profession is to preserve life. Second, only after every life-saving measure has been used—and a patient has *died*—would the process of organ donation proceed.

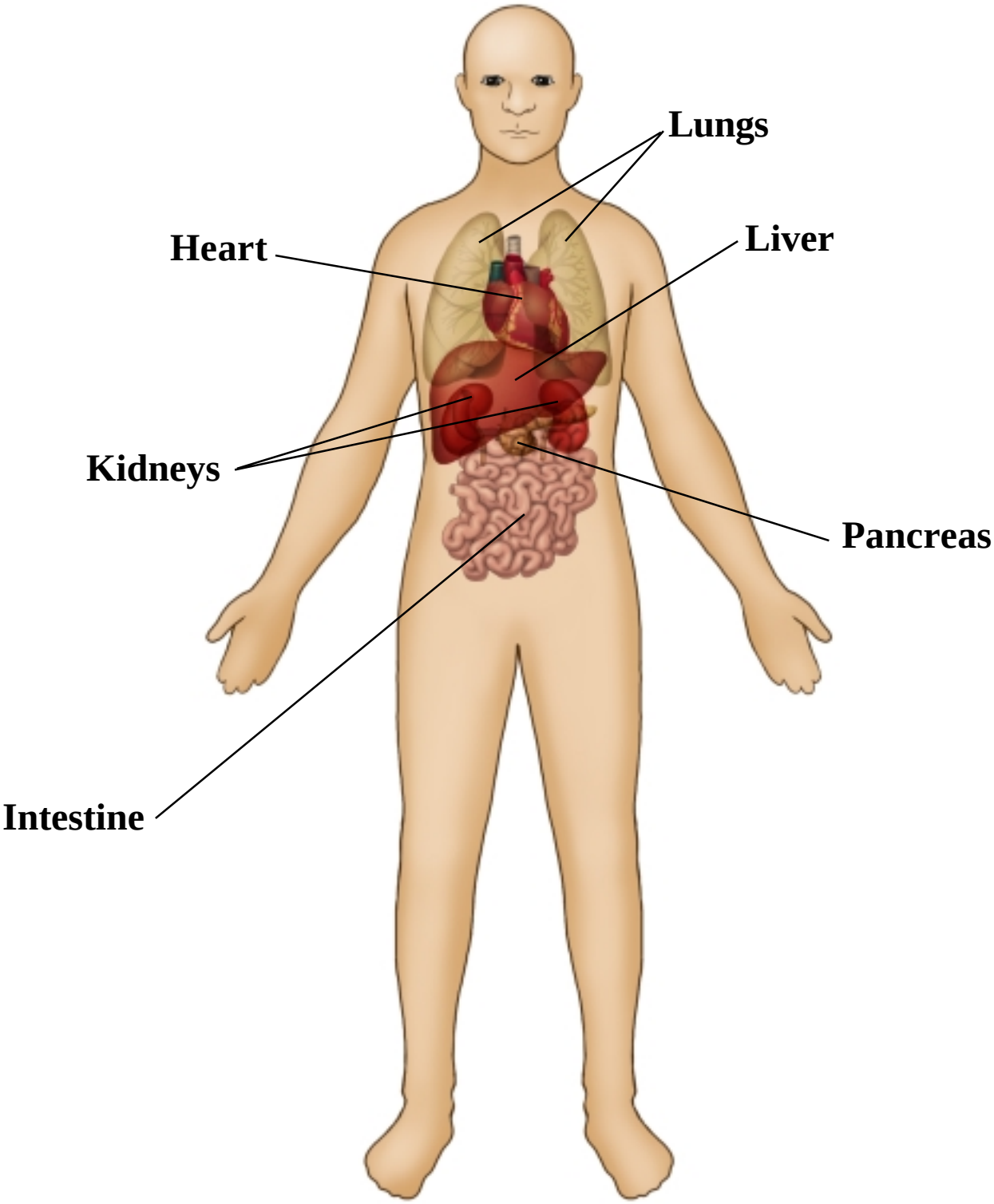
So what is the definition of "death" and how is the fact of death determined? Death may be pronounced in one of two situations: When the person's heart stops beating (cardiac death) or when the person's brain permanently stops functioning (brain death). While in some cases, organs can be donated by people who have died when their hearts stopped beating, most donated organs are transplanted from people who have died as a result of brain death. Tissues may be donated by people who have died as a result of brain death or cardiac death. (See **Types of Donors**.)

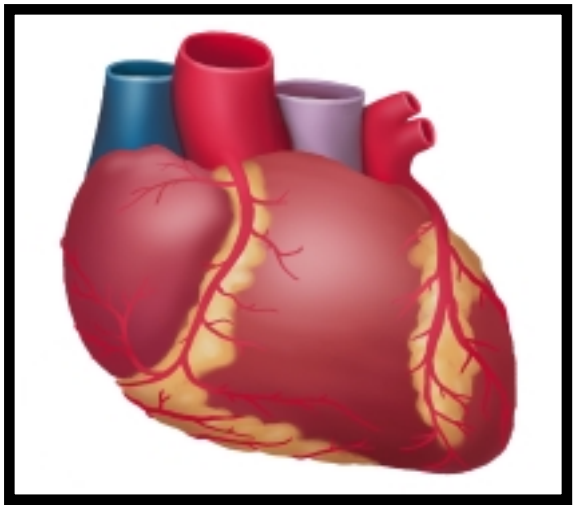
It is helpful for you and your family to understand the nature of brain death before you make the decision to become a donor. Your brain needs oxygen to keep working. When the brain is injured it swells. This swelling can prevent blood from entering the brain. When blood—which carries oxygen to the brain—stops flowing, the brain dies. This condition is known as brain death. A person who is brain dead has no awareness, cannot think, feel, move, or breathe. A person who is brain dead shows no brain activity, and no longer feels any pain or suffering.

Brain death is a permanent condition and cannot be reversed. Without a functioning brain, the rest of the person's organs can be kept working for a short time using a mechanical support system. Once this system is switched off, the body will stop working. A brain dead person on mechanical support may look as though he or she is sleeping, but because the brain is dead, the person is dead.

Several medical professionals perform a number of tests at separate times before a person is pronounced brain dead. If these tests prove that brain death has occurred, the body is kept on mechanical support to maintain the organs until it is determined whether the person will be a donor.

Transplantable Organs





Heart

This organ is a muscular pump 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.

Transplant Statistics

- Each year, about 2,000 heart transplants and fewer than 50 heart-lung transplants are performed.
- In early 2004, around 3,500 people were on the waiting list for a heart transplant and about 200 were waiting for a heart-lung transplant.
- In 2002, over 550 people died while waiting for a heart transplant.
- About 85 percent of heart transplant recipients are surviving one year after transplantation.

Interesting Fact: On average, a human heart beats about 2.5 billion times in a person's lifetime.

Diseases and Disorders

- **Cardiomyopathy** is an abnormality of the heart muscle. The cause is often unknown. Advanced cases may require a heart transplant.
- **Congestive Heart Failure** is a condition resulting from heart disease such as coronary artery disease. The heart no longer pumps enough blood to meet the body's needs. A heart transplant may be needed if medical treatments fail.
- **Myocarditis** is an inflammation of the muscle tissue of the heart, often a complication of various infectious diseases. Severe cases can result in heart failure and require a heart transplant.
- **Congenital Heart Disease** is the most common lethal birth defect, and the most common indication for heart transplantation in infants and young children.

Lung

This pair of organs provides an environment for gas exchange: Oxygen passes into the bloodstream through microscopic air sacs in the lungs, while waste carbon dioxide passes out of the bloodstream into the lungs. Breathing facilitates this exchange of gases.

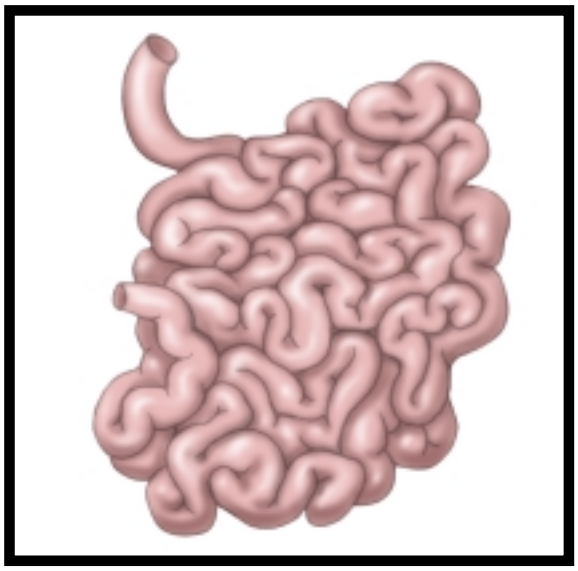
Diseases and Disorders

A number of diseases and disorders lead to lung transplants each year: **cystic fibrosis, pulmonary hypertension, pulmonary fibrosis, emphysema, and pulmonary edema,** among others. People with these conditions usually must lead a very sedentary lifestyle. Many of these conditions are life-threatening.

Interesting Facts: Normal breathing rate at rest for an adult ranges from 15-25 breaths per minute. During a 24-hour period, the average number of breaths taken by a human is around 23,040.

Transplant Statistics

- About 1,000 patients receive a lung transplant each year.
- Each year, about 4,000 people are waiting for a lung transplant.
- Over 400 people die each year while waiting for a lung transplant.
- About 75 percent of lung transplant recipients survive the first year.
- A single lung can save a life. One deceased donor can be the source of two lung transplants.



Intestine

The intestine is the part of the alimentary canal that extends from the stomach to the anus. The first part—a long, narrow, and convoluted section is referred to as the small intestine. Its function is to complete the digestion and absorption of digested nutrients into the bloodstream and lymph. The second part—the large intestine—is not usually transplanted.

Transplant Statistics

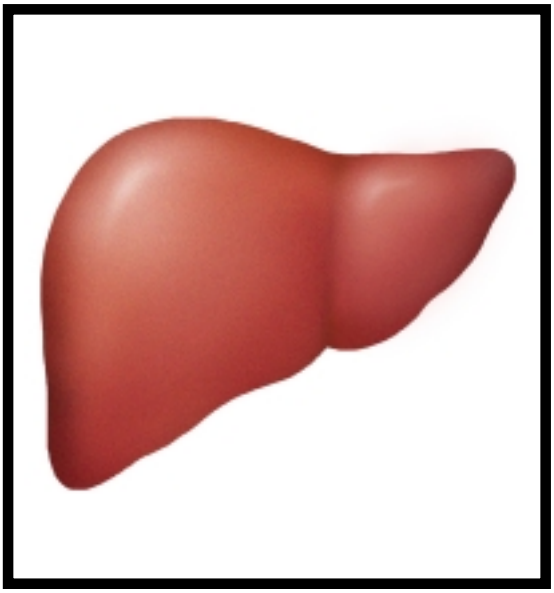
- Around 100 intestine transplants were performed in 2002.
- In early 2004, nearly 200 patients were on the waiting list for an intestine transplant.
- In 2002, over 50 people died while waiting for an intestine transplant.
- The one-year survival rate for intestine transplant recipients is about 60 percent.
- The majority of intestinal transplants are performed in infants and children.

Diseases and Disorders

Intestine transplants are required when the intestine becomes twisted and blocked or when there is irreversible intestinal failure. Most cases of intestinal failure are caused by short-gut syndrome (a significant loss of length of the small intestine present at birth or as a result of surgical removal or trauma). People with intestinal failure must receive nutrients intravenously. Because long-term intravenous feeding usually causes liver damage, many people who require a small intestine transplant also require a liver transplant at the same time.

Interesting Fact: While smaller in diameter than the large intestine, the small intestine is much longer—about 7 meters to the large intestine's 1.5 meters.

Liver



This large organ destroys toxic substances in the body and breaks down unwanted protein into the waste product urea. The liver stores some food substances until the body needs them. It also produces a green liquid—bile—that is released into the intestine to help break down large fat droplets into smaller fat droplets to prepare fat for chemical digestion.

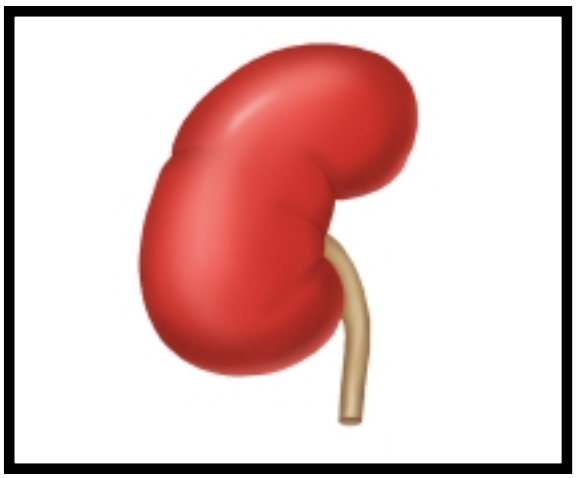
Diseases and Disorders

- Birth defects of the liver or bile duct.
- Chronic liver infections, such as **hepatitis** (particularly B and C), which severely damage the liver.
- Damage from alcohol and other drugs.
- Damage from blood clots in the liver.
- The skin of people with liver damage may turn yellow from a condition called jaundice. They also may gain weight and experience general weakness. Because the liver is involved in many metabolic processes, severe liver damage is often fatal.

Interesting Fact: More heat is produced by the liver than by any other organ in the body.

Transplant Statistics

- Around 5,000 people receive liver transplants each year.
- Each year, over 17,000 people are waiting to receive a liver transplant.
- Each year, about 2,000 people die while waiting for a liver.
- One year after the surgery, about 85 percent of liver transplant recipients live fairly normal lives.
- A donated liver can be split between two recipients, so that one deceased donor can be the source of two liver transplants.



Kidney

One of a pair of organs that control the amount of water in the body and filter urea and other wastes into urine. The kidneys also produce a hormone (erythropoietin) that controls the production of red blood cells.

Transplant Statistics

- About 14,000 kidney transplants are performed each year. Just over one third of transplanted kidneys are from living donors.
- At any point, about 55,000 people are on the waiting list for a kidney transplant.
- Every year, over 3,000 people die while waiting for a kidney transplant.
- The one-year survival rate for kidney transplant recipients is about 95 percent.

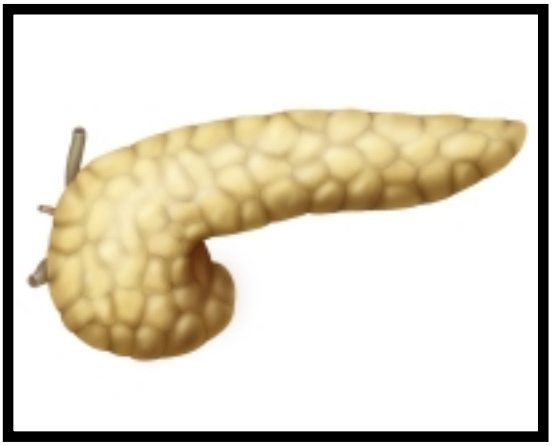
Interesting Fact: After kidney transplants, most recipients have three kidneys because their own kidneys are usually left in place.

Diseases and Disorders

- **High blood pressure** causes kidney damage, can lead to kidney failure, and is—as a result—an important predictor of kidney failure.
- **Diabetes** (see pancreas) is a leading cause of kidney failure.
- Other diseases (**cystic kidney diseases**) can cause the kidneys to become inflamed or can produce cysts in the kidneys that prevent them from functioning properly.
- People with severe kidney disease are often placed on dialysis machines—artificial kidney machines. They need to be connected to these large, stationary machines for about 24 hours every week. This severly impacts their work and lifestyle, sometimes leading to depression. A kidney transplant may improve the length and quality of life for some patients, and remove the need for dialysis.

Pancreas

The pancreas produces two enzymes—insulin and glucagon—that control the level of sugar in the blood. In addition, the pancreas produces a mixture of enzymes, called pancreatic juice, which is released into the small intestine to help digest starch, proteins, and fats.



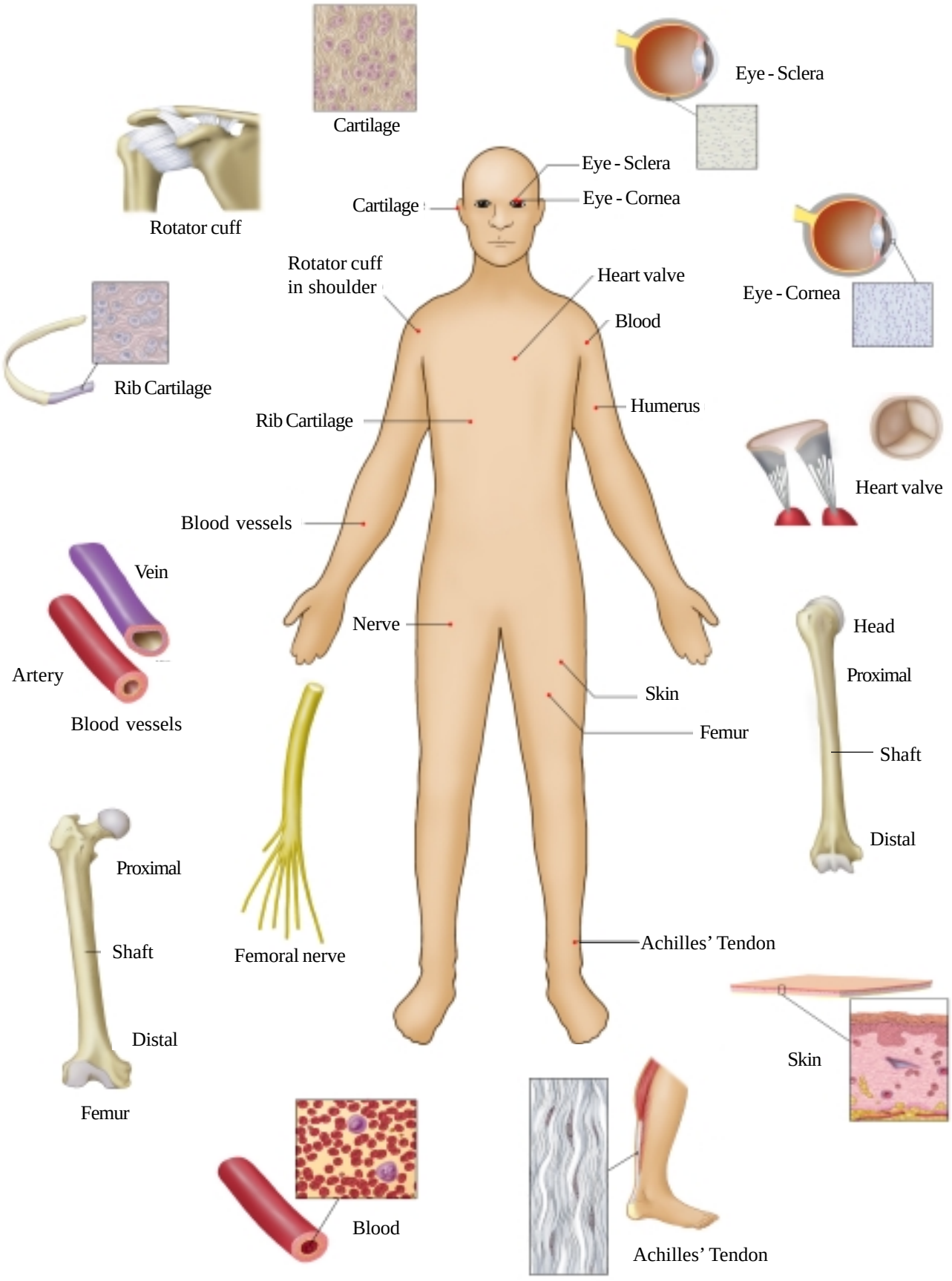
Diseases and Disorders

- Malfunction or failure of the pancreas leads to **diabetes**—an inability to control the level of glucose in the blood.
- Individuals with this condition are called diabetics and may need insulin to control the level of glucose in the blood. Diabetes can damage or cause the failure of many of the body's organs. Because patients requiring a pancreas transplant often have kidney disease, the pancreas and kidneys are sometimes transplanted together. Failure to treat diabetes can lead to organ failure and death.

Interesting Fact: The pancreas has a tremendous reserve capacity for the production of some enzymes. More than 95 percent of the function of the pancreas must be lost before the pancreas fails and symptoms of bloating and poor digestion occur.

Transplant Statistics

- In 2002, about 550 people received a pancreas transplant.
- In early 2004, about 1,500 people were on the waiting list for a pancreas.
- In 2002, about 30 people died while waiting for a pancreas transplant.
- One year after receiving a pancreas transplant, about 95 percent of recipients are still living.


Cartilage
Eye - Sclera
Rotator cuff
Eye - Sclera
Cartilage
Eye - Cornea
Rotator cuff in shoulder
Heart valve
Eye - Cornea
Blood
Rib Cartilage
Humerus
Rib Cartilage
Heart valve
Blood vessels
Vein
Nerve
Head
Proximal
Artery
Skin
Blood vessels
Femur
Shaft
Distal
Proximal
Femoral nerve
Shaft
Achilles' Tendon
Distal
Skin
Femur
Blood
Achilles' Tendon

Medical Applications of Donated Tissue

Tissue	Typical Applications	Benefits for Recipients
Eye Tissue		
Cornea	Replaces diseased or damaged cornea.	Prevents blindness; restores vision.
Sclera	Repairs eyelid; reinforces wall of eye. Also used to repair ruptured ear-drums.	Prevents blindness; restores hearing.
Cardiovascular Tissue		
Heart valves	Replacement for damaged heart valves. Most common recipients are children born with congenital heart valve defects.	Older children who receive heart valve transplants may grow into grafts and require no second surgery for size—though infants and younger children may.
Blood vessels	Transplanted to restore circulation in the heart and extremities.	Helps prevent need for amputation and helps the heart meet the needs of the body.
Blood	Nine out of ten people who live to the age of 80 will need some type of blood component transfusion during their life.	Restores normal blood functions.
Bones and Connective Tissue		
Humerus	Reconstruction related to trauma, tumors, degenerative diseases, and fractures. Total hip revision.	Prevents need for amputation. Accelerates, promotes, and allows healing. Restores mobility.
Femur (upper leg) and Tibia (lower leg)	Reconstruction related to trauma, tumors, degenerative diseases, and fractures. Supplement for small defects. Cervical spinal fusion.	Prevents need for amputation. Accelerates, promotes, and allows healing. Restores mobility.
Rib	Used as a bone graft for jaw repair.	Restores normal facial appearance.
Achilles' tendon	Replaces ligament; used as rotator cuff; replaces Achilles' tendon.	Restores mobility; restores independence in activities of daily living.
Cartilage	Repairs congenital and traumatic facial deformity.	Restores normal facial appearance.
Ligaments	Rotator cuff used in shoulder repair. Used for bladder suspension.	Restores independence in activities of daily living.
Other Tissue		
Nerve (femoral, sural)	Neurosurgery in wrist.	Restores feeling and function of hand.
Skin	Grafts for burn victims; temporary graft to prevent infection, decrease pain, prevent heat and fluid loss, and reduce scarring until patient's skin regrows.	Promotes healing; natural barrier to infection.

Types of Donors

Status of Donor	Description	Type of Donation	Specific Donation
Brain Dead	When a person is pronounced dead after brain activity ceases. No possibility of resuscitation.	Organ and Tissue	Most life-saving donations of major organs such as **heart, lungs, kidneys, liver, pancreas, and intestine** from deceased donors come from individuals who are brain dead. The heartbeat and breathing of a brain dead person can be temporarily maintained by a mechanical support system. This ensures the health of major organs by continuing the supply of blood and oxygen. (Typically donors have suffered a massive head trauma due to accident or stroke or other illness that has destroyed brain function.) Tissue transplants can be— • life-saving—for example, a **heart valve** to treat vascular disease or repair a congenital birth defect or **skin graft** after severe burns. • life-enhancing—for example, a **cornea** to prevent blindness or **bone, cartilage, and skin** to treat trauma injuries, tumors, or degenerative diseases.
Cardiac Dead	When a person is pronounced dead after the heart stops beating and breathing stops and resuscitation attempts are unsuccessful.	Tissue—and in some cases—organs	In most cases, organs from cardiac death individuals are unsuitable for donation because of the loss of blood flow and associated loss of oxygen, which leads to deterioration of the organ. (In 2002, approximately 3 percent of organs donated by deceased individuals came after cardiac death.) Tissues, on the other hand, are less vulnerable to oxygen starvation and can be recovered for 24 hours after the heart has stopped beating. This means as far as tissue donation there is no distinction between brain and cardiac dead donors. All transplantable tissues can be donated by both brain dead anad cardiac dead donors.
Living	In many cases, a relative or friend of the recipient or a person who chooses to be an anonymous donor.	Kidney or partial organ; bone marrow	**Kidney:** Donating a single kidney carries minimal risk to living donors if they have normal kidney function prior to donation and no underlying health issues such as high blood pressure. Donor's remaining kidney compensates by performing the function usually done by two kidneys. The risk to the donor is mostly the same as risk involved with any major surgery. Partial organ: **lung lobe, liver lobe,** or a part of **the small intestine**. Living donor's liver regenerates and returns to full function, while a lung or intestine does not regenerate. Transplanted **bone marrow** can produce normal blood cells within 2 – 3 weeks and is a life-saving transplant for people with leukemia or cancers of the bone marrow. Only a small quantity of living donor's bone marrow is removed. Remaining bone marrow regenerates.

Rejection

Organ transplants not welcome here!

Rejection is the human body's reaction to a transplanted organ that it views as a foreign invader, much as it would a virus or bacteria. Our body treats a donor organ as if it were invading the body. The immune system springs into action the same way it does when the invader is a harmful microorganism. The immune system first distinguishes "self" from "non-self" by comparing proteins (antigens) on the surface of the "invader" with the body's own antigens.* Once a "non-self" invader is detected, cells called lymphocytes attack the "invader" antigens while other lymphocytes produce proteins called antibodies. The antibodies attack and help to destroy the invader.

No two people—except identical twins—have identical antigens. Therefore, organ transplantation will almost always cause an immune response and result in an attempt to reject the transplant. Kidneys seem to be more sensitive to rejection than other organs so tissue typing is done to ensure that the transplanted organ is as similar as possible to the tissues of the recipient. No match (other than an identical twin) is perfect, so the possibility of organ rejection remains. (See **Matching Donors With Recipients**.)

Once rejection is underway, things begin to go wrong inside the body of the recipient. The transplanted organ's functioning is impaired, and a variety of symptoms of illness develop.

The way to prevent or reduce rejection (other than a perfect match between donor and recipient) is to use immunosuppressive drugs—medicines that subdue the body's response to invaders.

*Because tissue typing is usually done on white blood cells, or leukocytes, the antigen markers are referred to as human leukocyte antigens, or HLA. Each cell has six major HLA antigens that are important to organ transplantation. Since each antigen exists in different people in as many as 20 varieties, the number of possible HLA types is about 10,000. The genes that encode the HLA antigens are located on chromosome 6 and are the subject of intense research.

Matching Donors With Recipients

Attack of the Antibodies

Each person has thousands of genes. The expression of those genes is what makes each of us a unique individual. Some of the effects of these genes are visible—displayed in features like hair color and eye color. However, many are not so obvious, but rather are expressed within our bodies in blood and tissue proteins. Some of these proteins, called antigens, determine the person's tissue type. It is this uniqueness that makes matching donors with recipients so complex.

If you place an organ with a different tissue type into a recipient's body, the recipient's immune system goes on the offensive. Non-self antigens on the surface of the transplanted organ stimulate the production of T cells and of proteins called antibodies. The T cells and antibodies attack the organ and attempt to kill the organ's cells. This process is called rejection, and may eventually destroy the organ completely. (See **Rejection**.)

Kidneys are Special

In matching a kidney donor and recipient, transplant professionals identify six antigens in each donor and recipient. These six antigens have been called the *major histocompatibility complex*. Compatibility refers to how closely a donor is matched with a recipient. "Histo" refers to tissue.

Ideal compatibility for kidney transplant is a six-antigen match between donor and recipient. A six-antigen match occurs 25 percent of the time between siblings (brothers and sisters) with the same mother and father. It also occurs from time-to-time in the general population. Other than the perfect match of identical twins, the six-antigen match is the single best tissue match that can occur between any donor and recipient in terms of the routine testing performed today. Because long-term survival after kidney transplantation depends on the quality of the match, the most successful long-term outcomes are between individuals who share all six antigens.

However, recent medical advances have made finding an ideal match between a kidney donor and recipient less crucial. Immunosuppressive drugs—medicines that can subdue the body's response to a transplanted organ—have been improved greatly in the last few years. Today, these drugs are so effective that many transplant centers will consider transplants between some donors and recipients even if there is no tissue match between them. For now, although the best tissue match is still desirable, it is not absolutely necessary.

One last hurdle in matching a kidney donor and recipient must be cleared—a test called *crossmatching*. Crossmatching involves mixing cells from a potential donor with serum from the recipient. A positive crossmatch is a bad thing. It means that there are already antibodies in the recipient's blood ready to attack the donor organ. Therefore, immunosuppressive drugs would not adequately prevent these antibodies from attacking the organ. With a few exceptions, a positive crossmatch makes a successful transplant between a particular donor/recipient pair impossible.

The Waiting List

The Organ Procurement and Transplantation Network

On average, every 13 minutes another name is added to the list of those in need of organ transplants; 18 people on that list die every day waiting for a suitable organ.

In 2002, about 25,000 people received an organ transplant. Yet at the end of that year nearly 80,000 people in the United States were still waiting for a suitable organ. By early-2004, the number of people on the waiting list had grown to over 84,000. Every year the gap between those waiting and the number of organs available is tremendous. Clearly, the question to be answered is: Who decides which person gets an organ?

In an attempt to create a fair system of organ distribution, Congress enacted the National Organ Transplant Act (NOTA) in 1984. NOTA created the Organ Procurement and Transplantation Network (OPTN), which includes all transplant centers, organ procurement organizations (OPOs), tissue-typing laboratories, many scientific organizations interested in transplantation, and representatives of the general public. OPTN activities are overseen by the Federal government and carried out by the United Network for Organ Sharing (UNOS) under a contract with the U.S. Department of Health and Human Services. UNOS maintains the OPTN's national list of people waiting for organ transplantation. Each person accepted into a transplant program is registered with the OPTN. Computers link transplant centers with each of the 59 regional OPOs across the United States and Puerto Rico. Each OPO serves the hospitals within its region and is responsible for the identification, evaluation, maintenance, removal, and transport of organs for transplant.

The OPTN network is accessible 24 hours a day, 7 days a week. When an OPO identifies a donor organ that has become available, the OPO accesses the UNOS' computers that link the OPTN network to generate a list of individuals who are potential recipients, ranked according to the OPTN policies on organ allocation.

Ranking

So, how does this computer system decide whose name appears first on the waiting list? When a person's name is added to the national waiting list, his or her medical profile is entered and stored in the OPTN network. The person is not placed on a ranked list at that time. Rather, the person's name is added to the pool of names of other people waiting for a transplant. When a donor organ becomes available, the computer system matches each individual in the pool against the donor's characteristics. Using medical and scientific criteria, the computer then generates a list of individuals ranked in order of which potential recipient is the best match. This process ensures that *all* individuals in the pool are compared to that particular donor before being ranked in the order of who makes the best

match. The following criteria are used to determine the best match:

- body size
- blood type
- time waiting
- medical urgency
- proximity of donor and potential recipient

Decision to Transplant

After receiving the printout of potential recipients, an OPO coordinator contacts the transplant-team physician responsible for the care of the individual who appears first on the list. The transplant physician decides whether this potential recipient and the donor organ are suitable for one another. The physician must consider whether the potential recipient is available, healthy enough to undergo major surgery, and willing to undergo a transplant immediately. A laboratory test to measure compatibility between the donor and potential recipient may be necessary. As soon as these steps have been taken, surgery is scheduled and the transplant occurs.

This organ sharing system is a diverse program that allows individuals on the waiting list to be matched with donated organs regardless of age, race, sex, or financial status. UNOS is constantly monitoring every organ allocation to ensure that all OPOs are distributing organs fairly.

Religious Views on Donation

The following information about the views of various religions on organ and tissue donation is reprinted with permission from the United Network for Organ Sharing (UNOS) and the Southeastern Organ Procurement Foundation (SEOPF).(*See citation provided below.)

NOTE: If a student requires information from a religious organization not listed in this material, suggest that he or she contact a faith leader of that organization. Please note that, while organ donation organizations make every attempt to secure accurate information, students may wish to consult their faith leader before making the decision to donate.

Religious Views Concerning Organ and Tissue Donation

The death of a loved one often raises spiritual and religious issues. When faced with the decision of organ and tissue donation during the trauma of a family member's death, a person's religious group's position on the subject suddenly becomes very important. As the decision is being made, the question often arises, "What does my religious tradition believe about organ and tissue donation?" Recent surveys indicate that less than 10 percent of those surveyed were aware of their religious group's doctrine or position regarding organ and tissue donation. As a result, the decision maker often looks to his or her clergy person or hospital chaplain for an informed answer about a particular religious group's position.

No one person or even an assembly of religious representatives can speak for numerous religious groups, nor can any one document such as this speak for every sect. The "connectional" religious groups appear more likely to have official positions on subjects such as organ and tissue donation. The "free Church" traditions champion the idea that no group can usurp the autonomy of the local congregation. Thus, the religious group's official resolution is not binding on the local congregation or individual persons. It is, therefore, difficult to state an official position for some of the nation's larger religious groups. Research shows, however, that the vast majority of religious groups do support organ and tissue donation and transplantation so long as it does not impede the life or hasten the death of the donor.

Research into the positions of various religious groups reveals the underlying attitude that unless the group has taken action to prohibit organ or tissue donation and transplantation, it is usually assumed that such donation is permissible. It is encouraged as a charitable act that saves and/or enhances life; therefore, it requires no action on the part of the religious group. Although this is a passive approach to affirming organ and tissue donation and transplantation, it seems to be the position of a large segment of the religious community. Some groups have taken a more proactive stance in recent years, feeling that a resolution or adopted position encourages people to seriously consider the matter and plan accordingly. This segment appears to be increasing in number with only a few religious groups actively opposing organ and tissue donation and transplantation.

*Cooper, M.L., Taylor, G.J., eds. (2000). *Organ and Tissue Donation: A Reference Guide for Clergy.* 4th ed. Richmond, VA: SEOPF/UNOS.

Each congregational clergy person is encouraged to research his or her religious group's tradition and position on organ and tissue donation and transplantation, as well as other biomedical ethical issues. In addition, each clergy person should keep abreast of any new resolutions or positions adopted at his or her religious group's national assembly. The group's position is subject to change in any given year. It is important to be informed, since the family member is suddenly faced with making a decision concerning organ and tissue donation of a loved one and may be depending on the clergy to know the position held by his or her religious group. Inability to make an informed decision could leave the family member with a feeling of guilt regardless of the decision he or she may make.

The following summary statements concerning the various religious groups' positions on organ and tissue donation and transplantation may be of help to you. Perhaps you can help your religious group adopt a more clearly defined position.

Summary Statements of Various Religious Groups

AME & AME ZION (African Methodist Episcopal)

Organ and tissue donation is viewed as an act of neighborly love and charity by these denominations. They encourage all members to support donation as a way of helping others.

AMISH

The Amish will consent to transplantation if they believe it is for the well-being of the transplant recipient. John Hostetler, world-renowned authority on Amish religion and professor of anthropology at Temple University in Philadelphia, says in his book, *Amish Society*, "The Amish believe that since God created the human body, it is God who heals. However, nothing in the Amish understanding of the Bible forbids them from using modern medical services, including surgery, hospitalization, dental work, anesthesia, blood transfusions or immunization."

ASSEMBLY OF GOD

The Church has no official policy regarding organ and tissue donation. The decision to donate is left up to the individual. Donation is highly supported by the denomination.

BAPTIST

Though Baptists generally believe that organ and tissue donation and transplantation are ultimately matters of personal conscience, the nation's largest protestant denomination, the Southern Baptist Convention, adopted a resolution in 1988 encouraging physicians to request organ donation in appropriate circumstances and to "encourage voluntarism regarding organ donations in the spirit of stewardship, compassion for the needs of others and alleviating suffering." Other Baptist groups have supported organ and tissue donation as an act of charity and leave the decision to donate up to the individual.

BRETHREN

While no official position has been taken by the Brethren denominations, according to Pastor Mike Smith, there is a consensus among the National Fellowship of Grace Brethren that organ and tissue donation and transplantation is a charitable act so long as it does

not impede the life or hasten the death of the donor or does not come from an unborn child.

BUDDHISM

Buddhists believe that organ/tissue donation is a matter of individual conscience and place high value on acts of compassion. Reverend Gyomay Masao, president and founder of the Buddhist Temple of Chicago says, "We honor those people who donate their bodies and organs to the advancement of medical science and to saving lives." The importance of letting loved ones know your wishes is stressed.

CATHOLICISM

Catholics view organ/tissue donation as an act of charity and love. Transplants are morally and ethically acceptable to the Vatican. According to Father Leroy Wickowski, Director of the Office of Health Affairs of the Archdiocese of Chicago, "We encourage donation as an act of charity. It is something good that can result from tragedy and a way for families to find comfort by helping others." Pope John Paul II has stated, "The Catholic Church would promote the fact that there is a need for organ donors and that Christians should accept this as a 'challenge to their generosity and fraternal love' so long as ethical principles are followed."

CHRISTIAN CHURCH (DISCIPLES OF CHRIST)

The Christian Church encourages organ and tissue donation, stating that we were created for God's glory and for sharing God's love. A 1985 resolution, adopted by the General Assembly, encourages "members of the Christian Church (Disciples of Christ) to enroll as organ donors and prayerfully support those who have received an organ transplant."

CHRISTIAN SCIENCE

The Church of Christ Scientist does not have a specific position regarding organ donation. According to the First Church of Christ Scientist in Boston, Christian Scientists normally rely on spiritual instead of medical means of healing. They are free, however, to choose whatever form of medical treatment they desire—including a transplant. The question of organ/tissue donation is an individual decision.

EPISCOPAL

The Episcopal Church passed a resolution in 1982 that recognizes the life-giving benefits of organ, blood, and tissue donation. All Christians are encouraged to become organ, blood, and tissue donors "as part of their ministry to others in the name of Christ, who gave His life that we may have life in its fullness."

GREEK ORTHODOX

According to Reverend Dr. Milton Efthimiou, Director of the Department of Church and Society for the Greek Orthodox Church of North and South America, "the Greek Orthodox Church is not opposed to organ donation as long as the organs and tissue in questions

are used to better human life; i.e., for transplantation or for research that will lead to improvements in the treatment and prevention of disease."

GYPSIES (ROMA)

Gypsies (Roma) are a people of different ethnic groups without a formalized religion. They share common folk beliefs and tend to be opposed to organ donation. Their opposition is connected with their beliefs about the afterlife. Traditional belief contends that for one year after death the soul retraces its steps. Thus, the body must remain intact because the soul maintains its physical shape.

HINDUISM

According to the Hindu Temple Society of North America, Hindus are not prohibited by religious law from donating their organs. This act is an individual's decision. H.L. Trivedi, in *Transplantation Proceedings*, states that, "Hindu mythology has stories in which the parts of the human body are used for the benefit of other humans and society. There is nothing in the Hindu religion indicating that parts of humans, dead or alive, cannot be used to alleviate the suffering of other humans."

INDEPENDENT CONSERVATIVE EVANGELICAL

Generally, Evangelicals have no opposition to organ and tissue donation. Each church is autonomous and leaves the decision to donate up to the individual.

ISLAM

The religion of Islam believes in the principle of saving human lives. According to A. Sachedina in his *Transplantation Proceedings* (1990) article, "Islamic Views on Organ Transplantation," "the majority of the Muslim scholars belonging to various schools of Islamic law have invoked the principle of priority of saving human life and have permitted the organ transplant as a necessity to procure that noble end."

JEHOVAH'S WITNESSES

According to the Watch Tower Society, Jehovah's Witnesses believe donation is a matter of individual decision. Jehovah's Witnesses are often assumed to be opposed to donation because of their belief against blood transfusion. However, this merely means that all blood must be removed from the organs and tissues before being transplanted.

JUDAISM

All four branches of Judaism (Orthodox, Conservative, Reform, and Reconstructionist) support and encourage donation. According to Orthodox Rabbi Moses Tendler, Chairman of the Biology Department of Yeshiva University in New York City and Chairman of the Bioethics Commission of the Rabbinical Council of America, "If one is in the position to donate an organ to save another's life, it's obligatory to do so, even if the donor never knows who the beneficiary will be. The basic principle of Jewish ethics—'the infinite worth of the human being'—also includes donation of corneas, since eyesight restoration is considered a life-saving operation." In 1991, the Rabbinical Council of America (Orthodox) approved organ donations as permissible, and even required, from brain-dead patients. The Reform movement looks upon the transplant program favorably and Rabbi

Background: Religious Views on Donation

Richard Address, Director of the Union of American Hebrew Congregations Bio-Ethics Committee and Committee on Older Adults, states that "Judaic Responsa materials provide a positive approach, and by and large the North American Reform Jewish community approves of transplantation."

LUTHERAN

In 1984, the Lutheran Church in America passed a resolution stating that donation contributes to the well-being of humanity and can be "an expression of sacrificial love for a neighbor in need." They call on members to consider donating organs and to make any necessary family and legal arrangements, including the use of a signed donor card.

MENNONITE

Mennonites have no formal position on donation, but are not opposed to it. They believe the decision to donate is up to the individual and/or his or her family.

MORAVIAN

The Moravian Church has made no statement addressing organ and tissue donation or transplantation. Robert E. Sawyer, President, Provincial Elders Conference, Moravian Church of America, Southern Province, states, "There is nothing in our doctrine or policy that would prevent a Moravian pastor from assisting a family in making a decision to donate or not to donate an organ." It is, therefore, a matter of individual choice.

MORMON (CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS)

The Church of Jesus Christ of Latter-Day Saints believes that the decision to donate is an individual one made in conjunction with family, medical personnel, and prayer. They do not oppose donation.

PENTECOSTAL

Pentecostals believe that the decision to donate should be left up to the individual.

PRESBYTERIAN

Presbyterians encourage and support donation. They respect a person's right to make decisions regarding his or her own body.

SEVENTH-DAY ADVENTIST

Donation and transplantation are strongly encouraged by Seventh-Day Adventists. They have many transplant hospitals, including Loma Linda in California. Loma Linda specializes in pediatric heart transplantation.

SHINTO

In Shinto, the dead body is considered to be impure and dangerous, and thus quite powerful. "In folk belief context, injuring a dead body is a serious crime . . .," according to E. Namihira in his article,"Shinto Concept Concerning the Dead Human Body." "To this day it

is difficult to obtain consent from bereaved families for organ donation or dissection for medical education or pathological anatomy . . . the Japanese regard them all in the sense of injuring a dead body." Families are often concerned that they not injure the itai, the relationship between the dead person and the bereaved people.

SOCIETY OF FRIENDS (QUAKERS)

Organ and tissue donation is believed to be an individual decision. The Society of Friends does not have an official position on donation.

UNITARIAN UNIVERSALIST

Organ and tissue donation is widely supported by Unitarian Universalists. They view it as an act of love and selfless giving.

UNITED CHURCH OF CHRIST

Reverend Jay Lintner, Director, Washington Office of the United Church of Christ Office for Church in Society, states, "United Church of Christ people, churches, and agencies are extremely and overwhelmingly supportive of organ sharing. The General Synod has never spoken to this issue because, in general, the Synod speaks on more controversial issues, and there is no controversy about organ sharing, just as there is no controversy about blood donation in the denomination. While the General Synod has never spoken about blood donation, blood donation rooms have been set up at several General Synods. Similarly, any organized effort to get the General Synod delegates or individual churches to sign organ donation cards would meet with generally positive responses."

UNITED METHODIST

The United Methodist Church issued a policy statement regarding organ and tissue donation. In it, they state that, "The United Methodist Church recognizes the life-giving benefits of organ and tissue donation, and thereby encourages all Christians to become organ and tissue donors by signing and carrying cards or driver's licenses, attesting to their commitment of such organs upon their death to those in need as a part of their ministry to others in the name of Christ, who gave his life that we might have life in its fullness." A 1992 resolution states, "Donation is to be encouraged, assuming appropriate safeguards against hastening death and determination of death by reliable criteria." The resolution further states, "Pastoral-care persons should be willing to explore these options as a normal part of conversation with patients and their families."

Minority Health Issues

Would it surprise you to know that close to 50 percent of people on the transplant waiting list are minorities?* What accounts for this disproportionately large number of minorities needing organ transplants? Data indicate that certain minority groups are more likely to suffer from diseases that lead to a need for a life-saving organ transplant. For example, about one out of every three African Americans suffers from hypertension (high blood pressure); Type 2 diabetes is two times higher in Latinos than in Non-Latino Whites; Native Americans are four times more likely than Whites to suffer from diabetes. Both hypertension and diabetes can lead to kidney failure and the need for a new kidney. African Americans, Asian and Pacific Islanders, and Hispanics are three times more likely to suffer from kidney failure than Whites.

Add to these statistics the fact that while minorities donate in proportion to their representation in the population, only about 30 percent of all donors are minorities, and the transplant picture for minorities becomes even starker. For example, this imbalance between minority donors and potential recipients is bad news for minorities waiting for a kidney transplant for a very simple reason—they are likely to wait longer and possibly receive a kidney their bodies are more likely to reject. Why?

Despite recent advances in using immosuppressive drugs to reduce rejection, tissue-matching is an important indicator of the success of a kidney transplant and is thus important in finding a compatible donor/recipient match. Research indicates that, generally, people of a particular race or ethnicity are more genetically similar to other people of the same race or ethnicity. However, the role of ethnicity and tissue-matching in rejection is still poorly understood and is the subject of on-going research.

Because of the reasons cited above, a minority on the waiting list may wait longer for a compatible match. The longer the wait, the greater the risk that the person will die before an organ is found. Many organizations are working through educational campaigns to increase awareness in minority communities of the need for organ donation. Increasing this awareness will encourage individuals to consider making the decision to donate their organs and give all those on the waiting list a better chance at receiving a life-saving organ transplant.

*Minorities as a percent of those on transplant waiting list:
African Americans—27 percent
Hispanic Americans—15 percent
Asian Americans—5 percent
American Indian or Alaskan Native—1 percent
Others—1 percent

Organ and Tissue Donation at a Glance

Donation Saves Lives. . . Organ and tissue transplants save the lives of thousands of people each year and enhance the lives of many others. The average one-year survival rate for people receiving a heart, lung, kidney, or liver transplant ranges from 75-95 percent depending on the organ they received. (See **Transplantable Organs**.)

But Lives Are Lost Everyday Because Too Few Donate. . . There is a waiting list for life-saving organ transplants. Unfortunately, due to a shortage of donated organs, many people die before a suitable organ becomes available. As of early-2004, over 84,000 people on the list were waiting for a life-saving organ transplant. Each day about 68 people receive an organ transplant, but another 18 people on the waiting list die because not enough organs are available. (See **The Waiting List**.)

Who Can Be a Donor? There are no age limitations on who can donate. Both newborns and senior citizens have been donors. Physical condition, not a person's age, determines suitability to be a donor. At the time of death, a person's medical condition is evaluated to determine if the person is suitable to be a donor.

How Do You Sign Up to Be a Donor? A person can declare his or her intention to be a donor in a variety of ways: donor registry, driver's license, or donor card. Most State laws allow minors of a certain age (for example, 16 and older) to declare an intention to be a donor with the written consent of a parent or guardian.

In some situations, the family of a deceased person must consent before their loved one's organs and tissues can be donated. One of the best ways to increase the chance that one will be a donor is to share one's wishes with immediate family members. This ensures that if family consent is required, your family will understand and be supportive of your wishes. (See **The Transplant Process**.)

Most donated organs are provided by people who are brain dead—that is, they have been pronounced legally dead. Living donors are able to donate bone marrow, a kidney, and parts of some organs. (See **Brain Death** and **Types of Donors**.)

Misconceptions . . . People worry that if medical personnel know that a person wishes to be a donor it is less likely that everything possible will be done to save the person's life. This is not true. Medical personnel always take every possible step to save a person's life.

In addition, people might believe that an organ and tissue donor cannot have an open-casket funeral. This is also untrue. Organ and tissue removal is done in such a way that an open-casket funeral is still possible.

Some people believe that a wealthy or well-connected person has a better chance of receiving a life-saving organ transplant. This is not true. Decisions about who receives an available organ are based solely on medical and scientific criteria. The wealth, age, race, or gender of a person on the waiting list has no effect on when an individual will receive a donated organ. In addition, it is illegal to buy or sell human organs in the United States. (See **Common Questions and Misconceptions**.)

This page is only a summary of some of the important material found in the Background sections of this guide. We strongly suggest that you review those materials before teaching the Core Lesson. The Background is divided into three sections:

A. Overview

B. Science

C. Donation Issues

III. C. Transplant Process Chart

A nonprofit organization under contract with the U.S. Department of Health and Human Services maintains a computerized national waiting list of patients who need a life-saving organ transplant.

The hospital notifies the local organ procurement organization (OPO) of imminent death of patient. (An OPO is a nonprofit organization that coordinates organ donation and transplantation in a specific geographic area.)

After the patient's death, the donor's organs are kept oxygenated by a mechanical support system while deceased's donation intentions are verified and/or family consent is obtained.

The OPO verifies the medical suitability of the patient to be a donor.

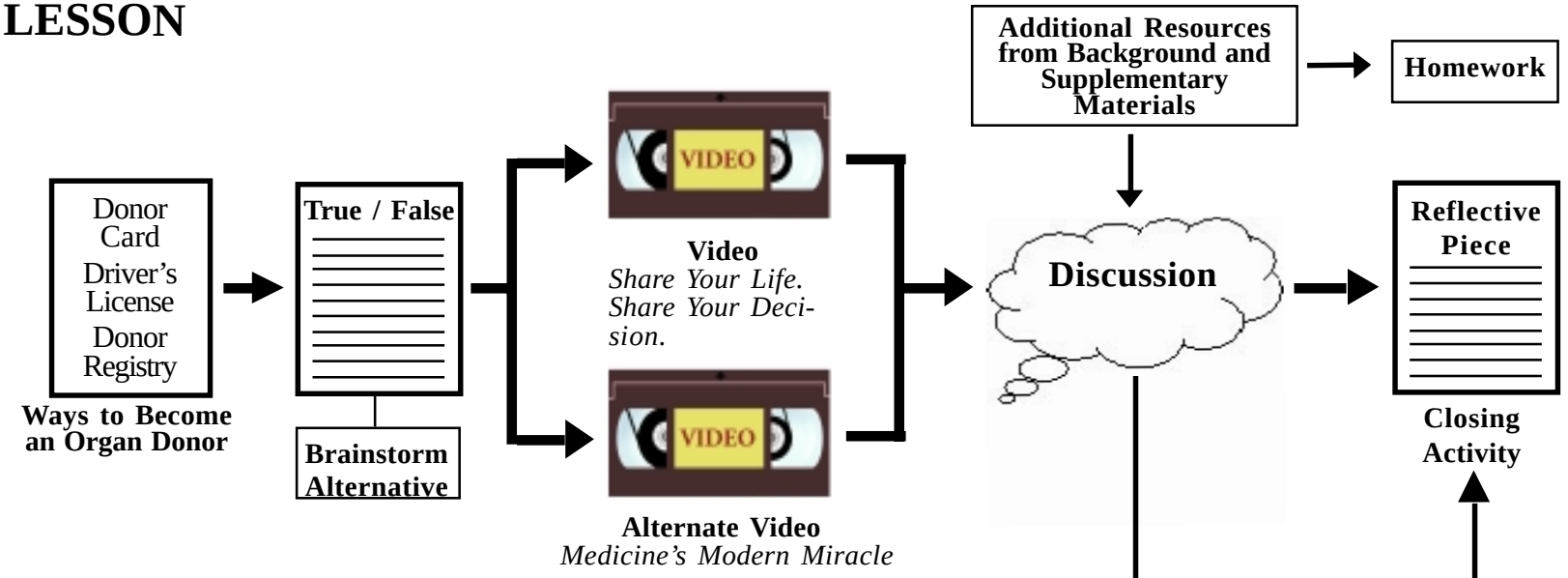
Once the deceased person is declared a donor, the computerized waiting list system matches the donor's characteristics, such as body size, blood type, geographic location, against each person on the waiting list.

After a suitable recipient is identified, the recipient's medical team is contacted. Arrangements are made to remove the donated organ and transport it to the recipient's hospital where the life-saving organ is transplanted into the recipient.

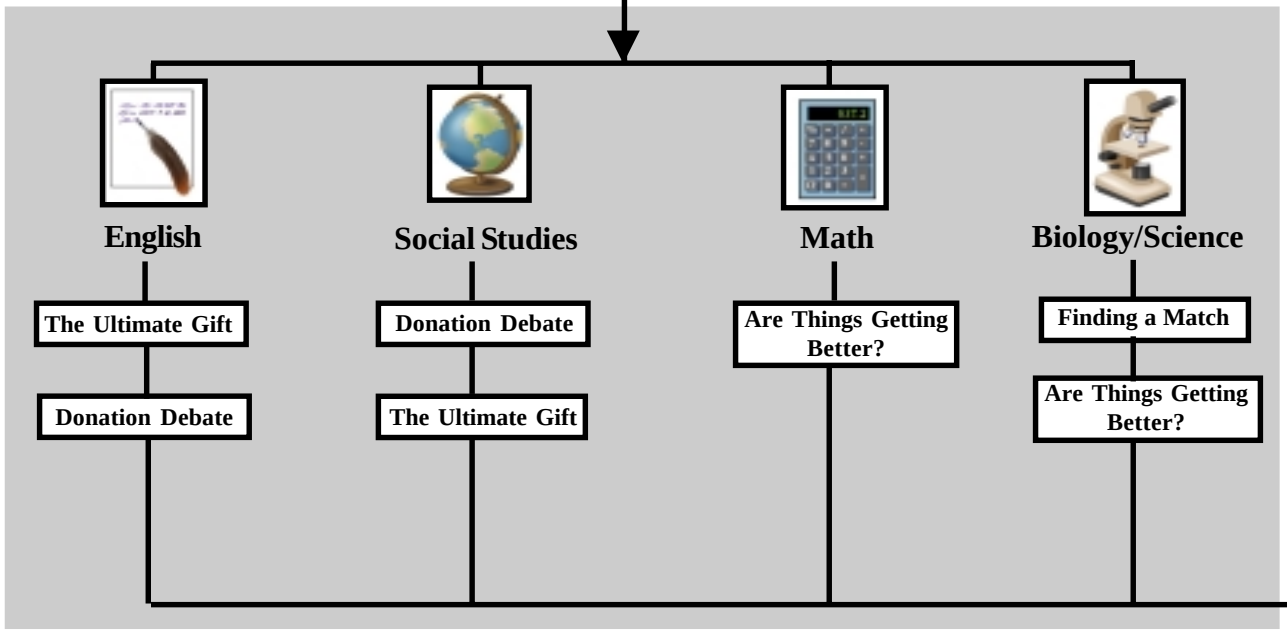
The organ removal is a surgical operation handled with sensitivity. The donor's family is able to make funeral arrangements (including an open-casket funeral) with very little delay.

Recipient undergoes period of recovery.

CORE LESSON



ADDITIONAL LESSONS



Core Lesson: Share Your Life. Share Your Decision.

Concepts

- Organs and tissues can be transplanted from a donor to a recipient.
- Becoming a donor is a voluntary process that requires making an informed decision and registering one's intention to be a donor by signing a donor card, completing the donation section of a driver's license application, or joining a donor registry.
- Because a donor's family may be asked to consent to organ and tissue donation, it is more likely that a donor's intentions will be carried out if the donor has shared his or her intentions with family members.
- Organs and tissues can be provided by deceased donors. Most organs are provided by donors who have been pronounced brain dead.
- Living donors can donate bone marrow, a kidney, and parts of a liver, lung, or intestine.
- For the best chance of a successful organ transplant, the donor's and recipient's tissue types need to match as closely as possible.
- Rejection is the response of the recipient's immune system when the tissue type of the donated organ does not exactly match the tissue type of the recipient. The immune system thinks the organ is a foreign object to be attacked.
- A computerized database matches donors with recipients. Names of potential recipients are stored as a waiting list on the database.

Overview

After a warm-up discussion, students view a video about organ and tissue donation. Students then discuss the process of donation and reflect in writing on their views about donation and whether they wish to be an organ and tissue donor. As a homework assignment, students are encouraged to use this reflective piece to share their wishes with their families.

Instructional Objectives

Students will show an understanding of the process of organ and tissue donation by—

- discussing their questions and concerns after viewing a video about donation.
- reflecting in writing on their views about donation and discussing their wishes with their families.

Materials

For the class:

Video: *Share Your Life. Share Your Decision*

Alternate Video: *Medicine's Modern Miracle*

For each student:

1 copy of Ways to Indicate Your Donation Decision* (4.1)

1 copy of Organ and Tissue Donation: True or False* (4.2)

1 copy of Letter to Parent or Guardian* (4.4)

For the teacher:

True or False Answer Key* (4.3)

*Black-line master provided

Core Lesson: Share Your Life. Share Your Decision.

Choice of Lesson Plan

This core lesson educates students about organ and tissue donation with the two-fold goal of helping them make an informed decision about whether to become an organ and tissue donor *and* encouraging them to share their wishes with family members. The lesson is designed for one 45-minute lesson—with or without activities outside of class. However, the design of the guide permits students' study of organ and tissue donation to be expanded over additional lessons in a variety of curriculum areas, as their interest or available time and curriculum allows.

The flowchart at the beginning of this section outlines some paths through the materials in this guide. If you choose to use some of these additional lessons, allow enough class time for the closing activity of this lesson in which students complete a reflective piece—a letter to their parents/guardian—outlining their views on being an organ and tissue donor. To complete this closing activity, students take this letter home to help them discuss their wishes with family members.

NOTE: The issue of organ and tissue donation is an important one. Therefore, while the core activity is designed to be done in one 45-minute class period, you are strongly urged to consider spending two 45-minute periods or one block schedule period on it. This extra class time would accommodate a fuller discussion of students' questions and concerns and would allow the reflective piece to be done in class rather than as homework.

Preparation

1. Visit the web and obtain information on the methods your State or area provides to register a decision to be a donor. These may be a donor card, an indication of your decision to donate on your driver's license application, or a donor registry. Your local organ procurement organization is the best source of this information. Locate them at www.organdonor.gov/OPO.htm.

2. Familiarize yourself with the information in the **Background** section. You may wish to copy some of these materials for your students for use either in the post-video discussion or as additional reading and homework materials. The following icons (located at the top of the first page of each component of the materials) indicate different lesson settings or curriculum areas in which these materials might be particularly appropriate:

Drivers Education

Biology / Science

Social Studies

Health

Mathematics

English

NOTE: Many of the materials are suitable for use in a number of different subject areas and are therefore designated with more than one icon.

3. Also review the materials in the next section—**Supplementary Materials**—for suggestions on how those materials can be integrated into the lessons in this guide and your curriculum. The supplementary materials are provided as black-line masters to allow them to be used as handouts.

4. Links to an on-line version (in PDF format) of all materials provided in this guide are found on the web at www.organdonor.gov. Some of these materials are provided in an interactive format. (See **Web Activities and Resources**.)

Warm-up

Inform students that they will be exploring the topic of organ and tissue donation. Distribute copies of **Ways to Indicate Donation Decision**. Explain that all States offer some method of signing up to be an organ and tissue donor on a donor card or a driver's license and many offer other methods such as a donor registry. Be prepared to show an example of the methods used in your State or area. Most State laws allow a minor over a certain age (for example, 16) to declare an intention to be a donor. Explain to students that your State may require additional steps for minors often involving the consent and signature of a parent or guardian.

NOTE: Your local OPO is an excellent resource for information on laws in your State regarding a minor's declaration of donation wishes. Locate your OPO at www.organdonor.gov/OPO.htm.

Preassessment

Distribute a copy of **Organ and Tissue Donation: True or False** to each student and use it to conduct a brief review of what students know about donation and what they would like to learn. Do not provide correct answers and avoid comment on student responses at this time. The video and other materials address the accuracy of most of these statements. An answer key for these statements is provided and can be used during the post-video discussion to address student misconceptions about organ and tissue donation.

If you are devoting more than one 45-minute period to this core lesson, consider using the **Brainstorm Alternative** outlined after the Homework section to facilitate a more thorough discussion of students' questions and concerns.

Using the Video

1. Show the video. Ask students to pay particular attention to information that addresses statements on **Organ and Tissue Donation: True or False**. If time permits, consider stopping the video to review information that addresses each item.

NOTE: If you are expanding this core activity over more than one 45-minute period, consider showing the alternate video provided. A short description of each video is provided, but consider watching both to help you choose the more appropriate video for your class.

Video: *Share Your Life. Share Your Decision* (16 minutes) This video explores issues facing those waiting for organ transplants and the experiences of a family who donated their loved one's organs and tissues. As this video is slightly shorter, it is a probably the best choice if you are only spending one lesson on this topic or if the topic is being taught in a class other than biology.

Alternate Video: *Medicine's Modern Miracle* (23 minutes) This video may be more appropriate for students already familiar with the issue or for use in a biology lesson, as it contains more information on the science behind the process of organ and tissue donation and transplantation. (Follow-up questions to this video are included in the **Supplementary Materials**.)

Core Lesson: Share Your Life. Share Your Decision.

NOTE: Some of students' questions or concerns may not be addressed by the video. You might consider having students use the resources of www.organdonor.gov to address any of these unanswered issues or to reinforce those that have been addressed.

2. At the end of the video, have students review their copy of **Organ and Tissue Donation: True or False**. Ask what information the video provides that answers questions or concerns they have about donation. Sample responses elicited by the video may include the following:

- There are tens of thousands of people on the waiting list for organs.
- Only after every effort is made to save a life and the individual is dead can the donation process begin.
- Organs need to be an appropriate size match.
- Blood types of an organ donor and recipient must match.
- Confidentiality is provided for donors and recipients.
- Most organs are provided by donors that are deceased. The most common exception is the kidney, which can be donated by a living donor.
- Brain dead means the person's brain can never function again, even though the body's organs can be kept functioning for a short time by a machine.
- Organ and tissue donation helps not only the recipient, but also the recipient's friends and families.
- Incisions made for organ and tissue removal can be covered by clothing so that an open-casket funeral is still possible.
- Even if one signs a donor card, indicates one's wishes on a driver's license, or joins a donor registry, the decision to become a donor should still be shared with family members so they can promote the individual's wishes at his or her time of death.

3. If you are devoting additional class time to this important topic of organ and tissue donation, use additional lessons and resources provided in this guide before conducting the closing activity with your class.

Closing Activity

Use this reflective activity to bring the class work on organ and tissue donation to a close. If you have spent a number of periods studying the topic, this activity should be the last one you conduct with your students.

Reflective Piece

1. Have students work alone or with a partner to reflect on what they have learned in order to assess their current feelings and attitudes toward organ and tissue donation. Have students write a few sentences—on the **Letter to Parent/Guardian** or other format you suggest—indicating whether they would be willing to donate their organs after their death and the reasons behind their decision. Explain to students that they can use this letter to help them share their wishes with their family. Emphasize that whether they use the letter or not, sharing their decision in some way with their family maximizes the likelihood that their wishes will be carried out.

2. Explain to students that in the near future they may be asked whether they wish to be an organ and tissue donor—for example when they apply for, or renew, a driver's license—and they will need to make an informed decision. Distribute a donor card to each student, and suggest that they keep this card as a reminder to share their wishes with their families. Explain to students that if they decide to become donors and have discussed their wishes with family members, they can finalize their decision by filling out the donor card, indicating their intention on their driver's license, or joining a donor registry if there is one in their State or area.

Homework

While continuing to respect the anonymity of each student's choice, again stress to students the importance of discussing their wishes with family members. Explain that their homework assignment is to use their letter to share their donation intentions with their families. Consider sending appropriate information home with students to help them inform their family members about donation—for example, materials from **Common Questions and Misconceptions**.

As you conclude your lesson on organ donation, encourage students to visit www.organdonor.gov to find out more about organ and tissue donation. This Website sponsored by the U. S. Department of Health and Human Services provides information on how your students can obtain donor cards and links to the OPO in your State or area. Your local OPO is the best source of information about ways to document donation intentions in your area or State. Donor cards can also be obtained by contacting the Division of Transplantation, Health Resources and Services Administration, at 301-443-7577.

NOTE: If you have only one 45-minute period for teaching this subject, you could have students do this reflective piece as a homework assignment.

NOTE: The decision to be a donor is a personal one. To ensure students' privacy and anonymity on this subject, this reflective activity should be a private one and students should not be asked to read aloud or to hand in this letter. It is intended for their use only.

Core Lesson: Brainstorm Alternative

NOTE: This brainstorm exercise can be used in place of the True or False handout.

Brainstorm Alternative

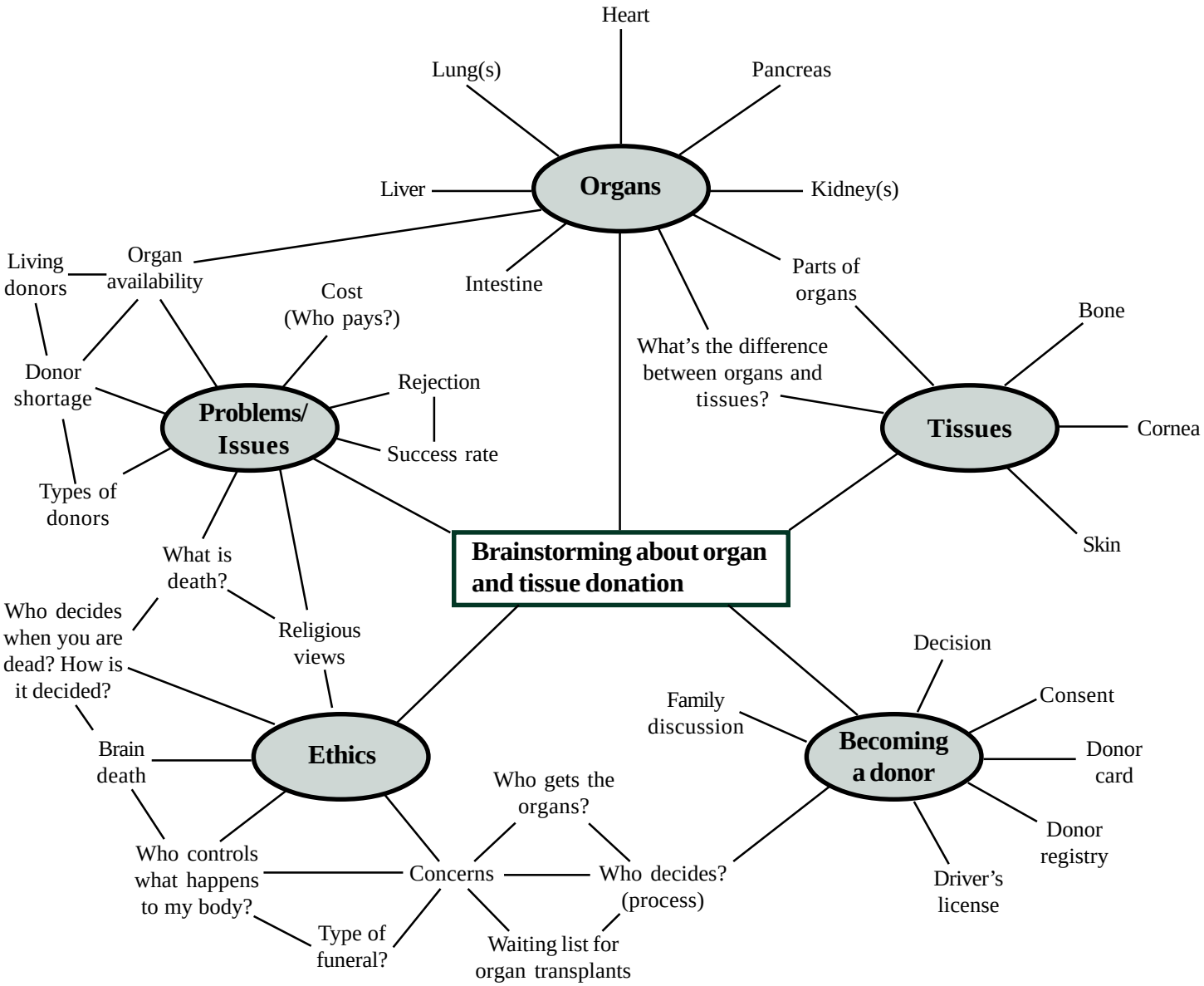
1. Give students a few minutes to work in groups of two to four to discuss and then contribute to a list of things they—

- already know about organ and tissue donation.
- would like to find out about organ and tissue donation.

2. Conduct a brief brainstorm session by having students share their ideas and questions about the topic. You may need to use a few guiding questions to stimulate the brainstorm process. Sample questions could include the following:

- What is an organ and what is a tissue?
- Why are organs and tissues needed?
- What do you know about organ and tissue donation?
- Which organs and tissues can be donated?
- Where do these organs and tissues come from?
- Who (or what) decides whether a patient receives a transplant? Waiting list, money, fame?
- How successful are transplants?
- Why are some organ transplants not successful?
- Can anyone be a donor?
- What concerns do you have about becoming a donor?
- What steps can you take to maximize the chances that your organs and tissues will be donated?

3. Solicit and record all different responses on a chalk or whiteboard, overhead transparency, or newsprint. As students contribute their ideas, try to arrange their responses in the form of a map or a series of lists. An example of such a brainstorm map is provided. All student ideas should be accepted in this brainstorm session. Avoid comment on the responses at this time. The map or lists can be used during the discussion after the video to identify and address student misconceptions about organ and tissue donation.



When conducting a brainstorm session with your students, try to arrange their knowledge, ideas, concerns, and questions about the organ and tissue donation process into a brainstorm map like the one above. Refer back to your class's brainstorm map when discussing the topic later in the lesson. Students can then see whether they have extended their knowledge and understanding of organ and tissue donation. (Do not expect your students' brainstorm map to be as complex as this example.)

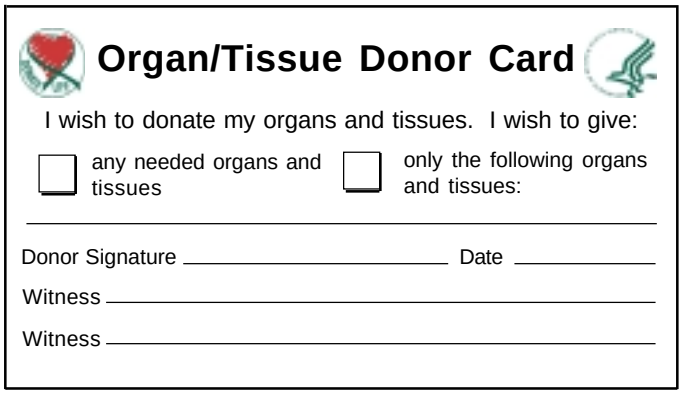
4. Show video. Refer to step 2 of Using the Video for a list of sample responses that should be emphasized in class discussion after watching the video.

5. At the end of the video, display the brainstorm map or lists. Ask students for suggestions for revising the map or lists based on what they learned in the video. Make the revisions as they respond.

6. As time permits, use the revised brainstorm to facilitate a class discussion on what students have learned about organ and tissue donation and transplantation.

Ways to Indicate Your Donation Decision

Organ and Tissue Donor Card


Organ/Tissue Donor Card

I wish to donate my organs and tissues. I wish to give:

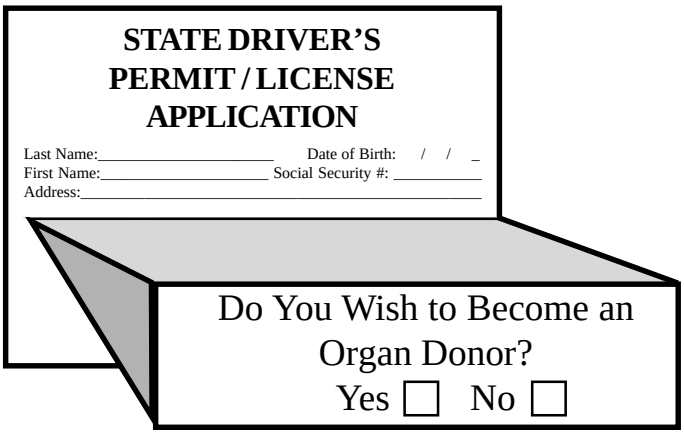
☐ any needed organs and tissues ☐ only the following organs and tissues:

Donor Signature _____ Date _____

Witness _____

Witness _____

Driver's Permit / License Application


STATE DRIVER'S PERMIT / LICENSE APPLICATION

Last Name:_____ Date of Birth: / / _

First Name:_____ Social Security #: _____

Address:_____

Do You Wish to Become an Organ Donor?

Yes ☐ No ☐

Donor Registry

4.2 Organ and Tissue Donation: True or False?

	True	False	Not sure
1. Organ transplants are rarely successful.	☐	☐	☐
2. If doctors see that I am a donor, they will be less likely to save my life in the event of an emergency.	☐	☐	☐
3. Americans overwhelmingly support organ and tissue donation.	☐	☐	☐
4. Organs and tissues from one donor can save the lives of several recipients and help many others return to normal, healthy lives.	☐	☐	☐
5. An organ and tissue donor cannot have an open casket at his or her funeral.	☐	☐	☐
6. Wealthy people are more likely than the average person to receive donated organs.	☐	☐	☐
7. Numerous religions prohibit organ and tissue donation.	☐	☐	☐
8. There is always a chance that a person who is brain dead will survive.	☐	☐	☐
9. Individuals can choose which organs and tissues they would like to donate.	☐	☐	☐
10. The United States is the only country in the world in which organ and tissue transplants are performed.	☐	☐	☐

Organ and Tissue Donation: True or False? Answer Key 4.3

	True	False	Not sure
1. Organ transplants are rarely successful.	☐	X	☐
2. If doctors see that I am a donor, they will be less likely to save my life in the event of an emergency.	☐	X	☐
3. Americans overwhelmingly support organ and tissue donation.	X	☐	☐
4. Organs and tissues from one donor can save the lives of several recipients and help many others return to normal, healthy lives.	X	☐	☐
5. An organ and tissue donor cannot have an open casket at his or her funeral.	☐	X	☐
6. Wealthy people are more likely than the average person to receive donated organs.	☐	X	☐
7. Numerous religions prohibit organ and tissue donation.	☐	X	☐
8. There is always a chance that a person who is brain dead will survive.	☐	X	☐
9. Individuals can choose which organs and tissues they would like to donate.	X	☐	☐
10. The United States is the only country in the world in which organ and tissue transplants are performed.	☐	X	☐

Answers Explained

1. False. The average one-year survival rate for people receiving a transplant of a heart, kidney, lung, or liver ranges from 75 to 95 percent depending on which organ transplant they receive.

2. False. Doctors always try to do everything possible to save a life. Organ and tissue donation only becomes a consideration when a person has been pronounced dead.

3. True. The most recent Gallup Poll on organ donation (1993) found that 85 percent of Americans support organ and tissue donation.

4. True. Organs and tissues from one donor can save or enhance the lives of 50 or more recipients.

5. False. Surgery to remove the organs and tissues is done in such a way that people who donate organs and tissues can be given an open-casket funeral. Incisions made to remove organs and tissues can be covered by clothing.

6. False. In the United States, the allocation of donated organs to people on the waiting list is based solely on medical and scientific criteria with no regard to wealth or connection. In addition, it is illegal to buy or sell human organs in the United States.

7. False. A large majority of world religions actively support organ and tissue donation.

8. False. Brain dead individuals are dead; they cannot recover.

9. True. Donors are able to indicate by way of a donor card or donor registry which organs and tissues they would like to donate.

10. False. Many countries throughout the world conduct organ and tissue transplants and have conducted research furthering the medical knowledge of transplantation.

Letter to Family

4.4

Dear (Parent/Guardian):

During _____class, I learned about organ and tissue donation and transplantation. An important part of the lesson was the need for me to share my wishes about donation and transplantation with you. As members of my immediate family, you may be asked for your consent to donate my organs and tissues. Discussing donation with you will enable you to understand and support my wishes as I have written below.

My feelings are as follows:

_____

_____

_____

_____

_____

_____

_____

_____

_____I **WISH** to be an organ and/or tissue donor.

_____I **DO NOT** wish to be an organ and/or tissue donor.

_____I am not sure at this time.

I'd also like to know how you feel about this subject and to talk with you about your wishes.

Signature _____ Date_____

Biology Lesson: Finding a Match

A Simulated Blood-Typing Exercise

Concepts

- Blood type
- Genetics
- Antigens
- Antibodies
- Agglutination
- Donor/recipient matching prior to organ transplantation

Overview

Students use simulated blood samples to carry out a blood-typing activity to determine potential donors for a kidney patient in need of a transplant. Students then complete a laboratory report and answer questions related to blood typing and the genetics of blood type.

Instructional Objectives

Students will show an understanding of blood type and the genetics of blood type and the wider application of these concepts to organ transplantation by—

- determining blood types for nine different simulated blood specimens in the context of organ donation.
- examining the effects of mixing incompatible blood types and relating this to what happens during tissue rejection following a mismatched transplant.

Introduction

This lesson is a standard activity with a twist—blood typing taught in the context of organ transplantation. Before using this lesson, make sure that your students are familiar with the fundamentals of blood typing. (An optional conclusion question addressing genotype is provided.) Emphasizing the concept of blood as a tissue while learning about blood typing and transfusion can be used to clarify issues surrounding organ transplantation, rejection, and the use of immunosuppressive drugs. (See **Matching Donors with Recipients** and **Rejection.)**

Materials

For the Class:

Simulated Anti-A serum (blue)
Simulated Anti-B serum (yellow)
Nine simulated blood samples labeled as follows:

- Mr. Earle
- Child #1
- Child #2
- Child #3
- Child #4
- Child #5
- Child #6
- Child #7
- Child #8

For each of nine individual teams:

One of the simulated blood samples
1 glass microscope slide (or one 3-well blood-typing tray)
2 new (e.g. unused) toothpicks
Laboratory Report

For each student:

Student Packet

Black-line masters

Student Packet (4.5)
Laboratory Report (4.6)
Answer Key (4.7)
Master Chart (4.8)

Biology Lesson: Finding a Match

NOTE: Please note that the information about Mike Earle and his family that appears in this blood-typing activity has been fabricated. Any similarity to persons dead or alive is unintended.

Preparation

1. To make simulated blood, you will need four containers, each holding 100 ml of water. To the 100 ml of water in each container, add about 25 ml of 25 percent Congo Red. Next, label each container for one of the four blood types and add chemicals to each container as follows:

- Type A: add 6 g $CaCl_2$ (calcium chloride)
- Type B: add 2.5 g $BaCl_2$ (barium chloride)
- Type AB: add 6 g $CaCl_2$ and 2.5 g $BaCl_2$
- Type O: no chemical added

2. To make simulated antiserums, you will need two containers, each holding 100 ml of *distilled* water. Label one container Anti-A serum and add one drop of blue food coloring. Label the other container Anti-B serum and add one drop of yellow food coloring. Next, add chemicals to each container as follows:

- Anti-A: add 1.06 g of $Na_2\ CO_3$ (sodium carbonate)
- Anti-B: add 1.92 g of $(NH_4)_2\ CO_3$ (ammonium carbonate)

3. Pour the simulated blood into nine labeled test tubes or dropper bottles according to the following chart:

Label	Contents
Mr. Earle	**Type A**
Child #1	**Type O**
Child #2	**Type O**
Child #3	**Type B**
Child #4	**Type A**
Child #5	**Type O**
Child #6	**Type AB**
Child #7	**Type B**
Child #8	**Type A**

4. Place the Anti-A serum and Anti-B serum in separate labeled dropper bottles.

5. Make a copy of the Classroom Master Chart on your chalk or white board. Students will use this chart to enter their results after they determine the "blood type" of their sample. As an alternative, you might make a transparency of the black-line master provided and have students enter their results on your overhead projector.

Safety Tips for Preparing Simulated Materials

Wear safety goggles at all times when handling chemicals.

Calcium Chloride
- Avoid contact with skin or eyes.
- Do not ingest or inhale.
- Use with adequate ventilation.
- Minimize dust generation and accumulation.
- Always use cool water when dissolving calcium chloride.
- When dissolving, add to water cautiously and with continuous stirring; solutions can get hot.
- Wash thoroughly after handling.
- Keep container tightly closed.
- Wash clothing before reuse.

Barium Chloride
- Use with adequate ventilation.
- Minimize dust generation and accumulation.
- Avoid contact with skin and eyes.
- Do not ingest or inhale.
- Wash thoroughly after handling.
- Wash hands before eating.

Sodium Carbonate
- Avoid eye contact or prolonged skin contact.
- Avoid breathing dust.
- When dissolving, add to water cautiously and with continuous stirring; solutions can get hot.

Ammonium Carbonate
- Avoid contact with eyes, skin, and clothing.
- Do not ingest or inhale.
- Wash thoroughly after handling.
- Remove contaminated clothing and wash before reuse.
- Use only in a well-ventilated area.
- Keep container tightly closed.
- Store protected from air.

Biology Lesson: Finding a Match

Procedure

NOTE: Remind students to use different and uncontaminated toothpicks to stir each blood sample.

1. Divide your class into nine teams. Distribute one of the labeled test tubes of "blood" that you have prepared to each team. (One team will receive Mr. Earle's "blood," while each of the other eight teams will receive the "blood" of one of Mr. Earle's children.)

2. Using the procedure steps outlined in the Student Packet, demonstrate the blood-typing procedure for the class. (Caution students against confusing a color change with agglutination.) Then direct each team to test their "blood" sample.

3. After students examine the "blood" drops for signs of clumping (agglutination) and determine the blood type of their sample, ask one member from each team to record their team's result on a Master Classroom Chart. (See step 5 of Preparation.)

4. Have each team copy the results from the master chart onto their copy of the laboratory report.

5. Have students answer the conclusion questions individually and attach their answers to the laboratory report for their team. (If your students have not yet studied heredity, you may want to have them skip question #1.)

6. If time permits, consider having the class discuss why clumping occurred in some samples and not in others.

Scoring Rubric

Although strong group participation is the goal, assessment is primarily based on individual responses to conclusion questions.

- Observations of student's conduct indicate full participation in the activity. The laboratory-report form is complete and accurate. All conclusion questions have been answered correctly. 3 points

- Observations of student's conduct indicate some participation in the activity. The laboratory-report form is complete. All conclusion questions have been answered. 2 points

- Observations of student's conduct indicate little participation in the activity. The laboratory-report form may be complete and/or accurate, but student did little more than observe the other members of the team carry out the procedures. Most conclusion questions have been answered. 1 point

- Observations of student's conduct indicate no participation in the activity. The laboratory-report form may be complete and/or accurate, but student did not participate in any way. Conclusion questions have not been answered. 0 points

Background

NASHVILLE — Country singer Mike Earle, battling kidney failure, is resting comfortably while doctors conduct tests to find a suitable transplant donor among his children, a spokesman said on Wednesday.

October 1, 2003

Country singer Mike Earle is "resting comfortably" while he waits for a kidney transplant.

Today, the hospital where you work has a famous patient. Country singer Mike Earle is suffering from kidney failure and you are a hematologist on duty. It will be your lab's responsibility to test blood samples from Mr. Earle and each of his eight children to determine whether or not there may be a suitable kidney donor among them.

Finding a kidney for transplantation is more than just finding a donor whose blood type matches the recipient's blood type. Kidney donors and recipients must also have histocompatibility (tissue compatibility) antigens that match. That's a complicated second step… your job, however, is only to determine the blood types.

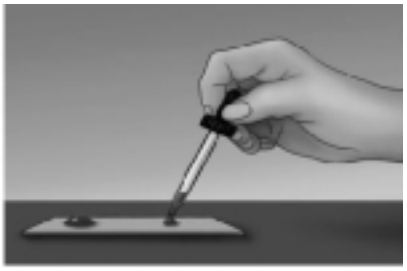
Four major blood types are found in humans: A, B, AB, and O. Another component associated with blood type is a protein called the Rh factor because it was first discovered in the **Rh**esus monkey. If this factor is present in a person's blood, the blood is said to be Rh positive (Rh+). Conversely, when this factor is absent, the blood is Rh negative (Rh–). This is why blood types are referred to as A+ or A–. While Rh factor is an important component to consider in matching donor and recipient for blood transfusions, Rh factor is not involved in matching donors and recipients in kidney transplantation. For purposes of this activity, it is assumed that all family members have the same Rh factor.

Student Objectives

- Use a blood-typing exercise as the first step in finding an organ suitable for transplantation.
- Observe the effects of mixing incompatible blood types during blood typing and relate these effects to those that occur during tissue rejection following a mismatched transplant.
- Use blood-type test results from some members of a family to determine the blood type of a non-tested member of the family.

Procedure

1. Your team has been assigned to identify the blood type of one member of the Earle family. Working with your team, place one drop of "blood" from your individual on each end of a clean microscope slide or in each of two wells of a blood-typing tray.

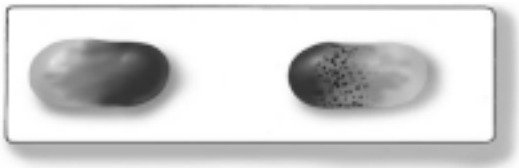


Place one drop of blood on each end of a clean slide.

2. Next, add one large drop of the Anti-A serum to one drop of blood and one large drop of Anti-B serum to the other drop of blood. Use one toothpick to mix the first drop of blood with the Anti-A serum and the other toothpick to mix the other drop of blood with the Anti-B serum. Why do you think it is necessary to use different toothpicks?

3. Look for clumping (agglutination) in each drop of blood. Clumping usually occurs within the first two minutes after adding the antiserum. (Do not confuse a color change with clumping.) If the donor/recipient has—

- type-A blood, clumping will only occur with the Anti-A serum.
- type-B blood, clumping will only occur with the Anti-B serum.
- type-AB blood, clumping will occur in both drops.
- type-O blood, there will be no reaction with either antiserum.

Blood with Anti-A serum  **Blood with Anti-B serum**

A positive test for type B blood

4. After you have determined the blood type for your sample, record it on the Classroom Master Chart your teacher has provided. Use the class's entries in this chart to complete a laboratory report for your team.

5. Complete the question sheet individually and attach your answers to your team's laboratory report.

Conclusion Questions

1. Based on the blood types for Mike Earle and his children, it is possible to determine the genotype for the blood group for each member of the Earle family. (Even though your class did not test Mrs. Earle's blood, you should be able to determine her blood type based on the blood types of Mr. Earle and the children.) Each member of your team should copy and complete Table 1.

Table 1. Blood Types

Label	Blood Type	Genotype
Mr. Earle		
Mrs. Earle		
Child #1		
Child #2		
Child #3		
Child #4		
Child #5		
Child #6		
Child #7		
Child #8		

2. Assuming that everyone in Mike Earle's family has the same Rh factor, then one family member can receive a blood transfusion from any family member. Which person can receive from anyone and why? (If your teacher told you to skip question #1, do not consider Mrs. Earle in your answers for this question and Question #3.)

3. Assuming that everyone in the family has the same Rh factor, more than one person can donate blood to all family members regardless of their blood type. Which family members can donate to everyone and why?

4. Mike Earle's high blood pressure has contributed to his kidney failure. Why is high blood pressure a common cause of kidney failure? Use an Internet search engine to answer this question and explain the connection here.

5. Explain why a kidney may be donated by a living individual with little risk to the donor.

6. Antibodies contained in antiserum cause the clumping of blood cells during the determination of blood type. Explain how this clumping compares to the body's rejection of a mismatched organ.

C. Bernard Kidney Transplantation Center

Hematology Laboratory

Preliminary Report

Date: _____ Technician(s) _____

Recipient Mike Earle Blood Type _____

Potential Donors

Donor	Blood Type
Child #1	
Child #2	
Child #3	
Child #4	
Child #5	
Child #6	
Child #7	
Child #8	

Possible Tissue Matches (List all donors whose blood type is the same as the recipient's.)

_____

_____

Additional Tests Recommended (Check all tests that should be completed on potential donors.)

☐ **Rh Factor** ☐ **Class I Histocompatibility Molecules** ☐ **Class II Histocompatibility Molecules**

Tissue Typing

The strongest antigens that can lead to transplant rejection are the Class I and Class II histocompatibility molecules. Genes for these antigens are encoded on chromosome 6. The collection of genes is called the major histocompatibility complex (MHC).

Testing for both Class I and Class II histocompatibility molecules is recommended as the next step.

1. The correct genotype chart:

Table 1. Blood Types

Label	Blood Type	Genotype
Mr. Earle	A	I^Ai
Mrs. Earle	B	I^Bi
Child #1	O	ii
Child #2	O	ii
Child #3	B	I^Bi
Child #4	A	I^Ai
Child #5	O	ii
Child #6	AB	I^AI^B
Child #7	B	I^Bi
Child #8	A	I^Ai

2. Child #6 can receive a blood transfusion from anyone because this person has neither Anti-A nor Anti-B antibodies.

3. Children #1, 2, and 5 can donate blood to all siblings and their parents regardless of their blood type because Type-O blood does not possess antigens for either A or B.

4. The heart of a person with high blood pressure works harder and, over time, blood vessels throughout the body are damaged. If the blood vessels in the kidneys are damaged, they may stop removing wastes and extra fluid from the body. The extra fluid in blood vessels may then raise blood pressure even higher. This becomes a dangerous cycle.

5. People only need one kidney to cleanse their blood. (Very strong evidence indicates that people without a predisposition to kidney disease—those with no diabetes, normal blood pressure, and normal kidney anatomy—have a very low likelihood of developing kidney failure after they donate a kidney.)

6. The clumping that occurs when blood is typed is caused when antibodies in the antiserum used to type the blood attack antigens on the surface of red blood cells causing the cells to clump together. This is similar to what happens when tissue rejection occurs. When organ donors and recipients do not match, antigens on the donor organ are attacked by antibodies produced by the recipient.

Master Chart

Recipient	Blood Type
Mr. Earle	
Donor	**Blood Type**
Child #1	
Child #2	
Child #3	
Child #4	
Child #5	
Child #6	
Child #7	
Child #8	

English Lesson: The Ultimate Gift
A Persuasive-Writing Activity

Concepts

- Encouraging others to be organ and tissue donors is a worthwhile goal given the imbalance between the supply of donated organs and the number of people waiting for a life-saving organ transplant.

- Writing a letter to friends or loved ones that is supported by well-researched points and written in a persuasive manner can help convince them to be donors.

Overview

Students read a true story about a family's decision to donate a loved one's organs and the reactions of this donor family and the family of one of the recipients. Students do a persuasive-writing activity by writing to a friend or loved one to encourage him or her to sign up to be an organ and tissue donor.

Instructional Objectives

By writing a persuasive letter encouraging a friend or loved one to be an organ and tissue donor, students will show an understanding of—

- how to use written language to accomplish a purpose and to communicate effectively with a specific audience.

- how to conduct research on an issue by gathering, evaluating, and synthesizing data from a variety of sources to communicate their ideas in a way that suits their purpose and audience.

- issues surrounding the decision to become an organ and tissue donor.

Assessment

- Distribute copies of the scoring rubric to students when you present the assignment and carefully review this rubric with them. Suggest that they use the rubric to assess their own work.

- Use this rubric to assess students' work or consider having students use the rubric to peer-evaluate a classmate's letter.

Materials

Black-line Masters

- Student Packet (4.9)
- Scoring Rubric (4.10)

In this lesson you will:

- Read a true story about a family's decision to donate a loved one's organs and the reactions of this donor family and the family of one of the recipients.

- Write a persuasive letter to a friend or loved one encouraging him or her to sign up to be an organ and tissue donor.

Background

The following story is true. It is based on a story that appeared at www.organdonor.gov, a site sponsored by the U. S. Department of Health and Human Services and dedicated to the promotion of organ and tissue donation.

A Tale of Two Families

Gloria—The Recipient

In the fall of 1992, Gloria was an active 37-year-old wife and working mother of two small children. When ongoing fatigue sent her to the doctor, she was sure that she was just "stressed out." So, Gloria was amazed when her doctor reported that her blood work indicated the possibility of hepatitis. Gloria was told to go home and rest; she left work early and went home to take a nap.

Weeks later, Gloria awoke from a coma to discover she had a new liver. "I was angry and frustrated when I woke. I thought someone had taken my liver and given it away. I was in a hospital, and I knew nothing about how or why I was there! My husband's hair had turned gray. My mother looked 10 years older. I learned that my children had been told their mother was not coming home. Then came the grief as I realized that someone's death had made my new liver available for transplant. And as I looked at my family's faces, their pain, I knew that somewhere another family was going through the same thing . . . and I grieved for them."

Bobby—The donor

The week before Thanksgiving, 1992, Bobby collapsed at work with a brain aneurysm—a rupture in a blood vessel in the brain. His wife, Suzi, and their children, Melissa and Matt, rushed to his side at a hospital just a few miles from where Gloria lay in a coma. As Bobby was being prepared for surgery, another aneurysm destroyed his brain stem, causing his death. Offered the option of donation, Suzi found comfort in the idea that Bobby "would be walking with us somewhere on this earth." Sixteen-year-old Melissa opposed the idea. But after imagining that another girl's father might be helped, Melissa reconsidered and the family consented to donation.

Their Story

Months later, Melissa wrote to the recipients of her father's organs, using only her first name. The organ procurement organization that had helped coordinate the donation of her father's organs also arranged the delivery of the letters in order to protect Melissa's privacy and that of the recipients.

Melissa received only one response—a letter from Gloria, the recipient of her dad's liver. Melissa and Suzi were moved by the warmth and sensitivity of Gloria's letter. Melissa and Gloria continued to correspond, but had no plans to meet. Fate intervened the day both families attended a ceremony honoring donor families. Suzi recognized Gloria, whose picture and story had appeared in a brochure. Suzi gathered up her family and walked forward to meet Gloria and her family. In a way, Gloria's family had become a part of her family's life three years earlier when Gloria became a recipient of one of Bobby's organs.

In the years since Gloria and Suzi met, they have spoken together many times of the benefits of donation and transplantation—in both public and private presentations. Often, they hold hands as they talk. Gloria has told Suzi of her grief over Suzi's loss and her intention to be sure she is deserving of Bobby's gift. Suzi says that her grief "turned to joy when I discovered that my husband's death was not final but had given five people a chance to live."

In her first letter to Gloria, Melissa had written that she hoped one of her dad's organs had gone to a child who could now live to grow up. Melissa now understands that the gift that saved Gloria's life also "saved" the lives of Gloria's children, son Arylon and daughter Aquia, who, at ages 9 and 6, came so close to losing their mother. Gloria and her family attended Melissa's wedding, and have since celebrated with Suzi the birth of Melissa's little boy, Robert.

Procedure

1. Having read this true story about the experiences of a donor family and a recipient family, your task is to write a persuasive letter to a friend or loved one to convince him or her to sign up to be an organ and tissue donor. Your letter should be one or two double-spaced pages and should include the following:

    - An opening statement that clearly states the issue and your position on this issue. Several paragraphs that include specific evidence, examples, and statistics about organ and tissue donation organized in a meaningful way. Each sentence must be related to the topic and to the sentence before it. Avoid broad generalizations and stereotyping of any kind. Sources of information should be varied and stated in your letter.

    - A minimum of three Internet sites that contain compelling information on organ and tissue donation should be listed. In addition, include a link to the web page of www.organdonor.gov that contains a donor card.

    - A conclusion in which the topic is restated and the one or two most compelling arguments are summarized. This is the last chance in the letter to convince your friend or loved one to be an organ and tissue donor. Nothing new should be added in the conclusion.

2. Due dates are as follows:

_____: Draft of persuasive letter _____: Final copy

Purpose of assignment:

Write a persuasive letter that convinces a friend or loved one to sign up to be an organ and tissue donor.

A thoroughly developed persuasive letter that fulfills the purpose by including the following:

- a valid, clearly focused, and well-defined issue
- relevant, sufficient, documented support from several valid sources, including at least three Internet sources
- precise organization of evidence and implications to enhance purpose
- effective use of appropriate technology tools for research, analysis, and communication
- careful attention to audience understanding and interest
- effective form and sequence

4 points

A well-developed persuasive letter that fulfills the purpose by including the following:

- a valid, focused issue
- relevant, specific, documented support from valid sources, including at least three Internet sources
- effective organization of evidence and implications to achieve purpose
- sufficient use of appropriate technology tools for research, analysis, and communication
- attention to audience knowledge and interest
- suitable form and sequence

3 points

An incomplete or oversimplified persuasive letter that only adequately fulfills the purpose by including:

- a valid issue
- irrelevant, inconclusive support from limited sources; includes fewer than three Internet sources
- inconsistent organization of evidence and implications
- insufficient use of appropriate technology tools for research, analysis, and communication
- consideration of audience awareness and interest
- inappropriate form and sequence

2 points

A poorly-written, inadequate essay/presentation that fails to fulfill the purpose including only the following:

- an unfocused or invalid issue
- incomplete, irrelevant support; internet sources not listed
- unclear organization of evidence and implications
- a lack of appropriate technology tools for research, analysis, and communication
- a weak sense of audience awareness and interest
- inconsistent, unclear form and sequence

1 point

Social Studies Lesson: Donation Debate
A Critical-Thinking Activity

Concepts

- Federal donation and transplantation guidelines promote policies that ensure that scarce organs are allocated in a way that is fair and equitable.
- Deciding who receives donated organs is not always a clear-cut issue and involves many difficult policy decisions premised on societal interactions among individuals, groups, and institutions.
- Aspects of science and technology have an impact on how society allocates scarce resources.

Overview

Students are asked to decide who should receive a donated organ in various scenarios in which there are two potential recipients, but only one organ. Students formulate and defend their decisions before learning how these decisions would be made under current organ donation policies. Students are then given the opportunity to evaluate these policies and suggest possible policy changes.

Instructional Objectives

By formulating an argument with the assistance of a graphic organizer and participating in a follow-up discussion, students will show—

- an understanding of the difficult situations organ procurement organizations (OPOs) face when trying to provide organs to patients in need.
- an understanding of why laws and policies are needed to govern organ and tissue donation and transplantation.
- the ability to evaluate organ allocation policies on donation and transplantation.
- an understanding of how to defend a position in a debate or in writing.

Materials

Black-line Masters

- Donation Scenarios (4.11)
- Donation Debate Organizer (4.12)
- Donation Scenario Outcomes (4.13)

IV. D. Social Studies Lesson: Donation Debate

Introduction

Federal and State laws regulate numerous aspects of the organ donation process. While most media attention focuses on the individual decision to donate organs, another important decision revolves around the recipients of donated organs. Deciding who receives donated organs is not always a clear-cut issue and often involves many difficult policy decisions. The organization responsible for formulating organ allocation policies is the Organ Procurement and Transplantation Network (OPTN).

The OPTN is a private, non-profit organization that links professionals involved in the donation and transplantation system. (All organ procurement organizations and transplant programs that receive organs from deceased donors are required to belong to the OPTN.) Congress established the OPTN when it passed the National Organ Transplant Act of 1984 (NOTA) and provided that the OPTN be administered under a Federal contract. Currently, the OPTN is administered by the United Network for Organ Sharing (UNOS), based in Richmond, Virginia, under a contract with the Health Resources and Services Administration of the U.S. Department of Health and Human Services.

The OPTN develops consensus-based policies and procedures for organ retrieval, distribution (allocation), and transportation within a framework of goals and objectives established by Federal regulation. The two primary goals of the OPTN are to increase the—

- effectiveness and efficiency of organ sharing and equity in the national system of organ allocation.

- supply of donated organs available for transplantation.

You can learn more about OPTN organ allocation policies by visiting: www.optn.org/policiesAndBylaws/policies.asp.

This lesson provides students with various scenarios in which there are two potential recipients, but only one organ available. Students are asked to decide who should receive the donated organ. Students formulate and defend their decisions before learning how these decisions would be made under OPTN policies on organ allocation. Finally, students are given the opportunity to evaluate these policies and offer possible changes. (For more information on how the organ allocation system works, see **The Waiting List**.)

Social Studies Lesson: Donation Debate

Procedure

This lesson offers five different scenarios in which two people—both in need of a life-saving 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? Set out below are three options for structuring your class to debate these questions.

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, 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 *transparency* to the group. Have each group decide collectively who they think should receive the donated organ and fill out their organizer transparency to justify their position. Have each group use the overhead projector to present to the class 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 each student with a debate organizer and ask students to formulate their own position and individually fill out the organizer. For each person depicted in the scenarios, ask a student who has taken the position of that person to read the scenario aloud and explain his or her decision (and justifications for that decision) to the class. Provide students with the Donation Scenario Outcomes so students can see how these difficult decisions would be decided under current policies. 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.

Social Studies Lesson: Donation Debate

Class Discussion

The following questions may serve as a guide for the discussion:

- 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 policies would be changed?

Donation Scenarios

Scenario #1: Michael, a 23-year-old male, is serving the third year of a 20-year jail sentence for three armed robberies and needs a lung transplant. Michael has been on the waiting list for 4 years. Roberta, a 30-year-old teacher and mother of four, also needs a lung transplant and has been on the waiting list for 2 years. An organ procurement organization (OPO) has identified a lung that matches both Michael and Roberta. Michael and Roberta are equally ill. Who do you believe most probably would receive the organ in this situation?

Scenario #2: Carmella, a 45-year-old billionaire CEO of a computer software company, recently discovered she needs a heart transplant. She has offered an organ procurement organization (OPO) $30 million if she receives a heart transplant immediately. Martha, a 33-year-old receptionist, also needs a heart transplant and has been on the waiting list for one year. The OPO has just identified a heart matching both Carmella and Martha. Martha is sicker than Carmella. Who do you think most probably would receive the organ in this situation?

Scenario #3: Preston is a 35-year-old male living with human immunodeficiency virus (HIV). Can he be placed on the waiting list to receive a liver for transplantation?

Scenario #4: Sophia, a 73-year-old retired nurse who needs a kidney transplant, has been on a waiting list for a kidney for 2 years. Navid, a 21-year-old college student, also needs a kidney transplant and has also been on the waiting list for 2 years. An organ procurement organization (OPO) has just identified a kidney matching both Sophia and Navid. Sophia and Navid are equally ill. Who do you think most probably would receive the organ in this situation?

Scenario #5: Kevin, a three-time scoring champion and recent Most Valuable Player of the National Basketball Association who is 29 years old, has recently been diagnosed with a pancreatic disorder and placed on a waiting list for an organ transplant. Jason, a 31-year-old security guard, has a similar pancreatic disorder and has been on the waiting list for three years. An organ procurement organization (OPO) has just identified a pancreas matching both Kevin and Jason. Kevin and Jason are equally ill. Who do you think most probably would receive the organ in this situation?

Donation Debate Organizer

We / I believe...

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

Scenario Outcomes Under Current Organ Allocation Policies

Scenario #1: 23-year-old male prisoner and 30-year-old female teacher and mother
In 1976, the Supreme Court ruled that States cannot bar prisoners from access to health care, which would include organ transplants, without violating the Eighth Amendment ("Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted"). The OPTN/UNOS Ethics Committee has stated "Convicted criminals have been sentenced only to a specific punishment, and have not been sentenced by society to an additional punishment of an inability to receive consideration for medical services." Thus, while both patients are equally ill, Michael, the 23-year-old prisoner would most likely receive the organ over Roberta the 30-year-old teacher and mother because he has been on the waiting list longer.

Scenario #2: Billionaire offers $30 million for preferential treatment
The National Organ Transplant Act of 1984 made it illegal to buy or sell human organs. Although the $30 million would be going to a good cause, this money cannot be accepted in return for preferential treatment. While both patients are equally ill, Martha has been on the waiting list longer and would most likely receive the organ.

Scenario #3: 35-year-old living with HIV virus
There is no specific legislation dealing with the right of HIV patients to obtain donated organs and tissues. The OPTN/UNOS Ethics Committee has stated that "transplantation should be carefully considered if the candidate's reasonable life expectancy is significantly shorter than the reasonably expected 'life span' of the transplanted organ." In an on-line article, CNN correspondent Don Knapp reports that AIDS patients started becoming eligible for transplants in 1997. Knapp reports that hospitals "give organ transplants only to those AIDS patients who have prospects for a good qualify of life for a long time." If Preston's physicians believe he is a good candidate to receive a liver transplant, he can be listed.

Scenario #4: 73-year-old and 21-year-old both need a kidney transplant
There is no age limit for individuals to receive organ and tissue transplants. The OPTN/UNOS Ethics Committee has stated that "transplantation should be carefully considered if the candidate's reasonable life expectancy is significantly shorter than the reasonably expected 'life span' of the transplanted organ." There is no clear recipient in this scenario. The decision of who should get the donated organ would be resolved by following OPTN allocation policies that provide a formula to weigh all characteristics, such as time on waiting list, medical condition of both potential recipients, and geographic proximity to the donor.

Scenario #5: NBA basketball star needs a pancreas transplant
According to United Network for Organ Sharing (UNOS), "Factors such as race, gender, age, income, or celebrity status are never considered when determining who receives an organ." According to this reasoning, a professional athlete, who has celebrity status, should not be given preferential treatment in this scenario. The organ would be allocated according to the OPTN allocation policies.

Mathematics Lesson: Are Things Getting Better?
A Data-Analysis Activity

Concepts

- Data Analysis—Students organize, display, and analyze data in order to make valid decisions, inferences, arguments, and predictions; interpret, evaluate, and communicate information obtained from an authentic source and communicate reasoning used.
- Algebra and Patterns—Students explore, represent, model, analyze, and communicate mathematical real world situations involving patterns and functional relationships with and without the use of technology.
- Transplant waiting lists
- Need for more donors

Overview

Students analyze data on the number of deaths over a 10-year period for patients on the heart-transplant waiting list by calculating and plotting the annual death rate. Students then use their graphs to further analyze these data in order to answer questions and predict future trends.

Instructional Objectives

By completing the student packet, students will show an understanding of—

- line-of-best-fit.
- slope and *y*-intercept.
- extrapolation.

Introduction

This activity examines data that show a declining annual death rate over a 10-year period for patients on the heart-transplant waiting list. Students will analyze the data by first calculating the death rate per 1,000 Patient-Years, and then by plotting that death rate. (Patient-Year is a number that reflects the amount of time that each patient actually spent on the waiting list. See note following the death-rate equation in the Procedure section in the Student Guide). Placing a line-of-best-fit allows students to determine the linear relationship between the numbers. Developing an equation for that line allows students to extrapolate 5 years in the future and discuss the implications. (Graphing calculators may be used in this activity.)

Materials

Black-line Master

- Student Packet (4.14)

NOTE: Students should first work individually on this problem and then be allowed to work with a partner to complete it.

Answers to Questions 1-4

1-3a. Below are data for the table that students will complete, the completed graph with the best-fit line that they plot, and sample answers to questions students will answer.

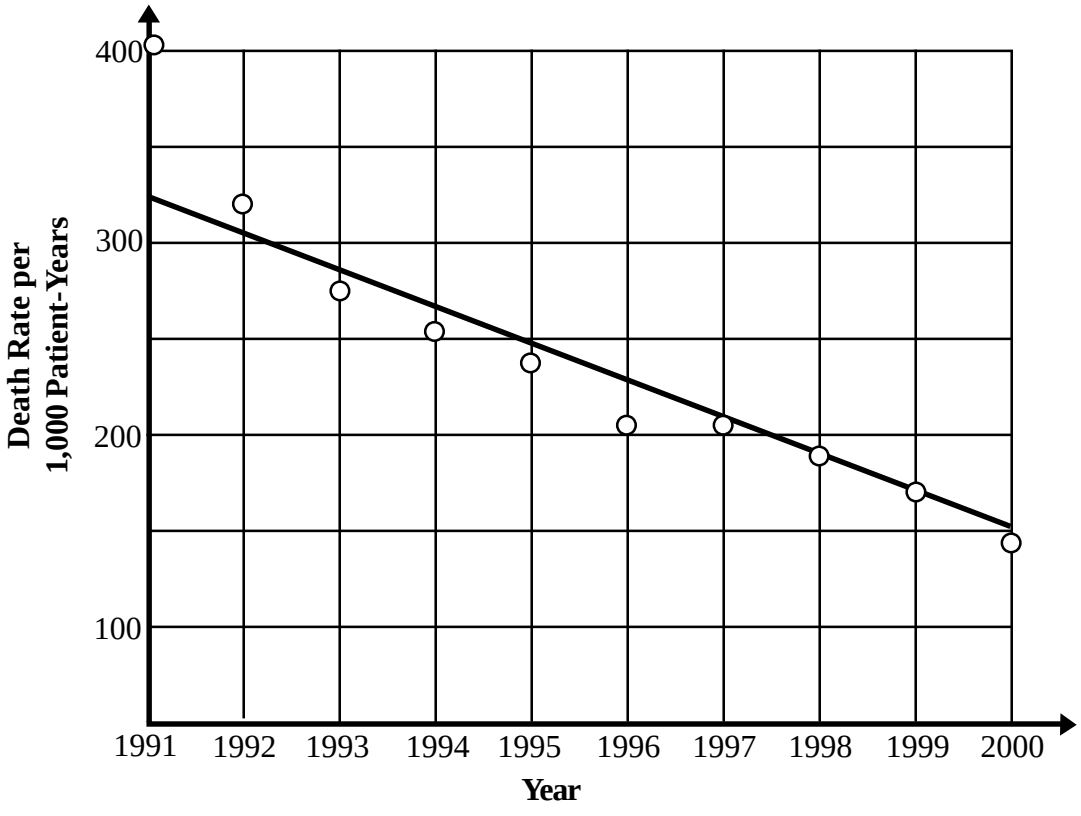
Teacher Table 1

Deaths on the Heart-Transplant Waiting List (1991-2000)

Year	Patients	Patient-Years	Deaths	Death Rate per 1,000 Patient-Years
1991	5,401	1,955	790	404
1992	5,946	2,461	781	317
1993	6,288	2,788	763	274
1994	6,380	2,882	731	254
1995	6,971	3,211	772	240
1996	7,165	3,591	743	207
1997	7,291	3,769	782	207
1998	7,658	4,027	770	191
1999	7,540	4,187	714	171
2000	7,336	4,083	592	145

Data and commentary are from the *2001 Annual Report of the U.S. Organ Procurement and Transplantation Network and the Scientific Registry of Transplant Recipients*, U.S. Department of Health and Human Services, Washington, DC

Teacher Table 2
Annual Death Rate on the Heart-Transplant Waiting List (1991-2000)



3.b *Develop an equation for the best-fit-line using y = mx + b.*

This answer will vary, but the best answer will ignore the first data point and be close to the following:

$$y = -19.2\ x + 318$$

4a. *Use the equation you developed under 3b to predict the death rate in the year 2005. Be sure to use 14 for x in the equation.*

$$y = -19.2 \times 14 + 318$$

$$y = 49.2$$

4b. *Give three reasons why you think the death rate of patients on the heart-transplant waiting list may be falling even though the number of patients on the list is rising.**

A. Doctors may be able to keep alive more patients who are awaiting a transplant.

B. There may be more donor hearts available each year.

C. A combination of the two.

*Accept all reasonable answers.

4c. *Do you think that the death rate will ever fall to zero? Explain.*

It is unlikely that the rate will fall to zero.*

*Accept all reasonable answers.

NOTE: Use of this equation is complicated by the fact that there is no zero point. For it to work, you must create a year scale that begins with zero (1991) and goes up 1 year at a time ending with 9 (2000). This does not affect the *y*-axis.

Student Objective

- Prepare a graph to analyze data.
- Use algebra to analyze heart-transplant waiting-list data.

Background

You need a heart transplant. You have been placed on a waiting list.

There are two ways you will be removed from this list. One is good news, one bad. If you are lucky, a donor will be found, a transplant performed, and you are removed from the list. Now for the bad news. If a donor is not found in time and your condition worsens, you might die. Death while on the waiting list will, of course, remove you from the list.

Every year, patients are added and patients are removed, but the waiting list almost always grows. Does that mean that things are getting worse, or better? As a statistician, it's your job to figure that out.

Procedure

Table 1 provides real data on the number of deaths that have occurred on the heart-transplant waiting list from 1991-2000. The data indicate a rising number of patients on the waiting list and a steady-to-falling number of deaths on the list. This sounds good, but is it? And, if it's good, just how good is it?

As a statistician, you have decided to calculate a new measure that will join together two of the raw measures. You plan to calculate the death rate per 1,000 Patient-Years by using the following equation:

$$\text{Death Rate} = \text{Deaths} \times 1{,}000/\text{Patient-Years}^*$$

For example: In a year when waiting list deaths total 800 and the number of Patient-Years is 2000, what would be the Death Rate per 1,000 Patient-Years?

$$\text{Death Rate} = 800 \times 1{,}000/2{,}000 = 800{,}000/2{,}000 = 400$$

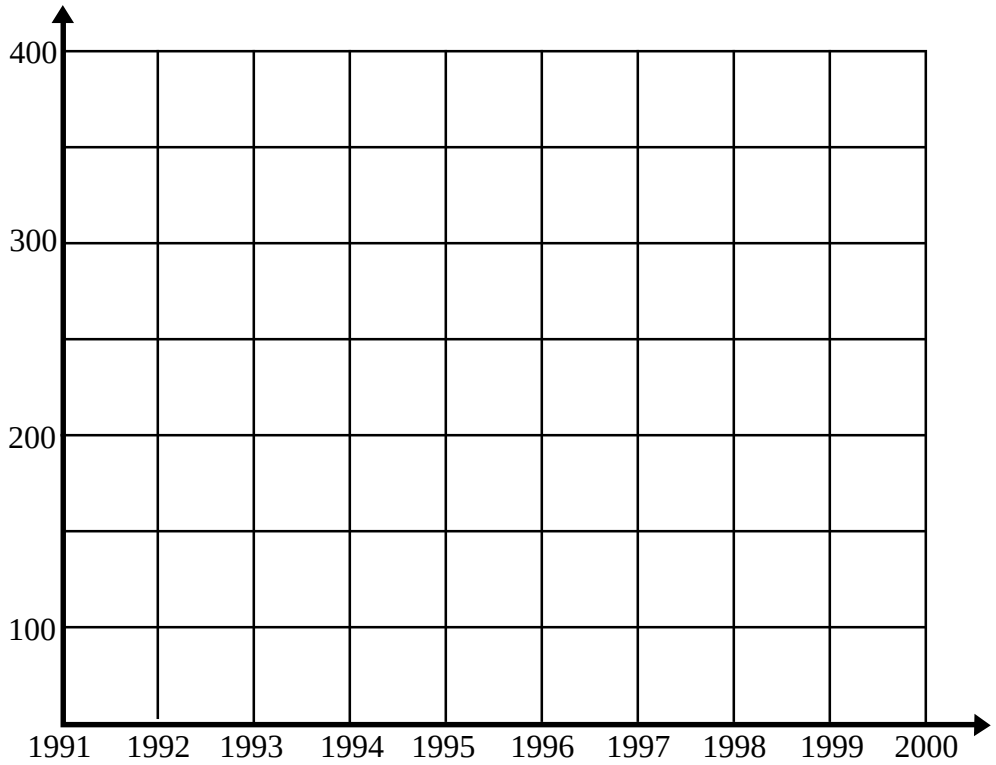
* Patient-Year is a number that reflects the amount of time that each patient actually spent on the waiting list. For example, patient A is on the list for 6 months; patient B is on the list for 3 months; and patient C is on the list for the entire year. Patient A contributes 0.5 Patient-Years to the calculation; patient B contributes 0.25 Patient-Years; and patient C contributes 1 Patient-Year.

1. Complete Table 1 by calculating Death Rate per 1,000 Patient-Years for each year from 1991-2000.

Table 1

Deaths on the Heart Waiting List (1991-2000)				
Year	Patients	Patient-Years	Deaths	Death Rate per 1,000 Patient-Years
1991	5,401	1,955	790	_____
1992	5,946	2,461	781	_____
1993	6,288	2,788	763	_____
1994	6,380	2,882	731	_____
1995	6,971	3,211	772	_____
1996	7,165	3,591	743	_____
1997	7,291	3,769	782	_____
1998	7,658	4,027	770	_____
1999	7,540	4,187	714	_____
2000	7,336	4,083	592	_____

2. Using the data from your completed Table 1, plot the death-rate points on the grid provided for you. Give the completed graph an appropriate title, and label the *x*-axis and *y*-axis.



3. Use your graph to complete the following steps:

a. Place a line-of-best-fit on the graph. (You should ignore any single point that lies far outside the rest of the data.)

b. Develop an equation for the best-fit line using $y = mx + b$.

4. Use the space provided to answer the following questions:

a. Use the equation you developed under 3b to predict the death rate in the year 2005.

b. Give three reasons why you think the death rate of patients on the heart-transplant waiting list may be falling even though the number of patients on the list is rising.

c. Do you think that this death rate will ever fall to zero? Explain.

102 Decision: Donation

Using the Supplementary Materials

This guide includes materials intended to enhance the lesson activities. Most are suitable for use as homework exercises and should be copied as required. Some suggestions as to how they may be used are provided below. These materials are provided as black-line masters.

A Decision to Share—This illustrated story could be used to deliver information in all classes, act as an icebreaker, or provide a starting point for community/service learning activities—such as submitting this illustrated story to the school newspaper or using it as a model for students' own illustrated stories. It is particularly appropriate for ESL students.

Donation Crossword—In addition to being used as homework or as a class activity in a biology or English class, this crossword could serve as a model for students to design their own donation crossword.

Transplantation Timeline—Use as a research project in health, biology, social studies, or English classes. Have students research a medical pioneer or legislative development listed in this timeline.

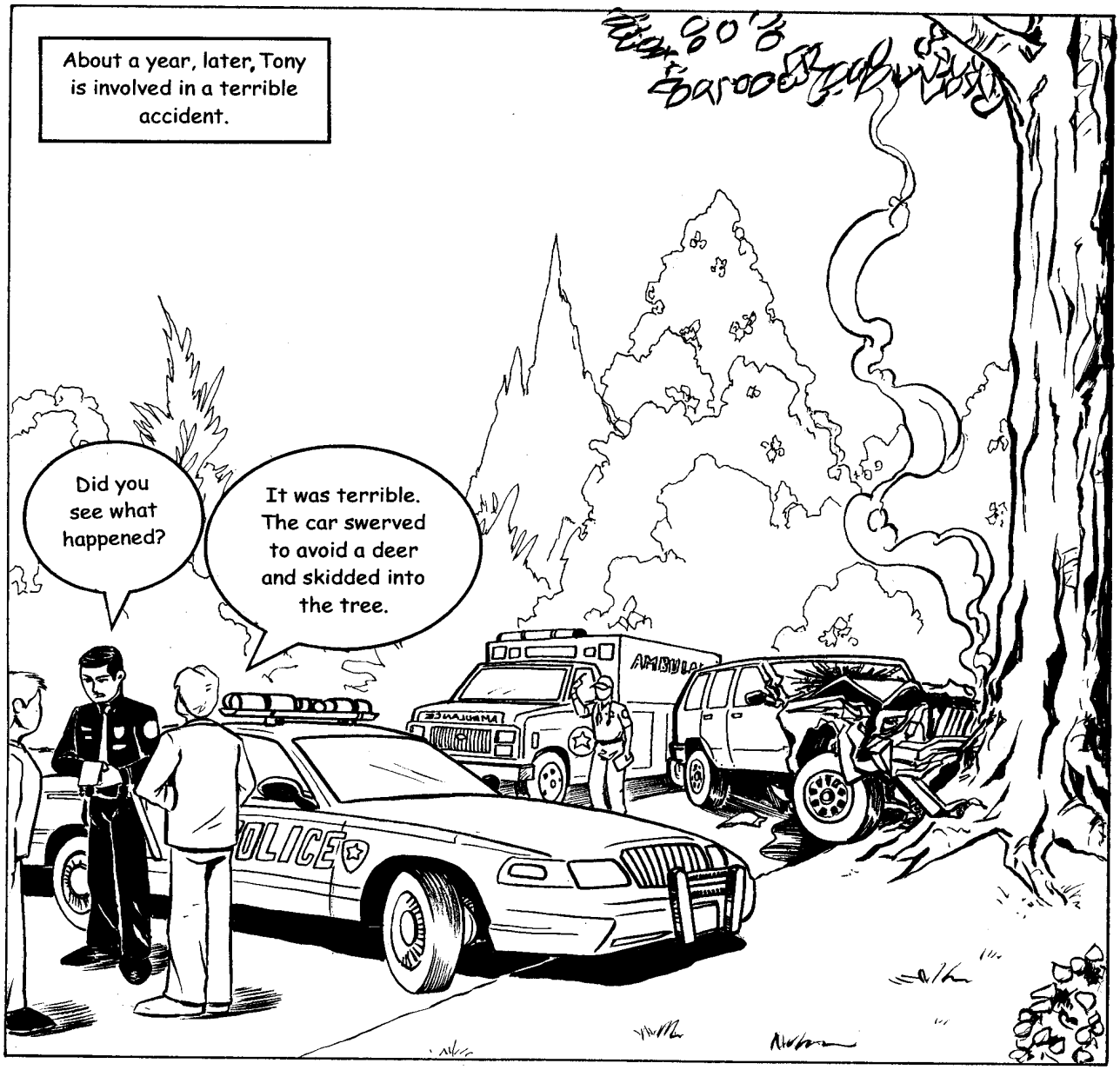
Follow-Up Questions for *Medicine's Modern Miracle* Video—This could be an in-class or homework activity for any class that watches this video.

Careers Associated With Transplantation—This description of potential careers in the field of organ and tissue donation and transplantation could be used as a handout in guidance offices.

Community/Service Learning Activities—These include activities appropriate for students interested in further exploration of the topic of organ and tissue donation, as well as for students who would like to become involved in educating their communities about donation.

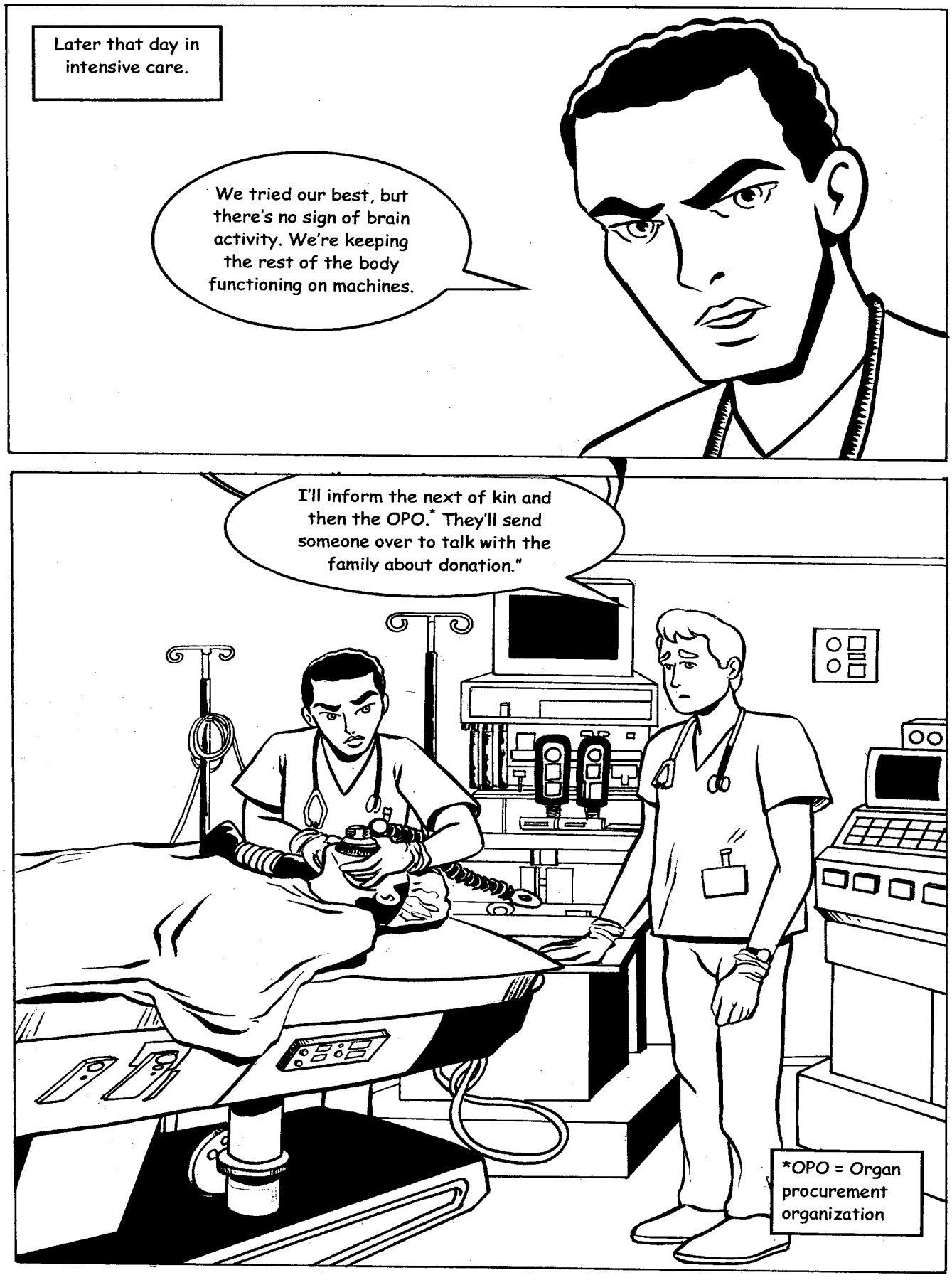
A Decision To Share

Blindwolf Studios


About a year, later, Tony is involved in a terrible accident.
Did you see what happened?
It was terrible. The car swerved to avoid a deer and skidded into the tree.
POLICE
AMBULANCE


It's a bad one! Looks like major head injuries. We'll arrive at ER in 12 minutes.
EMS
AMBULANCE

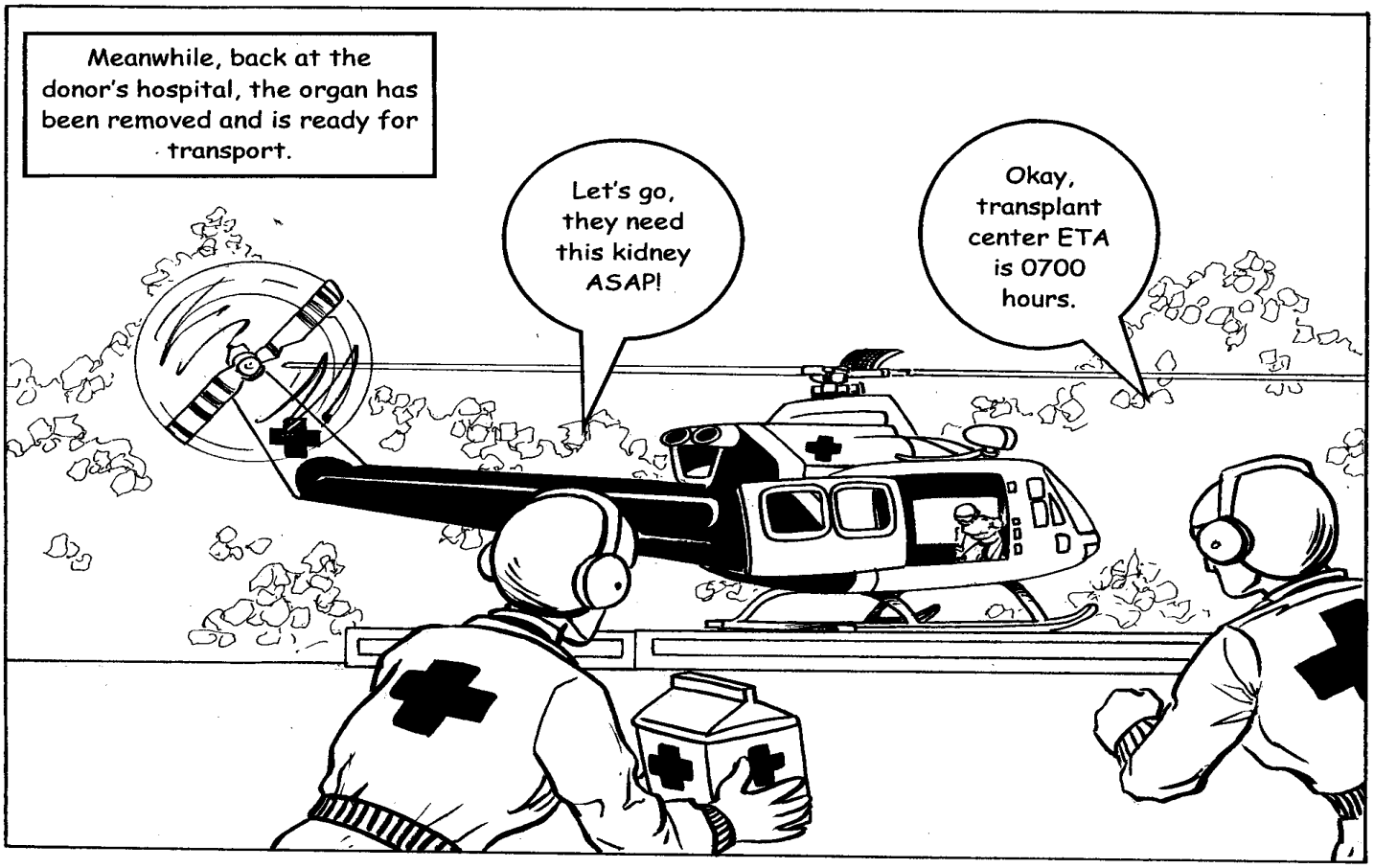
5.1 A Decision to Share

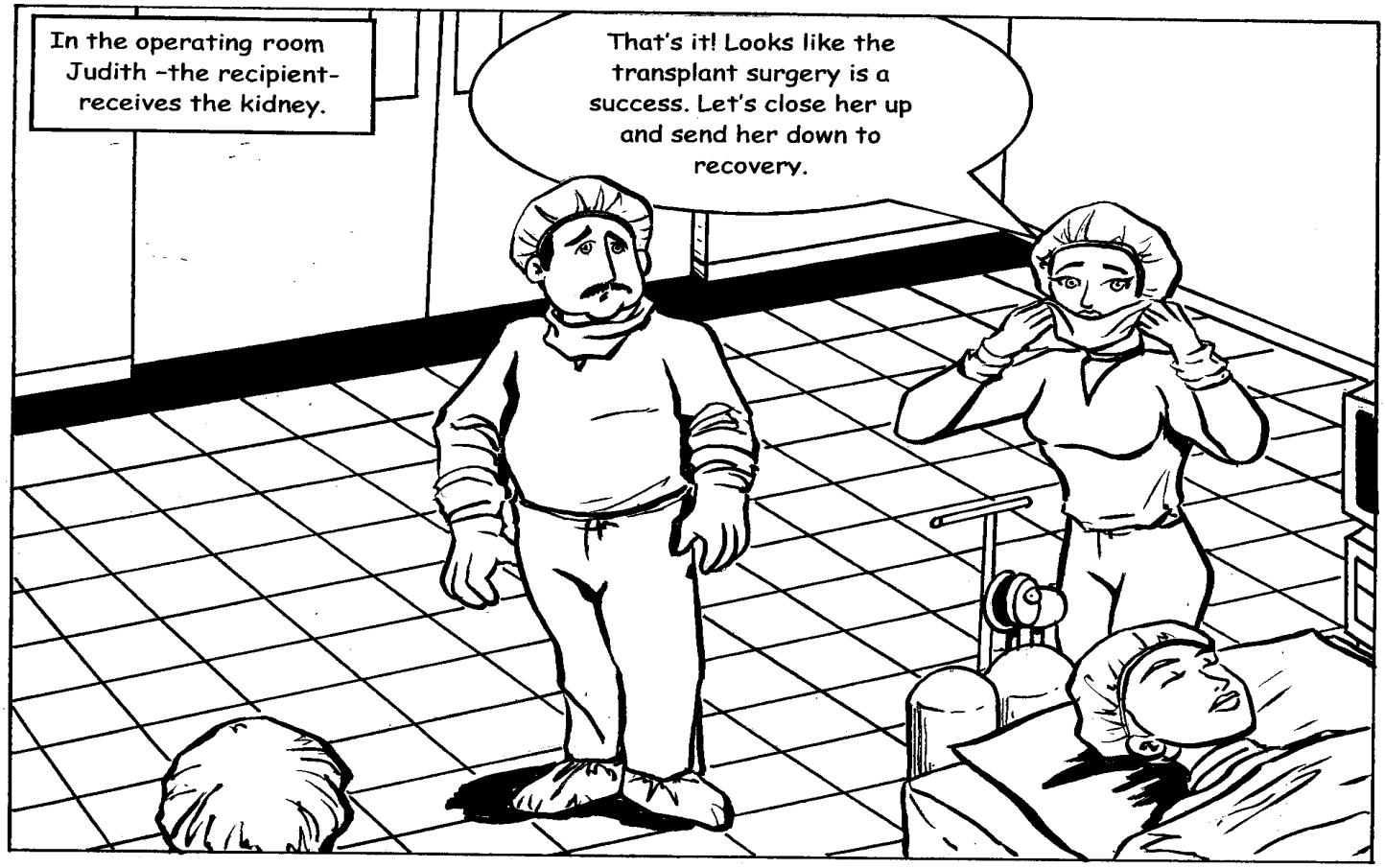


A Decision to Share

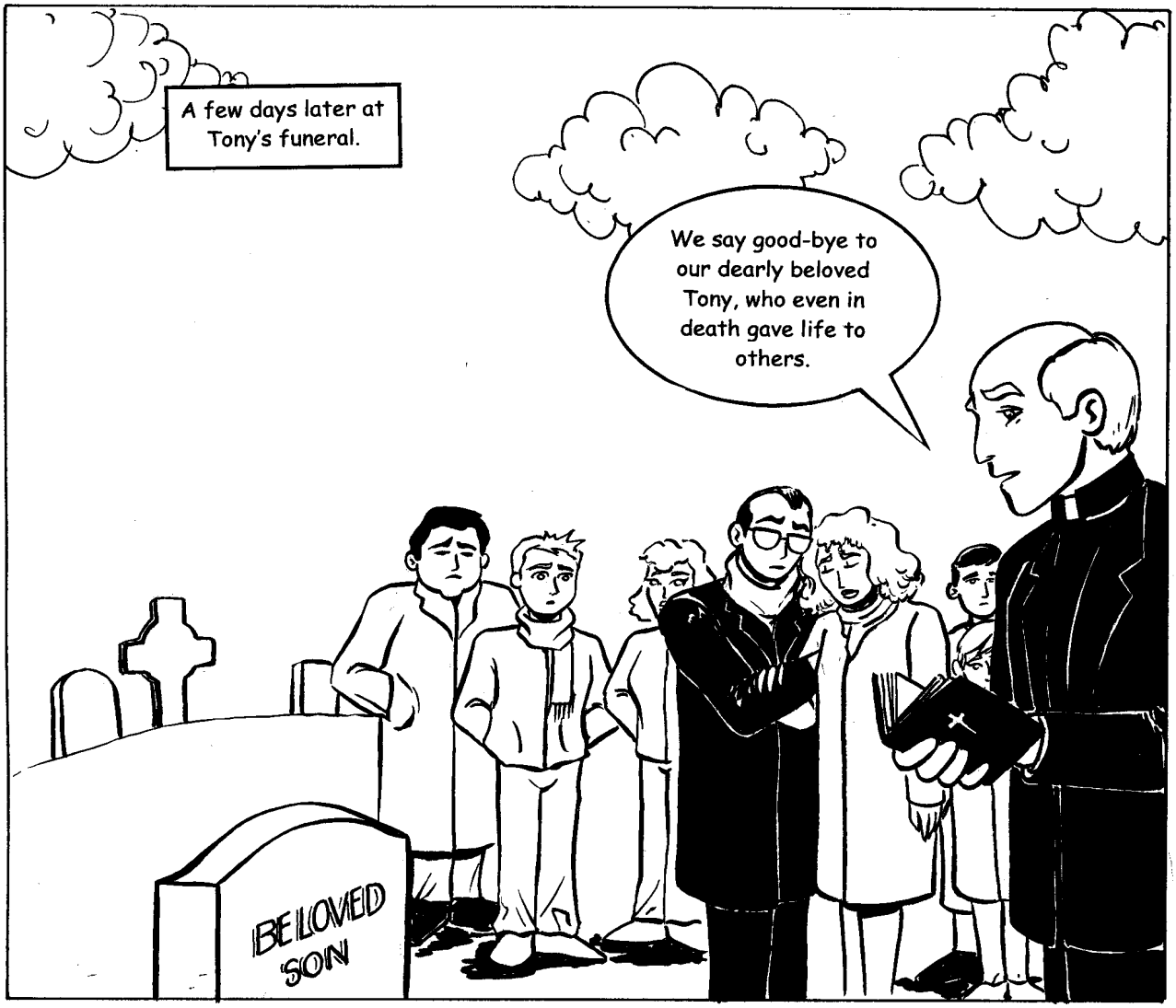
5.1

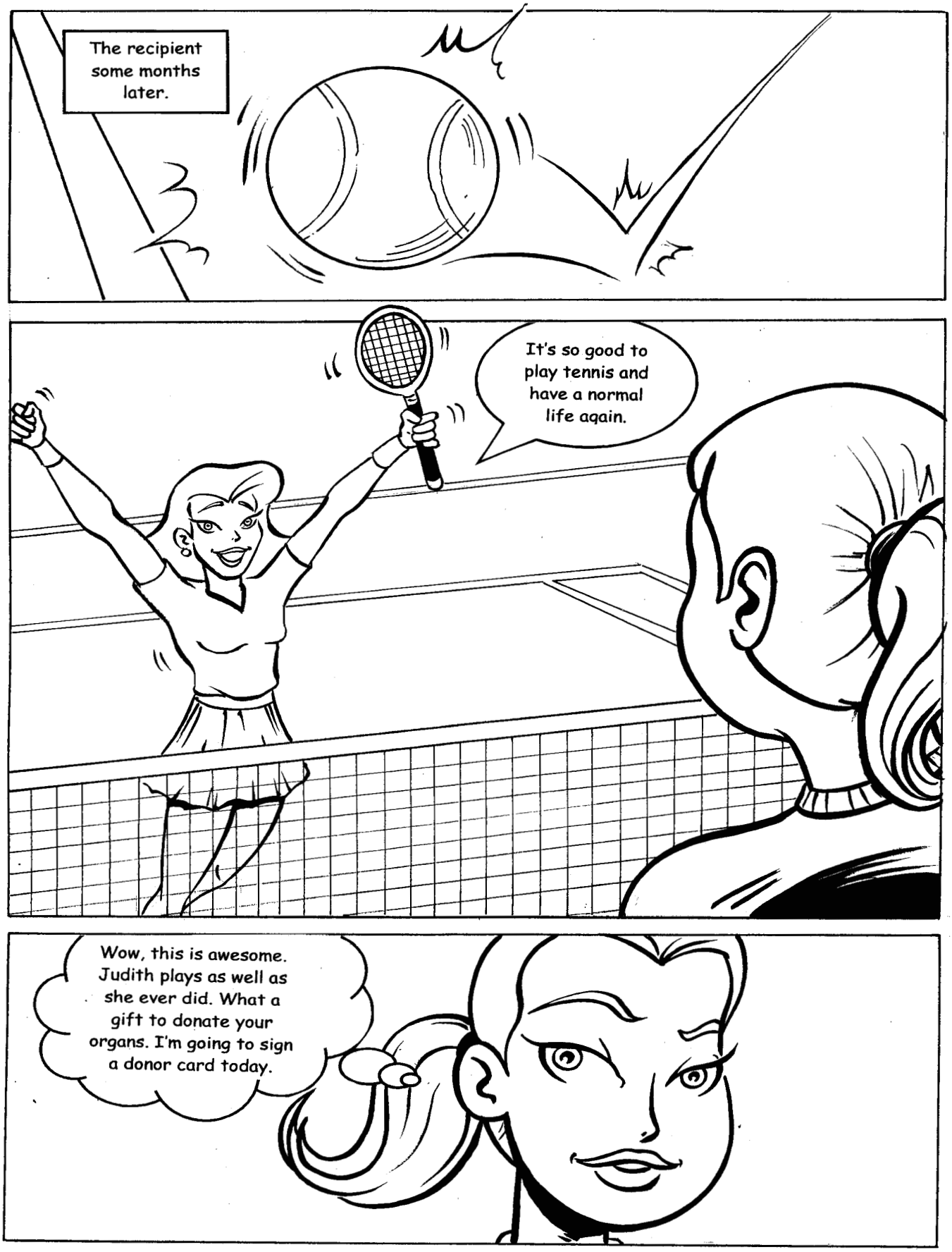
5.1 A Decision to Share


Meanwhile, back at the donor's hospital, the organ has been removed and is ready for transport.
Let's go, they need this kidney ASAP!
Okay, transplant center ETA is 0700 hours.


In the operating room Judith -the recipient- receives the kidney.
That's it! Looks like the transplant surgery is a success. Let's close her up and send her down to recovery.

5.1 A Decision to Share




The recipient some months later.
It's so good to play tennis and have a normal life again.
Wow, this is awesome. Judith plays as well as she ever did. What a gift to donate your organs. I'm going to sign a donor card today.

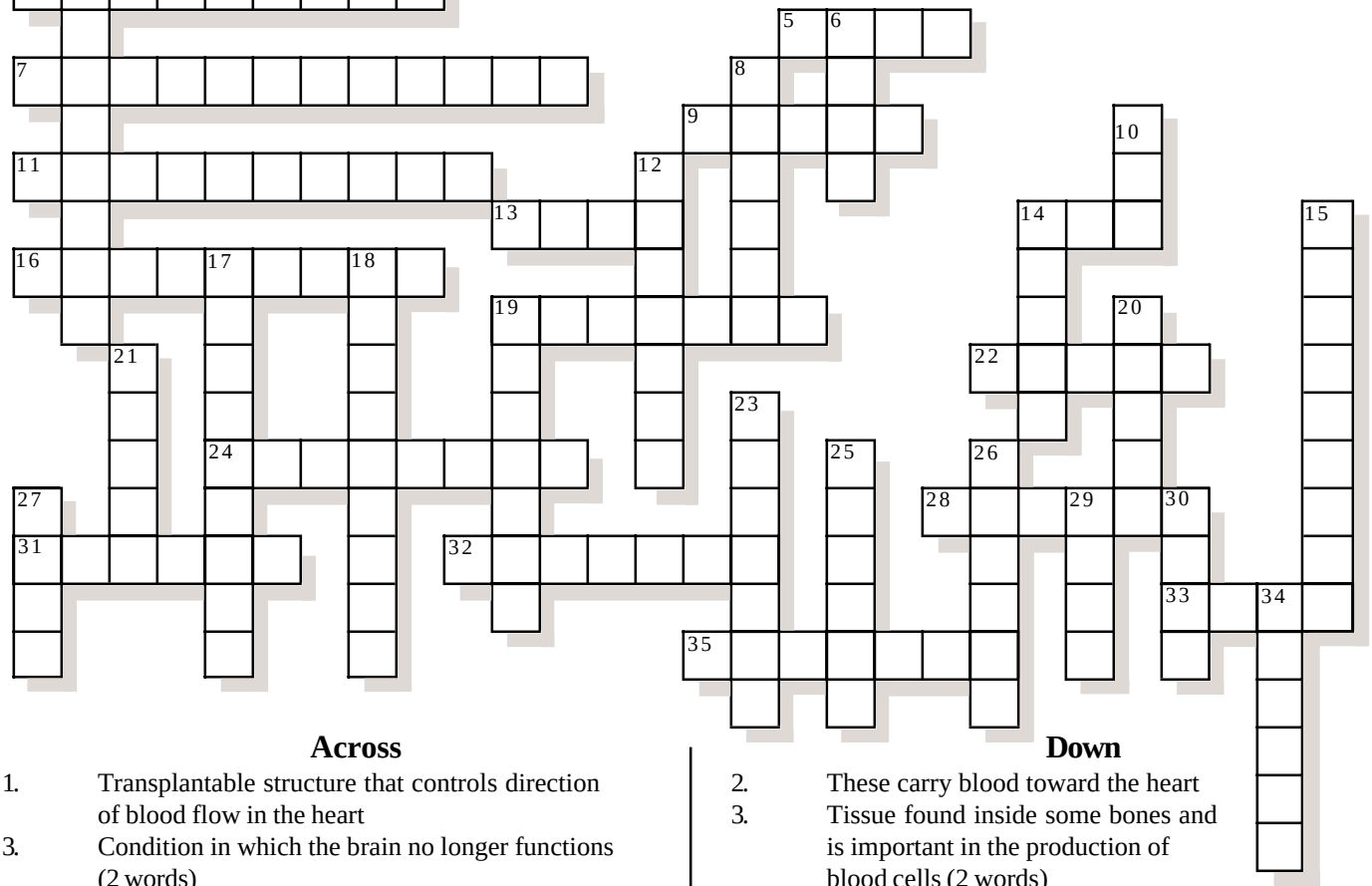
5.1 A Decision to Share

Name:

5.2

Donation Crossword

How much do you know about the process of organ and tissue donation and transplantation? Test your knowledge by trying to complete this crossword.



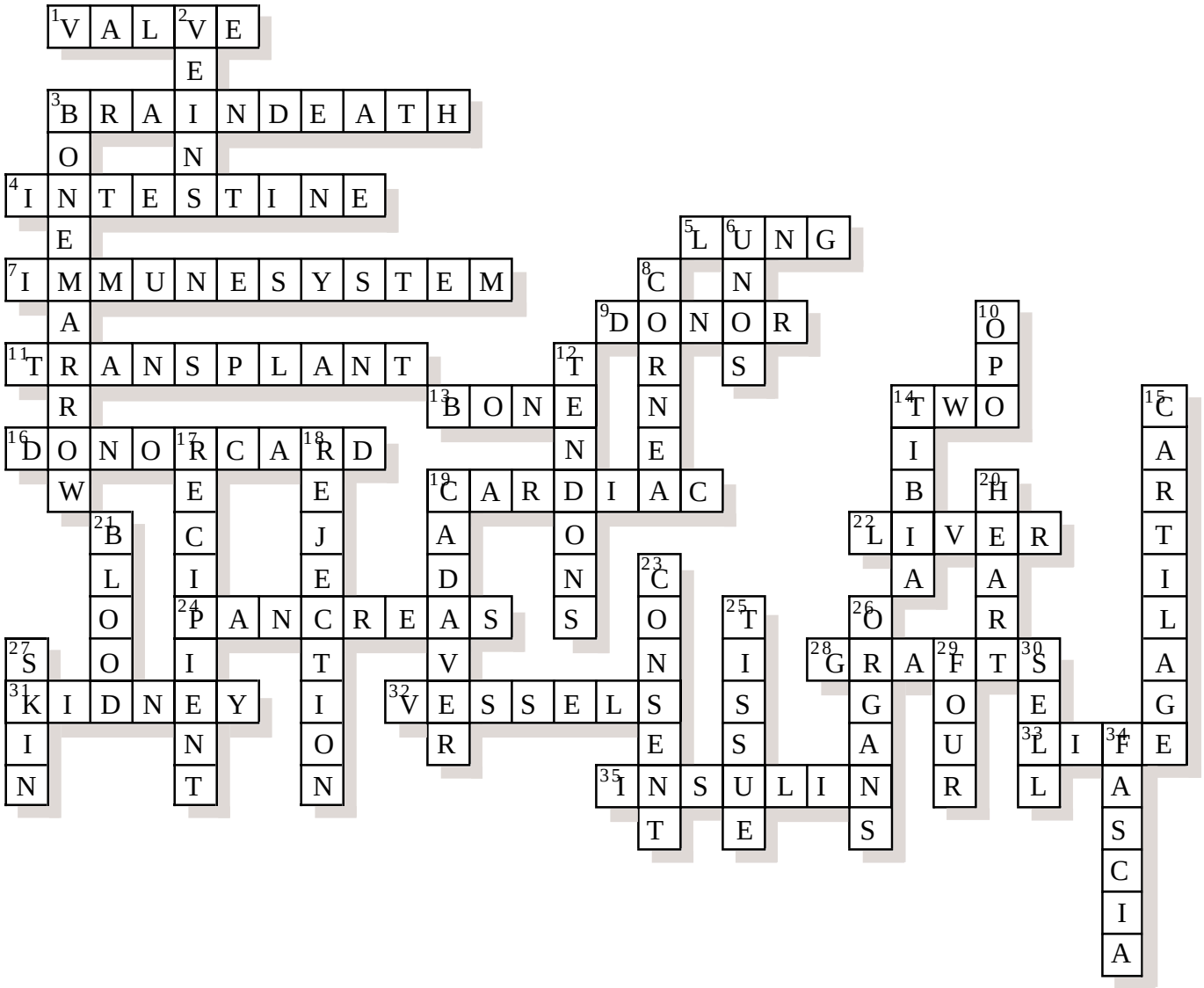
Across

1. Transplantable structure that controls direction of blood flow in the heart
3. Condition in which the brain no longer functions (2 words)
4. Long, narrow tubular part of the digestive tract
5. Organ whose function is gas exchange
7. System that protects the body against disease, and as a result, may cause rejection (2 words)
9. Individual who provides organs for others
11. To transfer an organ from one person to another
13. Main tissue that forms the skeleton
14. We have _____ lungs
16. Card that indicates your desire to become a donor
19. _____ death occurs when there is an absence of heartbeat with no chance of resuscitation
22. Large organ that, in addition to other functions, removes poisons from the blood
24. Organ that secretes a hormone that controls blood sugar level
28. Skin _____ are used to replace the skin of burn victims
31. Organ that produces urine
32. Arteries and veins are examples of blood _____
33. Organ and tissue donation is a gift of _____
35. Hormone that controls blood sugar level

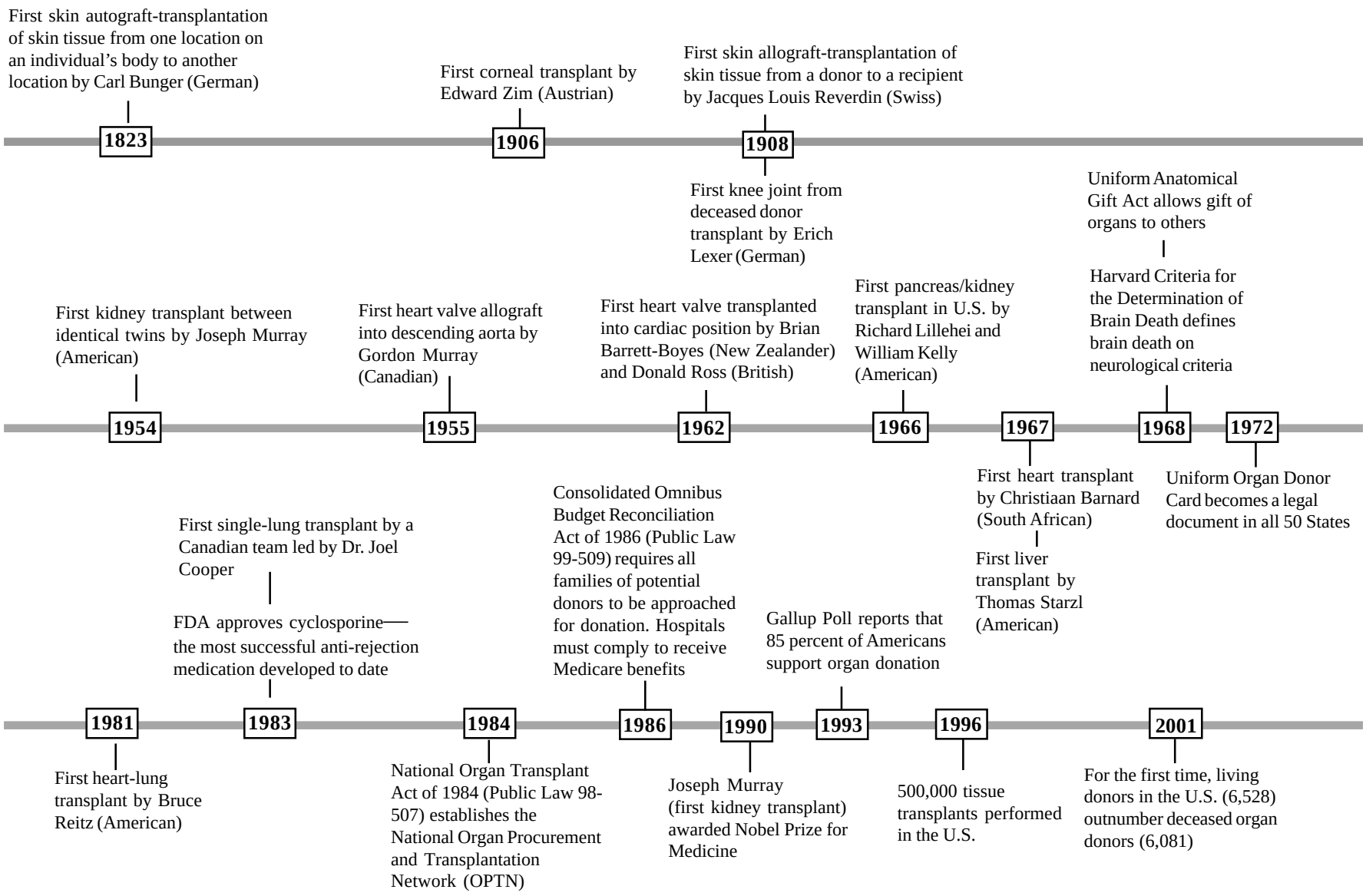
Down

2. These carry blood toward the heart
3. Tissue found inside some bones and is important in the production of blood cells (2 words)
6. United Network for Organ Sharing (Abbrev)
8. Transplantable outer layer of the eyeball
10. Organ Procurement Organization (Abbrev)
12. These connect muscle to bone
14. Transplantable long bone in the lower leg
15. Soft tissue that makes up part of the skeleton; also found in the nose and ears
17. Someone who receives an organ or tissue
18. Process by which the body's immune system recognizes and destroys transplanted organs or tissues
19. Another name for a dead body
20. Organ that pumps blood
21. Tissue that carries nutrients, oxygen, and waste products
23. What family is asked for before organs are removed from the body of a deceased loved one
25. Group of similar cells performing the same function
26. The heart, the brain, and the liver are examples of _____
27. Tissue that covers the body
29. Number of chambers in the human heart
30. It is illegal to _____ organs
34. Fibrous tissue that covers muscles

5.2 Donation Crossword Answer Key



Transplantation Timeline



5.4 Follow-up Questions for *Medicine's Modern Miracle* Video

Q. Name one thing that can cause a healthy organ to fail.

Q. What must match between a donor and recipient before a transplant is even considered?

Q. Why do some people who need organ transplants die before they get the organ they need?

Q. How long do most people wait for an organ?

Q. What percent of organs are rejected?

Q. Why do rejections occur?

Q. Can rejection be prevented?

Q. Name the organs that can be transplanted.

Q. Name the tissues that can be transplanted.

Q. Why is organ freshness important?

Q. Whose organs cannot be donated?

Q. What is brain death?

Q. How many people are on the waiting list?

Teacher's Guide for *Medicine's Modern Miracle* Questions

5.4

In addition to the post-video discussion, consider providing students who have watched *Medicine's Modern Miracle* video these follow-up questions, which closely track the content of the video.

NOTE: Do not treat these questions as a quiz. The goal is for the class to work together to come up with as many correct answers as they can and for you to provide the remaining answers.

Q. Name one thing that can cause a healthy organ to fail.
A. Infection

Q. What must match between a donor and recipient before a transplant is even considered?
A. Size and blood type

Q. Why do some people who need organ transplants die before they get the organ they need?
A. There are not enough donors.

Q. How long do most people wait for an organ?
A. The average wait is 1 year.

Q. What percent of organs are rejected?
A. In one third to 40 percent of all transplants, the organ causes a rejection response.

Q. Why do rejections occur?
A. There is not a good match between the donor and recipient.

Q. Can rejection be prevented?
A. Yes, with immunosuppressive drugs

Q. Name the organs that can be transplanted.
A. Heart, kidney, liver, lungs, pancreas, and small intestine

Q. Name the tissues that can be transplanted.
A. Bone, cornea, blood vessels, and skin

Q. Why is organ freshness important?
A. Without oxygen an organ's cells begin to die. The sooner they are transplanted the better. (Some organs must be transplanted more quickly than others: heart – 4 hours, lungs – 4 hours, liver – 15 hours, pancreas – 24 hours, kidney – 48 hours.)

Q. Whose organs cannot be donated?
A. Organs from people with active cancers, HIV, or a system-wide infection cannot be transplanted.

Q. What is brain death?
A. When the brain no longer functions and will never function again.

Q. How many people are on the waiting list?
A. Thousands of people are on the waiting list to receive transplants.*

*As of early-2004, the number of people on the waiting list for donated organs was nearly 84,000. Students can find the current number by going to www.organdonor.gov.

5.5 Careers Associated With Transplantation

The field of organ and tissue donation and transplantation offers many potential career paths. Students who pursue a career in organ and tissue transplantation will enter one of the most challenging and rapidly changing areas of medicine. These young people can make a significant contribution to the future of organ transplantation. The following is a brief description of the roles different careers play in organ 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 help 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.
Nurses	Nurses assist physicians in treating organ transplant recipients and donors, and assist in surgery during organ and tissue removal 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.
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 diseases 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.
Radiologists	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.
Transplant Coordinators	Transplant coordinators—a vital link in the transplantation and donation 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.
Transplant Surgeons	Transplant surgeons specialize in the transplantation of particular organs. They also remove organs from donors.

Community/Service Learning Activities

5.6

The following activities can be used as extension activities and to provide opportunities for community outreach:

Humanities, Life Sciences

- Research and write an article for your school or local paper about someone in your community whose life was saved by receiving an organ or tissue transplant or about a family that made the decision to donate a loved one's organs.
- Research for a local health fair how the process of tissue and organ donation is handled in other countries. Compare these with practices in the U.S. and comment on the advantages and disadvantages of the different approaches.
- Rent a video of a recent film that includes organ donation as part of its theme. Write a movie review for your school newspaper reporting on the points in the film that were accurate and those that were not accurate. Examples of recent films include *John Q* with Denzel Washington and *Blood Work* with Clint Eastwood.
- Conduct research to find an organ recipient in your area or someone waiting for a transplant. Interview that person and report on what you learned. Consider videotaping the interview for your local cable access station.

Computer and Graphic Arts

- Design an advertising campaign to encourage students at your school to sign up to be organ and tissue donors. For example, make "Wanted" posters.
- Design a PowerPoint presentation about organ donation to be shown at a meeting of your school's PTA.
- Use your computer to design a poster for your school health office about transplantable organs and tissues. Include at least four organs and two types of tissue. You may follow the link at www.organdonor.gov to the organ and tissue illustrations in this guide and download some of these images to use for your poster.
- Sponsor a contest at your school to see who can use a computer to design the most creative donor card. Get local merchants to pledge gifts for the winners.

Community Outreach

- Organize and staff a booth at local fairs, festivals, or school events to encourage people in your community to become organ and tissue donors. To obtain donor cards and other materials contact the Division of Transplantation, Health Resources and Services Administration, at 301-443-7577 or visit www.organdonor.gov.
- Make presentations on the topic of organ and tissue donation to youth groups—for example, school clubs, scout groups, and church groups.
- Urge your parents to visit www.organdonor.gov to find out about the *Workplace Partnership for Life* program and how they can participate.
- Use the Website www.transweb.org/reference/maps/opo_image_map/alphalist.htm or www.organdonor.gov/opo.htm to find contact information for your local organ procurement organization. Call and ask them how you can volunteer to help with their donation promotion campaigns.
- Get your principal's permission to have your student government sponsor an assembly about organ donation at your school. Solicit speakers for the assembly— for example, someone whose deceased loved one's organs were donated or someone who received a donated organ—and ask them to talk about how these events changed their lives.

The Performing and Graphic Arts

- Write lyrics about a transplantable organ and sing them to the tune of a well-known song of your choosing.
- Using the illustrated story—A Decision to Share—provided with this unit as a model, hold a contest in your school for the best cartoon or comic strip that encourages teenagers to become organ and tissue donors.

120 Decision: Donation

Web Activities and Resources

VI.

For more information on organ and tissue donation and transplantation, visit **www.organdonor.gov**. This Website, sponsored by the U.S. Department of Health and Human Services, offers a wealth of additional resources and links including downloadable materials and activities associated with this guide. Some of the following on-line resources found at this site are interactive and will provide your students with a stimulating way to learn more about organ and tissue donation and transplantation:

- Materials in this guide in PDF format.
- Interactive student tutorial for learning more about organ and tissue donation.
- Interactive versions of the organ illustrations, crossword, and true/false quiz included in this guide.
- Transplantation Timeline: An interactive version of the timeline, which allows students to click on a particular year or event to learn more about the medical advances in the field of donation and transplantation.
- A Decision to Share: A PDF version of the illustrated story about the impact of a teenager's decision to be an organ donor.
- Links that enable teachers and students to access their local OPO to learn how people in their local area can designate themselves as an organ and tissue donor.
- Links to other Websites particularly useful to teachers and students who want to learn more about organ and tissue donation and transplantation.

Appendix A. National Education Standards

EDUCATIONAL STANDARDS	ACTIVITY TITLE	Core Lesson	Biology Lesson	English Lesson	Social Studies Lesson	Mathematics Lesson	Donation Crossword	A Decision to Share	Transplantation Timeline	Community/Service Learning
Health	Comprehend Health Concepts	X	X	X	X	X	X	X	X	X
	Access Health Information									
	Practice Health-Enhancing Behaviors									
	Analyze Influences on Health	X			X	X			X	
	Enhance Health Through Interpersonal Communication			X						X
	Goal-Setting and Decision Making Skills	X								
	Advocate for Personal, Family, and Community Health	X		X						X
English	Standard 1									
	Standard 2									
	Standard 3									
	Standard 4	X		X						
	Standard 5			X						
	Standard 6									
	Standard 7			X						
	Standard 8	X		X						
	Standard 9									
	Standard 10									
	Standard 11									
	Standard 12	X		X						
Science	Unifying Concepts and Processes									
	Science as Inquiry									
	Physical Science									
	Life Science	X	X	X		X	X			
	Earth and Space Science									
	Science and Technology	X		X			X			
	Science in Personal and Social Perspectives	X	X	X	X	X		X		
	History and Nature of Science	X		X					X	
Mathematics	Numbers and Operations									
	Algebra					X				
	Geometry									
	Measurement									
	Data Analysis and Probability					X				
	Problem Solving									
	Reasoning and Proof					X				
	Communication									
	Connections									
	Representations									
Social Studies	Culture									
	Time, Continuity, and Change								X	
	People, Places, and Environments								X	
	Individual Development and Identity									
	Individuals, Groups, and Institutions	X			X				X	
	Power, Authority, and Governance				X				X	
	Production, Distribution, and Consumption				X					
	Science, Technology, and Society				X				X	
	Global Connections								X	
	Civic Ideals and Practices				X					

The following subject-specific national standards relevant to the curriculum materials can be found at the following sites:

Health: www.aahperd.org/aahe/pdf-files/standards.pdf
English: www.ncte.org/standards/standards.shtml
Science: www.nap.edu/html/nses/html
Mathematics: www.standards.nctm.org
Social Studies: www.socialstudies.org/standards

No Greater Love (1 hour)

This documentary film was funded by U.S. Department of Health and Human Services (HHS). Narrated by Angela Lansbury and featuring HHS Secretary Tommy G. Thompson, it was originally broadcast by PBS stations around the country. The film has been described by Wisconsin Public Television as focusing on "the healing that may come through the act of donation. The goal is to encourage families to discuss the issue of donation, as well as make their wishes known to their loved ones. . . .[The video] follows several families, health care providers and recipients to weave together an emotional and dramatic depiction of organ donation and transplantation in action." Also available is a 15-minute version. (3-minute version is included with the videos provided as part of this guide.)

For information on how to obtain this video, call the Division of Transplantation, Health Resources and Services Administration of the U.S. Department of Health and Human Services at 301-443-7577.

Share Your Life. Share Your Decision (16 minutes)

This video was developed by the Gift of Hope Organ & Tissue Donor Network—an organ procurement organization (OPO) working with hospitals and donor families in northern Illinois and northwest Indiana. The Gift of Hope describes this as a "video [that] dramatizes the need for organ donation and illustrates the need for students to make an educated decision about becoming donors. Real teenagers share their opinions, their fears, and their questions about donation." (This video is included as part of this guide.)

For information on how to obtain this video, contact Gift of Hope at 888/307-DON8 or www.giftofhope.org.

Medicine's Modern Miracle (23 minutes)

Developed by OneLegacy, A Transplant Donor Network, *Medicine's Modern Miracle* relates the life stories of several people who have had successful transplants and also provides the perspective of donor families. This video offers slightly more technical information appropriate for students either currently studying, or with some knowledge of, biology. Medical and scientific information is delivered primarily by a pair of doctors who are identical twins. They use their twin status to explain some of the issues related to transplantation and rejection. (This video is included as part of this guide.)

For information on how to obtain this video, contact OneLegacy, A Transplant Donor Network at www.onelegacy.org.

Pass it On—I and II

These videos were developed by the Lisa Landry Childress Foundation.

Pass It On—I (12 minutes)

This award-winning video features the late legendary Dallas Cowboys Coach Tom Landry, father of Lisa Landry Childress, an organ recipient, and was developed specifically for children ages 9 -12. A storyline of sports teams and replacement players is used to present information about organ and tissue donation, as well as health and wellness, in a way that is nonthreatening and kid-friendly. A "spokeskid" narrates the video in a classroom setting that incorporates Lisa's story as well as those of two other organ donors.

Pass It On II (10 minutes)

This video was developed as a tool to reach teenagers preparing to drive—a time when the question of whether to be an organ and tissue donation is often raised. People waiting for organs, recipients, donor families—teenagers and adults—share their stories and dispel myths. Fast-paced and contemporary in its "look," the video, nevertheless, presents accurate and straightforward information on this important topic so viewers can make an informed decision about donation.

For information on how to obtain either of these videos, contact the Lisa Landry Childress Foundation at 1-888-221-LISA (5472) or at www.passitonforlife.org.

Christopher (28 minutes)

Christopher is an award-winning short documentary produced by a Fort Wayne, Indiana, TV station—WANE TV 15—with the cooperation of the Indiana Organ Procurement Organization (IOPO). Filmed mostly in a hospital setting, the video follows a mother and father as they make the decision to donate their young son Christopher's organs after he was killed in an accident. From their arrival at the hospital to meeting some of the organ recipients their son helped to save, the video shares how the family has embraced Christopher's life, death, and gifts to become ambassadors for organ donation. This widely-distributed video allows viewers to experience first hand the emotional aspects of the donation process, as well as learn about some of the medical and technical aspects of donation.

For information on how to obtain this video, contact the Indiana Organ Procurement Organization at www. iopo.org or 888-275-4676.

VII. C. Appendix C. On-line Resources

The U.S. Department of Health and Human Services is helping to ease the critical shortage of organ, tissue, marrow, and blood donors through the Gift of Life Donation Initiative. The Department sponsors a Website devoted to donation and transplantation: **www.organdonor.gov**. Your local organ procurement organization (OPO) is another excellent source of information about organ and tissue donation. Many OPO Websites provide easily accessible information for your students. To locate your local OPO and other OPOs visit www.organdonor.gov/opo.htm.

The following Websites also provide information that can help you and your students in learning more about donation and transplantation. **Please note: The addresses of these links may change over time.**

Sites of General Interest

American Medical Association
www.ama-assn.org/ama/pub/category/1945.html
Contains general information about organ and tissue donation.

Association of Organ Procurement Organizations (AOPO)
www.aopo.org
Provides information on OPOs and the role they play in the organ donation and transplantation process.

Coalition on Donation
www.shareyourlife.org
Provides general information about organ and tissue donation. Home page has an article about Chris Klug, a liver recipient who won an Olympic medal for snowboarding.

Life Link
www.organ.redcross.org.au
Organ donation Website sponsored by the Australian Red Cross.

Living Organ Donor.org
www.livingorgandonor.org
Dedicated to providing the most current information for people considering being a living donor of a solid organ—such as a kidney or a lobe of a liver or lung.

National Donor Family Council (NDFC)
http://www.kidney.org/recips/donor/
Contains information and resources for families of donors.

National Minority Organ Tissue Transplant Education Program (MOTTEP)
www.nationalmottep.org
Comprehensive information about minority health issues relating to donation and transplantation.

National Transplant Assistance Fund
www.transplantfund.org/donation.html
Organization committed to educating the public about the critical need for organ donation.

The Nicholas Effect—A Boy's Gift to the World
www.nicolasgreen.org
Story about a young boy who was kidnapped and killed while on vacation with his family in Italy. His parents unselfishly donated his organs to seven Italians, an act which had a major positive impact on Italy's donation rates. Web site explores the ramifications of the family's generosity.

NOVA Online
www.pbs.org/wgbh/nova/eheart/transplant.html
A Public Broadcasting Service Website that employs a virtual operating theatre to allow one to conduct a greatly simplified heart transplant operation. Provides an idea of what's involved in making a donor heart work in a recipient.

Scientific Registry of Transplant Recipients (SRTR)
www.ustransplant.org
Provides extensive data on donation and transplantation.

Second Wind
www.2ndwind.org
A Website containing information on transplantation.

Surgery Door
www.surgerydoor.co.uk/level2/body/organ_donation_majortransplantprocs.shtml
Explains major transplant medical procedures.

Transplant Week
www.transplantweek.org
Aims to have the latest news about transplantation.

TransWeb
www.transweb.org
This comprehensive Website sponsored by a nonprofit educational project provides valuable information about organ and tissue donation, as well as links to other valuable Websites. Of particular interest is a video called *Give Life: The Transplant Journey,* which is a trip through the donation process as a donor's family might see it.

United Network for Organ Sharing (UNOS)
www.unos.org
Provides up-to-date news of developments in transplantation, information on the number of patients on waiting lists, and extensive background material on organ donation and transplantation.

Web Sites Associated With Organ and Tissue Donation and Transplantation
www.argonet.co.uk/body/lnks.html
Provides a comprehensive list of known sources of support and information about organ donation and transplantation at different levels of interest.

Sites Devoted to Specific Organs, Tissues, Marrow, and Blood

American Association of Blood Banks (AABB)
www.aabb.org
Site provides extensive information on blood and blood donation.

American Association of Tissue Banks
www.aatb.org
Contains extensive information on tissue donation and transplantation.

America's Blood Centers (ABC)
www.americasblood.org
Site for international network of local nonprofit blood centers. Contains easily accessible information about blood.

American Red Cross
www.redcross.org
Red Cross is the largest supplier of blood, plasma, and tissue products in the U.S. and provides 20 percent of the nation's tissues for transplant. Site provides extensive information on becoming a blood or tissue donor.

Eye Bank Association of America (EBAA)
www.restoresight.org
Site of organization of eye banks dedicated to the restoration of sight through the promotion of eye banking.

The Foundation for Cardiovascular and Transplant Research
www.giftoftheheart.net/GIFTOFTHEHEART/default.asp.18.html
An organ donation Website with specific information about the heart.

International Society for Heart and Lung Transplantation
www.ishlt.org
A Website which provides data pertaining to heart, lung, and heart-lung transplantation as well as links to a large number of informational websites.

The Marrow Foundation
www.themarrowfoundation.org
Dedicated to increasing the size and diversity of the National Registry of unrelated marrow donors.

National Heart, Lung, and Blood Institute, National Institutes of Health, U.S. Department of Health and Human Services
www.nhlbi.nih.gov/health/public/ heart/other/hrt_lung.htm
Provides both current news and background information on heart and heart-lung transplants.

National Institute of Allergy and Infectious Diseases
www.niaid.nih.gov/publications/transplant.htm
Site of the The Division of Allergy, Immunology, and Transplantation (DAIT) focuses on the immune system as it functions in the maintenance of health and as it malfunctions in the production of disease.

National Institute of Diabetes and Digestive and Kidney Diseases
http://kidney.niddk.nih.gov/kudisease/pubs/transplant/index.htm
Site within the National Kidney and Urologic Diseases Information Clearinghouse that provides an in-depth explanation of the causes of kidney disease and an overview of the kidney transplantation process.

National Kidney Foundation (NKF)
www.kidney.org
Site of organization dedicated to preventing kidney and urinary tract diseases, improving the health and well-being of individuals and families affected by these diseases, and increasing the availability of all organs for transplantation.

National Marrow Donor Program (NMDP)
www.nmdp.org
This site provides general information on how to become a volunteer donor, answers the most frequently asked questions, and provides information on diseases treatable by marrow or blood stem cell transplantation.

A Patient's Guide to Liver Transplant Surgery
www.livertransplant.org/patientguide/donationfactors.html
Provides extensive information on liver transplant surgery.

VIII. Glossary

Arteries – Vessels that carry blood away from the heart.

Bone Marrow – Substance in the bone cavity that is important in the production of red and white blood cells.

Brain death – Total cessation of brain function, including brain stem function. There is no oxygen or blood flow to the brain and the brain no longer functions in any manner and will never function again.

Cadaveric organ – An organ removed from a deceased person and used to replace a diseased or failed organ in a recipient. It is possible for a single deceased donor to save or help many people.

Cardiac death – Absence of heart beat with no chance for resuscitation.

Coma – Any state of unconsciousness, whether permanent or temporary. Not the same as brain death.

Cornea – Transparent covering of the eye.

Cyclosporine – Immunosuppressive drug that helps prevent organ rejection.

Dialysis – Process that removes toxic materials from the blood and maintains the fluid and salt balance of the body.

Donor – A person who gives organs or tissues for transplantation.

Donor card – A card indicating one's desire to be an organ or tissue donor.

Donor registry – A database of individuals who have designated themselves as organ and tissue donors, which can be accessed when a death occurs to determine the deceased's donation wishes.

End-stage renal disease – Occurs when the kidneys are no longer able to function at a level that is necessary for day-to-day life.

First person consent – Term often popularly used to describe laws that provide that when a person dies having indicated a decision to be a donor through specified methods, OPOs must honor the donor's intentions and family consent is not necessary prior to donation.

Heart – Organ that circulates blood to the body's cells.

Immunosuppressive drug – Chemical agent that suppresses the body's tendency to reject foreign elements.

Insulin – Hormone produced by the pancreas; regulates glucose metabolism.

Kidneys – Organs responsible for removing toxic substances from the blood and maintaining fluid and salt balance.

Life-enhancing – Enhances the recipient's overall health and life; refers to tissues and organs.

Glossary

Liver – Organ responsible for the conversion of nutrients into usable substances.

Living donor – A living person who donates a kidney, or part of an organ, to another person. This could be a friend or relative of the recipient or a donor who wishes to remain anonymous.

Lungs – Organs responsible for gas exchange.

NOTA – The National Organ Transplant Act of 1984 outlawed the sale of human organs and tissues, and initiated the development of a national system for organ sharing.

OPO – Organ procurement organization, a Federally designated nonprofit organization responsible for coordinating organ donation and educating the public about donation in a specific geographical area.

OPTN – Organ Procurement and Transplantation Network, the national computer network that matches donated organs with recipients. OPTN's purpose is to promote, facilitate, and scientifically advance organ procurement and transplantation on a national scale.

Organ procurement coordinator – Typically a registered nurse with critical care experience. The coordinator is responsible for maintaining the donor, assisting with organ recovery, and coordinating placement of organs for transplant.

Pancreas – Organ that secretes digestive enzymes as well as insulin for blood sugar metabolism.

Recipient – A person who receives an organ or tissue transplant.

Rejection – Process by which the body's immune system recognizes a transplanted tissue or organ as foreign and tries to destroy it.

Scientific Registry of Transplant Recipients – A database of post-transplant information administered by a not-for-profit health research organization. The database supports the ongoing evaluation of advances in transplant surgery techniques and organ preservation, improvements in matching donor organs with recipients, and developments in immunosuppressive therapies in order to reduce the size of the waiting list and to improve transplant outcomes.

Tendons – Strong, nonelastic bands of tissue that connect muscle to bone.

Tissue – A general term for transplantable parts of the body other than organs; includes bones, tendons, ligaments, corneas, heart valves, skin, veins, and some nerves.

Tissue typing – The laboratory procedure to determine the HLA or genetic makeup of an organ donor.

Transplantation – Transfer of an organ or tissue from one person's body into another person's body to replace a diseased or failed organ or tissue.

Veins – Vessels that carry blood back to the heart from the body or lungs.

Waiting list – A national computerized list of patients who are waiting for organ transplants.