

**GENETICS, CLONING & STEM CELL RESEARCH**  
**The Medical–Moral Crises in our Lives Today**  
**Del Meyer, MD**  
**St Matthew Lutheran Church**  
**November 21, 2004**

**Invocation**

**Introduction**

Please sign in with your name and email address so we can give you updates on medical ethics issues and related agendas.

**References Texts:**

*BIOETHICS: A Primer for Christians* by Gilbert Meilaender, PhD

*PLAYING GOD - Redesigning Life* by Robert Weise, PhD

*WHAT CHILD IS THIS?* Marriage, Family & Human Cloning, CTCR, April 2002

*MEN, MEDICINE and their MAKER* by John W Klotz, PhD

*BODY, SOUL, and BIOETHICS* by Gilbert Meilaender, PhD

*CHRISTIAN ETHICS* by Normal L Geisler, PhD

*LIFE, LIBERTY and the DEFENSE OF DIGNITY- The Challenge for Bioethics* by Leon R Kass, MD, Chair, President's Council on Bioethics.

*HUMAN CLONING and HUMAN DIGNITY*, The Report of the President's Council on Bioethics; With a foreword by Leon R Kass, MD, Chairman

**Reference Web Resources:**

President's Council on Bioethics, <http://www.bioethics.gov>

The Center for Bioethics and Human Dignity, <http://www.cbhd.org>

Christian Medical & Dental Association, <http://www.cmdahome.org>

Mars Hill Audio, <http://www.marshillaudio.org>

Stand to Reason, <http://www.str.org>, Steve Wagner: Understanding the Embryonic Stem Cell Research Debate: Scott Klusendorf: Harvesting the Unborn: Ethics of ESCR.

**The World Around Us**

Christianity Today: Nov 2004, page 74 Stem Cells

<http://www.christianitytoday.com>

The Economist: Aug 2004 13: Cloning Embryos

<http://www.economist.com>

Bulletin: San Mateo Co Med Assn: April 2004, pp 1, 12

<http://www.smcma.org>

JAMA: October 6, 2004 p 1618: Being Human

<http://www.ama-assn.org>

Newsweek: Oct 25, 2004: The War Over ESCR

<http://www.newsweek.com>

**Ethics Overview**

Ethics has had much public press in view of the lapse of ethics in business, universities, government, law and medicine. As Christians, we should be talking about Christian Ethics since these are the principles on which all ethics are based no matter what our chosen fields may be. Otherwise, Business Ethics would have evolved differently than Medical Ethics, especially since the Judaeo-Christian codes are even forbidden to be used in our country. As a result, we have a variety of principles based on beliefs of the moment held by those in a particular field at anytime.

## **Genetics, Cloning and Stem Cell Research**

The three related topics of the evening are genetics, cloning and stem cell research. They are closely intertwined. It was artificial insemination that brought on a host of other advances and problems, including sperm donation, egg harvesting and *in vitro* fertilization, that started the genetic revolution. This in turn made possible implantation of a fertilized ovum in an unrelated uterus that then allowed single parenting, homosexual parenting and surrogate motherhood. This has now opened the doors to designer babies, stem cell research and human cloning.

### **Reproduction and Cloning** (CTCR Report April 2002: What Child Is This?)

Physically, the development and growth of the human body is directed by our genes, some 30,000 sets of physical instructions encoded in the DNA in our cells. Except for cells that are involved in our reproductive systems, every other cell in our body contains the entire set of genes, a complete double set of instructions for our physical being.

**Artificial insemination** is a relatively simple technique that introduces sperm into the woman's uterus by some means other than sexual intercourse. Sperm often comes from the woman's husband, but donor sperm from outside a marriage is also used. This technique changes the way that sperm is made available, but it does not change the basic genetic fact that the embryo conceived has a new double set of genetic instructions that combines a set of genes from the egg and a set from the sperm. While birth control separated sexual intercourse from procreation, artificial insemination separated procreation, which becomes reproduction, from sexual intercourse.

**Surrogacy** is the practice of having a woman who is not intended to be the social mother of the child provide the womb in which the child develops until he or she is able to be born. Embryos can be conceived in the surrogate's womb by natural intercourse or, more likely, by artificial insemination. In this case, the surrogate's egg contributes half of the genetic instructions for the child. *In vitro* fertilization and the technology of cloning (see below) make it possible to introduce into the womb an embryo that is not genetically related to the surrogate.

### **Baby M Surrogacy**

With donor eggs and sperm and host uterus as in surrogate motherhood, it is possible for a child to have as many as five “parents:”

- a. Two genetic “parents,” who provided the egg and sperm to form the zygote.
- b. A surrogate or gestational mother.
- c. Two rearing parents who are not the genetic “parents.”

It can get complicated, as this example from nearly two decades ago illustrates. Baby M was born to Mary Beth Whitehead in 1986. Mrs Whitehead had contracted with William and Elizabeth Stern, who hoped to be the rearing parents of a child conceived and gestated by her. She was to be inseminated artificially with Mr Stern’s sperm, and, in return, the Sterns paid her a fee (\$20,000) and covered her medical expenses. She in turn contracted to bear the child and give it up after birth, agreeing also to behave in certain ways while pregnant (not to smoke, drink or undergo amniocentesis and abort the child if asked to do so by Mr Stern) and not to form a bond with the child conceived. She did bond with this child and this case ended up in court, and as I recall, Mrs Whitehead was eventually given visiting rights.

**Cloning** marks a significantly different approach to a child's origin. Cloning changes the way the double set of genetic instructions comes into the new life. In cloning, the double set of genetic instructions that directs the embryo's physical development is derived not from the combination of genes from two parents but from a double set of genetic instructions identical to that of the single "parent" from which the clone is generated.

### **Preimplantation Genetic Diagnosis**

The ability to fertilize egg and sperm outside the human body has changed the face of human reproduction forever. Since the birth of the first IVF (in vitro fertilization) baby in 1978, more than 300,000 children have been born through Assisted Reproduction according to a report by Christo Zouves, MD. Dr Zouves, who specializes in infertility and in vitro fertilization in Daly City, California, states that we can now remove eggs from one female to help another achieve pregnancy; we can remove sperm directly from the testicle allowing men to father a child who would otherwise not be able to. We can inject a single sperm into an egg to promote fertilization, virtually eliminating severe male factor and most vasectomy reversals. We can transfer the gametes of one couple to a host uterus allowing implantation and pregnancy to occur.

The technology of manipulating gametes (sperm & egg) has become more sophisticated, and from injection of a single sperm (ICSI), we have now moved to the molecular level where we are removing the nucleus and, shortly, individual chromosomes and genes.

### **The Genetic Revolution**

New technology like Preimplantation Genetic Diagnosis (PGD) allows testing to be completed in a shorter time and on ever-smaller samples of DNA, allowing for widespread application. Currently, children born in the United States have a 3 percent to 4 percent chance of a major birth defect. Some of these abnormalities occur because of a problem with a single gene inherited from one or both of the parents, while other abnormalities are related to an abnormal number of chromosomes (aneuploidy). Single-gene defects and aneuploidy can be diagnosed before embryos are transferred to the uterus. This is PGD.

PGD permits the selection of embryos that are less likely to have chromosomal abnormalities and also embryos that may be free of a known single-gene disorder, thereby increasing the likelihood of a healthy baby and decreasing the chances of having to terminate a pregnancy found to be abnormal through chorionic villus sampling or amniocentesis.

### **The Human Genome**

The United States began an International Partnership in 1990 to map the human genetic sequence. This was to understand genes and their function—to study and understand inheritance more fully. By the year 2000, the working draft of the human genome was 90% complete. In 2003, two years ahead of schedule, the entire human genome was 99.99 percent complete, costing \$2 billion. Publication of the human genetic blueprint has forever transformed the way we think about humanity and, indeed, about early human life. As attention has shifted from the study of single genes to the contemplation of all genes, one fact has become intriguingly conspicuous. The human embryo, from the moment of conception, possesses a complete and distinct human genome.

The Human Genome Project, by having published but one example of a human genome, has made the point that even a solitary copy is meaningful. Every embryo of human origin is genetically a member of the human species, is genetically male or female, and, with the exception of identical twins and

(hypothetically) clones, is genetically unique. The extraordinarily detailed genetic montage of a new human embryo resulting from the recombination of maternal and paternal DNA forms a living entity that differs from every other entity that has ever existed. Moreover, through the genome, the continuity of human genetic identity is maintained throughout an individual's lifetime. The genome seated within the zygote, the first cell of the human life span, is the very same genome a person will have in old age. The Orwellian terms "pre-embryo" and "potential human being" no longer have any scientific validity.

### **What is a Human Being**

Since the entire human genome is present in the zygote, human life begins at fertilization. So you must have a human being before you can get human stem cells. Then to get those stem cells, you have to kill that human being. There are two ways to get a human being. Either by normal sexual fertilization of the egg by the sperm to form the zygote (procreation) or by asexual assisted reproduction or human cloning.

### **The Human Clone**

A human clone is an individual grown from a single genetic cell from her/his parent and identical to her/his parent. The child is an identical twin to her/his parent. S/he is an offspring of her/his grandparent. S/he is a parent to her/his siblings. The individual is formed by somatic cell nuclear transfer. A human clone is a human being. But what is at stake?

Cloning is an urgent issue. What are the facts, the law and ethics. In February 2004, Dr Wu Suk Wang, using 247 human eggs, 16 women and a modified technique, formed 30 blastocytes, or human embryos. Thus cloning is here. It will bring society and biomedical research in sharp focus. What are the issues in research vs reproductive cloning?

### **U.N. Abandons Idea of Anti-Cloning Treaty**

While there is near universal support among the United Nations' 191 members to ban reproductive cloning - the cloning of babies - countries have wrestled over whether to allow cloning for stem cell and other research.

For more than a year, the General Assembly's legal committee has been wrestling with rival cloning resolutions. One, offered by Costa Rica, calls for the drafting of a treaty banning all forms of cloning. The other, from Belgium, would allow some cloning for science.

In the end, the two sides were too divided to get enough support for a treaty that would achieve worldwide ratification, said Marc Pecsteen, a Belgian diplomat in the thick of the talks.

Instead, they agreed to settle on a less powerful, nonbinding declaration that would include language ambiguous enough to please both sides.

**Human-animal chimeras** may be just around the corner. Robin Cook popularized this in his medical thriller, *Chromosome Six*. By taking the human chromosome six and implanting it into apelike animals, the underworld could grow chimeras whose organs could be transplanted into humans.

### **Is the embryo a person?**

A human being is anyone that has the genetic makeup of homo sapiens. The embryo has the same genetic makeup of any other human being. Scott Klusendorf's, paper, "Death with a Happy Face: Peter Singer's

Bold Defense of Infanticide," in the *Christian Research Journal*, points out that some ethicists do not equate a human being with a person. ([www.str.org](http://www.str.org))

In 1993, ethicist Peter Singer shocked many Americans by suggesting that no newborn should be considered a person until 30 days after birth and that the attending physician should kill some disabled babies on the spot. Five years later, his appointment as Decamp Professor of Bio-Ethics at Princeton University ignited a firestorm of controversy, though his ideas about abortion and infanticide were hardly new. In 1979, he wrote, "Human babies are not born self-aware, or capable of grasping that they exist over time. They are not persons;" therefore, "the life of a newborn is of less value than the life of a pig, a dog, or a chimpanzee."

Singer is not alone in these beliefs. As early as 1972, philosopher Michael Tooley bluntly declared that a human being "possess[es] a serious right to life only if it possesses the concept of a self as a continuing subject of experiences and other mental states, and believes that it is itself such a continuing entity." Infants do not qualify.

More recently, American University philosophy professor Jeffrey Reiman has asserted that unlike mature human beings, infants do not "possess in their own right a property that makes it wrong to kill them." He explicitly holds that infants are not persons with a right to life and that "there will be permissible exceptions to the rule against killing infants that will not apply to the rule against killing adults and children."

Peter Singer's book *Practical Ethics* upsets activists on both sides of the abortion debate. Surprisingly, he concedes the foundational premise of the pro-life position, namely, that there is no essential difference between fetus and newborn. Then comes the shocker. Instead of upgrading the fetus to the status of a person, Singer downgrades the newborn to a nonperson.

His case is strictly utilitarian: until a baby has self-consciousness and a desire to live, there is no controlling reason not to kill him or her to serve the preferences of the parents. In fact, some acts of infanticide are less problematic than killing a happy cat. Despite Singer's bold rhetoric, his thesis is seriously flawed. Utility alone cannot determine right and wrong. Some crimes, such as rape and murder, are wrong regardless of the consequences. Furthermore, Singer's functionalism results in savage inequality. If rationality and self-consciousness define the morally significant person, the intellectually gifted would be free to maximize their pleasure at the expense of those less gifted. Most troubling, Singer cannot say why anyone should be moral. By comparing acting morally to a preference such as collecting stamps, he freely admits there is no compelling reason to take his ethics seriously. In the end, his practical ethics are "practically" worthless.

### **Where do stem cells come from?**

Ethically, stem cells, those cells from which all tissues and organs are derived, can be obtained from umbilical cord blood, bone marrow, brain tissue, liver and a number of other organs.

To begin, some definitions will be helpful. Stem cells are thought to be totipotent, pluripotent or multipotent.

**"Totipotent" stem cells**, such as a fertilized human egg, can become an entire human being.

**"Pluripotent" stem cells**, such as those found in a seven-day embryo (a blastocyst), can develop into any body cell type but can't become an entire human being.

**"Multipotent" stem cells** can only differentiate into the same tissue type.

For example, a bone marrow stem cell can differentiate into a monocyte, white blood cell or lymphocyte but not into kidney, heart muscle or brain.

**There are five and, maybe soon, six sources of stem cells.**

1. **Embryonic Stem Cells** - are harvested from the inner cell mass of the blastocyst seven to ten days after fertilization and early cell differentiation. The embryo at this stage may be up to 200 cells in size.

2. **Fetal Stem Cells** - are often taken from the germline tissues that will make up the ovaries or testes of aborted fetuses.

3. **Umbilical Cord Stem Cells** - Umbilical cord blood contains stem cells similar to those found in the bone marrow of newborns.

4. **Placenta Derived Stem Cells** - Anthrogenesis Corporation recently announced the development of a commercial process that can extract ten times as many stem cells from a placenta as from cord blood.

5. **Adult Stem Cells** - Tissues, like bone marrow, lung, pancreas, brain, breast, fat, skin and even tooth pulp, contain stem cells that have been isolated. In the public debate, umbilical cord and placenta stem cells (No 3 & 4 ) are included in the term "adult stem cells," though they are not adult at all.

6. **De-differentiation of Somatic Cells** - PPL Limited, the Scottish biotech company that developed "Dolly," is trying to create stem cells by the "de-differentiation" of somatic cells. Using skin or other cells, they hope to cause a cell to revert back to its stem cell ancestor.

**There are five proposed stem cell applications.**

1. **Functional Genomics** - Scientists will use them to try to understand the complex events of cell development.

2. **Drug Testing** - Stem cells could allow scientists to test new drugs using human cell lines which could hasten new drug development.

3. **Cell Therapy** - If cells could be guided to differentiate into specific cell populations, they could be used to treat diseases characterized by cell death such as diabetes, multiple sclerosis, myocardial infarctions or strokes.

4. **Gene Therapy** - The cell's ability to integrate and generate new cells within an organ makes stem cells prime candidates to deliver gene therapy to replace genetically defective cells.

5. **Organ Generation** - Stem cells could become the seeds of an unlimited source of lab-grown organs for transplantation.

**What do the Bible and other ethical standards say about this issue?**

Most importantly, the Bible says man is made in God's image (Genesis 1:26-27, 9:5-7). God's image is not based on human capacity such as the ability to reason or have relationships. The image of God is something humans possess as part of their nature or essence. The Scriptures describe a continuity of human personhood from before birth (Psalm 51:5, 39:13-16). Man is not seen as just another animal. God gave man dominion over animals (Genesis 1:26). The Bible also teaches that man is not to unjustly take human life (Deuteronomy 5:17).

What drives these points home is the fact that Christ's incarnation began with a miraculous fertilization (Luke 1:43; 26-38). Our Savior was once a one-cell embryo.

There are many ethical principles that argue against destroying embryos. The ethical principle of autonomy states that no one may act in a way that will affect another person without his or her informed consent. There is no greater violation of autonomy than to take a person's life.

Our Declaration of Independence states that "All men are created equal and endowed by their Creator with certain inalienable rights, among which are the right to life, liberty and the pursuit of happiness." The right to life is "inherent" in the sense that it is bound to the human essence of a person. It cannot be bestowed or taken away by another person, legislative body or court unless a person has forfeited his or her right to life by killing someone with intent and forethought.