

QUESTIONS AND ANSWERS ON STEM CELL RESEARCH

A Statement of The Catholic Bishops of Pennsylvania

*"God alone is the Lord of life from its beginning until its end; no one can under any circumstance claim the right directly to destroy an innocent human being."
(Catechism of the Catholic Church 2258)*

Stem Cell Research

Medical science today holds out the promise of cures to diseases and medical advances far beyond anything imagined, even a generation ago. Much of what we hear, particularly in media accounts of this type of "medical miracle," has to do with a remarkable technology called stem cell research. This new medical research industry currently treats numerous illnesses and injuries and offers hope for more cures using adult stem cells.

We rejoice with these advances in medical science and the promise of relief to human suffering. At the same time, we have an obligation to ensure that medical capabilities do not progress so rapidly that they lack an ethical and moral foundation. Whatever is accomplished, we must be sure that it is not just what we are able to do but what we should do. There is a definite and necessary moral context for medical development as well as an ethical content to decisions involving stem cell research. It is this moral dimension of medical science that we call to your attention.

As the Bishops of Pennsylvania, we have a responsibility to help people make an informed moral judgment about one of the most important issues that we, as a people, face today. We must examine carefully the facts to determine what exactly is at issue and why the moral prohibition against the use of evil means to achieve a good end is applicable.

What is a stem cell?

A stem cell is an unspecialized cell. Stem cells have the potential to develop into a full range of tissues that constitute the human body. This makes them so attractive to researchers. The science of cell therapy concentrates on ways to replace, repair or enhance the biological function of damaged tissues or organs in the body.

What are embryonic stem cells?

At the very beginning of human life, the sperm and egg come together to form an embryo. After that embryo has grown for about 5-7 days, it contains embryonic stem cells which can be extracted. In this procedure, the embryo is killed. Similar embryonic-type stem cells can also be obtained from aborted fetuses. The extracted cells are then cultivated in a laboratory, replicating over and over again.

What are adult stem cells and from where do they come?

Fortunately, embryos are not the only source of stem cells. Adult stem cells are found in the individual at any time after birth. There are a number of ethical sources of stem cells that hold out realistic hope for cures and treatments of diseases. Stem cells from adult tissues, which are committed to differentiating into a limited number of cell types such as liver, brain or blood, are called adult stem cells. These too have the capability of developing into specific tissues. Adult-type stem cells can also be derived from various pregnancy-related sources such as umbilical cords, placentas and amniotic fluid. Some scientists

today assert that not only are adult stem cells more readily available but they are also more effective in treating diseases.

Which of the types of stem cells are medically most successful?

Stem cells derived from placental or umbilical cord blood have proven to be remarkably effective, similar to other adult stem cells. Originally it was theorized that stem cells from these various sources would be ineffective because they are limited in their ability to become various types of cells. However, alternative sources of stem cells have been successfully differentiated into needed tissue and are already effective in healing human illnesses. More than 50 diseases have already been treated successfully in humans using adult and umbilical cord stem cells.

What does the Church teach about adult stem cell research?

The Church does not oppose all stem cell research. In fact, the Church encourages and supports medical development and technological advancement. Adult stem cells are a solution. These cells exist in our bodies and provide a natural repair mechanism for many tissues of our bodies. There are methods available for obtaining human stem cells from adults. Furthermore, many therapies in humans have been successfully developed using adult stem cells. These include treatments for leukemia, juvenile diabetes, spinal cord injury, immune deficiency and corneal damage. It is important to note that no therapies in humans have ever been successfully carried out using embryonic stem cells.

Why is the extraction of embryonic stem cells immoral?

At the heart of the moral issue involving embryonic stem cell research is the fact that the embryo is killed so that the stem cells can be used for research - for the potential benefit of someone else. Embryos are human and at the very beginning of the process of life-long human development. Even though the human embryo is tiny at this point, as human beings and in solidarity with that life, we are not free to allow its use simply as a commodity for our convenience or benefit. As the Catechism of the Catholic Church teaches, "God alone is the Lord of life from its beginning until its end: no one can under any circumstance claim the right directly to destroy an innocent human being." (CCC 2258).

There are those who argue that, since hundreds of thousands of embryos frozen in fertility clinics are just going to be thrown away, it should be permissible to use them for research purposes. Such an argument ignores the truth that such embryos are human and should not be regarded as disposable in the first place. It is like saying that since one is going to die it is permissible to kill him or her. What makes this experimentation immoral is that in each case a human embryo in the process of human development would be intentionally destroyed for the sake of scientific experimentation. Immoral means can never be used even in achieving a good and noble end.

Is there a difference between embryonic stem cells and stem cell lines?

Scientists and moralists make the distinction between embryos, embryonic stem cells which are obtained by the killing of the embryo, stem cell lines which are developed from either embryonic or adult stem cells and products that are prepared from stem cell lines. There is a range of moral judgments relative to each of these specific aspects of stem cell research. In this pastoral reflection we are concentrating on human embryos and the moral prohibition against their destruction to produce stem cells for research.

What about the use of government funding for embryonic stem cell research?

Government funding would further encourage researchers to destroy human embryos. We must oppose the use of our tax dollars for research that involves the destruction of human life. When we enter the realm of public policy, each of us has an obligation to speak up and to take a stand for human life. We cannot proceed down the road of scientific development without sufficient moral reflection and ethical judgment.

What is the role of the Church in this debate?

The Church, the voice of Christ applying his gospel to the world today, speaks out of 2000 years of human experience and its reflection on that experience in the light of God's word and guided by the wisdom of the Holy Spirit. It is the constant task of the Church, as it is of all members of society, to be alert to the wisdom of God and the natural law as it offers ethical and moral reflection on what we are capable of doing technologically and scientifically. It is a question not of what we can do but of what we must do or not do in conformity to God's intended plan for us.

Many in our society maintain that scientific advances should not be restrained by moral compunction. We hear repeatedly that much good will come from embryonic stem cell research. This good end, we are told, certainly justifies any means needed to achieve it. However, to abandon the long-standing moral imperative that the end does not justify the use of immoral means places us on the course of moral anarchy.

The issue of embryonic stem cell research brings us face to face with a fundamental human moral principle and decision. We cannot allow scientific knowledge and technological advances to extend beyond needed moral and ethical guidance. The two must move forward together, always striving to embrace the natural moral order of human life as God intended.

MORAL AND ETHICAL GUIDANCE

In his encyclical letter "The Gospel of Life," Pope John Paul II praised the efforts of researchers and practitioners of medical science. At the same time, however, "The Gospel of Life" reminds those engaged in medical research and healthcare services of their "unique responsibility" to preserve the dignity and integrity of human life (n. 89). This responsibility is of increasing importance in our modern society with its growing embrace of the "culture of death," a culture that endorses the destruction of human life in the womb and promotes the creation of human life in order to destroy it for the sole purpose of harvesting parts.

What we are witnessing is the conflict of two completely different sets of ethical norms for human living. On the one hand, the traditional Judeo-Christian ethic teaches that all human life is sacred and should never be considered a commodity nor destroyed simply for the benefit of others. On the other hand, an expanding culture of death professes that human life, in its most vulnerable forms, can be killed for the benefit of the more powerful.

In concluding his encyclical, "The Gospel of Life," Pope John Paul II called on all members of society to build a culture of life. "What is urgently called for is a general mobilization of consciences and a united ethical effort to activate a great campaign in support of life. All together, we must build a new culture of life; new because it will be able to confront and solve today's unprecedented problems affecting human life." (n. 95).

Even more urgently, we are reminded by the Congregation for the Doctrine of the Faith that "No objective, even though noble in itself, such as a foreseeable advantage to science, to other human beings,

or to society, can in any way justify experimentation on living human embryos or fetuses, whether viable or not, either inside or outside the mother's body."(The Instruction on Respect for Human Life in its Origin and on the Dignity of Procreation).

The Catholic Church brings a living ethical tradition to this critical issue of embryonic stem cell research. May God continue to enlighten our minds and strengthen our resolve to speak out in support of human life and to help build a society that respects, defends and protects the gift of human life.

The Bishops of Pennsylvania

July 30, 2005

The following two pages are an effort to present in an even briefer form information about stem cell research.

Questions and Answers on Stem Cells

(Presented here with permission of Reverend Tadeusz Pacholczyk, PhD)

What is a stem cell?

A stem cell is essentially a "blank" [unspecialized] cell, capable of becoming another more differentiated cell type in the body, such as a skin cell, a muscle cell, or a nerve cell.

Why are stem cells important?

Stem cells can be used to replace or heal damaged tissues or cells in the body.

What are the two broad classes of stem cells?

The two broad classes of stem cells are embryonic type and adult type.

The embryonic type are: embryonic stem cells and embryonic germ cells.

The adult type are: umbilical cord stem cells, placental stem cells and adult stem cells.

Where do adult stem cells come from?

- Umbilical cords, placentas and amniotic fluid - Adult type stem cells can be derived from various pregnancy-related tissues.
- Adult Tissues - In adults, stem cells are present within various tissues and organ systems. These include the bone marrow, liver, epidermis, retina, skeletal muscle, intestine, brain, dental pulp, and elsewhere. Even fat obtained from liposuction has been shown to contain significant numbers of adult type stem cells.
- Cadavers - Neural stem cells have been removed from specific areas in post-mortem human brains as late as 20 hours following death.

How do embryonic and adult stem cells compare?

Embryonic stem cell advantages:

1. Flexible - appear to have the potential to make any cell.
2. "Immortal" - one embryonic stem cell line can potentially provide an endless supply of cells with defined characteristics.
3. Availability - embryos from in vitro fertilization clinics.

Embryonic stem cell disadvantages:

1. Destruction of human life.
2. Difficult to differentiate uniformly and homogeneously into a target tissue.
3. Immunogenic - embryonic stem cells from a random embryo donor are likely to be rejected after transplant.
4. Tumorigenic - capable of forming tumors or promoting tumor formation.

Adult stem cell advantages:

1. Special adult type stem cells from bone marrow and from umbilical cords have been isolated recently which appear to be as flexible as the embryonic type.
2. Already somewhat specialized - inducement may be simpler.
3. Not immunogenic - recipients who receive the products of their own stem cells will not experience immune rejection.
4. Relative ease of procurement - some adult stem cells are easy to harvest (skin, muscle, marrow, fat), while others may be more difficult to obtain (brain stem cells). Umbilical and placental stem cells are likely to be readily available.
5. Non-tumorigenic - tend not to form tumors.
6. No harm done to donor.

Adult stem cell disadvantages:

1. Limited quantity - can sometimes be difficult to obtain in large numbers.
2. Finite - may not live as long as embryonic stem cells in culture.
3. Less flexible (with the exception of #1 under "Adult stem cell advantages") - may be more difficult to reprogram to form other tissue types.

Why are adult stem cells preferable to embryonic stem cells?

Adult stem cells are a "natural" solution. They naturally exist in our bodies, and they provide a natural repair mechanism for many tissues of our bodies. They belong in the microenvironment of an adult body, while embryonic stem cells belong in the microenvironment of the early embryo, not in an adult

body where they tend to cause tumors and immune system reactions. Most importantly, adult stem cells have already been successfully used in human therapies for many years. As of the date of this publication, NO therapies in humans have been successfully carried out using embryonic stem cells. New therapies using adult stem cells, on the other hand, are being developed all the time. There are many examples of success stories using adult stem cells.

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