

# STEM CELL RESEARCH BIOETHICAL ISSUES FROM A CATHOLIC PERSPECTIVE

## **Political Background**

In 1994, a panel, established by the National Institute of Health, examined the scientific, legal and moral issues involved in the use of human embryos in scientific research. One of the recommendations of the panel was to permit federal funding for research on embryos left over from *in vitro* fertility treatments. Another recommendation was to permit federal funding to create human embryos for research purposes.

Reacting to adverse public reaction to this recommendation, President Clinton issued an executive order banning the use of federal funds to create human embryos for scientific research, but did agree to fund research on left-over embryos created by *in vitro* fertility treatments.

At this point, the Congress intervened and passed the Dickey Amendment in 1995 which prohibited all federal funding for research that resulted in the destruction of the embryo regardless of the source of the embryo. The Dickey Amendment still remains in the law.

In the same year, the National Bioethics Advisory Commission was created by President Clinton to make recommendations to the National Science and Technology Council on issues involving bioethics and public policy, e.g., cloning and use of human biological materials.

Then in 1998, James A. Thompson, a biologist at the University of Wisconsin, isolated embryonic stem cells for the first time. This step was hailed as the beginning of a process that could quite possibly result in the cure of such diseases as Parkinson's and Alzheimer's. The hope was based on the fact that the cells of a 4-5 day old embryo, (blastocyst), are as yet undifferentiated and have the potential to become any part of the human body. Once isolated and reproduced, they could then be given "appropriate signals" to differentiate into various specialized cell types and then, theoretically, be "guided" into becoming specific body tissues. If this process proved successful it could result in the replacement or repair of many kinds of diseased tissues.

In September of 1999, the National Bioethics Advisory Commission sent a report to President Clinton entitled: *Ethical Issues in Human Stem Cell Research*. This report was more conservative in tone than that of the 1994 N.I.H. report. It recommended *against* creating embryos for research purposes. Rather, it recommended that embryos used in research should come from the supply of surplus embryos generated in the process of infertility treatment, since these unwanted embryos were already facing eventual destruction. The report also recommended that research using these embryos be restricted to stem cell research.

Eventually, President Clinton decided that the Federal ban against funding embryo research (the Dickey Amendment) would not be violated if funds were used only for stem cell studies and not for the processes which destroyed embryos to obtain the stem cells. This policy would remain until the presidency of George Bush.

In August of 2001, President Bush changed the Clinton policy and decided to limit Federal funding to the study of the 60 genetically diverse stem cell lines that already exist (actually less than 30 lines now exist). He reasoned that in the case of these stem cell lines, the destruction of the embryos had already taken place. However, he stated that no funding will be provided “that would sanction or encourage further destruction of human embryos that have at least the potential for life.” While many pro-life advocates applauded this decision, it seemed to some that this policy, at least indirectly, did “sanction and/or encourage” the destruction of embryos that produced these cells.

Despite urging from Congress in 2004, 2005 and 2006 President Bush continued to oppose federal funding for embryonic stem cell research, but currently there is new pressure coming from Congress. On January 11, 2007, the House voted 253 to 174 to increase federal funds for embryonic stem cell research. A similar bill is expected to pass the Senate. President Bush has promised to veto this bill and there are not enough votes in the Congress to override his veto.

None of the current or former federal policies have restricted private embryonic stem cell research, which could include destruction of embryonic life. Therefore, it would seem that the door had been left open for private “production” of embryonic stem cells, which could then be the objects of research using federal funds.

**Stem cells defined** - Stem cells are undifferentiated human cells present at all stages of human life. At the embryonic stage, they have the ability to differentiate in order to become the specialized cells needed to create all the tissues of the human body. At this early embryonic stage they even have the power to generate a completely new embryo (twinning). In adults, their ability to differentiate seems less flexible, but they can and do perform such tasks as strengthening the immune system or repairing damaged tissues in various parts of the human body.

Stem cells are classified as to their “plasticity” or “potency”, that is, their ability to differentiate and form various cells types of the human body. In order of their potency they are called totipotent, pluripotent, multipotent and unipotent.

Totipotent cells are cells that have the potential to differentiate to become all parts of the developing human body. They also can form a new embryo (in twinning). These are available only in the very early embryonic stages.

Pluripotent cells are cells that are able to differentiate to form most or all tissues of the human body. These are present in the embryo and recently some adult stem cells have been given this designation.

Multipotent cells are cells that are able to differentiate to form many, but not most of the cells of the bodily organs and tissues. These are present in adults.

Unipotent cells are seen as able to form only one differentiated human cell type and are also present in adults.

### **The Potential of Stem Cell Research**

Interest in human stem cell research is so great because it is believed that stem cells have the potential to cure diseases and save lives. In theory, embryonic stem cells are judged to have the greatest potential, because they are pluripotent cells that are not yet specialized. As such, they can undergo division to form other stem cells and then remain stem cells or go on through a process of differentiation to become specialized cells performing various functions of forming or repairing the damaged parts of the human body. As we shall see, adult stem cells were judged to have much less potential, but recent research has brought that judgment into question. In any event, researchers hope that stem cell research could some day result in the cure of such diseases as Parkinson's, Alzheimers, cancer and many others.

This exciting promise for stem cell research can become a reality if researchers can consistently isolate and reproduce stem cells, give them "appropriate signals" to differentiate into various specialized cell types and then "guide" them into becoming repair or replacement cells for various diseased tissues within the body.

It is also theoretically possible that stem cells could be used to grow entire new organs or regenerate the immune system. The potential benefits to human health are judged to be vast and obviously have created a great deal of anticipation in the medical research community and the general public, to say nothing of the commercial bio-medical industry.

Of course, stem cell research is still in its infancy. There have been ever increasing reports of successes with various kinds of adult stem cells and while the first crucial step of isolating embryonic stem cells has been taken, research has not discovered a way to make them effective in curing diseases. Again, to date, only adult stem cells have been reported to be effective in treatment experiments. And as important as these results are with adult stem cells, the clinically tested and verified results are still fairly limited in scope. Furthermore, the long term effects/benefits of all stem cell therapies are still to be assessed.

### **Biological Framework - The Development of Human Life**

At the heart of the ethical concerns about embryonic stem cell research is the question of when human life begins and becomes the subject of full human rights. Modern biology has made a strong supporting case for the position that individual human life begins at the moment of conception, although some scientists speak of conception as a process rather than a moment. A brief outline of the process of conception is as follows:

As a mammalian species, human reproductive cells - germ cells contained in the sexual organs - divide to produce the sperm and egg cells by a complicated process called meiosis. Meiosis reduces the number of chromosomes in the sperm and eggs to half. Since human cells possess forty-six chromosomes, each human sperm and egg contains only twenty-three chromosomes.

When the sperm enters the fallopian tube, it begins a process of capacitation in which the fluids in the fallopian tube give the sperm the “capacity” to penetrate the egg. This process can take from eight to ten hours.

Fertilization takes place when a single cell generated by a sperm cell of the father successfully penetrates the egg cell of the mother. The twenty-three chromosomes of the male sperm migrate through the egg’s protoplasm and pair up with the twenty-three chromosomes of the female egg. This process of conception (syngamy) produces a nucleus containing a full complement of forty-six human chromosomes (including its DNA) and a new, distinct human life, with its own distinct chromosome pattern comes into existence.

Many biologists refer to the single cell human life as an *embryo*, others prefer to call it a *zygote* and only accord it the status of an embryo after the first 14 days of existence. As we shall see, the Catholic ethical position considers human life from conception as an embryo.

After this fertilization process, nothing essential to the definition of human life is added from the outside. All that is observable is a continuous process of development throughout life - youth, maturity and old age. Human life is never static, it is always changing.

A review of the early biological process after fertilization may help when considering differences in opinions about the moral status of the embryo during the first 14 days.

As the single cell travels down the fallopian tube (oviduct) to the uterus, it begins to divide (not grow) by a process known as *mitosis* in which cells divide to form identical daughter cells. Finally, when cell division reaches 64 cells it is now called a *morula*, which under a microscope resembles a tiny raspberry. Cell division in the *morula* continues by *mitosis* and passes down into the uterus. The *morula* then folds in upon itself to form a double cellular-layered hemisphere known as the *blastocyst*. The *blastocyst* becomes a hollow ball and implants itself in the uterine lining.

The cells of the blastocyst will further divide and form two cell masses - and inner and an outer. After about four or five mitotic cell divisions from the original egg, the inner cell mass consists of “totipotent” embryonic stem cells. They are called totipotent because they can become a complete human being. As such, up to six days after fertilization one or two of these totipotent cells can even “bud” out and develop into another distinct human being creating twins or triplets, etc.

As mitosis continues over the next three or four days, the cells of the inner mass number between 128 and 256 cells. After six to eight mitotic cells divisions from the original fertilized egg, these older cells are no longer totipotent. They are now termed “pluripotent” because they no longer have the potential to produce another human being, but can only develop into the cell types of the various tissues and organs of the fully developed human body. However, their pluripotency is important and necessary because these stem cells have the potency to become all tissues and organs of the complete human being. Meanwhile, the outer layer becomes part of the placenta and eventually implants itself within the uterine wall.

By the fourteenth day after conception, implantation has taken place and the *primitive streak* appears in the now pear-shaped inner mass of cells, signaling the advent of differentiation of cells into the various parts of the human body. The primitive streak is the first recognizable anatomical differentiation of cells. These cells subsequently form the brain. The thinner “neck” of the pear becomes the body of the individual. Soon tissue buds appear, which become the limbs. Further differentiation of other cells occurs next and structures begin to appear which later may be clearly identified as gut, spine and heart. By the ninth week the embryo has developed into the fetus resembling a miniature adult.

It is important to note, however, some 35% to 50% of the products of human conception never reach the implant stage, but are discharged in the menstrual flow of the next menstrual period. In such occurrences, a woman may never even know that she has been pregnant. This process is sometimes labeled “spontaneous abortion” and various biological reasons are given for its occurrence.

This outline of the first 14 days of after conception is important because, as we shall see, some who hold an ethical position in opposition to the Catholic position admit that while human life begins with conception, some biological characteristics of the first 14 days - twinning and spontaneous abortion - may indicate “morally distinct stages” in the process of human development.

Thus, they would define human life in the first 14 days as zygotic human life, which cannot bear the moral significance of embryonic human life that is only present after the advent of the primitive streak (14 days), when final individuality is settled and brain development begins. In their view, only embryonic human life - after 14 days - might be considered individual, personal human life or at least demand the same respect and reverence accorded to personal human life. More of this later.

**Official Catholic Teaching** - There is little moral opposition from the Catholic hierarchy or Catholic moral theologians concerning stem cell research in itself. The goal of curing human afflictions is a laudable goal. The decisive moral questions revolve around the *source* of stem cells.

The official Catholic approval of research on adult stem cells was articulated in a letter to the National Institutes of Health Office of Science Policy from Msgr. Dennis Schnurr,

then the General Secretary for the U. S. Conference of Catholic Bishops. He wrote; “The existence of such startling new alternatives (adult stem cell research), which may be much more amenable to clinical use and do not require any destruction of human life, poses a significant new issue for ethics and public policy”.

The official Catholic position argues for a public policy position that excludes research involving embryonic stem cells based on an evaluation of its ethical dimensions and based on the successes and future hopes surrounding adult stem cell research that may, in fact, make embryonic stem cell research unnecessary.

The official Catholic position was also carefully outlined in a 1987 document, *Donum Vitae* (the Gift of Life), issued by the Vatican’s Congregation for the Doctrine of the Faith (CDF). It reads: “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.” (I.1) Further, it states: “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 womb”.(I.4)

This view is consistent with the Catholic Church’s position on other related issues, e.g., abortion, *in vitro* fertilization, embryo freezing, and preimplantation genetic diagnosis. The fundamental principle is this: *Any direct destruction of innocent human life is held to be immoral.*

The official Catholic position as expressed in *Donum Vitae* also makes the following qualification about the presence of *personal human life* in the early embryo within the context of the traditional Catholic moral evaluation of abortion:

Certainly no experimental datum can be in itself sufficient to bring us to the recognition of a spiritual soul; nevertheless, the conclusions of science regarding the human embryo provide a valuable indication for discerning by the use of reason a personal presence at the moment of this first appearance of a human life: how could a human individual not be a human person? *The Magisterium (teaching authority) has not expressly committed itself to an affirmation of a philosophical nature, (italics mine)* but it constantly reaffirms the moral condemnation of any kind of procured abortion. (3.1)

This position is also supported by a long-standing Catholic moral dictum which holds that when in doubt about a critical moral decision, the “safer course must be followed”. For example, if a person is hunting and it is impossible to distinguish whether a deer or another human is moving in the bush, the safer course (not shooting) must be followed because of the risk of taking an innocent human life. Since either the destruction or the manipulation of human life is at stake in embryonic research, the safer course must be followed.

Pope John Paul II, in his letter *Evangelium Vitae*, applied this principle of “following the safer course” to the human embryo from the moment of conception: “What is at stake is so important that, from the standpoint of moral obligation, the mere probability that a human person is involved would suffice to justify an absolutely clear prohibition of any intervention aimed at killing a human embryo.”

Within the ethical literature, which addresses embryonic stem cell research, this position is seen as one pole within the spectrum of ethical positions, from conservative to liberal. The Catholic position is seen as conservative in that the human embryo is to be considered, from the moment of conception, as a person with a full set of rights.

Other positions labeled liberal see the early embryo, often termed a zygote in the first 14 days, as a cellular product of human conception, but lacking a settled individuality. This lack of a settled individuality is based on the phenomenon of twinning and the absence of an anatomically identifiable brain which would indicate the absence of a “rational nature”. Thus it is argued, given this lack of a settled, rational nature, it cannot support the same moral claims a human persons do.

### **The Catholic Moral Evaluation of the Sources of Stem Cells**

It is often overlooked that many, if not most, involved in the ethical debates concerning stems cells (including the Catholic Church) agree on the morality of research on adult stem cells, stem cells from placentas, umbilical cords and the recent prospect of potent stem cells from amniotic fluid. Moral disagreement centers on the process of isolating embryonic stems cells, especially when the embryo is destroyed or manipulated.

It is also quite interesting that most moral theologians - no matter what their opinions on embryonic stem cell research - agree on two fundamental ethical positions based on natural law and held in the Catholic tradition:

- 1) It is ethically wrong to directly take innocent human life. (natural law)
- 2) It is ethically wrong to use another human person as a mere means to our ends and not an end in themselves. (natural law and also Kant)

Thus we are left, not so much with a disagreement on morals, but rather with a question of fact, i.e., at what point in the reproductive process is personal and/or individual human life present and thus able claim the full range of human rights -- especially the right to life and the right to be treated as an end in itself?

We have already mentioned the official Catholic position on judging the moral status of the embryo: “given the fact that human life is at stake, the safer course must be followed”. However, some moralists, even in the Catholic tradition, judge that this question has not been definitively addressed and have offered an “alternative approach” to the official Catholic approach. Therefore we are left to make an evaluation of this

“alternative approach” to the Catholic position on embryonic stem cell research. This alternative approach accepts the two fundamental ethical positions within the Catholic tradition (cited above) and hinges on an evaluation of the presence of individual, personal human life in the first 14 days of life.

A brief outline of the alternative position is important because some would argue that it gives a basis for a judgment in good conscience against the official Catholic position. It will be argued in this paper that the alternative position may be rightly judged as flawed, but it concerns a question of fact and not of morals. Supporters of the alternative position may hold that the fact of the presence of personal, individual human life is so challenged in the first 14 days, that one may successfully challenge the basis of the principle to “follow the safer course”, given the vast potential for good in the possibility of addressing many grave human illnesses.

### **The Focus of An Alternative Position on Embryonic Stem Cell Research**

Given the note of “philosophical modesty” on the presence of personal human life expressed in *Donum Vitae* cited above, some moral theologians feel free to explore an alternative view. The context of this alternative view centers on the first 14 days after conception, as noted above. The phenomenon of twinning, the potential of recombination (twins becoming a single individual again) and the phenomenon of “spontaneous abortion” before implantation are considered as indications for consideration of an alternative view relative to the conservative view as exemplified in the official Catholic position. Some Catholic moral theologians are also giving some new consideration to the medieval Catholic tradition of “delayed animation” held by St. Thomas and others and reflected in Canon Law.

One result of this questioning has been to first propose a possible distinction between *human life* in the first 14 days and *personal and/or individual life* after implantation. (The question of personal human life is included here, although some would argue that this is purely a philosophical question).

The next step is to determine whether or not it is possible to place a moral value on *human life* in the first 14 days that might differ in some significant degree from the value of *individual human life* which exists after implantation. This potential difference in moral value may open the possibility that the moral value of *human life* in the first 14 days could give way to the moral value of the benefits to humankind which would come from embryonic stem cell research and its potential benefits, even if embryonic life is destroyed or manipulated in the process.

This developing moral investigation among Catholic theologians is *not* based on a simplistic view of embryonic human life expressed in an extreme liberal view which would treat the early product of conception as merely “biological material”, a mere clump of cells with no moral significance. These theologians affirm that at conception we indeed have human life and whatever distinctions may be made about its relative moral

status at certain stages of development, from the moment of conception all human life deserves a degree of respect. It is the “degree of respect” than is in focus and in question.

The important operational question to be answered is this: Is a degree of respect for human life in the first 14 days inherently incompatible with embryonic research, given the possible benefits to humanity? Some moralists are answering: Perhaps not.

### **Basis for the Alternative Position - the Definition and Presence of Individual/ Personal Human Life**

So far we have not attempted to define personal human life and when it is present. For purposes of this discussion, it is assumed that this is a philosophical problem, obviously related and important to the issue, but logically distinct from the biological issues. In the Catholic tradition, science is extremely important for theology and ethics, but not determinative. All Catholic moral theologians agree that whenever personal human life is present, either at conception or sometime thereafter, this personal human life must be accorded all the respect and rights which we demand for all personal human life.

The first and fundamental right accorded to human persons is the right to life. Within most moral traditions, including the Catholic tradition, once personal human life is present, *the absolute prohibition against the direct killing of innocent human life*, becomes operative. This position is, of course, defended by the vast majority of Catholic moral theologians.

The current debate in Catholic moral circles in this discussion focuses on two *possible dimensions* of human life: human life and individual human life. The results of investigations into these two areas provide the scientific basis for what we might term an “alternative position”.

#### Individual Human Life

We mentioned earlier that some would argue that during the first 14 days after conception certain phenomena may throw some doubt as to whether or not we can rightly refer to this developing human life as “individual human life”. We noted above that the phenomena of twinning and spontaneous abortions, coupled with the philosophical discussion of ensoulment, are critical factors in any possible distinction of “individual human life” as opposed to “human life” in the first 14 days following conception.

Twinning - After fertilization, a number of things can happen which give cause for consideration. For example, up until the 14th day, the phenomenon of twinning may occur. Identical twins develop from an single fertilized egg. During this time the embryo has not yet developed a “primitive streak,” the precursor to the various parts of the human anatomy -- the brain, the backbone. Once a backbone develops, the embryo can no longer split and become twins, and will grow as a single human being. The possibility of twinning indicates that in this early stage of development there is a sense that the cells have not yet “decided” to become an individual.

Therefore, some moral theologians are suggesting that perhaps in these circumstances, while human life is certainly present, we cannot speak yet of “individual” human life. Of course, even if this is a valid distinction (not proven), the question remains whether or not zygotic *human life* as opposed to embryonic *individual human life*, provides us with a distinction that has any impact concerning the morality of stem cell research.

This possibility of twinning also poses another problem for certain historical strands of Catholic theology based on Aristotelian-Thomistic philosophy - the hylomorphic theory. This philosophical tradition (still used in official Catholic thought) uses the Greek philosophical terms matter and form. The “matter” (the body) is informed by the “form” (the soul) and this results in an individual human life. However, a tradition that holds to the immediate “implantation” at conception of an immortal, spiritual, indivisible soul, thus creating an individual human person, is challenged when this “matter”, informed by this indivisible “form”, divides into two, or three or more. Germain Grisez, who defends the position that individual, personal human life is present at conception, has called these twins “grandchildren” of the original embryo.

This situation is further complicated by a little known phenomenon in which twins may be recombined or rejoin. Therefore, these same strands of the Catholic tradition might be challenged to offer an explanation for the disappearance of one or two individual, immortal souls without the death of any fertilized egg. Therefore, some have suggested that the notion of an individual human life at this embryonic stage seems difficult to defend, at least in traditional terms.

Spontaneous abortions -- When focusing on the first 14 days after conception, another problem for certain strands of Catholic theology arises from the current estimation by embryologists that from 35% to 50% of all blastocyst that attempt to implant themselves in the uterine wall, fail to do so and perish -- or as some say, they are “naturally aborted”. This creates a problem for a position that considers human life from the moment of conception onward to be human life in the fullest sense.

While Catholic theology no longer teaches that unbaptized infants cannot be saved or that they are consigned to the state of “Limbo”, it is still difficult for some to imagine a natural process within God’s creative plan that would exclude nearly one-half of all human beings from reaching some form of individual human development. Are all of these spontaneously aborted blastocysts to be considered individual human beings/persons in the same sense as more developed human life? In other words, does human life at this stage of development have an eternal destiny? On what basis would this biologically undeveloped “person” be able to make a conscious, fundamental option for or against God?

The medieval Catholic tradition of ensoulment -- The Catholic tradition continues to teach that the human soul is a special creation by God infused at the moment of conception.. In the words of the *Encyclopedia of Catholicism* “In its (the Church’s) authoritative teaching, it leans to the view that the soul is infused into the zygote at the time of conception.” An older view of the distinction between “unensouled and ensouled

fetuses” based on the theory of delayed animation dating from St. Thomas in the thirteenth century was removed from Canon Law in 1869.

The theory of delayed animation as proposed in the 13th century by St. Thomas Aquinas envisioned “ensoulment” of the embryo as a process which took forty days for a male and eighty days for a female. It was a conclusion resulting from Aristotle’s “theory of hylomorphism”. In its simplest terms, the theory of hylomorphism states that “matter” must first be properly disposed to receive its “form” (in humans the form is the soul). To be human, it must have human form. Therefore, Thomas held that true human life went through three stages of ensoulment related to what Thomas viewed as the three stages in the development of human life; the vegetative, the animal and finally the human.

St. Thomas, as St. Augustine before him, considered abortion unacceptable at all times, but did not consider it homicide in the early stages of pregnancy. It has been rightly pointed out that 13th century biology was primitive, to say the least, and therefore the theory of delayed animation has long been held in disrepute and is not currently a part of official Catholic teaching. However, it is again being reexamined by some Catholic theologians and philosophers.

Summary -- After giving consideration to the phenomenon of twinning, the high rate of spontaneous abortions and the lack of philosophical certainty about the process of “ensoulment” and thus the advent of personal human life, some scientists and moral theologians are proposing that, although at fertilization a new genetic package (a “human package”) is brought into being within the confines of one cell, this anatomical fact may not necessarily mean that all of the genetic material in it becomes crucially activated at that point, or that final, irreversible individuality has been achieved, at least in the initial 14 day period. Therefore it seems questionable to attach the term “person” to a being whose individuality is still unsettled and for whom there is naturally about a 50% chance of not making the transition to implantation and survival.

Thus some Catholic theologians now maintain an alternative view that it is now possible to make a distinction between *human life* that is undifferentiated, non-individual and quite doubtfully personal during the first two weeks of human life and *individual human life* in the full sense of that term present after the first two weeks of human life. If it is indeed possible to make a distinction between “human life” and “individual human life” (not yet proven), the question remains as to the moral significance of terminating “human life” as opposed to terminating “individual human life”. Some of these authors have suggested that while “individual human life” ought to be regarded as sacred and thus inviolable, “human life”, while certainly worthy of respect is not sacred and therefore perhaps not absolutely inviolable relative to other human goods, e.g., stem cell research possibly resulting the cure of many human diseases. The implications of this respect have not been fully determined.

At the current time it seems evident that within the Catholic moral tradition there are several “schools” of thought involved in the stem cell issue. On the issue of the personhood of early embryonic human life, one school questions its presence given the

phenomenon of twinning, another the phenomenon of spontaneous abortions and the “developmental school” argues that while early embryonic human life is deserving of respect, it does not gain the moral status of person until there has been sufficient development. The theological basis for this view is grounded on the theological writings of some of the most important theologians of the 20th century and include such names as Bernard Haring, Karl Rahner, Joseph Donceel, Richard McCormick, John Mahoney and Margaret Farley.

Against such a view the columnist Sidney Callahan writing in *Commonweal* (July 14, 2002) makes this insightful comment:

Human zygotes also have a long lineage. They are the incredibly developed endpoints of millions of years of evolutionary change. The active genetic information in the microscopic initial stages of human life is as dynamically potent as a nuclear explosion....After all, it is this very capacity for potential that makes scientists want to manufacture, dissect, and destroy embryos in their research....

As evolutionary biology has progressed in understanding the developing saga of human life, it has also honed our awareness of our common genetic heritage. We share an identity as one species. Each instance in time of embryonic human life is related to all the rest of the human family, and not just to its progenitors. The human species lives from generation to generation as an interdependent unitary whole. How misguided it is to think it acceptable to divide human kind into bits and pieces of disposable property....

By viewing embryos as individualistic entities, isolated and unembedded in evolutionary history and species identity, (some) would deny them equal moral status, at least until fourteen days, or implantation, or some other arbitrary milestone. Too bad. (p.7)

### **An Evaluation of the Alternative Position**

Given some ambiguity about the facts concerning the presence of individual human life worthy of all human respect, we have indicated that certain scientists and certain moral theologians are raising questions about possible moral distinctions in the first 14 days of human life. However, it is well to note that many other equally competent scientists and theologians see no need to raise such questions. And certainly, the official Catholic position remains the same: *All human life from the moment of conception is to be considered sacred and accorded all the rights given to human persons, the first of which is the right to life.*

So how can we approach an evaluation of the alternative position? The alternative position can be evaluated according to the two ethical principles (noted above) which have near universal acceptance:

- 1) It is ethically wrong to directly take innocent human life.
- 2) It is ethically wrong to use another human person as a mere means to our ends and not an end in themselves. (natural law and Kant)

While there are questions raised by the phenomena of twinning and spontaneous abortion and the revival of the medieval theory of delayed animation these questions do not result in a definitive conclusion that individual human life is not present until the advent of the primitive streak. Lacking a definitive conclusion, it can be argued, that it is reasonable and perhaps mandatory to follow the safer course and refrain from embryonic stem cell research, especially when the destruction of the embryo is part of the process of isolating embryonic stem cells. It can also be argued that with the advancement of adult stem cell research, embryonic stem cell research may not be necessary to achieve the laudable goals of addressing a variety of human illnesses.

As we shall see below, recent research by Robert Lanza seems to indicate the future possibility of isolating embryonic stems cells at the eight cell stage, without destroying the embryo. However, even if this proves to be possible in the future, the process may well be judged to violate the second fundamental ethical principle mentioned above, i.e., it is ethically wrong to use another human person as a mere means to our ends and not an end in themselves. Given this principle the manipulation of the embryo would be held to be unethical by this principle.

### **A Recent Development**

Most of the ethical concern with research on embryos is focused on the fact that in the research process the embryo is destroyed. This ethical concern is based on the ethical principle that it is unethical to directly destroy innocent human life.

Recently this ethical principal seemed to be sidestepped by research cited in an article published on August 24, 2006 in *Nature* magazine, concerning the reported research of Dr. Robert Lanza, the medical director of Advanced Cell Technology in Worcester, Mass. In this report, Lanza states: "What we have done, for the first time, is actually create human embryonic stem cells without destroying the embryo itself."

Lanza presented his research as a justification for therapeutic cloning. Lanza used a procedure similar to that commonly used for pre-implantation genetic diagnosis, to check for genetic disorders during the process of in vitro fertilization (IVF). Lanza said that he was able to pluck out one totipotent cell of an embryo at the 8 to 10 cell stage, without destroying the embryo. And that he was able to devise a way to co-culture the cell with other cells and reported that "they have been growing for over eight months, are entirely normal genetically and they were able to generate all of the cell types of the body".

He hopes that this procedure - where the embryo is not destroyed - will pave the way for federal funding, which at the present time is restricted to stem cell lines derived from

embryos that had been already destroyed before the limit was set by President Bush in 2001.

However, in a September 6th Nature magazine online article, it was reported that, in fact, all 16 of the embryos used in Lanza's research had been destroyed and that more than one cell had been taken from each embryo. What Lanza did show is that a human embryonic stem-cell line can be created from a single cell, extracted from a very early embryo comprising 8-10 cells.

Lanza's work has also been critiqued on several counts by Arthur Caplan, Ph.D., director of the Center for Bioethics at the University of Pennsylvania. He does not see Lanza's work as a breakthrough. Certainly scientific evaluation of Lanza's efforts will continue in the literature. (for details see: [www.msnbc.msn.com/id/14502237/](http://www.msnbc.msn.com/id/14502237/))

In any event, the ethical principle invoked above is that, even if the science of cloning advances and cloned embryos could become healthy adult human beings and even if Lanza's procedure proves to be successful and does not destroy the embryo, this process involves a manipulation of human life that amounts to using another human life as a means to the ends of others and therefore, cannot be ethically permitted. Furthermore, if a totipotent cell is extracted, and it has the possibility of becoming a twin it could be argued that this could result in the destruction of a possible individual human life.

### **An Ethical Alternative to Embryonic Stem Cell Research**

Given the fact that, as of yet, there have been no medical success stories with embryonic stems cells and given the ethical issues involved in the various research methods for isolating embryonic stem cells, one obvious reasonable recommendation would be to use stem cells from other sources which, as sources, pose no ethical issues and have already demonstrated some success.

Here are two examples.

Adult stem cells - Adult stem cell research has been a long process. It took approximately 25 years between discovery and routine clinical application of adult stem cell therapy. In truth, a few years ago researchers thought that there were relatively few adult stem cells present in the body. They also seemed difficult to isolate and grow in culture and seemed to be extremely limited in their capacity to generate new cell types. It was thought that they were limited to forming more cells only from their tissue of origin.

However, a number of reports in recent years have changed these opinions, because adult stem cells are proving to be remarkably flexible. In a 2001 publication, evidence was presented that a single adult bone marrow stem cell could contribute not only to formation of cells for marrow and blood, but also to the formation of liver, lung, digestive tract, skin, heart and muscle cells.

Several examples now exist of some adult stem cells demonstrating pluripotent flexibility. These examples include cells from bone marrow, peripheral blood, the inner ear, umbilical cord blood, etc. These pluripotent cells can multiply in culture for extensive periods of time while still retaining their ability to differentiate and provide sufficient numbers of cells for clinical treatments.

While all these research results hold great promise, yet on the clinical side, there are still only a few adult stem cell treatments that have been fully tested in all required phases of clinical trials in order to be approved by the U.S. Food and Drug Administration. These approved adult stem cell therapies are considered powerful and life-saving, but the clinical applications are basically limited to blood disorders and specific blood cell-derived cancers such as leukemia, lymphoma and multiple myeloma.

Some strong advocates of adult stem cell research, like Senator Brownback, are claiming high numbers of success stories. Brownback uses a list created by David Prentice of the Family Research Council, which claimed that adult stem cells have now helped patients with at least 65 different human diseases. However, other researchers point out that only 9 of the conditions on the Prentice list have been fully clinically tested and the others still await clinical validation and FDA approval.

However, because of the actual, clinical tested success stories involving adult stem cells, a number of other diseases are being targeted, such as problems from spinal cord injury, Parkinson's disease and coronary artery disease. Researchers and funding agencies see a bright future for adult stem cell therapy.

For example, this bright future resulted in a \$100,000 grant from Joan's Legacy, a lung cancer foundation, given to Kansas State University researchers Masaaki Tamura and Deryl Troyer. They isolated stem cells from the cushioning material of the umbilical cord and successfully used these cells in treating lung cancer in mice. Their long-term goal, financed by this grant, is to use this therapy to cure cancer in humans.

Other researchers have "morphed" placental stem cells into nerve, blood, cartilage, skin and muscle cells and they urge researchers and funding sources to concentrate on placental cell research. They point out that there are 4.5 million births each year and the placentas are routinely discarded.

Another example, at the June 2006 meeting of the International Society for Stem Cell Research, Shinya Yamanaka and Kazutoshi Takahashi of Kyoto University reported that they were able to turn adult mouse skin cells back to an embryonic state by adding four biochemical messenger molecules found in early embryos. Assuming that their methods will work on human adult cells, they would be able to grow replacement cells and tissues, genetically matched to individual patients, thus effectively producing embryonic stem cells without using a embryo at all.

(Information above taken in part from a paper by Dr. David A. Prentice, "Current Science of Regenerative Medicine with Stem Cells" from a symposium sponsored by The Family

Research Council and Center for Clinical Bioethics, Georgetown Medical Center, Washington, DC 2001, a July, 2006 article in *Science*, the *New Scientist* and the K-State Collegian Newspaper).

Amniotic stem cells - With embryonic stems cells at one end of the potency spectrum and adult stem cells seem to be on the other, the recently reported success with isolating stem cells from amniotic fluid may provide a middle course, by making pluripotent stem cells available without either destroying or manipulating an embryo.

Amniotic-fluid stem cells (AFS cells) are found in both the placenta and the liquid that surrounds growing fetuses. The potency of these cells is judged to be somewhere between embryonic and adult, but have been described as pluripotent and seem to be very close in potency to embryonic stem cells. Like embryonic stem cells they multiply quickly and are remarkably long-lived.

Amniotic-fluid stem cells are collected by the process of amniocentesis in which some of the fluid surrounding the fetus is drawn out through a hollow needle inserted into the uterus. They can also be taken from the placenta or from tissues shed after birth.

In a recent article in the journal *Nature Biotechnology*, Dr. Anthony Atala, director of the Institute for Regenerative Medicine at the Wake Forest University School of Medicine in Winston-Salem, N.C., reported very favorable research results with amniotic-fluid stem cells: "So far, we've been successful with every cell type we've attempted to produce from these stem cells."

## **Conclusion**

The official Catholic position on embryonic stem cell research seems to coincide quite well with the data of modern biology. From the moment of conception (absent genetic malfunctions) the single human cell contains all the potentialities that will enable it to become a complete human person. As such, it should never be treated as a mere object. There seems to be no reason not to grant this developing human life all the dignity that we grant human life at other stages in its development. Therefore, the minimal moral stance would require that, at least operationally, we would do well to adopt the Catholic moral tradition in following the safer course and to foster a moral presumption for the sacredness of human life from the moment of conception and thus a moral presumption against embryonic stem cell research.

Because of the important ethical concerns surrounding embryonic cloning and all other research involving embryonic stem cells and given the success, availability and lack of ethical concerns relative to research involving non-embryonic stems cells, e.g., adult and amniotic, it seems the most logical course to follow at this point would be to continue to allow, support and fund adult stem cell research.

(This article was written in February of 2007. With the rapidity of change and development in this area, there may be recent developments that are not addressed in this brief outline)

## **BIBLIOGRAPHY**

These lecture notes have not been completely footnoted and should not be reproduced without complete footnotes. The information related in this lecture has been taken, in part, from the following articles:

- Cahill, Lisa Sowle, *Stem Cells: Bioethical Balancing Act*, March 26, 2001, *America* pp.14-19.
- Callahan, Sidney, *Zygotes & Blastocysts: Human enough to protect?*, July 14, 2002, *Commonweal*, p. 7
- Harvey, John Collins, M.D., *Distinctly Human: The When, Where & How of Life's Beginnings*, February 8, 2002, *Commonweal*. pp. 11-13.
- Lauritzen, Paul, *Neither Person Nor Property: Embryo Research and the Status of the Early Embryo*, March 26, 2001, *America* pp. 20-23.
- Broadening the Debate on Cloning and Stem Cell Research*, February 4, 2002, *America*.
- McBrien, Richard, ed., *The Harper Collins Encyclopedia of Catholicism*, 1995.
- Porter, Jean, *Is the Embryo A Person?: Arguing with the Catholic Traditions*, February 8, 2002, *Commonweal*. pp. 8-10.
- Shannon, Thomas A., *Human Embryonic Stem Cell Therapy*, December 2001, *Theological Studies Vol. 62, No. 4*. pp. 811-824.
- Wildes, Kevin Wm., *The Stem Cell Report*, October 16, 1999, *America*. pp. 12-14

### **Web Sites**

*Donum Vitae*, Congregation for the Doctrine of the Faith - [ww.vatican.va/roma.../rc\\_con\\_cfaiht\\_doc\\_19870222\\_respect-for-human-life\\_en.htm](http://ww.vatican.va/roma.../rc_con_cfaiht_doc_19870222_respect-for-human-life_en.htm)

### **Books**

Recommended source book: Suzanne Holland, Karen Lebacqz, and Laurie Zoloth, *The Human Embryonic Stem Cell Debate: Science, Ethics, and Public Policy* (Boston: MIT, 2001)

