Catholic Organization for Life and Family

Life Matters

Stem Cells

Astonishing promises … but at what cost?

The scientific advances of the last few years have opened up incredible new possibilities for the treatment of a vast range of diseases and disabilities, and for the reparation of human organs and tissues.

Around the world, multidisciplinary teams anxious to improve the lives of the ill and disabled are focusing on a new type of research that is built around microscopic particles: stem cells.

There are no holds on the hopes expressed by enthusiastic researchers. But are these promises too good to be true? What should we think about all this? The question is particularly important because research on human stem cells challenges both individual and collective consciences.

When Christians give their support to scientific advances that benefit the human being, they expect these new technologies and treatments to respect human life and dignity. Where does stem cell research stand in that regard?

The following questions and answers are formulated to enable readers to arrive at an informed opinion on this subject that is in keeping with Christian ethics.

1

What are stem cells?

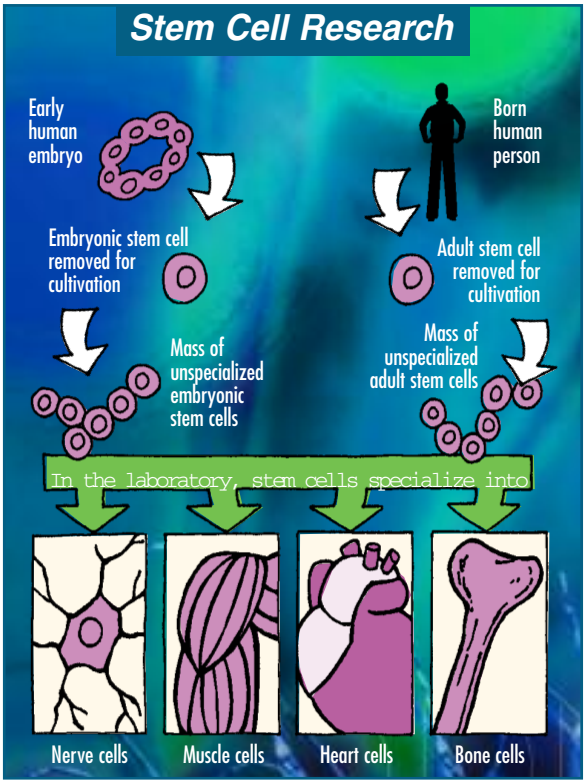
The human body is made up of basic building blocks called cells. These are incredibly small: on average, about 10,000 human cells would fit on the head of a pin,[1] and the typical human body is made up of about 100 trillion cells.[2] There are about 200 types of human body cells.

The human body begins to develop after fertilization, when the egg and sperm fuse to create the first cell of the new human being. This cell is "totipotent" because it is able to generate an entire new organism. Indeed, sometimes a totipotent cell will break off the first mass and develop into an identical twin!

About five days after fertilization, human cells lose their capacity for totipotence and become "pluripotent". Each cell can still specialize into all the different types of body cells, but it can no longer become a new human being. Pluripotent cells are often called "embryonic stem cells", because they are found in unborn human beings that are only a few days old (embryos). They are also found in unborn humans that are fetuses.

The other main type of stem cell is the "adult" stem cell. Adult stem cells are found in anyone who is already born, whether a baby or an adult. They exist in various parts of the body, and also in the placenta and umbilical cord blood. Adult stem cells are often called "multipotent" because they have the ability to develop into only a limited number of body cell types. However, recent research suggests that at least some adult stem cells have a flexibility similar to "pluripotent" stem cells, and can develop into a wider range of body cells than was previously believed. Compared to embryonic stem cells, adult stem cells multiply less readily in the laboratory, so it is more difficult to create adult "stem cell lines" that can be used for further research.

All stem cells, whether embryonic or adult, help the human body to build and repair itself. They have unique features for this purpose. While most human cells are specialized to do a specific function, such as white blood cells, muscle cells or nerve cells, stem cells are unspecialized and can stay unspecialized for long periods of time, continuing to multiply until they are needed to repair a part of the body. When the body is damaged, stem cells respond by developing into a variety of cell types, depending on the needs of the body. They can become specialized cells such as cardiac muscle cells, cerebral tissue cells or liver cells, thus repairing the body.



2 What can stem cell research do for us? Is it really producing miracle cures?

The promise of all stem cells lies in our ability to make them specialize into whatever the kind of body cell that we need. For example, if we can learn to make stem cells develop into brain cells, then we may be able to repair a brain damaged by stroke.

Scientists are currently trying to learn to control the development of stem cells into different types of body cells, in the hopes of finding cures and therapies for human illnesses and disabilities. Their research has been called "stem cell research," and it can involve both adult and embryonic stem cells.

Adult stem cell research has already shown great promise: adult stem cells have produced more than 70 treatments and cures, and have been used to treat tens of thousands of patients. A well-known example of adult stem cell therapy is bone marrow transplants, which have been saving patients for 40 years. Adult stem cells have also been used to treat blood disorders such as leukemia and lymphoma, diabetes, heart disease, bladder disease and incontinence, multiple sclerosis, spinal cord injury, Parkinson's disease, advanced kidney cancer, stroke, and other conditions.

In contrast, embryonic stem cell research has not yet developed any medical treatments for human beings.[3] Embryonic stem cell therapies have never been tested on human subjects because they continue to be too risky.

> **"Somatic stem-cell research also deserves approval and encouragement when it felicitously combines scientific knowledge, the most advanced technology in the biological field and ethics that postulate respect for the human being at every stage of his or her existence."**
>
> ***– Pope Benedict XVI to the participants in the symposium on the theme: "Stem Cells: What Future for Therapy?", Pontifical Academy for Life (September 2006)***

3 What are the safety concerns associated with the use of stem cells?

Most of the safety concerns are related to embryonic stem cells. Ironically, their danger lies in their greatest strengths: their capacity to develop into any cell type, and the ease with which they continue to multiply. Scientists have not yet found a sure way to control the development of these cells, so once they are placed in the human body, they could specialize into the wrong kinds of cells and divide uncontrollably into cancerous tumors.

Embryonic stem cells are also unsafe because of the problem of tissue rejection. The DNA of embryonic stem cells is different from the DNA of the patient, so there is a serous risk that the patient's immune system will reject the implanted stem cells. This risk is not encountered with adult stem cells, which come from the patient's own tissue and have the same DNA.

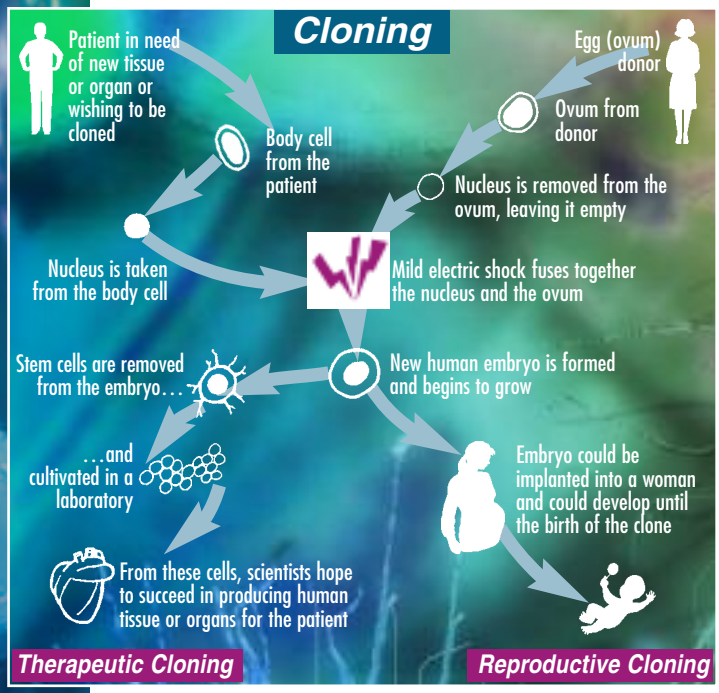
4 Why is there controversy over stem cell research?

Not all stem cell research is unethical. Adult stem cell research is ethical because adult stem cells are taken from human beings without causing them harm. In contrast, embryonic stem cell research is controversial because currently, embryonic stem cells can only be obtained in two ways: by extracting them directly from human embryos, causing their death in the process, or by extracting them from aborted human fetuses.[4]

While society often tells us that embryos are just "clumps of cells," science reveals that the embryo is an irreplaceable, living human being from the moment the sperm fertilizes the ovum. From that very moment, the newly conceived human being contains all of its own, unique DNA, different from that of its mother. This individual and ascertainable genetic code starts to guide its growth and development.

5 Does stem cell research have anything to do with cloning?

Scientists have been creating animal clones for years, and some of them hope to create human clones in the future. Cloning involves the creation of a new living organism in a laboratory without bringing together a sperm and an ovum. For example, scientists can extract the DNA from one body cell and place it into an emptied human egg, then stimulate the egg so that it begins to grow and divide as if it had been fertilized by sperm.



Using this procedure, scientists are sure that the cloned embryo contains virtually the full DNA of the original person. In effect, a clone is like a "synthetic" twin of the original person. Thus, embryonic stem cells from cloned embryos would be genetically identical to the patient's own tissue, and this would help solve the problem of tissue rejection encountered in embryonic stem cell research.

Scientists sometimes make a distinction between "reproductive" and "therapeutic" cloning. Reproductive cloning refers to the creation of a clone for reproductive purposes – that is, the cloned embryo would be implanted in a woman and the pregnancy would be brought to full term. Therapeutic cloning refers to the creation of a clone solely for its stem cells – the cloned embryo would be killed within its first few days as its stem cells are harvested, and these stem cells would then be used to generate cures and therapies.

Why should we oppose human cloning?

The World Health Organization (WHO) explains that "widespread consensus exists internationally among the public, scientists, and policy makers against reproductive cloning," and that the Universal Declaration on Human Genome and Human Rights (UNESCO 1997) rejects reproductive cloning as contrary to human dignity. According to the WHO, reproductive cloning "furthers an instrumental attitude toward human beings, that is, that people exist to serve purposes set by other people," and "risks turning human beings into manufactured objects."[5]

However, therapeutic cloning has gained much wider support among scientists and the international community. Many people do not seem to oppose the creation of cloned human embryos, as long as these embryos are not allowed to be born.

From a Catholic perspective, *all* human cloning goes against the dignity of the human person and the dignity of procreation, since "the gift of human life must be actualized in marriage through the specific and exclusive acts of husband and wife, in accordance with the laws inscribed in their persons and in their union."[6]

Every child also has the right to be conceived, carried in his mother's womb, brought into the world and brought up within marriage. It is through a relationship with his biological parents that the child best discovers his own identity and reaches his full development. A cloned child would be deprived of these important gifts. The child wouldn't even have biological parents – rather, he would be an asexually created copy of another person.

> **"From the moment of fertilization, that is from the earliest moment of biologic existence, the developing human being is alive, and entirely distinct from the mother who provides nourishment and protection.**
>
> **From fertilization to old age, it is the same living human being who grows, develops, matures and eventually dies. This particular human being, with his or her characteristics, is unique and therefore irreplaceable."**
>
> ***– Dr. Jerôme Lejeune, father of modern genetics***

What is the law in Canada on stem cell research and human cloning?

In Canada, the *Assisted Human Reproduction Act* that was adopted in 2004 forbids all forms of human cloning for any reason. However, the Act allows both adult and embryonic stem cell research, and both types are eligible for federal funding.

Canada allows embryonic stem cell research but does not allow embryos to be created solely to be used for this research. It is also illegal to buy or sell human embryos, sperm, ova, human DNA, and other cells that are intended for human reproduction, or to advertise the sale of human embryos.

Scientists can thus obtain embryonic stem cells only from "spare" embryos that were originally created for artificial reproduction, but were late

donated by their parents for scientific research, or from aborted fetuses, as long as the mother consents to both the abortion and to the stem cell extraction.

Canadian scientists thus find it difficult to obtain a sufficient supply of human embryos for research. Recently the media reported the concerns of some ethicists, who warned that mothers undergoing in vitro fertilization may be counseled to create extra embryos so that these could be donated to scientists and used for research.

What does the Catholic Church say about embryonic stem cell research?

The Catholic faith tells us that human life is sacred and inviolable from conception. It is a gift from the love of God who is the Source and the Master of life. In creating each person in his image and resemblance, God invites this new child of His to a personal relationship with Him for eternity.

The Church objects to all activities that endanger the life of the embryo, including current methods of stem cell research that involve the destruction of embryos. This type of stem cell research contradicts the law that God has inscribed in every human heart: "You shall not kill." Life is the first of fundamental rights. If it is not respected, other human rights are sooner or later threatened.

In the words of Pope John Paul II: "'The human being is to be respected and treated as a person from the moment of conception; and therefore from that same moment his rights as a person must be recognized, among which in the first place is the inviolable right of every innocent human being to life.'"[7]

Is the Church putting embryos ahead of suffering patients? What about the possibility of curing so many diseases and disabilities?

Followers of Christ walk in solidarity with those who carry the cross of disease and disability. They are also concerned for those human beings who are at the very beginning of their life and who are defenseless against the demands of science. They are not putting embryos ahead of suffering patients, nor putting patients ahead of embryos.

We recognize that the born and the unborn have equal rights and dignity. The Church tells us: "To use human embryos or foetuses as the object of experimentation constitutes a crime against their dignity as human beings having a right to the same respect that is due to the child already born and to every human person."[8]

The Catholic faith reminds us that science should be at the service of mankind, rather than placing the human person at the service of science. God created man and woman to have stewardship over the earth. Science is one way in which we practice this stewardship over creation. Science and technology are thus "valuable resources for man when placed at his service and when they promote his integral development for the benefit of all."[9]

> "Whatever you did for one of these least brothers of mine, you did for me."
>
> – Matthew 25:40

But science can also be misused. When science loses its conscience, the inherent dignity and inalienable rights of the human person are endangered. This is why we are called to temper our use of scientific research so that it always respects human life.

The Church is a strong supporter of efforts to find medical cures and therapies in ethical ways, including adult stem cell research. Some dioceses in other countries have even started their own adult stem cell research programs or are funding adult stem cell research directly.

Why not make use of "spare" embryos or aborted fetuses that would be discarded anyway?

Some argue that when embryos are left over from artificial reproduction, they should be given to science rather than letting them "go to waste." Science will put these embryos to a positive use, and their tissue could even be used to develop medical cures. Similarly, when the life of fetuses is ended through abortion, their bodies could be put to positive use by harvesting their stem cells.

Yet no matter how weak, how small, or even frozen and unborn, no human being deserves to be treated like an object to be used for another purpose, however good it may be. Human life has an inherent dignity, and the value of a person does not depend on his usefulness to society. Rather, the person has an inherent worth because he is created in the image and likeness of God.

The Church also reminds us that parents are called to safeguard the physical safety of the unborn child, and it is not their right to take away the precious gift of life that is breathed into each of us by the Creator. Thus, "The informed consent ordinarily required for clinical experimentation on adults cannot be granted by the parents, who may not freely dispose of the physical integrity or life of the unborn child."[10]

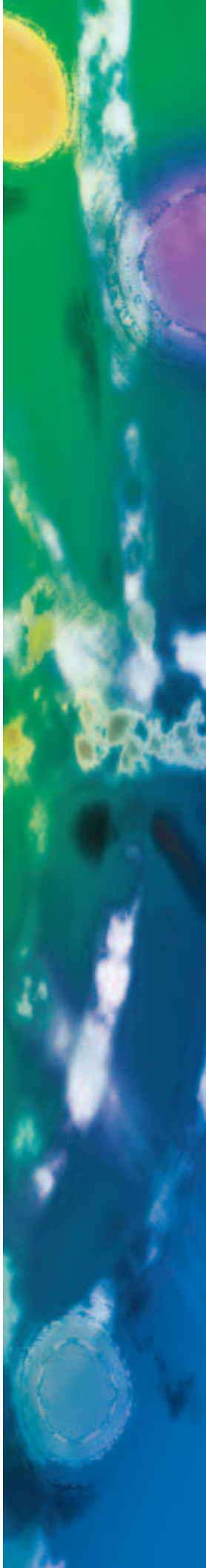
Does embryonic stem cell research endanger some aspects of our social life?

While adult stem cell research is already brining us the first fruits of healing and improvement of many medical conditions, embryonic stem cell research promises to bring us a very different type of harvest.

Embryonic stem cell research can only be carried out if we believe that some people are expendable for the benefit of others. In effect, the most vulnerable of Canadians would become the raw materials with which would we try to maintain the physical health of other citizens.

How can we remain safe if our society no longer respects the inherent dignity and inalienable rights of each human being, when some have the right to decide who lives or dies? How will we be able to resist further attacks on human life, including euthanasia, assisted suicide, prenatal genetic screening, and so on?

As members of the human family created by God, all human beings are responsible for their brothers and sisters. And as Christ's disciples, Christians are all needed as witnesses to the truth, to build a society that will "restore full human dignity and the right to life of every human being from the first instant of life and throughout the whole prenatal stage."[11] Years before becoming Pope Benedict XVI, Cardinal Ratzinger invited us "to recognize as a neighbour even the littlest among the children of men."[12]



Is there hope for conducting embryonic stem cell research in ethical ways?

Yes, some developments in scientific research have opened up the possibility of obtaining pluripotent stem cells in ways that do not harm human life.

One potential way could be to turn ordinary body cells into embryonic stem cells by "reprogramming" them to go backwards in their development.[13]

It also appears that a new type of pluripotent stem cell has more recently been found in amniotic fluid. This cell has some characteristics of embryonic stem cells and other characteristics of adult stem cells. Scientists are optimistic that this could become another ethical source for future stem cell therapies.

> "Scientists, therefore, must 'truly use their research and technical skill in the service of humanity,' being able to subordinate them 'to moral principles and values, which respect and realize in its fullness the dignity of man.'"
>
> ***– Compendium of the Social Doctrine of the Church, 458***

1 http://www.becomehealthynow.com/article/bodycell/709/

2 http://ask.yahoo.com/20020625.html

3 http://www.stemcellresearch.org/

4 Monitoring Stem Cell Research, President's Council on Bioethics (January 2004), *available at:* http://www.bioethics.gov/reports/stemcell/chapter1.html.

5 World Health Organization, "A dozen questions (and answers) on human cloning," *available at:* http://www.who.int/ethics/topics/cloning/en/

6 Congregation for the Doctrine of the Faith, *Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation: Replies to Certain Questions of the Day (Donum Vitae)*, 1987, Introduction, 5.

7 Pope John Paul II, The Gospel of Life *(Evangelium Vitae)*, 1995 (italics omitted), 60.

8 *Donum Vitae*, supra, I, 4.

9 *Donum Vitae*, supra, Introduction, 2.

10 *Donum Vitae*, supra, I, 4.

11 Pope John Paul II, "Reclaim Every Human Being's Right to Life," Address to the Pontifical Academy for Life, February 14, 1997.

12 *Donum Vitae*, supra, Conclusion.

13 Robert P. George, "A win-win option on stem cells," *Philadelphia Inquirer*, May 9, 2006.

Catholic Organization for Life and Family

This leaflet has been prepared by the Catholic Organization for Life and Family (COLF). Copies are available from the COLF offices at 2500 Don Reid Drive, Ottawa, Ontario, K1H 2J2, Tel.: (613) 241-9461, ext. 161, Fax: (613) 241-9048, E-mail: colf@colf.ca, Website: http://www.colf.ca

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