# ISSUE ★ BRIEF

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## BIOETHICS

## ★ AT A GLANCE ★

*Overview of Bioethics:*

- A Diversity of Definitions
- Ethical Frameworks
- The Role of the Bioethicist
- Bioethical Decision-Making

*Ethical and Social Considerations:*

- An Ongoing Challenge

*Additional Resources:*

- A Glossary of Terms
- Relevant Links

## ★ OVERVIEW OF BIOETHICS ★

Decisions involving bioethical issues are made every day in diverse situations such as the relationship between patients and their physicians, the treatment of human subjects in biomedical experimentation, the allocation of scarce medical resources, the complex questions that surround the beginning and the end of a human life and the conduct of clinical medicine and life sciences research.

Ethicists serve as advisers to hospitals and other health care institutions. They also have served as advisers to federal and state legislatures in the writing of laws concerning the decision to end life support, the use of genetic testing, physician-assisted suicide and other matters. Bioethics even has become part of the landscape in the commercial world of science. An increasing number of firms involved in biotechnology regularly consult with biomedical ethicists about business and research practices.

In the United States and Canada, more than 25 universities offer degrees in medical ethics. In many instances, the subject also is part of the curriculum in the education of physicians and other health care professionals. Many medical schools include ethics courses that examine topics such as theories of moral decision-making and the responsible conduct of medical research.

### A Diversity of Definitions

Depending on the creator of the definition, bioethics is defined as:

- the study of the ethical and moral implications of new biological discoveries and biomedical advances — as in the fields of genetic engineering and drug research.
- the branch of ethics, philosophy and social commentary that discusses the life sciences and their potential impact on society.
- the study of value judgments pertaining to human conduct in the areas of biology and biotechnology.
- the study and consideration of what is right and wrong in biological advances and activities such as genetic engineering, the transplantation of organs and the care of the terminally ill.
- the study of the moral and ethical choices scientists and doctors face in medical research and in the treatment of patients.
- the study of biology combined with diverse humanistic knowledge, forging a science that sets a system of medical and environmental priorities for acceptable survival.
- the exploration of moral and ethical questions surrounding life, health, science, medicine and the environment.

Clearly, there is no simple definition for this very complex subject. But while there seem to be as many definitions as there are definers, most scientists and ethicists agree that bioethical arguments center around the concept of "right vs. right" rather than "right vs. wrong."

#### QUICK DEFINITIONS

**Moral:** Of, relating to or concerned with the principles of right and wrong in human conduct.

**Immoral:** Corrupt, dishonest or unjust.

**Right:** In accordance with what is fair and morally good; conforming with justice, law or social standards; in accordance with fact, logic or reason.

**Wrong:** Acting in an unjust, unsuitable or incorrect way.

**Judgments:** Opinions or evaluations based on the weighing of evidence.

**Principles:** Laws, doctrines or assumptions on which action or behavior is based; personal codes of behavior or morality.

**Values:** Principles considered most important; moral codes.

**Ethics:** Moral principles that govern or influence behavior and the choices we make as individuals and communities.

### Ethical Frameworks

Medical ethics traces its roots to several early codes of ethics, such as the ancient Greek Hippocratic Oath for physicians; the Caraka Samhita, a Sanskrit text written in India roughly 2,000 years ago that urged physicians, "Day and night, however you may be engaged, you shall strive for the relief of the patient with all your heart and soul. You shall not desert the patient even for the sake of your life or living"; the code of ethics written by English physician Thomas Percival in the 18th century that provided a foundation for the first code of ethics, established in 1846 by the founders of the American Medical Association; and the Nuremberg Code for research ethics on human subjects, which was established during the war crime trials at the close of World War II. After the 1950s, the advent of new medical and reproductive technologies further complicated the moral and societal issues of biomedical research and medical practice.

To better evaluate medical cases and make decisions, medical ethicists have tried to establish specific ethical frameworks and procedures. One system, developed in the late 1970s by American philosopher Tom Beauchamp and American theologian James Childress, is known as principlism, or the Four Principles Approach. In this system, ethical decisions pertaining to biomedicine are made by weighing the importance of four separate elements: (1) respecting individuals' autonomy and their right to their own decisions and beliefs; (2) the principle of beneficence, with helping people as the primary goal; (3) the related principle of nonmalificence, or refraining from harming people; and (4) justice, or distributing burdens and benefits fairly.

Beauchamp and Childress also were members of the 27-member committee that developed the important historical document *Ethical Principles and Guidelines for the Protection of Human Subjects* for the Department of Health and Human Services. Issued in 1979, the document, better known as *The Belmont Report* (named for the conference center where it was drafted), established the principles of respect, beneficence and justice as the cornerstones for regulations involving human participants in medical research.

While some medical ethicists follow principlism, others employ a system known as casuistry — a case-based

approach. When faced with a complex bioethical case, casuists attempt to envision a similar yet clearer case in which virtually anyone could agree on a solution. By weighing solutions to the hypothetical case, casuists work their way toward a solution to the real case at hand.

Casuistry and principlism are just two of many bioethical frameworks. Each approach has its proponents, and volleys of disagreement and debate fly frequently among the various schools of thought. Yet, each approach represents an attempt to deal with touchy, conflicting issues that commonly arise in the complex and contentious arena of medicine.

Advances in medical science have created new and difficult moral choices for individuals, their families and the health professionals who work with them. As scientists and physicians are faced with new and exciting options for saving lives, transplanting organs and furthering research, they also must wrestle with new and troubling choices, such as who should receive scarce and vital treatment and how we determine when life ends.

## *The Role of the Bioethicist*

While the roots of bioethics lay in philosophy, today's bioethics requires collaboration among many additional areas of study, including law, medicine, biology, genetics, environmental toxicology, public health, pharmaceuticals, stem cell research, biotechnology, politics, sociology and business. Bioethical dilemmas, once rare, now are commonplace, in part because new medical technologies have outpaced our ability to understand their implications.

Traditionally, bioethicists have dealt with difficult medical decisions, but their role has expanded with the explosion of knowledge in the fields of genetics and biotechnology. Ethical decisions are required for issues as diverse as cloning, the use of fetal tissues and the genetic engineering of crops. The recent growth in the fields of biomedical, bioengineering and biotechnology research has created an unprecedented need for our society to confront the new and challenging ethical implications that arise.

Bioethics consists of identifying emerging moral issues related to human heath and biological systems and analyzing them according to the principles determined by the value system of the community. Such principles do not always dictate a single "moral" course of action, but provide a means of evaluating and deciding among competing options.

## *Bioethical Decision-Making*

Decision-making in bioethics occurs when an individual or group of individuals confronts a bioethical dilemma that requires a choice be made between two or more seemingly conflicting outcomes. Often, there are both positive and negative consequences to each of these possible outcomes. In trying to reach decisions, bioethicists consider the following paradigms:

*Individual vs. Community*
In this paradigm, the needs and interests of the individual are weighed against the needs and interests of the community.

*Short-Term vs. Long-Term*
In this paradigm, the costs and benefits that will arise in the short-term are weighed against the costs and benefits that will arise in the long-term.

*Justice vs. Mercy*
In this paradigm, the need for exacting appropriate justice is weighed against the need to show appropriate mercy.

Each of these paradigms characterizes a unique struggle between competing values. Strategies used to make decisions tend to fall into one of the following three broad categories:

*Ends-Based*
Ends-based reasoning operates on the principle of "the greatest good for the greatest number."

*Rule-Based*
Rule-based reasoning is guided by the rules that generally guide the actions of the people in the community.

*Care-Based*
Care-based reasoning uses concern for others as the guiding principle for a moral decision.

## ★ ETHICAL AND SOCIAL CONSIDERATIONS ★

Why should we care about bioethical issues? The rapid advance of biotechnology quickly is outpacing our ability as a society to absorb how our lives will be affected by these new technologies. We already are grappling with many serious and wide-ranging issues, such as cloning, stem cell research, in vitro fertilization and prenatal identification of genetic disorders. Advances made possible by biotechnology profoundly will affect what it means to be human and how we live our lives. It will have implications in many areas, including politics (public policy, legislation and control of resources), spirituality ("What is life?", "What does it mean to be human?") and culture ("What implications do our genetic makeups reveal?", "What are the implications of new technology for gender, class and race?").

As a result of these recent, unparalleled advances, the need for thoughtful engagement in bioethical decision-making has grown increasingly urgent. That need extends beyond the professional communities of the bioengineering and biotechnology industries to include all members of society, because the burden of establishing accepted practices falls on us all. In order to meet this burden, it is critical that the members of our society are intellectually prepared.

The National Academy of Sciences has identified this responsibility in a broad sense in its *National Science Education Standards*:

- Science and technology are essential social enterprises, but alone they only can indicate what *can* happen, not what *should* happen. The latter involves human decisions about the use of knowledge.
- Understanding basic concepts and principles of science and technology should precede active debate about the economics, policies, politics and ethics of various science- and technology-related challenges. However, understanding science alone will not resolve local, national or global challenges.
- Progress in science and technology can be affected by social issues and challenges. Funding priorities for specific health problems serve as examples of ways that social issues influence science and technology.
- Individuals and society must decide on proposals involving new research and the introduction of new technologies into society. Decisions involve assessment of alternatives, risks, costs and benefits and consideration of who benefits and who suffers, who pays and gains and what the risks are and who bears them.

Ethical decision-making asks us to explore the pros and cons of a situation from a variety of perspectives. There is no "right" or "wrong" answer. The emphasis is on the process of arriving at an acceptable solution in which all stakeholders have an opportunity for input.

### *An Ongoing Challenge*
Issues in biotechnology have the potential to challenge deeply held beliefs and traditions surrounding ethics, spirituality and culture.

Some ethical issues are associated with risk. These include such questions as, "What level of risk is acceptable?", "Who decides?" and "Who carries the risk?"

These risks and benefits apply not only to individuals, but also to public health and ecosystems. For what purposes should genetic modification technology be used? By whom, and under what conditions? Are there activities that should never be allowed, even if we are able to overcome the safety issues?

Issues also can challenge our social and cultural views and beliefs about the intrinsic value of organisms and the choices we make when having children and forming families.

A variety of issues will face medical ethicists throughout the 21st century, such as advances in cloning technology, new knowledge of the human brain and the wealth of genetic data from the Human Genome Project. Population changes worldwide also will affect the course of medicine and will raise issues of medical ethics. By roughly 2020, the number of Americans over the age of 65 is expected to double. This aging of the population seems certain to increase the demand on the U.S. health care system and subsequently to increase health care costs. And, with an increase in the number of elderly citizens, ethical dilemmas surrounding end-of-life issues seem certain to become more prevalent. Determining the quality of life for aged patients sustained by artificial means and deciding when treatment has run its course for the aged will be issues that medical ethicists will need to address. As they have for centuries, medical ethicists will continue to ponder, debate and advise on the most basic and profound questions of life and death.

With advancing technology and modern innovations, new and exciting insights are being gained for many scientific processes and diseases. But at the same time, new questions of medical ethics continually arise, such as, "What can happen?", "What are the odds?" and "How do scientists know what will happen?"

## ★ ADDITIONAL RESOURCES ★

### A Glossary of Terms

**Abortion:** Termination of a pregnancy before birth.

**Bioremediation:** The use of microorganisms, such as bacteria, to remove environmental pollutants from soil, water or gases.

**Biotechnology:** ***1.*** Any technological application that uses biological systems, living organisms or derivatives thereof to make or modify products or processes for specific use. ***2.*** The industrial use of living organisms or biological techniques developed through basic research. Biotechnology products include antibiotics, insulin, interferon, recombinant DNA and techniques such as waste recycling.

**Chromosome:** A strand of coiled DNA. The nucleus of each animal cell contains at least one chromosome, and the number of chromosomes in each cell differs from animal to animal. Humans have 23 pairs of chromosomes, including the pair of sex chromosomes (two X chromosomes for females versus an X and a Y chromosome for males).

**Cell:** A fundamental unit of an animal body. Each body organ contains different types of cells, and at the heart of a cell is the nucleus, which contains chromosomes, or long coils of DNA. DNA provides not only a blueprint from which a cell can produce proteins to perform its function, but also a design for the entire body.

**DNA (deoxyribonucleic acid):** The chemical at the center of the cells of living things that controls the structure and purpose of each cell and carries genetic information during reproduction.

**Embryo:** An animal in the early stage of development before birth. In humans, the embryo stage is the first three months following conception.

**Euthanasia:** The act of assisting a chronically ill person to die.

**Fetus:** An animal in the later stage of development before birth. In humans, the fetal stage lasts from the end of the second month until birth.

**Gamete:** A reproductive cell (egg or sperm).

**Gene:** A unit of hereditary information. A gene is a section of a DNA molecule that specifies the production of a particular protein.

**Genetic engineering:** Alteration of an organism's genetic, or hereditary, material to eliminate undesirable characteristics or to produce desirable new ones.

**Genetically modified organism:** Organisms that have had genes from other species inserted into their genome.

**Genome:** The total hereditary material of a cell.

**Humanistic:** Concerning human nature and the welfare and dignity of humans.

**Immunosuppression:** The prevention of or interference with an immune response, either by disease or drugs. After receiving an organ transplant, a patient must be immunosuppressed by drugs to prevent the body from rejecting the organ.

**In vitro:** Performed in a test tube or other laboratory apparatus. The term literally means "in glass."

**Paradigm:** An example, model or pattern.

**Plasmid:** A small, circular piece of DNA found outside the chromosome in bacteria. Plasmids are the principal tools for inserting new genetic information into microorganisms or plants.

**Protein:** A biological molecule that consists of many amino acids chained together by peptide bonds.

**Recombinant DNA:** DNA molecules that have been created by combining DNA from more than one source.

**Rejection:** An immune reaction a patient may have against an organ or tissue that has been transplanted.

**RNA (ribonucleic acid):** A molecule similar to DNA whose functions include decoding the instructions for protein synthesis that are carried by the genes. RNA comprises the genetic material of some viruses.

**Stakeholder:** A person or group that has a direct interest in a negotiation or other decision-making process.

**Tissue:** A part of an organism consisting of a collection of cells having a similar structure and function (a piece of skin or bone, for example).

**Transgenic:** An organism that has been genetically engineered to contain the genes from another species.

**Virus:** An infectious agent composed of a single type of nucleic acid, DNA or RNA that is enclosed in a coat of protein. Viruses can multiply only within living cells.

**Xenotransplantation:** The term used to describe the transfer of living cells, tissues and organs from nonhuman animals into humans for medical purposes.

## *Relevant Links*

**http://www.accessexcellence.org**
Access Excellence, launched in 1993, is a national educational program that provides health, biology and life science teachers access to their colleagues, scientists and critical sources of new scientific information via the World Wide Web. Check out these articles: *Tearing Up The Andromeda Strain*, *Decision Making in a High-Tech World* and *Survey of Bioethical Issues*.

**http://www.bioethics.govt.nz**
The Web site of the New Zealand Bioethics Council, which contains excellent information and international links.

**http://www.criticalthinking.org**
The Foundation and Center for Critical Thinking offers primary and secondary schools, colleges and universities professional development programs emphasizing assessment, research, instructional strategies, Socratic questioning, critical reading, critical writing, higher-order thinking, quality enhancement and competency standards. The site contains a detailed description of the philosophy and components of critical thinking.

**http://encarta.msn.com**
Encarta is a digital multimedia encyclopedia published by Microsoft. As of 2005, the complete English version, Encarta Premium, consisted of more than 68,000 articles, numerous images, movies and homework tools. Click on *Bioethics* for a comprehensive investigation of the provocative topic.

**http://www.thecbc.org**
The Center for Bioethics and Culture is composed of doctors, nurses, ethicists, clergy, educators and other professionals working to educate and equip people in the bioethics issues of the 21st century. The site presents a multitude of excellent articles dealing with varied bioethical issues.

**http://www.womensbioethics.org**
The Women's Bioethics Project is a nonprofit, nonpartisan public policy think-tank dedicated to ensuring that women's voices, health concerns and unique life experiences have an influence on bioethical decisions in health care and biotechnology. Click on *Bioethics* for in-depth discussions of women and bioethics and bioethics both in the United States and internationally.