Cloning—Lesson Plan

Student Objectives

- Understand the role of democratic decision making in accommodating human dignity and freedom of thought in the areas of science, medicine, and public health.
- Learn the issues raised by genetic cloning and the scientific and public policy terms used to discuss this area of science.
- Explore the tensions between the protection of human dignity and the alleviation of human suffering raised in the discussion of therapeutic cloning of human cells.
- Analyze the reasons supporting and opposing therapeutic cloning of human cells.
- Identify areas of agreement and disagreement with other students.
- Decide, individually and as a group, whether the government should permit therapeutic cloning of human cells; support decisions based on evidence and sound reasoning.
- Reflect on the value of deliberation when deciding issues in a democracy.

Question for Deliberation

Should our democracy permit therapeutic cloning of human cells?

Materials

- Lesson Procedures
- Handout 1—Deliberation Guide
- Handout 2—Deliberation Summary
- Handout 3—Student Reflection on Deliberation
- Reading
- Selected Resources
- Deliberation Question with Arguments
  (optional—use if students have difficulty extracting the arguments or time is limited)

Cloning—Reading

In 1996, scientists in Scotland created Dolly, a sheep who was an identical genetic copy of her mother. Since that time, scientists in other parts of the world have produced genetic duplicates of such animals as a cow, a mouse, a cat, a dog, a horse, a pig, and even a ferret. This process, called ***cloning***, has led to increased interest and concern by governments and ordinary persons. Officials and citizens around the world are discussing the uses of human cells in medical research and the prospect of reproducing people through cloning.

Kinds of Cloning

Cloning is different from other forms of assisted reproduction, such as artificial insemination or *in vitro* fertilization. In assisted reproduction, the sperm of a male donor is brought together with the egg of a female donor, just like in natural reproduction. Cloning, by contrast, involves transferring the genetic material from the nucleus of one adult cell of an organism and placing it into an egg whose genetic material has been removed. After receiving a careful burst of electricity, the egg begins to divide into an embryo as if sperm had fertilized it.

Regarding human cloning, scientists and policymakers generally make a distinction between ***reproductive*** and ***therapeutic*** cloning. While the same techniques are used in the initial stages of both processes (German National Ethics Council, 2004), they quickly differ in important ways (Committee on Science, Engineering, and Public Policy, 2002).

Reproductive cloning, the process used to create Dolly the sheep, involves implanting an embryo into a female's uterus. If the implantation is successful, the embryo grows and is born

just like any other baby. The result, like Dr. Evil's "Mini-Me" in the *Austin Powers* movies or the master composers in the Russian opera *Rosenthal's Children*, is a genetic copy of the donor.

Therapeutic cloning does not implant an embryo into a uterus. Instead, therapeutic cloning focuses on stem cells and how they develop. These cells are very versatile: all the specialized cells of the body—bone, blood, nerves, muscles, skin—develop from stem cells. Despite this versatility, stem cells "do not themselves have the capacity to form a fetus or a newborn animal" (COSEPUP, 2002). Some researchers use therapeutic cloning to understand genetic defects. They also use therapeutic cloning to learn how to renew cells or tissues in people who suffer from degenerative diseases or crippling injuries. Other scientists pursue therapeutic cloning because they believe that stem cell research, like other frontiers in science, will lead to unexpected discoveries.

Cell Sources for Cloning

Currently, surplus embryos donated by parents undergoing *in vitro* fertilization are used as a source for stem cells. Fertility clinics routinely discard these unused embryos. When researchers receive embryos from a fertility lab, the embryos are only a few days old but are alive and growing. The embryos are still in the blastocyst stage. That means they are a hollow ball of 64 to 200 cells in two layers. The researchers remove the stem cells—the inner layer of cells—to grow them in the lab. The outer layer of cells—which would have grown into the placenta, the means for nutrients to pass to a growing fetus—is discarded.

The Debate over Cloning

No country today supports the reproductive cloning of humans. Since the creation of Dolly, individual countries and the international community have worked to ban the cloning of humans to produce children. A 1998 United Nations General Assembly declaration stated that "Practices

which are contrary to human dignity, such as reproductive cloning of human beings, shall not be permitted" (Universal Declaration on the Human Genome and Human Rights).

Yet the declaration also said "Freedom of research, which is necessary for the progress of knowledge, is part of freedom of thought. The applications of research, including applications in biology, genetics and medicine, concerning the human genome, shall seek to offer relief from suffering and improve the health of individuals and humankind as a whole" (Article 12). This balance of interests—the preservation of human dignity and the relief of human suffering—exposes the fundamental fault line dividing those who see promise and value in therapeutic cloning and those who seek a total ban on all forms of cloning.

Cloning in a Democratic Society: Who Decides?

Another key question in the cloning discussion is who has the authority to decide. Many countries have created advisory committees of scientists, ethicists, and medical experts to help them understand cloning. Yet most governments keep the power to decide for themselves. Not surprisingly, different democracies have made different choices. The German National Ethics Council, for example, recommended in 2004 that the country maintain its 1990 Embryo Protection Law. This law bans all forms of cloning. This decision was made even though a majority of the council's members were in favor of allowing therapeutic research. In 2006, the Australian parliament overturned a ban on therapeutic cloning, and a five-year ban in Russia is due for reconsideration in 2007. The United States has restricted federal funding for therapeutic cloning since 2001, limiting research to a narrow group of government-approved stem cells. Research funded by private and state sources continues at U.S. research institutes and universities, however.

Cloning Human Cells: Supporters and Opponents

Supporters of cloning argue that careless use of the term *cloning* has confused the public at the cost of good science. Reproductive cloning places an altered human cell in a female's uterus. In contrast, therapeutic cloning takes place in a laboratory and cannot lead to a human being. The clear differences in technique between therapeutic and reproductive cloning and the international consensus against reproductive cloning mean there is little danger of a "slippery slope" leading from cloning that can cure to cloning that is universally condemned.

Supporters agree that the technology of cloning must be regulated. By legislating procedures and safeguards, society can determine what kind of cloning is acceptable and what kind is not. Reproductive cloning can be identified, isolated, criminalized, and, when necessary, punished without limiting therapeutic cloning.

While acknowledging concerns about human experimentation, supporters of therapeutic cloning note that the "embryos" used in research are really tiny blastocysts of undifferentiated stem cells. These blastocysts would be thrown away or destroyed by fertility clinics and medical facilities. Through therapeutic cloning, these cells can be saved and used to advance human life.

Supporters argue that therapeutic cloning holds great promise to alleviate human suffering and advance human knowledge. "Obtaining cells and tissues through therapeutic cloning gives a great hope to a number of incurably ill patients," says Professor Eva Syklová, director of the Institute of Experimental Medicine of the Academy of Sciences in Prague. This research will be guided by reason and by democratic principles: results will be subjected to scientific peer review, and scientific work will proceed only with the knowledge and consent of society.

Opponents of human cloning argue that the "different" processes of therapeutic and reproductive cloning are both based on the destruction of human embryos. Thus, they say, there

is no moral difference between the two. Cloning denies the fundamental rights of persons and reduces them to technical or medical commodities. As Okon Efiong Isong of Nigeria's U.N. mission notes, "The United Nations was set up primarily to stop all acts that could violate the sanctity and dignity of human life—including the self-serving application of science and technology. It is, indeed, an inconceivable paradox that the proponents of human cloning for therapeutic purposes would opt to destroy or sacrifice human life—for the human embryo is a human life, a human being in its formative stages—so as to save the life of another."

Opponents also argue that human cloning gives the living preference over the unborn, who cannot voice their opinion. Once an embryo is selected for therapeutic cloning, that life is over. It is the responsibility of those who can speak to advocate for those who cannot. Furthermore, stem cells needed for research can be taken from other sources, such as umbilical cord blood. Thus, using cloned embryos is unnecessary.

Critics further note the divergence between the costs of cloning and its possible benefits to humanity. Any scientific or medical advances are decades away, they argue. Those advances will benefit primarily the wealthy and influential. The money and scientific effort devoted to cloning could be better invested to fight current problems—like AIDS, malaria, and tuberculosis. That funding would help tens of millions of mostly poor people worldwide right now. The decisions about these issues cannot be left to scientists. Scientists want to do whatever can be done. They do not always think about what should be done.

The debate about cloning asks what it means to be human. Despite all of humanity's advances in knowledge, people still seek an answer to this fundamental question.

Cloning—Selected Resources

"5-year Ban on Human Cloning in Russia," *Prima News* (April 10, 2002), http://www.prima-news.ru/eng/news/news/2002/4/10/9541.html?print.

"Additional Protocol to the Convention for the Protection of Human Rights and Dignity of the Human Being with Regard to the Application of Biology and Medicine, on the Prohibition of Cloning Human Beings" (Paris: Council of Europe, opened January 12, 1998, entered into force January 3, 2001), http://conventions.coe.int/Treaty/en/Treaties/Html/168.htm.

"Ad Hoc Committee on an International Convention Against the Reproductive Cloning of Human Beings" (New York: United Nations), http://www.un.org/law/cloning/.

Beardsley, Tim, "A Clone in Sheep's Clothing," *Scientific American* (March 3, 1997), http://www.sciam.com/article.cfm?articleID=0009B07D-BD40-1C59-B882809EC588ED9F.

"Click and Clone," Genetic Science Learning Center, University of Utah, http://learn.genetics.utah.edu/units/cloning/clickandclone/.

"Cloning Fact Sheet," Human Genome Program, Office of Biological and Environmental Research, Office of Science, U.S. Department of Energy, http://www.ornl.gov/sci/techresources/Human_Genome/elsi/cloning.shtml.

Committee on Science, Engineering, and Public Policy (COSEPUP), Board on Life Sciences (BLS), "Executive Summary," *Scientific and Medical Aspects of Human Reproductive Cloning* (Washington, DC: National Academy of Sciences, 2002), www.nap.edu/openbook/0309076374/html/1.html.

Constitutional Rights Foundation, "Stem-Cell Research: The Promise and the Pitfalls," *Bill of Rights in Action,* 22:4 (Winter 2006).

"General Assembly Resolution 56/93, International Convention Against the Reproductive Cloning of Human Beings" [without vote], http://www.un.org/Depts/dhl/resguide/r56.htm.

German National Ethics Council. *Cloning for Reproductive Purposes and Cloning for the Purposes of Biomedical Research: Opinion* (Berlin: 2004 Nationaler Ethikrat, 2004), http://www.ethikrat.org/_english/publications/Opinion_Cloning.pdf.

Human Cloning and Human Dignity: An Ethical Inquiry (Washington, DC: President's Council on Bioethics, July 2002), http://bioethics.gov/reports/cloningreport/index.html.

"S Korea Cloning Research Was Fake," *BBC News* (December 23, 2005), http://news.bbc.co.uk/1/hi/world/asia-pacific/4554422.stm.

"Scientists 'Cloned Human Embryos'," CNN.com (February 12, 2004), http://www.cnn.com/2004/HEALTH/02/12/science.clone/.

"United Nations Declaration on Human Cloning," United Nations General Assembly Resolution 59/280 (March 23, 2005), http://www.pre.ethics.gc.ca/english/pdf/UN%20Nations%20Resolution%202005.pdf.

United States Department of State, Bureau of Public Affairs, "To Ban Human Cloning" (September 16, 2004), http://www.usunnewyork.usmission.gov/ga59-fact5.pdf.

"Universal Declaration on the Human Genome and Human Rights," United Nations General Assembly Resolution 53/152 (9 December 1998), http://www.ohchr.org/english/law/genome.htm.

Cloning—Deliberation Question with Arguments

Deliberation Question

Should our democracy permit therapeutic cloning of human cells?

YES—Arguments to Support the Deliberation Question

1. Imprecise use of the term *cloning* confuses the public at the cost of good science. Therapeutic and reproductive cloning are clearly different. Reproductive cloning places an altered human cell in a woman's uterus. In contrast, non-reproductive cloning takes place in a laboratory and cannot lead to a human being. These differences mean there is little danger of a "slippery slope" leading from cloning that can cure disease to cloning that is universally condemned.
2. Therapeutic cloning covers an array of scientific possibilities. Among these are stem-cell research and other forms of non-reproductive cloning. Therapeutic cloning holds great promise to alleviate human suffering and advance human knowledge.
3. The technology of cloning is too tempting to leave unregulated. Because of its extraordinary potential, unscrupulous people will attempt cloning. By legislating procedures and safeguards, society can regulate what kind of cloning is permitted. It can also set proper limits and define what kind of cloning is illegal. Reproductive cloning can be identified, isolated, criminalized, and, when necessary, punished without limiting the scientific knowledge or medical advances that might be gained through therapeutic cloning.
4. Scientists have the necessary technical training and background to make informed decisions about cloning. Democratic societies must learn about, discuss, and debate the moral and ethical issues surrounding therapeutic cloning. The expertise of scientists is critical to helping democracies make informed decisions about policy.
5. The "embryos" used in research are not babies with limbs or brains. They are tiny balls of stem cells. Moreover, the embryos currently used are from fertility clinics, where they are routinely discarded. Using them for research assures that they are not wasted. Using them values their potential to expand human knowledge.

Cloning—Deliberation Question with Arguments

Deliberation Question

Should our democracy permit therapeutic cloning of human cells?

NO—Arguments to Oppose the Deliberation Question

1. The processes for therapeutic cloning and reproductive cloning both share a fundamental act: the destruction of human embryos. Therapeutic cloning is therefore no different from reproductive cloning—the very policy that the world universally condemns as an affront to human dignity.
2. Therapeutic cloning is wrong because it requires the creation of human beings only so that they may be "harvested" for the betterment of other human beings. Such activity gives the impression that some human lives are much more important than others. International laws were created in large part to protect all human beings from such a judgment. Furthermore, cloned embryos are not necessary to stem cell research—cells from umbilical cord blood could be used instead.
3. Cloning is very costly and any advances will happen decades from now and benefit only the wealthy and influential. The money and effort devoted to cloning should be spent on current problems—like AIDS, malaria, and tuberculosis—that affect millions of mostly poor people worldwide.
4. Humanity cannot leave decisions about human cloning to "experts." Scientists do not ask whether something should or should not be done; instead, they ask whether something can be done and what can be learned from doing it. Societies, through national and international agreements, have the right and the responsibility to draw the line in scientific research.
5. Human cloning represents the very worst characteristics of capitalism. Both therapeutic and reproductive cloning turn human embryos into little more than spare parts or new clothes for those who can afford them. When human beings are viewed as market commodities, they are denied their fundamental rights as persons.