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STEM CELL ETHICS

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STEM CELLS: SCIENCE AND SOCIETY





CHAPTER ONE:

What is at Stake in the Embryo Experimentation Debate

NOAH AND THE FLOOD

On January 16, 2007, a remarkable journey came to an end in Covington, Louisiana. Sixteen months earlier, Noah Benton Markham's life had been jeopardized by the winds and rain of Hurricane Katrina. Trapped in a flooded hospital in New Orleans, Noah depended upon the timely work of seven Illinois Conservation Police officers, and three Louisiana State officers who used flat-bottomed boats to rescue Noah and take him to safety.

Although many New Orleans residents tragically lost their lives in Katrina and its aftermath, Noah's story of rescue is, nevertheless, one of many inspirational tales of heroism from that national disaster. What, then, makes it unique? And why did the story of his rescue end sixteen months after the events of September 2006? The answer is that Noah has the distinction of being one of the youngest residents of New Orleans to be saved from Katrina: when the Illinois and Louisiana police officers entered the hospital where Noah was trapped, he was an embryo, a human being in the very earliest stages of development, frozen with fourteen hundred embryos in canisters of liquid nitrogen.

Noah's story had a happy ending: Noah's parents were overjoyed those sixteen months later when Noah emerged, via cesarean section, into the light of the wide world. His parents named him in acknowledgment of a resourceful survivor of an earlier flood. His grandmother immediately started phoning relatives with the news: "It's a boy!" But if those officers had never made it to Noah's hospital, or if they had abandoned those canisters of liquid nitrogen, there can be little doubt that the toll of Katrina would have been fourteen hundred human beings higher than it already was, and Noah, sadly, would have perished before having the opportunity to meet his loving family.

Let us repeat it: Noah would have perished. For it was Noah who was frozen in one of those canisters; Noah who was brought from New Orleans by boat; Noah who was subsequently implanted into his mother's womb; and Noah who was born on January 16, 2007.

Noah started this remarkable journey as an embryo, or blastocyst—a name for a very early stage of development in a human being's life. Noah continued that journey after implantation into his mother's womb, growing into a fetus and finally an infant. And he will continue, we are confident, to grow into an adolescent and a teenager as he continues along the path to adulthood.

Noah's progress in these respects is little different from that of any other member of the human race, save for the exertions necessary to save him at the very earliest stage of his life. But in later years, if Noah were to look back to that troubled time in New Orleans and ask himself whether he was rescued that day, whether it was his life that was saved, we believe that there is only one answer he could reasonably give himself: "Of course!"

THE MORAL

This answer to Noah's question is a mere two words long, yet it contains the key to one of the most morally and politically troubled issues of our day. Is it morally permissible to produce and experiment upon human embryos? Is it morally permissible to destroy human embryos to obtain stem cells for therapeutic purposes? Is it morally permissible to treat human embryos as disposable research material that may be used and destroyed to benefit others? All such questions have the seeds of their answer in these two words. For what Noah would be saying in these two words—and his answer is confirmed by all the best science—is that human embryos are, from the very beginning, human beings, sharing an identity with, though younger than, the older human beings they will grow up to become.

Human embryos are not, that is to say, some other type of animal organism, like a dog or cat. Neither are they a part of an organism, like a heart, a kidney, or a skin cell. Nor again are they a disorganized aggregate, a mere clump of cells awaiting some magical transformation. Rather, a human embryo is a whole living member of the species *Homo sapiens* in the earliest stage of his or her natural development. Unless severely damaged, or denied or deprived of a suitable environment, a human being in the embryonic stage will, by directing its own integral organic functioning, develop himself or herself to the next more mature developmental stage, i.e., the fetal stage. The embryonic, fetal, child, and adolescent stages are stages in the development of a determinate and enduring entity—a human being—who comes into existence as a single-celled organism (the zygote) and develops, if all goes well, into adulthood many years later.

But does this mean that the human embryo is a human person worthy of full moral respect? Must the early embryo never be used as a mere means for the benefit of others simply because it is a human being? The answer that this book proposes and defends with philosophical arguments through the course of the next several chapters is "Yes."

This "yes" has many implications, for human life in its earliest stages and most dependent conditions is under threat today as in no other era. The United States, as well as many of the countries of Europe and the developed countries of Asia, are about to move beyond the past thirty years' experience of largely unrestricted abortion to a whole new regime of human embryo mass production and experimentation. This new regime requires new rationalizations. Whereas, in the past, the humanity of the fetus, or its moral worth, were ignored or denied in favor of an alleged "right to privacy," or considerations of the personal tragedies of women experiencing unwanted pregnancies, what is now proposed is something quite different. The production of human embryos, and their destruction in biomedical research, will take place in public labs by teams of scientists. If those scientists and their many supporters have their way, their work will be funded, as it is or soon will be in California, New Jersey, and elsewhere, by the state or by the nation, and in either case by taxpayers' money. And if that work bears fruit, then the consequences of this research will be felt throughout the world of medicine and the pharmaceutical industry. It will be virtually impossible for those with grave moral objections to such experimentation to remain free from entanglement in it: their money will pay for labs in their universities, and their doctors will routinely use the results of embryo-destructive research.

For example, in 2004, a ballot initiative known as Proposition 71 was passed in California. This referendum was supported by Arnold Schwarzenegger, the Republican governor of the state. Its backers contributed a tremendous amount of money, and much propaganda, to ensure its passage. The measure promises that up to \$3.1 billion will be spent on embryo-destructive research over the next ten years. Even supporters of the research have pointed out that Proposition 71 threatens to bring about a largely unregulated industry that will inevitably line the pockets of a relative few. But such objections, important as they are, ignore what this industry is centrally about: the production and destruction of human beings in the earliest stage of development. This basic truth is lost amidst discussion of "therapeutic cloning" or "Somatic Cell Nuclear Transfer (SCNT)," euphemisms and technicalities designed to obscure rather than clarify. And amidst the promises of boundless health benefits from this research, it can become tempting to lose sight of all that



is really at stake. But consider the following analogy.

Suppose that a movement arose to obtain transplantable organs by killing mentally retarded infants. Would the controversy that would inevitably erupt over this be best characterized as a debate about organ transplantation? Would anyone accept as a legitimate description the phrase therapeutic organ harvesting? Surely not: the dispute would best be characterized—and in any decent society it would be characterized—as a debate about the ethics of killing retarded children in order to obtain their organs. (Indeed, in a truly decent society, the question would not arise at all!)

Nor would the public, we submit, accept arguments for the practice that turned on considerations about how many gravely ill nonretarded people could be saved by extracting a heart, two kidneys, a liver, etc., from each retarded child. For the threshold question would be whether it is unjust to relegate a certain class of human beings—the retarded—to the status of objects that can be killed and dissected to benefit others. Similarly, there would be something almost obscene in worrying about underregulation of these procedures.

By the same token, we should not be speaking, as in California, in terms of a debate about embryonic stem cell research; nor is the main moral issue that of adequate governmental oversight. No one would object to the use of embryonic stem cells in biomedical research or therapy if they could be derived without killing or in any way wronging the embryos. Nor would anyone object to using such cells if they could be obtained using embryos lost in spontaneous abortions. The point of the controversy is the ethics of deliberately destroying human embryos for the purpose of producing stem cells. The threshold question is whether it is unjust to kill members of a certain class of human beings—those in the embryonic stage of development—to benefit others. Thus we return to the significance of the story of Noah and the flood.

THE EMBRYO TECHNOLOGIES OF TODAY AND TOMORROW

What is it, though, that is currently being done with embryos, or that can currently be done with embryos, or that might one day be done with embryos? In this section we describe various embryo technologies, some of which are currently possible, and some that might be on the horizon. Before doing this, however, it is important to make some distinctions. In particular, we need to distinguish between what we will call embryo science, embryo technology, and embryo ethics.

We distinguish between embryo technology, and technologies, on the one hand, and embryo science, on the other, for a simple reason: Embryo science tells us two important things about human embryos: what they are, and when they begin. It tells us, that is, that human embryos are human beings at a certain (very early) developmental stage, and that in the vast majority of cases, those human beings begin at conception, the initiation of a new single-celled human organism after the fertilization of an egg by a sperm. Science tells us these two things so definitively, in fact, that a whole chapter of this book is devoted simply to the science of embryos. But science itself does not provide us with guidance in making moral decisions about the treatment of those embryos or of human beings at any developmental stage.

Embryo technologies represent the abilities of researchers to do things to or with embryos. And researchers can do many such things. They can make embryos in a lab, whether by in vitro fertilization or by cloning. They can keep embryos alive in the lab, whether in a petri dish, or indefinitely by cryopreservation (freezing). Researchers can then manipulate those embryos by tinkering with their DNA or by introducing foreign DNA, such as animal DNA, into a human embryo's genetic makeup. And, ultimately, researchers can destroy those embryos, extracting cells for the purpose of providing pluripotent stem cell lines.

Like embryo science, embryo technology is incapable of providing moral guidance regarding the question

of how we ought to treat those embryos. We know from science that those embryos are nascent human beings; and we know from technological research that we can manipulate those embryos in a variety of destructive ways. But is such manipulation morally right? Is it just? It is the business of moral philosophy-embryo ethics, as we call it here-to answer this question.

It is critical to engage seriously with embryo ethics today. For it is not uncommon to hear embryo researchers and their supporters claim that only science should have a say in what science does, and that ethics, religion, and politics have no business in the concerns of science. Such sentiments should sound familiar to anyone who has listened to proponents of such research defend the freedoms and even the imperatives of scientific research.

Such claims are true in one way and false in another, however. It is true that moral philosophy cannot say what the embryo is. Nor does moral philosophy have anything to say about what can be done with an embryo. These are matters of the way the world is, and moral philosophy is concerned with what we ought to do, or refrain from doing. But by the same token, science, which is concerned with what is the case, has nothing to say about what we ought to do, even in the domain of science.

Moreover, it is clearly false to say that if something can be done, then it ought to be done, or that it would be good to do it. This was made abundantly clear earlier in our hypothetical story about transplanting the organs of retarded children. It is, sadly, made even clearer by the historical record of the twentieth century. Nazi experiments on handicapped persons, Jews, and others regarded as "undesirables"; the Tuskegee experiments on poor black men; radiation experiments on the unsuspecting carried out by the U.S. military-all testify to the necessity of science accompanied by moral reflection, not the imperative of science unbounded by morality. And, as the following brief look at what is and might soon be the case in embryo technology reveals, now is the time for that reflection.

Some say that the age of embryo technology began on July 25, 1978, with the birth of Louise Brown, the world's first "test tube baby," in England. More accurately, the age of embryo technology began nine months earlier, when Louise herself came into existence in a petri dish under the guidance of doctors Patrick Steptoe and Robert Edwards. Since then in vitro fertilization (IVF) has become a significant way of addressing infertility, with nearly 1 percent of all live births in the United States originating in vitro.

Current IVF techniques are easily understood. In natural human reproduction, a sperm cell from the male penetrates and fertilizes a waiting egg that has been released from the ovary of the mother. (In chapter two, we will give a more detailed account of what happens in this process.) The result of successful fertilization is a new single-celled human organism, the zygote.

In most cases, of course, the means by which the sperm is introduced into the environment of the egg is sexual intercourse between a man and a woman. But in IVF, the meeting of sperm and egg takes place "in vitro," that is, in a petri dish in a lab (although "in vitro" means "in glass," a petri dish is actually made of plastic). Typically, the mother-to-be is given drugs to stimulate ovulation. An ultrasound-guided needle is inserted into one of her ovaries and used to retrieve the eggs. Sperm is obtained from the father, and either many sperm are injected into a solution surrounding an egg, or a single sperm is directly inserted into an egg. When the sperm penetrates the egg, the resulting fertilization process takes place just as it would within the mother. After three days, or a bit more, the resulting embryo or embryos are transferred to the mother's uterus. The mother may receive a hormonal treatment to ensure that her uterine lining remains suitable for implantation.

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EMBRYONIC STEM CELL RESEARCH: AN ETHICAL DILEMMA

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Embryonic stem cells offer hope for new therapies, but their use in research has been hotly debated. Different countries have chosen to regulate embryonic stem cell research in very different ways. Mention embryonic stem cells in the pub and the topic still divides opinion. But what exactly are the ethical arguments and why are they so tricky to resolve?

The Ethical Dilemma

Embryonic stem cell research poses a moral dilemma. It forces us to choose between two moral principles:

The duty to prevent or alleviate suffering

The duty to respect the value of human life

In the case of embryonic stem cell research, it is impossible to respect both moral principles. To obtain embryonic stem cells, the early embryo has to be destroyed. This means destroying a potential human life. But embryonic stem cell research could lead to the discovery of new medical treatments that would alleviate the suffering of many people. So which moral principle should have the upper hand in this situation? The answer hinges on how we view the embryo. Does it have the status of a person?

**Chapter 1 of this film introduces some of the key ethical arguments.
Watch this film and others on our [films page](#).**



What moral status does the human embryo have?

The moral status of the embryo is a controversial and complex issue. The main viewpoints are outlined below.

1. The embryo has full moral status from fertilization onwards

Either the embryo is viewed as a person whilst it is still an embryo, or it is seen as a potential person. The criteria for 'personhood' are notoriously unclear; different people define what makes a person in different ways.

Arguments for this view :

Development from a fertilized egg into to baby is a continuous process and any attempt to pinpoint when personhood begins is arbitrary. A human embryo is a human being in the embryonic stage, just as an infant is a human being in the infant stage. Although an embryo does not currently have the characteristics of a person, it will become a person and should be given the respect and dignity of a person.

Arguments against this view :

An early embryo that has not yet implanted into the uterus does not have the psychological, emotional or physical properties that we associate with being a person. It therefore does not have any interests to be protected and we can use it for the benefit of patients (who ARE persons).

The embryo cannot develop into a child without being transferred to a woman's uterus. It needs external help to develop. Even then, the probability that embryos used for in vitro fertilization will develop into full-term successful births is low. Something that could potentially become a person should not be treated as if it actually *were* a person

2. There is a cut-off point at 14 days after fertilization

Some people argue that a human embryo deserves special protection from around day 14 after fertilization because:

After 14 days the embryo can no longer split to form twins. Before this point, the embryo could still be split to become two or more babies, or it might fail to develop at all.

Before day 14, the embryo has no central nervous system and therefore no senses. If we can take organs from patients who have been declared brain dead and use them for transplants, then we can also use hundred-cell embryos that have no nervous system.

Fertilization is itself a process, not a 'moment'. An embryo in the earliest stages is not clearly defined as an individual.

3. The embryo has increasing status as it develops

An embryo deserves some protection from the moment the sperm fertilizes the egg, and its moral status increases as it becomes more human-like.

Arguments for this view :

There are several stages of development that could be given increasing moral status:

1. Implantation of the embryo into the uterus wall around six days after fertilization.
2. Appearance of the primitive streak – the beginnings of the nervous system – at around 14 days.
3. The phase when the baby could survive if born prematurely.
4. Birth.

If a life is lost, we tend to feel differently about it depending on the stage of the lost life. A fertilized egg before implantation in the uterus could be granted a lesser degree of respect than a human fetus or a born baby.

More than half of all fertilized eggs are lost due to natural causes. If the natural process involves such loss, then using some embryos in stem cell research should not worry us either.

Arguments against this view :

We protect a person's life and interests not because they are valuable from the point of view of the universe, but because they are important to the person concerned. Whatever moral status the human embryo has for us, the life that it lives has a value to the embryo itself.

If we judge the moral status of the embryo from its age, then we are making arbitrary decisions about who is human. For example, even if we say formation of the nervous system marks the start of personhood, we still would not say a patient who has lost nerve cells in a stroke has become less human.

If we are not sure whether a fertilized egg should be considered a human being, then we should not destroy it. A hunter does not shoot if he is not sure whether his target is a deer or a man.

4. The embryo has no moral status at all

An embryo is organic material with a status no different from other body parts.

Arguments for this view :

Fertilized human eggs are just parts of other people's bodies until they have developed enough to survive independently. The only respect due to blastocysts is the respect that should be shown to other people's property. If we destroy a blastocyst before implantation into the uterus we do not harm it because it has no beliefs, desires, expectations, aims or purposes to be harmed.

Arguments against this view :

By taking embryonic stem cells out of an early embryo, we prevent the embryo from developing in its normal way. This means it is prevented from becoming what it was programmed to become – a human being.

Embryonic stem cell research and religion

Different religions view the status of the early human embryo in different ways. For example, the Roman Catholic, Orthodox and conservative Protestant Churches believe the embryo has the status of a human from conception and no embryo research should be permitted. Judaism and Islam emphasize the importance of helping others and argue that the embryo does not have full human status before 40 days, so both these religions permit some research on embryos. Other religions take other positions. You can read more about this by downloading the extended version of this factsheet below.

Find out more

Extended factsheet with a fuller discussion of the issues by Kristina Hug (pdf)
EuroStemCell film "Conversations: ethics, science, stem cells"
EuroStemCell factsheet on ethical issues relating to the sources of embryonic stem cells
EuroStemCell factsheet on the science of embryonic stem cells
EuroStemCell FAQ on human embryonic stem cells and their use in research
EuroStemCell summaries of regulations on stem cell research in Europe
Booklet for 16+ year olds about stem cells and ethics from the BBSRC
Research paper on the ethics of embryonic stem cell research by Kristina Hug

Acknowledgements and references

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Images courtesy of Wellcome Images: Egg and sperm by Spike Walker; Blastocyst on pin by Yorgos Nikas; Diabetes patient injecting insulin by the Wellcome library, London.

Other images from "Conversations : ethics, science, stem cells", a film by EuroStemCell.

Source: <http://www.eurostemcell.org/factsheet/embyronic-stem-cell-research-ethical-dilemma>