

Medicine: *Discussion Guide*

Overview

From the earliest days of human civilization, people have tried to treat and prevent disease. However, the past two centuries have been watershed years in our understanding of the human body and how it functions. Help your students explore some of medicine's most innovative practitioners and their inventions.

Students begin by examining Edward Jenner's development of the first vaccine. They then explore chronic kidney disease and the invention of dialysis. Next, an array of innovations in treating cardiovascular disease demonstrates how far cardiac medicine has progressed in the past 50 years. The guide ends with a look at how anesthesia, operating room sterilization, and other advances dramatically increased the safety of surgery.

Classroom Activities

1. Show the "The Road to Vaccines: Edward Jenner" segment of the *History of Medicine: Innovations in Obstetrics and Pediatrics* program.
 - **Discussion:** Ask students whether they were surprised to learn that Jenner tested his vaccine on an eight-year-old boy. Would they have been willing to participate in such an experiment? Why or why not?
 - **Science Investigation:** In the video, students learn that in 1967 the World Health Organization (WHO) launched a campaign to vaccinate every person in the world against smallpox. At the time the campaign began, the disease affected 15 million people a year. By 1980, the WHO declared smallpox eradicated. Have students work in small groups to learn more about this disease, including its symptoms, how it spreads, and the potential threat it poses as an agent of bioterrorism. Then have them summarize their findings in a script for a public service announcement that could be aired during a smallpox outbreak.
 - **Web Exploration:** Have students visit the Jenner Museum to learn more about the man who called himself the "vaccine clerk to the world."
 - <http://www.jennermuseum.com/>

2. Show the “Safer Surgery” segment from the *History of Medicine: Innovations in Reproductive Health* program. (Access to *unitedstreaming* is required.)
 - **Pre-Viewing Discussion:** Have any of the students or members of their family had surgery? What risks did they face?
 - **Post-Viewing Discussion:** After watching the video clip, ask students the following questions: Besides making the experience much more bearable for the patient, what are some other advantages of using anesthesia in surgery? (*Answers may include that working on a still patient makes the operation easier for doctors and that it allows them to work with more precision.*) Were you surprised to learn about the unhygienic conditions of early surgery? Why? What two inventions dramatically lowered the risk of infection in surgery patients? (*Sterilization of the operating room and instruments and the invention of rubber gloves both lowered the risk of infection.*)
 - **Science Investigation:** Working individually or in small groups, have students learn more about modern anesthesia and its four categories: general anesthesia, regional anesthesia, local anesthesia, and sedation. Have them create a chart that compares the four categories and their uses and risks. The following Web sites are good starting points for their research:
 - <http://health.howstuffworks.com/anesthesia1.htm>
 - <http://www.mayoclinic.com/health/anesthesia/SC00026>
3. Show the “Machines and Medicine” segment from the *History of Medicine: Innovations in Adult Care* program. (Access to *unitedstreaming* is required.)
 - **Pre-Viewing Discussion:** Ask students to write answers to the following questions: How have machines improved health care? How important are your kidneys? What functions do they perform? Have students add to and revise their answers as they watch the video clip.
 - **Post-Viewing Discussion:** How do kidneys help the body? (*They filter toxic substances out of the blood so they can be eliminated in the urine.*) What is dialysis? (*In this common treatment for kidney disease, the patient is connected to a machine that serves as an artificial kidney, filtering toxic substances from the blood.*) What basic condition is necessary for a kidney transplant? (*The tissues of the donor and receiver must be compatible.*) How is compatibility determined? (*By a blood test*)
 - **Science Investigation:** Working individually or in small groups, have students learn more about chronic kidney disease, including its causes, risk factors, symptoms, and treatment options. Then challenge them to present their findings to the class in a brief and creative presentation. The following Web sites are good starting points for their research:

- <http://www.kidney.org/kidneydisease/>
 - <http://science.howstuffworks.com/kidney1.htm>
 - http://kidshealth.org/kid/body/kidneys_noSW.html
4. Show the “The Heart: Fixing the Pump” segment from the *History of Medicine: Innovations in Elder Care* program. (Access to *unitedstreaming* is required.)
- **Discussion:** How did Forssmann’s cardiac catheter revolutionize cardiovascular medicine? (His probe allowed doctors to examine coronary veins and arteries from outside the body, without surgery, and determine whether they are clogged or covered with plaque deposits, and whether the patient is at risk of suffering a heart attack.) What function does the heart-lung bypass machine serve? (*It allows the patient’s heart and lungs to be stopped during open-heart surgery.*)
 - **Science Investigation:** Have students use the Internet or your school library to learn more about the second generation of artificial hearts, the AbioCor Implantable Replacement Heart. Then have them write a paragraph in which they explain whether or not they’d be willing to undergo surgery to receive an AbioCor heart and their reasons why.
 - **Web Exploration:** Have students visit the Franklin Institute’s The Heart Preview Gallery to learn more about the heart’s development and structure.
 - <http://www.fi.edu/biosci/preview/heartpreview.html>

Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL’s Content Knowledge: A Compendium of Standards and Benchmarks for K–12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following national standards:

- Nature of Science: Understands the nature of scientific knowledge; Understands the nature of scientific inquiry; Understands the scientific enterprise
- Technology: Understands the relationships among science, technology, society, and the individual; Understands the nature of technological design
- Language Arts: Viewing: Uses viewing skills and strategies to understand and interpret visual media

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site: <http://books.nap.edu/html/nses/html/overview.html#content>.



This discussion guide addresses the following national standards:

- History and Nature of Science: Science as a human endeavor; Nature of scientific knowledge; Historical perspectives
- Science and Technology: Abilities of technological design; Understandings about science and technology
- Science in Personal and Social Perspectives: Science and technology in local, national, and global challenges