

Searching For a Substitute

- **Why is there an interest in substitute heart transplants?**
(Each year, there are over 45,000 people in need of heart transplants compared to fewer than 3,000 available donors. As a result, the medical industry has looked for an alternative means to meet this troubling demand, like artificial and animal heart transplantation.)
- **When was the first attempt at finding a substitute heart? What happened?**
(The National Heart Institute sponsored the development of an artificial heart that was first transplanted in 1969. The device and its large apparatus kept the man alive for over two days, but a variety of controversies left the public view of this “inhuman” breakthrough as “more monstrous than miraculous.”)
- **Twenty years later, how was Barney Clark’s experience any different?**
(Clark’s artificial pump transplant was permanent and kept him alive for 112 days, despite suffering continual infections and strokes.)
- **Why do you think the government and public remained averse to artificial hearts after Clark’s death?**
(Accept all reasonable answers. A general view might be that the public had yet to warm up to the idea of mechanical devices inside the human body, particularly if they impede mobility and cause other serious complications. It seems that prolonging life this way would not necessarily be worth this painful, unnatural, and expensive effort.)
- **What is the life expectancy of donated human heart transplant patients today?**
(86 percent of patients who receive a donor heart survive for at least one year after the procedure. More than 70 percent of patients live at least four years.)
- **What are LVADs? Why are they important? Remarkable?**
(Briefly, LVADs are mechanical devices that are “designed to assist, not replace, weakened hearts” as patients wait for donors. As they prolong life, evidence also has shown that the restful break they induce helps to “cure” heart disease in some patients. These remarkable findings may ultimately provide a bridge to recovery for millions.)
- **What kinds of roles is modern science playing in the realm of substitute heart transplantation?**
(Scientists from various areas, including NASA, continue to work toward developing more efficient artificial heart devices. Other scientists are working toward adapting and genetically “designing” and manipulating animal organs for transplantation.)
- **What sorts of complications or issues have surfaced from the use of primate and pig organ transplants?**
(Issues and complications range from transmission of viruses to man’s creation of human-compatible animal organ “farms.” Both can pose a threat to the public and involve humankind’s further control and manipulation of animal species.)

Amazing Heart Facts

- **What kinds of things did you learn from the Amazing Heart Facts reading?**
(Accept all answers based on the reading.)
- **Which facts did you find most interesting or enlightening? Why?**
(Accept all responses and encourage students to elaborate on their feelings and views.)
- **What is the first step in how the heart moves blood? Second? Third? Etc.**
(Follow the highlighted, six-step blood flow process listed on the Map of the Human Heart page. Let six students take turns mapping out the process.)
- **What are the benefits of knowing these facts about the heart and how it works?**
(Accept all agreeable answers.)

Treating a Sick Heart

- **What is the primary function of the heart?**
(It is to pump blood to all parts of the body, bringing nutrients and oxygen to the tissues and removing waste products.)
- **What determines the rate at which the heart beats?**
(In short, heartbeats are directly proportional with the level of activity of a person; more blood is needed when a person is exercising than when he or she is at rest.)
- **What is meant by “heart failure”?**
(It means that a heart is “not working as efficiently” as it could. It doesn’t necessarily mean that it has failed and that a person has died.)
- **What are the causes of heart disease?**
(The most common is coronary heart disease. Others include drug and alcohol abuse, heart valve abnormalities, and heart muscle disease.)
- **How is heart disease treated?**
(Prevention is considered the best treatment. Prevention includes a good diet, regular exercise, regular medical checkups, limiting alcohol use, and avoiding the use of tobacco or illegal substances. A variety of prescription drugs have also been developed to strengthen heart functionality. Surgery and heart transplantation are also used to remedy serious heart conditions.)

Operation Heart Transplant

- **How did your operations go? What did you think?**
- **What was your impression of the level of medicine, science, and technology involved in the operation?**
- **If you could, would you observe or take part in such an operation in real life? Why or why not?**
- **Which of the steps or instruments did you find most interesting? Challenging? Troubling? Why?**
- **What would be your reaction if your patient died?**
- **How did performing this operation affect how you feel about heart transplantation or the use of artificial, animal substitutes for human hearts?**

(Accept all responses and encourage students to support their feelings and views.)