

**Activity 4.4.1 Replacement Parts**

Introduction

In this activity, you will explore the possible future interventions for patients in organ failure. These potential interventions include *xenotransplantation*, the transplantation of living tissues or organs from one species to another; and *tissue engineering*, the replacement of damaged organs or tissues with engineered organs or tissues created in the laboratory. You will investigate how these technologies work and then construct an argument from the perspective of different stakeholders regarding whether or not further research for these interventions should be banned.

Procedure

1. Work with a partner to brainstorm answers to the following questions. Take notes.

* Which organs or tissues in the human body can normally heal or regenerate?
* Which organs or tissues can be damaged beyond repair?
* How does modern medicine treat missing, damaged, or failing organs?
* What parts of the human body can be replaced?
* Where do replacement tissues or organs come from?

1. Use the following websites to explore the history of transplants as well as the various tissues and organs within the human body that can be transplanted. Take notes in your laboratory journal.

* CBSNews.com – Transplant History <http://www.cbsnews.com/htdocs/transplants/framesource_time.html>
* The Gift of a Lifetime – The Interactive Body: Organs and tissue for transplant <http://www.organtransplants.org/understanding/interactivebody/index.html>

1. Compare what you learned in the websites above to what you brainstormed in step 1.
2. Answer Conclusion questions 1 - 3.
3. Note that you and a partner will be assigned one of the patient scenarios below.

Patient One – Xenotransplantation:

Patient One is a 24-year-old female with Type One Diabetes. She is interested in an islets of Langerhans transplant from a pig.

Patient Two – Tissue Engineering:

Patient Two is a 57-year-old male with cirrhosis of the liver. He is interested in receiving a liver transplant grown using tissue engineering.

1. Read through your assigned patient scenario with your partner. Investigate the technology presented in your assigned patient scenario using the corresponding websites below as well as other reliable sources. Take notes in your laboratory journal.

* Xenotransplantation:
* Secrets of the Sequence Video Series – Xenografts: Alternative Transplants. Click on the *Videos* button in the upper right portion of the screen and type in Xenografts into the *Keywords* search box. <http://www.sosq.vcu.edu/videos.aspx>
* Frontline – Organ Farm <http://www.pbs.org/wgbh/pages/frontline/shows/organfarm/>
* CBS Interactive Inc. - Interactive: Organ Transplants <http://www.cbsnews.com/htdocs/transplants/framesource_pig.html>
* Pig Parts For People? – Times article <http://www.time.com/time/printout/0,8816,1001610,00.html>
* Tissue Engineering:
* Secrets of the Sequence Video Series – Tissue Engineering: Building Body Parts. Type *Tissue Engineering* into the *Keywords* search box. <http://www.sosq.vcu.edu/videos.aspx>
* The Science of Growing Body Parts – Times article <http://www.time.com/time/printout/0,8816,1679115,00.html>
* Doctors Grow Organs From Patient’s Own Cells – CNN.com <http://www.cnn.com/2006/HEALTH/conditions/04/03/engineered.organs/index.html>
* Could We Clone Our Organs to be Used in a Transplant – HowStuffWorks.com <http://science.howstuffworks.com/genetic-science/cloned-organ-transplant.htm>

1. Create a graphic organizer in your laboratory journal that includes the information found below.

* How does this technology work?
* What are the potential risks of using this technology?
* What are the potential benefits of using this technology?
* What are the challenges of this technology?
* What are the ethical or moral concerns of using this technology?

1. Fill in the graphic organizer using the notes from your investigation of your assigned technology.
2. Imagine that politicians are arguing over whether or not there should be a legal ban making research for your assigned technology illegal.
3. Answer Conclusion questions 4 and 5.
4. Write a one to two paragraph letter to your local politician from the perspective of a patient in organ failure arguing for or against the ban.
5. Write a one to two paragraph letter to your local politician from the perspective of a biomedical professional arguing for or against the ban.
6. Form a group containing two other students who were assigned the other patient scenario.
7. Present your graphic organizer and letters to your group.
8. Take notes in your laboratory journal as your new group members present their graphic organizers and letters for their assigned technology.
9. Answer the remaining Conclusion questions.
10. Extension: Investigate other cutting-edge transplants, such as face transplants and artificial skin transplants, found at the following websites.

* ‘Facing’ the future of transplants – NBC News <http://www.msnbc.msn.com/Default.aspx?id=3969001&p1=0>
* Artifical Skin Grafts – How Stuff Works <http://health.howstuffworks.com/skin-care/information/anatomy/skin-graft5.htm>

4.4.1 Replacement Parts Conclusion Questions

1. How did your brainstorming compare to the actual number of available replacement tissues or organs?
2. How has organ transplantation changed in the last century?
3. Why has organ transplantation changed so drastically in the last fifty years?
4. List at least three arguments for banning research for your assigned technology.
5. List at least three arguments in favor of further research for your assigned technology.
6. How do you think Diana Jones’ treatment would change if she was diagnosed with ESRD and needed a kidney transplant in the year 2025?
7. Think back to what you learned about cloning technology in Unit 2. How might reproductive or therapeutic cloning help in finding compatible donor organs?