

HUMAN CLONING

HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY,
AND SPACE,

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION

UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

FIRST SESSION

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MAY 2, 2001
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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SEVENTH CONGRESS

FIRST SESSION

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HUMAN CLONING

WEDNESDAY, MAY 2, 2001

U.S. SENATE,
SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:30 p.m. in room SR-253, Russell Senate Office Building, Hon. Sam Brownback, presiding.

OPENING STATEMENT OF HON. SAM BROWNBACK, U.S. SENATOR FROM KANSAS

Senator BROWNBACK. The Committee will come to order. Today, we will be holding a hearing on the vital issue of human cloning.

As our country debates the issue of human cloning, as well as those issues which surround it, I think it is helpful to engage in a similar dialog in the Senate. The issue of human cloning forces us to debate first principles—most particularly, the meaning of human life, and whether that life is a person or a piece of property.

The importance of the issue of human cloning simply cannot be underestimated. It is an issue that touches on our humanity in a way few issues have, and it does so at a time when we have the unique ability to resolve the issue properly, not only for our own country, but also to lead the way for the world.

I recently introduced legislation to ban human cloning, Senate bill S. 790, which has been referred to the Senate Judiciary Committee. I believe there is a deep concern in America, and the world in general, with the use of this technology for the purposes of creating humans. In fact, according to a recent Time/CNN poll, 90 percent of Americans thought that it was a bad idea to clone human beings.

I believe, along with Congressman Weldon, and many Americans share this belief, that efforts to create human beings by cloning mark a new and decisive step toward turning human reproduction into a manufacturing process in which children are made in laboratories to preordained specifications.

Creating cloned live-born children begins by creating cloned human embryos, a process which some also propose as a way to create embryos for research or as sources of cells and tissues for possible treatment of other humans. The prospect of creating new human life solely to be exploited and destroyed in this way has been condemned on moral grounds by many as displaying a profound disrespect for life.

Furthermore, recent scientific advances indicate that there are fruitful and morally unproblematic alternatives to this approach. There is no need for this technology to ever be used with humans, whether for reproductive purposes or for destructive research purposes.

I look forward to a good full debate on this issue not only in this Committee but in the full Senate as well. I think we are faced with a wonderful opportunity to fully address this issue and to pass meaningful legislation.

Our panels present a wide variety of viewpoints on this issue. During the hearing today we will hear philosophical, religious, ethical, and scientific views expressed. We will also hear from those who advocate for patient research, as well as those who represent the biotech industry, an industry that stands to profit substantially if they are allowed to undertake human cloning research.

Our first panel is Representative David Weldon, who has introduced companion legislation to mine in the House of Representatives.

**STATEMENT OF HON. DAVID WELDON,
U.S. REPRESENTATIVE FROM FLORIDA**

Mr. WELDON. Human cloning is the asexual reproduction of an organism which is genetically virtually identical to an existing or previously existing human being, performed by somatic cell nuclear transfer technology.

It took 277 attempts to produce Dolly, and some estimate that producing a human child could take 1,000 attempts. Of cloned cows, sheep, goats, pigs, and mice, 95 to 97 percent of these efforts still end in failure. The attempt to clone humans does not account for the scientific problems which occur with animal cloning and, therefore, any such attempts will result in high failure rates.

Most scientists agree that human cloning poses a serious risk of producing children who are stillborn, unhealthy, severely malformed or disabled, and almost universal opinion is that such attempts are thoroughly unethical. Additional problems with human cloning include the potential for mutation, transmission of mitochondrial diseases, and the negative effects from the aging genetic material.

Abnormal clone development likely results from faulty DNA reprogramming, leading to abnormal gene expression of any of the 30,000 genes needed. Prenatal screening methods to detect chromosomal or genetic abnormalities in a fetus cannot detect these reprogramming errors, and no future methods exist for detecting reprogramming errors. If there would be undetectable genetic abnormalities in a developing human clone, then there may also be genetic defects in any tissues or cells derived from human clones.

Cloning human beings is utilitarian in nature. Efforts to create human beings by cloning mark a new and decisive step toward turning human reproduction into a manufacturing process in which children are made in laboratories to preordained specifications and, potentially, in multiple copies.

While people have indicated a desire to be cloned, almost no one has claimed that they would want to be a clone. Cloning could easily be used to reproduce persons without their consent.

Because it is an asexual form of reproduction, cloning confounds the meaning of father and mother. Human cloning confuses the identity and kinship relations of any cloned child.

The prospect of creating a new human life solely to be exploited or destroyed in this way has been condemned on moral grounds by many, including many supporters of the right to abortion, often referred to as displaying a profound disrespect for human life. Some groups in this category include the General Board of Church and Society of the United Methodist Church.

Moreover, human cloning is not therapeutic. Therapy implies a therapeutic application, and today there are no known published accounts of how cloning can be used in therapeutic applications. Embryonic stem cells are not being used today in any clinical trials. The Journal of Science recently reported the successful use of embryonic stem cells from mice to produce pancreatic islet cells. However, those islet cells produced only 2 percent the normal amount of insulin in culture, and when placed into mice with diabetes, the mice did not survive. They died.

Researchers at the University of Florida have taken adult mice pancreatic stem cells and been able to produce islet cells and culture that produce insulin, and when these were injected in diabetic mice, they began secreting insulin and within 7 to 10 days the mice successfully regulated their glucose level.

Researchers in France have found human pancreatic stem cells from healthy donors that expressed the critical production of insulin. Recent scientific advance indicates that there are fruitful and morally unproblematical alternatives. Adult stem cells have already been used successfully in clinical trials to treat cartilage defects in children, restore vision in patients who are legally blind, relieve systemic lupus, multiple sclerosis, and rheumatoid arthritis, and to cure severe combined immunodeficiency disease.

Now, some want to still nonetheless allow human cloning for research purposes, but only want to outlaw or ban the implantation of cloned embryos. The legislation we are working on, the Human Cloning Prohibition Act of 2001, bans human cloning for reproductive and experimental purposes. It bans the participation in human cloning. It bans the importation of products derived from this technique.

This bill does not ban animal cloning, or cloning of DNA cells or other human embryos. It does not ban twinning. It does not ban stem cell research. The bill prohibits cloning techniques to create new human life at all stages of the process of life. This means both experimental and reproductive cloning would be illegal in the United States.

Other bills allow for human cloning for experimental purposes, and merely ban implantation of cloned embryos into the mother's womb. However, Mr. Chairman, it would be virtually impossible to prevent reproductive cloning once a cloned embryo for experimental reasons becomes available in the lab.

Additionally, reproductive-only bans are fraught with enforcement complexities should a cloned embryo ever be implanted. An effective ban must therefore stop the process at the beginning, which H.R. 1644 in the House does. Reproductive-only bans—might I add, this approach would allow for human cloning of human em-

bryos typically just to be used for research. However, the reproductive-only ban would require by Federal law that cloned human embryos be destroyed prior to implantation. This would be the first time Federal law would allow for the creation of human life solely for the purposes of experimentation, while simultaneously making it a Federal offense to let that life continue.

I think clearly this is ethically and morally fraught with extreme hazard for our Nation, and that is why I have introduced this legislation.

[The prepared statement of Mr. Weldon follows:]

PREPARED STATEMENT OF HON. DAVID WELDON,
U.S. REPRESENTATIVE FROM FLORIDA

What would it be like to have five Michael Jordans to suit up an entire team? Or what if there were two of you to accomplish more in a 24 hour day? The prospect of human cloning has been the stuff of science fiction novels and movies. However, on February 27, 1997 Ian Wilmut from the Roslin Institute in Scotland cloned Dolly the sheep, a feat which has triggered international debate on the issue of cloning human beings. Chicago physicist Richard Seed announced that he would begin cloning children for infertile couples. President Clinton called for a five year moratorium on human cloning and advised the National Bioethics Advisory Commission to review human cloning. They recommended that cloning humans for reproductive purposes is unsafe and unethical at this time. However, they largely ignored the use of cloning technology to create human embryos solely for research purposes. This year, Panos Zavos of the University of Kentucky and his Italian colleague, Sevenno Antinori, have begun work with a global consortium to develop human cloning techniques in their efforts to perform human cloning and produce a human child within the next two years. Dr. Brigitte Boisselier, the Director of Clonaid which is part of the Raelian movement, has stated that they already have been offered substantial sums of money to clone children, and they are secretly working on developing technologies in this country to clone children. Many biotechnology companies look forward to multi-millions of dollars in the hope of developing cures for various diseases from cloning human embryos.

There are scientifically and medically useful cloning practices, such as cloning of DNA fragments, known as molecular cloning, the duplication of somatic cells (or stem cells) in tissue culture, known as cell cloning, and whole-organism or embryo cloning of non-human animals. Human cloning is not about these techniques, nor is it about issues related to fetal tissue research or embryo research. Instead, human cloning as discussed here is about the creation of cloned human embryos for reproductive or experimental purposes. Instead of the fertilization of an egg with sperm to conceive an embryo with DNA from male and female, human cloning is asexual reproduction. It is currently accomplished by somatic cell nuclear transfer technology. This is accomplished by introducing the nucleus of a human somatic cell into an egg whose nucleus has been removed or inactivated to produce a living organism with a human genetic constitution. A "somatic cell" is a diploid cell, that is a non-germ cell which has a complete set of chromosomes, which is obtained or derived from a living or deceased human body.

There are significant problems with cloning. It took 277 attempts to clone Dolly. Despite success at cloning cows, sheep, goats, pigs and mice, 95 percent to 97 percent of these efforts still end in failure.

Most scientific experts claim that the attempt to clone human organisms does not account for scientific problems which occur with animal cloning, and therefore, any such attempts will result in high failure rates. Rudolf Jaenisch of the Whitehead Institute states that serious problems have happened in all five species cloned thus far, so that there is no question that it will happen with humans. Most scientists agree that human cloning poses a serious risk of producing children who are still-born, unhealthy, severely malformed or disabled. As such, most scientists are ethically opposed to producing cloned human children.

Those such as Ian Wilmut and Rudolf Jaenisch conclude that the most likely cause of abnormal clone development is faulty reprogramming of the genome. This may lead to abnormal gene expression of any of the 30,000 genes residing in the animal. Methods used in routine prenatal screening to detect chromosomal or genetic abnormalities in a fetus cannot detect these reprogramming errors. Further, they claim that there are no methods available now or in the foreseeable future to assess whether the genome of a cloned embryo has been correctly reprogrammed.

Creating cloned live-born human children necessarily begins by creating cloned human embryos, a process which some also propose as a way to create embryos for research or as sources of cells and tissues for possible treatment of other humans. It is absolutely crucial to realize the fact that if there would be undetectable genetic abnormalities in a developing human clone, then there may also be significant genetic defects in any tissues or cells derived from cloned human embryos. The problem of genetic defects is a major reason why most scientists are opposed to implanting cloned embryos and allowing any development toward childhood. However, the same argument applies then as a major reason why human cloning for medical purposes should be opposed. Will we create human clones, and from these derive tissues or cells with hidden genetic defects to be used on other human beings? Additional scientific problems exist with human cloning such as the potential for mutation, transmission of mitochondrial diseases, and the negative effects from the aging genetic material.

Some call cloning for experimental purposes "therapeutic cloning." On the contrary, human cloning is not therapeutic in itself. Therapy implies an existing individual and a standard of health to be pursued. But because human clones will be created and then destroyed, human cloning diminishes the distinction between health promotion of an individual and genetic enhancement, between so-called negative and positive eugenics. A fundamental tenant of medical ethics is "DO NO HARM". But that is precisely what is involved with experimental cloning, the creation and harm of cloned embryos for research purposes.

What seems outrageous and macabre can become accepted given time. The principle behind human cloning, for reproductive or experimental purposes, is utilitarian. Our society was not built upon utilitarian principles, which ultimately accept discriminating against or even destroying those in the minority or the weak for the greater good of the greater number. These things begin very small, with apparently unobjectionable measures taken out of sympathy to deal with difficult cases. But soon the definition of difficult cases expands, and the exception becomes the rule. Ethically, this parallels the justification of eugenics and human experimentation in the early 20th Century. A diminished view of human value coupled with the veneration of science, especially in Germany, provided the ethical context within which sterilization and euthanasia programs became socially acceptable. It was the medical profession that first embarked on these programs which, in part, led to the eventual havoc wrought in Germany.

There are additional ethical problems. Because cloning requires no personal involvement by the person whose genetic material is used, cloning could easily be used to reproduce living or deceased persons without their consent. Imagine that. Someone takes some skin cells from your comb or toothbrush, or from your body without your permission and creates a replica of yourself, to which you would be both parent and twin. Additionally, because human cloning is an asexual form of reproduction, cloning confounds the meaning of "father" and "mother" and confuses the identity and kinship relations of any cloned child. This threatens to weaken existing notions regarding who bears which parental duties and responsibilities for children.

Efforts to create human beings by cloning mark a new and decisive step toward turning human reproduction into a manufacturing process in which children are made in laboratories to preordained specifications and, potentially, in multiple copies. Some have stated that they want to clone themselves, but none have stated that they would want to be a human clone. Effects on the genetic characteristics of a population, have the potential to be used in a eugenic or discriminatory fashion. These practices are completely inconsistent with the ethical norms of medical practice.

Moreover, the prospect of creating new human life solely to be exploited and destroyed for research purposes has been condemned on moral grounds by many, including supporters of a right to abortion, as displaying a profound disrespect for life. The General Board of Church and Society of the United Methodist is opposed to any form of human cloning.

There are two approaches of regulating human cloning. One is to allow human cloning, but ban any implantation into a woman's womb. The problem with this approach is that it allows the creation of human organism solely for experimental purposes. Because cloning would take place within the privacy of a doctor-patient relationship; because the transfer of embryos to begin a pregnancy is a simple procedure; and because any government effort to prevent transfer of an existing embryo, or to prevent birth once transfer has occurred, would raise substantial moral, legal, and practical issues, it will be nearly impossible to prevent attempts at "reproductive cloning" once cloned human embryos are available in the laboratory. If a cloned embryo is implanted into a woman's womb, will the Federal Government force her to have an abortion? An effective ban on human cloning must therefore stop the process at the beginning.

Senator Brownback and I have submitted legislation that bans human cloning for reproductive or medical purposes. It bans participating in human cloning, and it bans the importation of products derived from human cloning. This bill does not ban the scientifically and medically useful practices of cloning of DNA fragments, known as molecular cloning, the duplication of somatic cells (or stem cells) in tissue culture, known as cell cloning, and whole-organism or embryo cloning of non-human animals. My bill also calls on the Federal Government to commission a study to review the impact of any decision to allow human cloning, and review new developments in cloning technology directed toward the asexual reproduction of human beings.

There are numerous problems with human cloning, such as the danger of failure, the genetic defects of tissues derived from cloned embryos, the possibility of creating monsters, or in some cases of creating human-animal hybrids. But unless the fundamental problem is faced, whether we have the right to mock nature, the incidental problems will not prevent us from beginning a very dangerous attempt to change human nature.

Senator BROWNBACK. Thank you very much, Dr. Weldon. I look forward to working with you on this topic.

I think it is particularly important what you put forward. As people look at this issue and divide it into so-called, "reproductive" or "experimental" cloning, it seems to me it would be difficult to just limit cloning to "experimental" cloning. If we did that, at some point down the road it may well be that somebody would decide to implant a clone. What would we do then? Would we push for a Federal law that would force this person to abort the child? I guess that is the question we have before us.

Mr. WELDON. Well, it would certainly be in conflict with the tenets or principles established by the Supreme Court through the *Roe v. Wade* decision and some of the preceding decisions on privacy and subsequent decisions relating to this issue. It would run directly in conflict to that.

Clearly, a reproductive-only ban would encourage or allow all the scientific technology to develop that is necessary for human reproductive cloning, but then put the Federal Government in the precarious position of having to somehow police the process, and some people might add that it would still be illegal.

I think the purpose or intent here is not necessarily to make sure that somebody who did this faced the consequences, but the purpose and intent is to make sure it does not happen, and the best way to effectively do that is to ban embryonic cloning.

Senator BROWNBACK. Dr. Weldon, what drew your interest to this topic at this time? There has been the potential for this to occur for some period of time, but what drew your attention now?

Mr. WELDON. Well, I think the thing that really brought it to my attention was that we had scientists in the United States who said they wanted to proceed down this path. There are also some people in the research community and the biotechnology industries who want to exploit the issue of embryonic cloning. Therefore, I felt that it was very, very timely that the Federal Government take a position on this issue, and that that position be to make it illegal in the United States.

Senator BROWNBACK. Before we got started down this path?

Mr. WELDON. Absolutely.

Senator BROWNBACK. Thank you very much for being here today. We look forward to working with you on this topic.

Mr. WELDON. Thank you.

Senator BROWNBACK. Now we will call the second panel, if they would come forward. They are Ms. Margaret Colin, an actress; Mr. Clarke Forsythe, President of Americans United for Life; Dr. Rudolf Jaenisch, Professor of Biology at MIT; Dr. Leon Kass, the Committee of Social Thought, University of Chicago; Mr. William Kristol, Chairman of The Bioethics Project.

Thank you all very much for being here.

Ms. Colin, we will be pleased to start with your testimony and look forward to hearing what you have to say.

STATEMENT OF MS. MARGARET COLIN, ACTRESS

Ms. COLIN. Thank you, Mr. Chairman, for this opportunity to discuss an issue that is near and dear to my heart. I am here on behalf of Feminists for Life of America, an organization that opposes the creation and destruction of human clones for stem cell research.

In the tradition of Susan B. Anthony and other early American feminists, we oppose all violence. Feminists for Life is proud to serve in the National Violence Against Women Task Force, and is a member of the National Coalition Against the Death Penalty. Suffragist organizer Elizabeth Cady Stanton, whose statue sits down the street in the Capitol Building, strongly criticized the destruction of newly formed humans “as property to be disposed of as we see fit.”

The proper role of medical research is to eradicate illness, not create and then destroy human beings. Disease and disability affect every family in America. My husband, actor Justin Deas, is committed to raising funds in order to bring about a cure for ALS after a friend and a colleague of his died from it. I have helped raise funds for Juvenile Diabetes Association because a college friend’s daughter was diagnosed with it. I have also supported National Association of Breast Cancer organizations, and the Pediatric AIDS Foundation. Like you, we are committed to finding a cure to debilitating diseases and relieve human suffering.

I am not a scientist, but it was widely reported that it took hundreds of attempts to clone sheep before Dolly was created without gross fetal anomalies. Cloning, therefore, would seem to be an unreliable source for stem cells in addition to violating the basic tenets of feminism—nonviolence, nondiscrimination and justice for all.

My intent here is not to downplay the importance of medical research, but to plead for standards that ensure we do not abuse our power by choosing who is important enough to live while disposing of another. We are wasting time arguing over destroying life while we all want to protect and improve it. Fortunately, we can move forward with medical research from stem cells derived from a multitude of sources.

We do not need to go to extreme measures by making and destroying carbon copies of people. Alternative sources to cloning which present no ethical problems are proving very promising for those who would benefit from medical research. We urge you to direct Federal funds to support these promising new alternatives, including stem cells acquired from consenting adults, women donating placenta, umbilical cord donations, even stem cell from fat,

which I am sure many of us would be more than happy to dedicate in the name of science.

Feminist pioneer Mary Wollstonecraft, who in 1792 wrote the landmark book, *The Vindication of the Rights of Women*, prophetically warned nature in everything deserves respect, and those who violate her laws seldom violate them with impunity. This woman, who championed the rights of women and condemned the destruction of embryos, died giving birth to her second daughter, named Mary after her mother. She, too, became a great writer. Mary Wollstonecraft Shelley fictionalized her mother's warning through her classic novel, *Frankenstein*.

I am here today to keep a promise to my 7-year-old son, Joe. Together with his brother, Sam, we watch his shows, and invariably they are animated science fiction programs which preach the benefits of cloning humans to harvest body parts for the use of others. On one occasion, we watched one of mom's shows, a human interest show interviewing a mother and a father who decided to have a second child in order to harvest cells to save the life of their first-born child.

My Joe asked me, are they going to kill the baby? I asked him why he thought the parents would kill their child. He told me that he knows all about human clones created to supply human hearts for others, so I promised my son that no, our Government does not create human clones for research and then destroy them.

You have in your hands the power to decide whether the creation and destruction of innocent human beings is ever justified, whether the manipulation of the laws of nature is without risk.

Thank you, Mr. Chairman and members of the Committee, for serving those who practice and who would benefit from research within ethical boundaries. Feminists for Life and I support non-destructive forms of stem cell research. By redirecting much-needed funds to promising new alternatives your compassion translates into life-saving action.

Thank you.

[The prepared statement of Ms. Colin follows:]

PREPARED STATEMENT OF MARGARET COLIN, ACTRESS

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Suffragist organizer Elizabeth Cady Stanton, whose statue sits down the street in the Capital building, strongly criticized the destruction of newly formed humans as "property to be disposed of as we see fit." The proper role of medical research is to eradicate illness, not create and then destroy human beings.

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therefore, would seem to be an unreliable source for stem cells—in addition to violating the basic tenants of feminism—non-violence, non-discrimination, and justice for all.

My intent here is not to downplay the importance of medical research, but to plead for standards that ensure we do not abuse our power by choosing who is important enough to live while disposing of another. We are wasting time arguing over destroying life while we all want to protect and improve it.

Fortunately, we can move forward with medical research from stem cells derived from a multitude of sources. We do not need to go to extreme measures by making and destroying carbon copies of people. Alternative sources to cloning, which present no ethical problems, are proving to be very promising for those who would benefit from medical research.

We urge you to direct federal funds to support these promising new alternatives, including stem cells acquired from consenting adults, women donating placenta and umbilical cord blood donations—even stem cells from fat, which I have a feeling many of us would be more than happy to donate, in the name of science, of course.

Feminist pioneer Mary Wollstonecraft, who in 1792 wrote the landmark book, “The Vindication of the Rights of Women,” prophetically warned, “Nature in everything deserves respect, and those who violate her laws seldom violate them with impunity.” This woman, who championed the rights of women and condemned the destruction of embryos, died giving birth to her second daughter. Named Mary after her mother, she too, became a great writer. Mary Wollstonecraft Shelley fictionalized her mother’s warning through her classic novel, “Frankenstein.”

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So, I promised my son. No, our government does not create human clones for research and then destroy them.

You have in your hands the power to decide whether the creation and destruction of innocent human beings is ever justifiable, whether the manipulation of the laws of nature is without risk.

Thank you, Mr. Chairman and members of the Committee, for serving those who practice and those who would benefit from research within ethical boundaries. Feminists for Life and I support non-destructive forms of stem cell research. By redirecting much-needed funds to promising new alternatives, your compassion translates into life-saving action.

Senator BROWNBACK. Thank you, Ms. Colin. I agree with you. We need to put more funding toward those solutions that we know can work, and that do not have the ethical problems. One of the things we are doing now is doubling the funding for the National Institutes of Health over a period of 5 years, much of that in an effort to find solutions that work, that do not penalize one group or another.

Mr. Forsythe, we look forward to your testimony.

**STATEMENT OF MR. CLARKE D. FORSYTHE, PRESIDENT,
AMERICANS UNITED FOR LIFE**

Mr. FORSYTHE. Thank you, Mr. Chairman, for this opportunity to testify today. Congress can and should pass a Federal ban on human cloning. Neither *Roe v. Wade* nor substantive due process more generally restricts governmental prohibitions on human cloning. This is due to five factors:

First, the medical fact that no pregnancy is involved in the manufacture of extracorporeal human embryos through somatic cell nuclear transfer.

Second, the demonstrated authority of State and Federal Governments to protect human life at every stage of development.

Third, the lack of any constitutionally protected right to noncoital asexual reproduction such as cloning.

Fourth, the limits of substantive due process, outlined in the Supreme Court's landmark decision in *Washington v. Glucksberg*.

And finally, the profound social and ethical interests in prohibiting human cloning.

Let me just touch on the last. There are profound social and ethical reasons for Congress to prohibit human cloning, and I will only briefly summarize the testimony that others will present today, but in addition to the pervasive destruction of human lives inevitably caused by cloning research, human cloning will create confusion of personal identity and individuality, represent a significant step toward transforming human procreation into manufacture, represent a form of despotism of the cloners over the cloned, and violate the meaning of the parent-child relationship, and fourth, constitute an unethical experiment upon the resulting child without his or her consent. Protecting against each of these harms is a compelling State interest.

Roe v. Wade does not prevent governmental prohibitions against human cloning. *Roe* created a limited right to terminate pregnancy. Human cloning is conducted outside the human body, *in vitro*. No pregnancy is involved with the manufacture of extracorporeal human embryos, and no right to terminate pregnancy can be impacted by a ban on cloning human embryos.

In the discrete area of abortion, the Supreme Court has broadly prohibited governmental regulation as exemplified by *Planned Parenthood v. Casey* and *Stenberg v. Carhart*, but this has never been expanded beyond abortion into an unlimited right of procreative liberty.

I would like to emphasize, however, that a bill that banned implantation of cloned embryos would raise unique legal problems not implicated by a ban on making cloned embryos in a laboratory, because implanting and gestating a cloned embryo obviously involves a woman's body and reproductive interests in a more direct way. Thus, the better approach from a legal standpoint is the one taken by Senator Brownback's legislation, S. 790, which bans the cloning of human embryos at the outset.

A Federal ban on human cloning would rest on a substantial body of law protecting human life at all stages of development. Governmental authority to protect human life at every stage of development, at least outside the context of *Roe v. Wade* and abortion, is broadly and increasingly exercised today. In particular, at least 38 States have affirmed at one time or another, as a matter of public policy, that human life begins at fertilization (conception).

Since extracorporeal human embryos are outside the womb, they are born for legal purposes, and are entitled to the full protection of the law as developing humans. At least nine States specifically prohibit destructive research on the extracorporeal human embryo, and Louisiana's laws are perhaps the most comprehensive in their protection.

Substantive due process, more generally, does not prevent legal prohibitions on human cloning. Human cloning simply cannot meet

the strict requirements for substantive due process outlined in *Washington v. Glucksberg*, as you know, the Supreme Court's landmark 1997 decision which rejected a constitutional right to assisted suicide. Nothing in Supreme Court case law establishes noncoital reproduction, much less asexual reproduction, as a fundamental right.

I would like to touch very briefly on two final points.

First, no right to scientific inquiry and research would be violated by a ban on human cloning. The Supreme Court has never explicitly recognized a fundamental right to scientific research and inquiry. In any case, it is clear that human cloning would not be pure speech, but action, and any supposed interest in cloning research would be outweighed by the profound social interest in prohibiting human cloning, including the protection of human life.

Second, Congress' power to prohibit human cloning is solidly founded on Congress' commerce power. The language included in S. 790, for example, "in or affecting interstate commerce," directly addresses Commerce Clause concerns, as outlined in the Supreme Court's most recent cases in the *United States v. Lopez* and *United States v. Morrison*.

In nearly 2 months, Mr Chairman, our Nation will celebrate the 225th anniversary of the founding political document of America, the Declaration of Independence, which proclaims it to be a self-evident truth that all are created equal, and endowed by their Creator with certain inalienable rights. To secure those natural rights for the next generation of Americans, a Federal ban on human cloning should be enacted to prevent the dehumanization of human beings.

Thank you again, Mr. Chairman, for the opportunity to testify today.

[The prepared statement of Mr. Forsythe follows:]

PREPARED STATEMENT OF CLARKE D. FORSYTHE,* PRESIDENT,
AMERICANS UNITED FOR LIFE

Neither *Roe v. Wade*, 410 U.S. 113 (1973), nor substantive due process more generally, restricts governmental prohibitions on human cloning. This is due to five factors: (1) the medical fact that no pregnancy is involved in the manufacture of extracorporeal human embryos through somatic cell nuclear transfer, (2) the demonstrated authority of the state and federal governments to protect human life at every stage of development, including the human embryo, (3) the lack of any constitutionally-protected right to non-coital, asexual reproduction, (4) the limits of substantive due process outlined in the Supreme Court's decision in *Washington v. Glucksberg*, and (5) the compelling social and ethical interests in prohibiting human cloning.

There are compelling social and ethical reasons for Congress to prohibit human cloning. In addition to the pervasive destruction of human lives inevitably caused by cloning research, human cloning will: (1) create confusion of personal identity and individuality, (2) represent a significant step toward "transforming human procreation into manufacture," (3) represent a form of despotism of the cloners over the cloned and violate the meaning of the parent-child relationship, and (4) constitute an unethical experiment upon the resulting child without his or her consent.

The history of legal protection of developing human life is important to the question of cloning because that history shapes substantive due process, informs the lim-

*B.A. Allegheny College (1980); J.D., Valparaiso University (1983); President, Americans United for Life (AUL). Copies of two of my professional articles have been submitted to the Subcommittee: Clarke D. Forsythe, Human Cloning and the Constitution, 32 Val. U.L. Rev. 469 (1998); Clarke D. Forsythe, Homicide of the Unborn Child: The Born Alive Rule and Other Legal Anachronisms, 21 Val. U.L. Rev. 563 (1987).

its of *Roe v. Wade*, 410 U.S. 113 (1973), and supports protection for the developing human being in non-abortion circumstances today. Governmental authority to protect human life at every stage of development is deeply rooted in English and American history, and—at least outside the context of abortion—is broadly and increasingly exercised today. State protection of human life at every stage of development has grown in criminal law and civil (tort) law throughout the 20th century. In particular, at least 38 states have affirmed, as a matter of public policy, that human life begins at fertilization (conception).

Throughout American history, legal protection of developing human life has grown as medical knowledge has grown. Legal protection required medical knowledge of the existence of a living human. The common law relied on two types of medical evidence: quickening (the first sign of fetal movement *in utero*) and birth (the location of the developing child inside or outside the womb). Human cloning is conducted extracorporeally, outside the human body, *in vitro*. As with *in vitro* fertilization (IVF), only after the cloned human embryo is allowed to divide would the embryo be implanted in a woman's uterus. There is no "pregnancy" to be terminated, and no right to "terminate pregnancy" is affected by state protection of the extracorporeal human embryo. Since extracorporeal human embryos are outside the womb, they are born, for legal purposes, and, as developing human beings, are entitled to the full protection of the law. Approximately ten states specifically protect the extracorporeal human embryo; Louisiana's laws are perhaps the most comprehensive in their protection.

The constitutional right of privacy—or substantive due process more generally—does not prevent legal prohibitions or regulations on human cloning. There is no fundamental right to non-coital, asexual reproduction (cloning). Supreme Court privacy cases preceding *Roe v. Wade* protect family interests related to coital, sexual reproduction. In 1973, in *Roe v. Wade*, the Supreme Court created a right to "terminate pregnancy." In the discrete area of abortion, the Supreme Court has broadly prohibited governmental regulation, as exemplified by *Planned Parenthood v. Casey*, 505 U.S. 873 (1992), and *Stenberg v. Carhart*, 120 S.Ct. 2597 (2000). But this has never been expanded beyond abortion into a broad right of "procreative liberty." Nothing in Supreme Court case law establishes non-coital reproduction, much less asexual reproduction, as a constitutionally protected right. None of the values deeply rooted in the nation's history and tradition or implicit in the concept of ordered liberty—such as marital intimacy, marital sexual relations, bodily integrity—is implicated by non-coital, asexual reproduction in the laboratory like cloning. As George Annas has pointed out "Cloning is replication, not reproduction, and represents a difference in kind, not in degree, in the way humans continue the species."¹

I. THE COMPELLING STATE INTERESTS IN BANNING HUMAN CLONING

A. THE INTERESTS IN HUMAN CLONING

There are obvious utilitarian benefits for American society to be gained from animal and plant cloning. The utilitarian considerations that are appropriate for plants and animals, however, cannot be extended to humans. To do so violates a basic principle of human rights—to treat human beings as ends and not as means.²

Perhaps the three most compelling reasons offered for human cloning research are the production of children for infertile couples, possible enhancement of the ability to do prenatal diagnosis and detect genetic defects in the embryo leading to eugenic abortion, and the knowledge derived from cloning embryos that may result in new therapies (such as transplantation) to treat disease.³ The National Bioethics Advisory Committee (NBAC) referred to "important social values, such as protecting the widest possible sphere of personal choice, particularly in matters pertaining to procreation and child rearing, maintaining privacy and the freedom of scientific inquiry, and encouraging the possible development of new biomedical breakthroughs."⁴

Perhaps the most commonly voiced reason for human cloning is infertility. Cloning will be a handmaiden to IVF. As Professor John Robertson has stated, "scientific zeal and profit motive combine with the desire of infertile couples for biologic offspring to create an enormous power to manipulate the earliest stages of human life in infertility centers across the country."⁵ Some couples undergoing IVF who "cannot produce enough viable embryos to initiate pregnancy" might arguably seek cloning by blastomere separation or somatic cell nuclear transfer.⁶ Human cloning, it has been argued, is justified as just an "incremental step beyond what we are already doing with artificial insemination, *in vitro* fertilization, fertility enhancement drugs and genetic manipulation."⁷ While the anguish of infertile women and couples may be great, it does not logically follow that they may seek any means to counter-

act that infertility or seek any means to have a particular child to their liking. There is no “right” to a “perfect child,” as demonstrated by the long legal tradition against infanticide, or a right to perpetuate one’s lineage. It follows that there is no right to a genetically perfect or genetically identical child. At some point, there are simply ethical limits to available solutions to infertility. There are ethical alternatives, and they must be pursued as much as possible.

There are times when scientific knowledge is greatly desired but not morally obtainable. As the Declaration of Helsinki points out, at those times, it is necessary to pursue other avenues.⁸ Alternative avenues that are morally permissible must be pursued. A ban on human cloning would create appropriate incentives to invest in alternative areas of research, which—though perhaps more difficult or expensive—do exist.

B. THE INTERESTS PROTECTED BY PROHIBITING HUMAN CLONING

There are clear, compelling state interests that justify a ban on human cloning and outweigh any proposed “right” to human cloning. These interests can be grouped into three categories: preventing the extensive destructive of human life that human cloning would clearly involve, preventing injury to the child-to-be, and preventing the degradation of the parent-child relationship.

Many social and ethical objections to human cloning have been articulated by scientists, ethicists, scholars, and philosophers including Marc Lappe, George Annas, Leon Kass, and Gilbert Meilaender. These include the following: (1) cloning creates confusion of personal identity and individuality, (2) cloning represents a giant step toward transforming procreation into manufacture, that is, toward the increasing depersonalization of the process of generation, the production of human children as artifacts, products of human will and design, (3) cloning represents a form of despotism of the cloners over the cloned and thus is a violation of the inner meaning of parent-child relations, of what it means to have a child, and (4) any attempt to clone a human being would constitute an unethical experiment upon the resulting child because of the lack of any consent by the child produced.⁹ The common law born alive rule and current legislation in many states provide a solid legal basis for these social and ethical objections: any human being injured before birth can claim injury after birth.¹⁰ There is congruence between the human entity before and after birth.

1. *Preventing Experimentation On and Death of Unborn Human Beings*

Human cloning, and the process of developing it, will inevitably involve creating, manipulating, injuring, and killing individual members of the human species, i.e., human beings. (Killing is not a rhetorical word, simply the straight-forward use of the dictionary definition.¹¹ We may “discard” things, because things do not die, but we “kill” living beings by causing their death. The very use of the term “discard”—as is typical in most ethical discussions of embryo experimentation—reduces the living human embryo to a thing.) Public reports indicate that it is precisely the ambition of scientists to do research on such developing human entities, with the “disposal” of many or most.¹²

Cloning will inevitable involve non-therapeutic experimentation on human embryos in violation of medical ethics.¹³ For example, the Nuremberg Code (1947) limited experimentation on the “human subject” by requiring that “voluntary consent” is “absolutely essential.” Experimentation is not permitted on “human subjects” without “legal capacity to give consent” and cannot be continued if “a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.”¹⁴ Likewise, the Declaration of Geneva [1948] declares: “I will maintain the utmost respect for human life from conception.” Similarly, the United Nations Declaration on the Child (November 20, 1959) states: “The child by reason of his physical and mental immaturity needs special safeguards and care, including appropriate legal protection before as well as after birth.” By these contemporary, authoritative ethical standards, human cloning cannot be justified.¹⁵ This is most clearly true with intentionally cloning human beings for research without intending to implant them.

It is precisely the prerogative of society to give respect to the dignity of these developing human beings and to require that equal dignity and respect be given by other individuals. Anglo-American law has always treated human beings, and the human species as special, and uniquely protected it through the criminal law.

2. *Preserving Human Freedom and Dignity*

It is obvious that human cloning by any means (by somatic cell nuclear transfer or blastomere separation) is intended to use extracorporeal human embryos. They would be treated as means, not ends. They would be evaluated and valued precisely

because of their attributes. The NBAC referred to “a possibly diminished sense of individuality and personal autonomy.”¹⁶

It would greatly extend the degree of human control over permanently shaping human lives and in ways that are highly subjective. Clearly, human cloning is elective and not therapeutic, either to the mother or the human being cloned. Cloning is only the most recent and highly publicized example of the admonition that technology always involves the power of some people over other people.¹⁷ As the Oxford scholar, C.S. Lewis has written, “For the power of Man to make himself what he pleases means . . . the power of some men to make other men what *they* please.”¹⁸ Of course, education—to a greatly limited extent—has always involved a similar power. But, as C.S. Lewis points out, “in the older systems both the kind of man the teachers wished to produce and their motives for producing him were prescribed by the *Tao*—a norm to which the teachers themselves were subject and from which they claimed no liberty to depart. They did not cut men to some pattern they had chosen.”¹⁹

Perhaps the most sympathetic case for cloning a human being—the genetic replacement of a lost child—shows the depersonalization of children. The notion that genetically cloning a child will replace the lost child suggests that children are their genes. We know that children are at least their genes, but they are more than their genes. Children are not fungible and cannot simply be “replaced.”

3. *The Diminution of Parental Responsibility*

A third result of human cloning is a coarsening of the relationship between parents and cloned children. The NBAC referred to a “concern about a degradation in the quality of parenting and family life.”²⁰ With cloning, children will be manufactured in ways that are highly subjective and particular. Because of highly subjective criteria, cloned children will be conditionally accepted; and, if the conditions are not satisfied, they will most likely not be born at all—the embryos will be “discarded.” Such conditional acceptance treats children as commodities, possessions, property. Consequently, “family relations are necessarily diminished, turned into merely contractual relationships between autonomous individuals.”²¹

As Leon Kass has testified:

[C]loning represents a giant step (though not the first one) toward transforming procreation into manufacture . . . toward the “production” of human children as artifacts, products of human will and design . . . [C]loning—like other forms of eugenic engineering of the next generation—represents a form of despotism of the cloners over the cloned, and thus . . . represents a blatant violation of the inner meaning of parent-child relations, of what it means to have a child, of what it means to say “yes” to our own demise and “replacement.”²²

The resulting detachment between parent and child is not speculative. We see the shadow of it in sperm and egg donation, as exemplified by the California Court of Appeals’ decision in *Jaycee Buzzanca*.²³ Buzzanca was conceived from anonymous sperm and egg donors and born in 1995 to a surrogate mother (with her husband’s consent), contracted by John and Luanne Buzzanca. The Buzzancas separated shortly after Jaycee was conceived and subsequently divorced. Luanne Buzzanca, who had custody of Jaycee since birth but had not adopted her, sued John Buzzanca for child support, and was “the only one of the six people who helped create her to claim parental rights.”²⁴ A California Superior Court judge ruled that Jaycee had no legal parents, but the court of appeals reversed. Advocates for Jaycee argued that the court should focus on what is best for the child and not on the biological status of the Buzzancas, and the ACLU contended that the child has a “right to have parents” that overrules the lack of legal precedent in California. The way to give meaning to a “the child’s right to have parents,” however, is by preserving biological links and preventing detached, asexual reproduction through cloning, not by imposing parental responsibilities, after the fact, on people who do not have a biological link with the child. The California court of appeals explicitly urged the state legislature to address the situation through legislation because “[t]hese cases will not go away.”²⁵

Cloning would undermine the traditional principle of Anglo-American jurisprudence that limits parental authority over the life and health of the child. The protection of vulnerable human life is reflected in the common law’s clear repudiation of the absolute power of the Roman father over the life of the child and the common law’s elevation of legal protection for human life. Blackstone pointed out this contrast.²⁶ Justice James Wilson, one of the first associate justices of the Supreme Court, emphasized the common law protection for the unborn and newborn child:

I shall certainly be excused from adducing any formal arguments to evince, that life, and whatever is necessary for the safety of life, are the natural rights

of man. Some things are so difficult; others are so plain, that they cannot be proved. It will be more to our purpose to show the anxiety, with which some legal systems spare and preserve human life; the levity and cruelty which others discover in destroying or sporting with it; and the inconsistency, with which, in others, it is, at some times, wantonly sacrificed, and, at other times, religiously guarded. . . .

[I]n Sparta, if any infant, newly born, appeared, to those who were appointed to examine him, ill formed or unhealthy, he was, without any further ceremony, thrown into a gulph near mount Taygetus . . . At Athens, the parent was empowered, when a child was born, to pronounce on its life or its death . . . [A]t Rome, the son held his life by the tenure of her father's pleasure. . . .

With consistency, beautiful and undeviating, human life, from its commencement to its close, is protected by the common law. In the contemplation of law, life begins when the infant is first able to stir in the womb. By the law, life is protected not only from immediate destruction, but from every degree of actual violence, and, in some cases from every degree of danger. . . .²⁷

Wilson concluded that “[t]he formidable power of a Roman father is unknown to the common law. But it vests in the parent such authority as is conducive to the advantage of the child.”²⁸ To paraphrase Justice Harlan, this is a tradition from which we have broken.

Based on the common law principle that parental authority must be consistent with the life and health of the child, states have limited parental control that threatens the life or health of the child. For example, parental beliefs against medical treatment can be overridden to preserve the life and health of the child. Parents may be held responsible for the death of the child if medical treatment is not provided. Based on this principle, the states have a related interest in limiting parental control over the genetic destiny of a child.

Each of these social and ethical concerns independently justifies a ban on human cloning. Each supports governmental action to protect human life. These interests against human cloning cannot be protected short of a prohibition on the practice. Once cloned, the embryo's genetic identity is formed and controlled and, while subject to further possible experimentation, it cannot be unaltered. Once cloned, it is not possible to effectively protect the life of the extracorporeal embryo. Requiring implantation is inconceivable, and placing them for “adoption” would entail freezing techniques carrying a high risk of death or injury. And preventing implantation (as a remedy for cloning embryos) would raise fundamental ethical concerns and instigate a conflict with “reproductive rights” under current Supreme Court case law. The only effective way to protect the human embryo and the compelling interests against human cloning is to prevent the cloning of embryos altogether.

II. THE LIMITS OF ROE V. WADE AND ITS PROGENY

A. THE LIMITS OF THE SUPREME COURT PRIVACY CASES BEFORE *roe*

Whether human cloning is a constitutional right involves an application of, as Professor Michael McConnell has phrased it, “the most fundamental question of modern constitutional theory: when, and under what conditions, may courts invalidate duly enacted state or federal laws on the basis of unenumerated constitutional rights?”²⁹ The Supreme Court's 1973 decision in *Roe v. Wade* has spawned 28 years of litigation, legislation, scholarship, cultural change, and public discussion concerning sexual reproduction and the scope of a constitutional right to sexual reproduction. Proponents of an expansive right to sexual reproduction have given it various names and descriptions, among them “procreative liberty,” “a right of the couple to reproduce,” “a right to form a family.” Professor John A. Robertson, one of the foremost advocates of a broad “procreative liberty,” claims that “reproductive freedom” has traditionally been a right taken for granted. Of course, this begs a definition of “reproductive freedom.”

“Procreative freedom” is too broad a description of what the Supreme Court has actually held to be constitutionally protected from popular, democratically-approved limits and constraints. The Supreme Court's substantive due process decisions of the twentieth century do not support a broad right to “procreative liberty” that encompasses using technology for non-coital, asexual reproduction like cloning. *Prince v. Massachusetts*³⁰ involved traditional family relationships. Two other cases relating to parental rights are deeply based in the common law: *Meyer v. Nebraska*³¹ dealt with the education of children, and *Pierce v. Society of Sisters*³² concerned the decision of parents to send their child to a private school.

*Skinner v. Oklahoma*³³ dealt with liberty against coerced sterilization of “habitual criminals,” a negative liberty that could be based in deeply-rooted, common law

principles involving battery and informed consent. *Skinner* (a case sometimes referred to as involving “procreation” broadly³⁴) is to cloning as *Cruzan v. Director, Missouri Dept. of Health*³⁵ is to assisted suicide. Both *Skinner* and *Cruzan* involved negative liberties of refusing treatment that are based in concepts of battery and informed consent; they did not involve positive liberties to an activity or power. In this regard, the fact that cloning does not treat infertility and cannot be considered to be therapeutic diminishes the strength of a “right” to cloning.

These substantive due process cases that preceded *Roe* in the area of family law and reproduction are distinguishable in a number of ways.³⁶ First and foremost, with the exception perhaps of *Eisenstadt v. Baird*³⁷—involving the use of contraceptives by individuals—the rights recognized in those cases have *historical antecedents deeply rooted in American law and were explicitly recognized as such*.³⁸ It is also important to point out that Justice Harlan’s opinion in *Poe v. Ullman*, 367 U.S. 497 (1961), was limited to marital *use* of contraception.³⁹ Nothing in the substantive due process cases preceding *Roe* provides any basis for a right to non-coital, asexual reproduction.⁴⁰

A broad notion of “procreative liberty” is an abstraction imposed on the case law, not a principle derived from it. Professor Robertson’s vision of parenthood is the “wish to replicate themselves, transmit genes, gestate, and rear children biologically related to them.”⁴¹ Robertson posits a right to “produce a child for rearing that is genetically or gestationally related to one or both partners.”⁴² Entailed in such a right would be “discretion to create, freeze, donate, transfer and discard embryos, because these maneuvers are necessary to overcome coital infertility.” He argues for “the right of persons to use technology in pursuing their reproductive goals”⁴³ and for “presumptive moral and legal protection for reproductive technologies that expand procreative options.”⁴⁴ But Robertson’s argument is declaratory and conclusory, not reasoned: “If the moral right to reproduce presumptively protects coital reproduction, then it should protect noncoital reproduction as well.”⁴⁵

Quite clearly, a constitutional right to cloning cannot be logically derived from the two sets of substantive due process cases that Professor Robertson posits as a basis for a right to non-coital, asexual reproduction.⁴⁶ The first line of cases involves contraception and abortion, both of which involve a person’s physical integrity against a physical imposition by a third party. These involve a right *not* to procreate, as Robertson points out. From these, Robertson merely states that a positive right to procreate by non-coital techniques exists, but without any reasoning: “This well-established right [not to procreate] implies the freedom not to exercise it and, hence, the freedom to procreate.” The right to use contraception, as developed by American courts, may well assume a right not to use contraception, but this implies no more than a right to coital, sexual reproduction. With asexual cloning, both the intimacy of sexual intercourse and the biological union of male and female is absent.

The second line of cases involves rearing children, or the “assignment of rearing rights,” in Robertson’s words, from which he infers “a right to bring children into the world.” Parental rights, however, are deeply rooted in American law and tradition and the common law, involving biological relationships between living parents and living children. There are several limitations on these rights that do not imply any right to non-coital, asexual reproduction. First, the parental relationship is founded in duty, not ownership. Second, these rights presume the existence of children from coital reproduction and nothing more. Third, parental rights are limited by the interests of the children, and while *Roe* establishes a right to end the life of a child conceived but not yet born, it says nothing about ending the life of children living out of the womb.

It may be said that American law establishes a privacy interest in coital reproduction. But even this has been limited to marriage. The precedents leading to *Roe* fairly establish this. Harlan’s specific emphasis in *Poe v. Ullman* was that the state statute in question criminalized *marital use* of contraception.⁴⁷ While there may be a right to the use of contraceptives, even by minors, there is still no established liberty in premarital or extramarital sexual relations.⁴⁸

Hence, nothing in Supreme Court case law jumps the gap between coital and non-coital reproduction—to say nothing of the gap from sexual to asexual reproduction—and the reliance of the cases involving coital reproduction on physical integrity cannot be extended to the extracorporeal use of germ cells to achieve *in vitro* fertilization. Finally, it is apparent in Robertson’s construction of his procreative liberty that the essence of this parental right is the exertion of parental will and desire, a notion of ownership, the imposition of personal will, a conditional love or care. It is exactly this notion that characterized the complete autonomy of the Roman father and was repudiated by the common law.

B. THE LIMITS OF ROE'S RIGHT TO "TERMINATE PREGNANCY"

Roe v. Wade, 410 U.S. 113 (1973), properly understood on its own terms, dealt with a right to "terminate pregnancy" and nothing more.⁴⁹ It was entirely based on the physical impact of pregnancy on a woman and her desire to rid herself of the pregnancy.⁵⁰ As Professor John Robertson acknowledges, *Roe* involved "the physical burdens of bearing and giving birth."⁵¹ As the Court noted in *Harris v. McRae*, "the Court in *Wade* emphasized the fact that the woman's decision carries with it significant personal health implications—both physical and psychological."⁵² *Roe* created a negative right to terminate a pregnancy without social (governmental) limits; it did not establish a positive liberty to procreation or a positive liberty in non-coital reproduction. *Roe* created a right to *avoid* procreation, not a right to procreate. This characterization was reaffirmed in *Carey v. Populations Services International*,⁵³ and *Planned Parenthood v. Casey*.⁵⁴ The central discussion of "terminating pregnancy" in *Casey* is concluded by a reference to "these considerations of the nature of the abortion right. . . ." ⁵⁵ Likewise, when the Court in *Eisenstadt v. Baird* refers to "the decision whether to bear or beget a child,"⁵⁶ it was understood to refer to the literal physical burden of pregnancy.⁵⁷ "Terminating pregnancy" is the concept of the *Roe* liberty held by Justice Blackmun himself.⁵⁸

The limits of *Roe* are seen as well in the abortion-funding cases. In *Maher v. Roe*,⁵⁹ the Court held that "the right protects the woman from unduly burdensome interference with her freedom to decide whether to terminate her pregnancy"⁶⁰ In *Harris v. McRae*,⁶¹ the Supreme Court referred, more than once, to the *Roe* liberty as "the freedom of a woman to decide whether to terminate a pregnancy."⁶² The funding cases demonstrate that the states may "make a value judgment favoring childbirth over abortion" and "implement that judgment" by the use of public funding.

The *Roe* abortion liberty as the basis for an unlimited right to "procreative liberty" is also severely limited by the fact that it expressly and forcefully excludes men, even married men, from any right whatsoever in the abortion decision. The father of "the developing child" (as *Casey* used the phrase⁶³), even the woman's husband, has no right to consent to the abortion (*Danforth*) or even to notice of the abortion (*Casey*). Many efforts by men to have a say in abortion decision-making have been summarily rejected by the courts.⁶⁴ Men have no legal right to be involved in abortion decision-making. Formally, the decision is the woman's, even if the reality is otherwise. *Roe* saw the decisionmaking as between the woman and her doctor only,⁶⁵ and, as the plurality stated in *Casey*, "what is at stake is the woman's right to make the ultimate decision."⁶⁶ The plurality in *Casey* went on, at great length, describing the total exclusion of the father or spouse from decisionmaking.⁶⁷ Legal commentators who advocate a broad right to "procreative liberty" are inclined to wax eloquent over the involvement of "couples" in "decisions about whether and when to bear children" but they conveniently ignore the reality that fathers (and spouses) are strictly and absolutely excluded by the *Roe* framework from "procreative" decision making.⁶⁸

The limits of *Roe* are fairly admitted even by proponents of a broad right of non-coital procreation. Thus, such a familiar advocate as John Robertson states:

In the United States, the right to avoid reproduction by contraception and abortion is now firmly established. Whether single or married, adult or minor, a woman has a right to terminate pregnancy up to viability⁶⁹ and both men and women have the right to obtain and use contraceptives. The right to procreate—to bear, beget and rear children—has received less explicit legal recognition. . . . [N]o cases (with the possible exception of *Skinner v. Oklahoma*) turn on the recognition of such a right. However, dicta in cases ranging from *Meyer v. Nebraska* to *Eisenstadt v. Baird* clearly show a strong presumption in favor of marital decisions to found a family. . . . What then about married couples who cannot reproduce coitally? . . . The values and interests that undergird the right to coital reproduction clearly exist with the coitally infertile. Their interest in bearing, begetting or parenting offspring is as worthy of respect as that of the coitally fertile. It follows that restrictions on noncoital reproduction by an infertile married couple should be subject to the same rigorous scrutiny to which restrictions on coital reproduction would be subject.⁷⁰

Again, Robertson has noted the limits to *Roe* elsewhere:

Even though the Court has eliminated most of the legal limitations on the right to avoid pregnancy, the freedom not to procreate is still circumscribed by a number of restrictions. One such restriction derives from the negative nature of constitutional protections, which shield individuals from state interference

with their liberty but do not guarantee them the means to exercise those rights.⁷¹

These concessions are telling. As one scholar has summarized the case law and the limited nature of the abortion liberty: “to characterize some or all of the cases on which the Court relies in reaffirming *Roe* [in *Casey*] as standing for an abstract right to ‘personal autonomy’ simply creates an artificial common denominator among a very disparate and largely unrelated group of cases while at the same time denying what makes abortion unique.”⁷²

For purposes of governmental prohibitions on human cloning, the critical point of distinction in the case law is not only coital versus non-coital reproduction but also corporeal versus extracorporeal reproduction (occurring outside the living body). The negative liberty that has been recognized by the Supreme Court is grounded in personal physical integrity, and the Court has on several occasions explicitly disavowed a right to use one’s body in whatever way desired.⁷³ The “values and interests” of the “coitally infertile” may be conceded, but it does not follow that these may be pursued by whatever means or “techniques” possible. Some techniques may be legitimate, while others are wholly illegitimate. And it does not follow that any of the techniques are necessarily of a constitutional dimension that overrides other social and ethical judgments made by society through the democratic process. Still less is it clear that the judiciary is empowered to override the authority and decisions of society through the democratic process.

Robertson’s analysis begs all of these questions by focusing on one consideration to the exclusion of all others. Richard McCormick has mounted an insightful critique of Robertson’s utilitarian approach to the status of the human embryo and ethical defense of human cloning.⁷⁴ In McCormick’s words, Robertson’s defense is “breath-taking in the speed with which it subordinates every consideration to its [cloning by blastomere separation] usefulness in overcoming infertility. [Robertson’s] thesis can be summarized as follows: if it aids otherwise infertile couples to have children, it is ethically acceptable . . . anything that is useful for overcoming infertility is ethically acceptable.”⁷⁵ McCormick points out that Robertson is trying to create a consensus, not protect an existing one.

The limits of *Roe* are apparent, as well, from the Joint Opinion in *Casey*, where the plurality of Justices O’Connor, Kennedy and Souter shifted the basic rationale of the abortion liberty from privacy to the sociological grounds of abortion as a backup for failed contraception and the “reliance interests” of Americans.⁷⁶ The Joint Opinion again put the emphasis on terminating pregnancy (a backup to contraception) not a positive liberty to “procreate” by any means, much less a liberty in extracorporeal reproduction.

Roe itself identified abortion as unique and “inherently different from marital intimacy, or bedroom possession of obscene material, or marriage, or procreation, or education, with which Eisenstadt and Griswold, Stanley, Loving, Skinner, and Pierce and Meyer were respectively concerned.”⁷⁷ The courts have not gone beyond *Roe*’s formulation since 1973. No federal court has held forthrightly that there is a constitutional right to *in vitro* fertilization. Lower federal courts have struck down fetal experimentation statutes, but primarily on vagueness grounds.⁷⁸

Under the regime of *Roe v. Wade*, government may protect human beings—the traditional function of the criminal law and homicide law—outside the context of abortion. It is not necessary that the human beings be “persons” within the meaning of the 14th Amendment. Legislation does not need any other justification, if the exercise of legislative authority does not interfere with woman’s right to abortion. The states can protect any extracorporeal human being under the homicide code. Protecting that extracorporeal embryo or human being does not interfere with the Court’s limited abortion right. The right to “procreative liberty” is a negative right and does not extend to power over extracorporeal embryos or human beings.

C. THE LIMITS OF SUBSTANTIVE DUE PROCESS

The broader formulation of a positive liberty in “procreation” by various scholars is based on contemporary moral philosophy, rather than caselaw, or legal or constitutional history. Some would ground the procreative liberty and its scope on the subjectivity of the “choice” rather than physical integrity. For example, John Robertson has written that “[t]he personal importance of a decision or activity, rather than its secrecy from the gaze of others, determines its status as part of protected privacy (or liberty, to be more precise).”⁷⁹ Proponents of an unlimited “procreative liberty” have relied on the expansive language of autonomy in *Planned Parenthood v. Casey*,⁸⁰ sometimes called the “mystery” passage. There, the plurality opinion stated: “At the heart of liberty is the right to define one’s own concept of existence, of meaning, of the universe, and of the mystery of human life. Beliefs about these mat-

ters could not define the attributes of personhood were they formed under compulsion of the State.⁸¹ But it was aptly pointed out by scholars that this passage must be considered within the context of the plurality's entire opinion and its emphasis on *stare decisis*.⁸² Within that context, the passage should be understood as rhetorical and not as prescriptive of any specific rights.

That's exactly what the Supreme Court said five years later in its landmark decision in *Washington v. Glucksberg*,⁸³ where the Court held that the Due Process Clause does not protect any right to assisted suicide. First, the Court in *Glucksberg* specified the two strict requirements of substantive due process. The Due Process Clause protects "those fundamental rights and liberties which are, objectively, 'deeply rooted in this Nation's history and tradition' [cit. omit.] and 'implicit in the concept of ordered liberty,' such that 'neither liberty nor justice would exist if they were sacrificed.'" And a "careful description" of "the asserted fundamental liberty interest" is required.⁸⁴ It must first be established that an asserted interest is fundamental so as to "avoid[] the need for complex balancing of interests in every case."⁸⁵

Second, the Court specifically emphasized the limited nature of the passage from *Casey*. Referring to this passage, the Court stated:

By choosing this language, the Court's opinion in *Casey* described, in a general way and in light of our prior cases, those personal activities and decisions that this Court has identified as so deeply rooted in our history and traditions, or so fundamental to our concept of constitutionally ordered liberty, that they are protected by the Fourteenth Amendment. The opinion moved from the recognition that liberty necessarily includes freedom of conscience and belief about ultimate considerations to the observation that 'though the abortion decision may originate within the zone of conscience and belief, it is *more than a philosophical exercise*.' [cit. omit.] That many of the rights and liberties protected by the Due Process Clause sound in personal autonomy does not warrant the sweeping conclusion that any and all important, intimate, and personal decisions are so protected [cit. omit.], and *Casey* did not suggest otherwise.⁸⁶

Two of the three Justices who joined the *Casey* plurality opinion joined this opinion in *Glucksberg* (O'Connor and Kennedy).

The Court in *Glucksberg* also reaffirmed the limits of *Cruzan v. Director, Missouri Dept. of Health*.⁸⁷ The right recognized by the Supreme Court in *Cruzan* was a right to "refuse unwanted medical treatment," not a "right to treatment" and not a "right to die."⁸⁸ The right is properly seen as a right to refuse medical treatment, based in bodily integrity and the common law doctrine of informed consent, and not a right to "bodily expression." As the Court stated in *Glucksberg*, "[t]he right assumed in *Cruzan* . . . was not simply deduced from abstract concepts of personal autonomy. Given the common-law rule that forced medication was a battery, and the long legal tradition protecting the decision to refuse unwanted medical treatment, our assumption was entirely consistent with this Nation's history and constitutional traditions."⁸⁹

In addition, the Court stated in *Cruzan*, and reaffirmed in *Glucksberg*, that the states have an "unqualified interest in the preservation of human life."⁹⁰ As the Court stated in response to the suicide advocates' argument in *Glucksberg* that the state's interest in life only applies to "those who can still contribute to society and enjoy life":

Washington, however, has rejected this sliding-scale approach and, through its assisted-suicide ban, insists that all persons' lives, from beginning to end, regardless of physical or mental condition, are under the full protection of the law. [citing *United States v. Rutherford*, 442 U.S. 544, 558 (1979) (" . . . Congress could reasonably have determined to protect the terminally ill, no less than other patients, from the vast range of self-styled panaceas that inventive minds can devise")] As we have previously affirmed, the States 'may properly decline to make judgments about the 'quality' of life that a particular individual may enjoy. [citing *Cruzan*, 497 U.S. at 282] This remains true, as *Cruzan* makes clear, even for those who are near death.⁹¹

Although this "unqualified interest in the preservation of human life" applies to the end of life in *Glucksberg*, there is no reason—outside the constraints of *Roe*—that this unqualified interest does not apply equally to both ends, or all stages, of human life. Thus, just as the states can decline to "make judgments about the "quality" of life that a particular individual may enjoy," and enjoin assisted suicide despite an individual "interest" in assisted suicide, so too the states may prohibit non-coital, asexual reproduction despite varying notions about "personhood" or the interests of infertile individuals.

Finally, since *Roe*, defenders of the abortion liberty have sometimes shifted from the Due Process Clause to the Equal Protection Clause to sustain *Roe*, emphasizing

the unequal impact on women as compared to men.⁹² To the extent that this is persuasive, it cuts against any right to human cloning. And it is instructive that Justice O'Connor, at oral argument in *Vacco* and *Glucksberg*, emphasized that suicide (and death and dying) did not affect women uniquely but affected men and women equally. A ban on human cloning—and the protection of extracorporeal human embryos—would fall equally on women and men. A prohibition on somatic cell nuclear transfer applies equally to the cells of men and women. For these reasons, as well, *Roe* and its progeny could not encompass a right to human cloning or somatic cell nuclear transfer.

III. LEGAL PROTECTION OF HUMAN LIFE

Congressional prohibitions on human cloning would rest on a firm foundation of state and federal legal protection for developing human life. Human cloning will inevitably involve embryo experimentation and destruction. Hence, the legal status of the human embryo is directly relevant to constitutional issues affecting human cloning.⁹³ Because this legal history—and its significance today—is so widely misunderstood, I set it forth at some length.

For much of the public and for many scholars, the legal and moral status of the developing human being begins and ends with *Roe v. Wade*, 410 U.S. 113 (1973), the Supreme Court's decision which legalized abortion in every state, for any reason, at any time of pregnancy, a quarter of a century ago. Legal commentators who write on the legal status of the embryo commonly demonstrate only the most superficial understanding of the history of legal protection of the developing human being.⁹⁴ For example, to justify human cloning and “the manipulation and destruction of embryos that cloning research, if not the procedure itself, will inevitably cause,” Professor John A. Robertson, a leading advocate of reproductive technologies including cloning, contends that there is a “prevailing moral and legal consensus that views early embryos as too rudimentary in neurological development to have interests or rights.”⁹⁵ Whether such a “consensus” exists in fact and history requires a detailed review of American legal history and contemporary legislation and caselaw. Hence, the history of the legal protection of developing human life is important because it shapes substantive due process, informs the limits of *Roe v. Wade*, and undergirds protection for the developing human being in non-abortion circumstances today.

A. COMMON LAW PROTECTION OF HUMAN LIFE

Anglo-American law has always considered human beings and the human species special. There has always been an important distinction in American law between the human species and all other species. The basic law protecting the inviolability of human life—the law of homicide—is reserved for human beings. The principle of the natural rights of human beings, the equal creation of human beings, and the inalienability of the right to life is deeply imbedded in the American political and legal tradition. The founding political document of the United States, the Declaration of Independence, proclaims that all are created equal, endowed by their Creator with certain inalienable rights, including a right to life, and that government is instituted to secure (not create) that right. These were considered—by Jefferson, Madison, Adams, Franklin and the entire founding generation—to be “self-evident” truths.

At common law, the basic law protecting human life was the law of homicide. The protection of the law of homicide was very broad—extending its protection to “the killing of any human creature,” according to Blackstone, the leading authority on the common law.⁹⁶ Contemporary debate over the moral status of the human embryo, however, forgets that the homicide law, by definition, protects human beings, not “persons.” This confuses the 14th Amendment (and the Court's discussion of “person” in *Roe v. Wade*) with the criminal code.⁹⁷ Even if a human being is not considered by the courts to be a person under the 14th Amendment, that human being still may be protected under homicide law. Homicide law does not protect only mature or developed persons, but all human beings as human beings, including all offspring of human parents. It is species-directed. *Roe v. Wade* merely created a constitutional exception to the general rule when it stipulated that that protection may not interfere with a woman's right to “terminate pregnancy.”

The common law protected unborn human life to the greatest extent possible given contemporary medical knowledge. The law was informed by medicine, and legal protection was extended as medical knowledge progressed. As Blackstone wrote, the right to life was “a right inherent by nature in every individual; and it begins in contemplation of law as soon as an infant is able to stir in the mother's womb.”⁹⁸ What was most important was not “personhood” but the child's status as a “human creature.” In the face of the limitations of primitive medical knowledge,

every consideration was given to protect the life and rights of the unborn human. Thus, as Blackstone wrote, “An infant in ventre sa mere, or in the mother’s womb, is supposed in law to be born for many purposes.⁹⁹” The common law protection of the unborn child had direct antecedents in the Roman civil law’s protection of the unborn child from the time the mother was known to conceive.¹⁰⁰

That English medical-legal authorities considered abortion at any stage of gestation to be the taking of human life, and thus a crime, influenced the development of English legislation.¹⁰¹ As Glanville Williams observed, with Lord Ellenborough’s Act of 1803, Parliament “made not merely a legal pronouncement but an ethical and metaphysical one, namely that human life has a value from the moment of impregnation.¹⁰²” Why these laws arose in the nineteenth century and not before is clear: Parliament only then learned of the medical evidence concerning human development.¹⁰³

Anglo-American society’s consideration of the unborn human being is also seen in legal references to the unborn human being as a “child” or “unborn child” stretching back over centuries. At common law, the unborn human being was commonly called a “child.⁰⁴” The term has been used by legal authorities for centuries—by Fleta, Staunford, Lambarde, Dalton, Coke, Blackstone, Hawkins, and Hale.¹⁰⁵ This is also seen in the common phrase, being “with child.¹⁰⁶” Early texts on midwifery, medicine, and jurisprudence used the term “child” at any time of pregnancy.¹⁰⁷

Though limited by contemporary medicine, American law incorporated a general rule of protection. Thus, the Massachusetts Supreme Judicial Court stated, “[t]o many purposes, in reference to civil rights, an infant *in ventre sa mere* is regarded as a person in being.¹⁰⁸” Or, as the New Jersey Supreme Court stated as long ago as 1849 in *State v. Cooper*, “[i]t is true, for certain civil purposes, the law regards an infant as *in being* from the time of conception. . . .¹⁰⁹”

The centuries during which legal protection was burdened by the limitations of medical knowledge dwarf the relatively few, recent years when heightened medical knowledge has allowed treatment and surgery *in utero*. The novelty of medical technology that allows treatment and visualization of the unborn human being was highlighted by the famous Swedish photographer, Lennart Nilsson. “New technology has made it possible to see the actual events surrounding fertilization and to visualize the growing fetus more clearly.¹¹⁰”

B. QUICKENING AS AN EVIDENTIARY LINE

With the limitations of medical knowledge, quickening was established centuries ago as the most reliable medical line showing evidence of life. From the fourteenth through the nineteenth centuries, quickening was the only reliable evidence that a woman was pregnant or that the unborn human being was alive. As late as 1800, a standard text on midwifery (the forerunner to obstetrics) concluded that “there appears to be no unequivocal sign, whereby that state [pregnancy] can with certainty be determined, till between the fourth and fifth months, when the child quickens, that is, when its motions are distinctly felt.¹¹¹” Texts of midwifery typically contained chapters on the “signs of pregnancy,” in which quickening was emphasized.¹¹² Thomas Denman, a widely cited authority on the subject, expressed the developing understanding of quickening in his 1829 text:

The changes which follow quickening have been attributed to various causes. By some it has been conjectured, that the child then acquired a new mode of existence; or that it was arrived to such a size as to be able to dispense with the menstuous blood, before retained in the constitution of the parent, which it disturbed by its quantity or malignity. But it is not now suspected, that there is any difference between the aboriginal life of the child, and that which it possesses at any period of pregnancy, though there may be an alteration in the proofs of its existence, by the enlargement of its size, and the acquisition of greater strength.¹¹³

Beck, in his *Elements of Medical Jurisprudence*—one of the primary authorities in the 19th century—emphasized the same understanding:

It is important to understand the sense attached to this word [quickening] formerly, and at the present day. The ancient opinion, on which indeed the laws of some countries have been founded, was, that the foetus became animated at this period—that it acquired a new mode of existence. This is altogether abandoned. The foetus is certainly, if we speak physiologically, as much a living being immediately after conception, as at any other time before delivery; and its future progress is but the development and increase of those constituent principles which it then received.¹¹⁴

Wharton and Stille emphasized the same point:

This symptom [quickening] was formerly given much weight, because at that time the child was supposed to receive its spiritual nature—to become animate. Such ideas have now become entirely obsolete in the scientific world. The time perfecting the child is at its conception. After then, in all ways, it is merely a question of growth and development.¹¹⁵

Based on the primitive medical knowledge of the day, the common law adopted the presumption that the fetus first became alive at quickening.¹¹⁶

At the earliest time of the common law, in the thirteenth century, Bracton and Fleta held that the killing of a “quickened child” in the womb was homicide without any explicit requirement of live birth.¹¹⁷ However, there is substantial common law authority that abortion was a crime at common law without regard to quickening and without regard to the time of gestation. As the highest court in Maryland stated in 1887, “[A]s the life of an infant was not supposed to begin until it stirred in the mother’s womb [quickening], it was not regarded as a criminal offense to commit an abortion in the early stages of pregnancy. A considerable change in the law has taken place in many jurisdictions by the silent and steady progress of judicial opinion; and it has been frequently held by Courts of high character that abortion is a crime at common law without regard to the stage of gestation.¹¹⁸”

Prior to this Maryland decision, two of the most prestigious criminal law scholars of the 19th century, Bishop and Wharton, also criticized the quickening rule, concluding that abortion was a crime at common law regardless of the stage of gestation.¹¹⁹ Wharton’s discussion revealed the dynamic between medical evidence and increasing protection for unborn human life:

There is no doubt that at common law the destruction of an infant unborn is a high misdemeanor, and at an early period it seems to have been deemed murder. If the child dies subsequently to birth from wounds received in the womb, it is clearly homicide, even though the child is still attached to the mother by the umbilical cord. It has been said that it is not an indictable offense to administer a drug to a woman, and thereby to procure an abortion, unless the mother is quick with child, though such a distinction, it is submitted, is neither in accordance with the result of medical experience, nor with the principles of the common law. The civil rights of an infant in ventre sa mere are equally respected at every stage of gestation; and it is clear that no matter at how early a stage he may be appointed executor, is capable of taking as a legatee, or under a marriage settlement, may take specifically under a general devise, as a “child”; and may obtain an injunction to stay waste . . . It appears, then, that quickening is a mere circumstance in the physiological history of the foetus, which indicates neither the commencement of a new stage of existence, nor an advance from one stage to another—that it is uncertain in its periods, sometimes coming at three months, sometimes at five, sometimes not at all—and that it is dependent so entirely upon foreign influences as to make it a very incorrect index, and one on which no practitioner can depend, of the progress of pregnancy. There is as much vitality, in a physical point of view, on one side of quickening as on the other, and in a social and moral point of view, the infant is as much entitled to protection, and society is as likely to be injured by its destruction, a week before it quickens as a week afterwards.¹²⁰

Today, for obvious reasons, quickening “provides only corroborative evidence of pregnancy and itself is of little diagnostic value.¹²¹”

C. THE EVIDENTIARY SIGNIFICANCE OF THE BORN ALIVE RULE

Like quickening, the born alive rule was a rule of medical jurisprudence, first expressly introduced into the common law by the *Sim’s Case*¹²² in 1601. It was a bright-line rule of evidence used to eliminate cases of uncertain evidence in the killing of a child.¹²³ As a leading 19th century legal authority described the purpose of the born alive rule:

It is well known that in the course of nature, many children come into the world dead, and that others die from various causes soon after birth. In the latter, the signs of their having lived are frequently indistinct. Hence, to provide against the danger of erroneous accusations, the law humanely presumes that every newborn child has been born dead, until the contrary appears from medical or other evidence. The onus of proof is thereby thrown on the prosecution; and no evidence imputing murder can be received, unless it be made certain by medical or other facts, that the child survived its birth and was actually living when the violence was offered to it.¹²⁴

It was generally recognized at common law that pre-viable children could be born alive.¹²⁵ The medical purpose of the born alive rule 400 years ago has been com-

pletely eliminated by modern medical science and technology. It is outmoded, and its existence no longer makes sense in the law.¹²⁶

The evidentiary nature of the born alive rule is confirmed by the congruence the law drew between injury in the womb and death after birth. As a renowned 19th century commentator stated the rule: "If a person . . . does an act which causes a child to be born so much earlier than the natural time that it is born in a state much less capable of living, and afterwards dies in consequence of its exposure to the external world, the person who . . . so brings the child into the world, and puts it thereby into a situation in which it cannot live, is guilty of murder."¹²⁷ If the born alive rule were a gestational rule and a moral rule, both the injury and death would have had to occur *after* birth. Russell's explication shows both the evidentiary nature of the born alive rule and the irrelevance of viability. Modern courts have increasingly recognized this legal congruence.¹²⁸ This demonstrates that the born alive rule recognized biological and existential continuity between the unborn child (at any stage of gestation) and the born child.

What the common law demonstrates is that law and medicine had a dynamic relationship with regard to the unborn child. As medical knowledge of fetal development increased, legal protection increased. The law considered the offspring of human parents to be a human being, and the law considered the unborn child to be a human being whenever it could be determined to be alive. Evidence of life—a living human being—was what was important for legal protection, not "personhood." The modern debate about "personhood" began with the Supreme Court's consideration of the 14th Amendment liberty clause (protecting "persons") in *Roe v. Wade* in 1973 and subsequent philosophical discussions about *Roe*. The common law in contrast protected unborn human life to the greatest extent possible given contemporary medical knowledge.¹²⁹ The common law protection encompassed living members of the human species.

The Supreme Court in *Roe v. Wade* misconstrued the born alive rule and converted it from an evidentiary rule, dependent on location (in or out of the womb), into a gestational rule (fullterm). The Court confused gestation with location. This is indicated by the Court's misstatement that the rights of persons do not begin until term birth, after the third trimester.¹³⁰ Outside abortion law, the born alive rule has been increasingly abandoned by state courts and legislatures.

D. THE IRRELEVANCE OF VIABILITY

The common law placed significance on quickening and live birth. Viability was not a concern of the common law.¹³¹ It played no role in the development of the common law and its protection of the unborn child.¹³² A leading 19th century legal authority confirmed this:

The English law does not act on the principle that a child, in order to become the subject of a charge of murder, should be born viable, i.e., with the capacity to live . . . The capacity of a child continuing to live has never been put as a medical question in a case of alleged child murder; and it is pretty certain, that if a want of capacity to live were actually proved, this would not render the party destroying it irresponsible for the offense.¹³³

In American law, viability first began as a judicially-imposed gloss on the law, with Oliver Wendell Holmes' 1884 opinion in *Dietrich v. Inhabitants of Northampton*¹³⁴ for the Massachusetts Supreme Judicial Court. *Dietrich* denied recovery for the death of a child born alive but premature from a miscarriage and created a novel viability requirement for civil recovery that had no basis in statute or common law.¹³⁵

As the "dean of torts," William Prosser made clear, some American courts followed *Dietrich* for about 50 years, but with developing medical knowledge in the 20th century, and the 1946 decision in *Bonbrest v. Kotz*, 65 F.Supp. 138 (D.D.C. 1946), American courts increasingly rejected the viability rule until the Supreme Court's decision in 1973 in *Roe v. Wade* placed such great emphasis on viability. Relying on *Roe*, some state courts limited legal protection for the unborn to viability. More recently, other courts have recognized that *Roe*—and its emphasis on viability—does not apply outside abortion law.

E. MODERN CRIMINAL AND TORT LAW DEVELOPMENTS

1. Tort Law

Until modern scientific advances allowed greater knowledge of human life *in utero*, abortion law was the primary—but not exclusive—legal field for the protection of unborn human life. Until nearly the 20th century, homicide and abortion law proceeded on two different, evidentiary tracks based on *location* of the child—homi-

cide law applied to human beings *outside* the womb, abortion law applied to human beings *inside* the womb.

Dean Prosser explained both the evidentiary reasons for the born alive rule in tort law and the advancements in medical science that eliminated its rationale:

When a pregnant woman is injured, and as a result the child subsequently born suffers deformity or some other injury, nearly all of the decisions prior to 1946 denied recovery to the child. Two reasons usually were given: First, that the defendant could owe no duty of conduct to a person who was not in existence at the time of his action; and second, that the difficulty of proving any causal connection between negligence and damage was too great, and there was too much danger of fictitious claims.

So far as duty is concerned, if existence at the time is necessary, *medical authority has recognized long since that the child is in existence from the moment of conception, and for many purposes its existence is recognized by the law . . .* So far as causation is concerned, there will certainly be cases in which there are difficulties of proof, but they are no more frequent, and the difficulties are no greater, than as to many other medical problems. All writers who have discussed the problem have joined in condemning the old rule, in maintaining that the unborn child in the path of an automobile is as much a person in the street as the mother, and in urging that recovery should be allowed upon proper proof.¹³⁶

The Court in *Roe* cited Prosser to support its erroneous description that courts had granted recovery for prenatal injuries only where the fetus was viable or at least “quick.”¹³⁷ But Prosser stated just the opposite, pointing out that, in fact, most states permitted recovery for prenatal injuries regardless of the stage of gestation in which the injuries are inflicted:

Most of the cases allowing recovery have involved a fetus which was then viable . . . Many of them have said, by way of dictum, that recovery must be limited to such cases, and two or three have said that the child, if not viable, must at least be “quick.” But when actually faced with the issue for decision, *almost all of the jurisdictions have allowed recovery even though the injury occurred during the early weeks of pregnancy, when the child was neither viable nor quick.*¹³⁸

As Professor David Louisell summarized the law two years before *Roe*:

[T]he progress of the law in recognition of the fetus as a human person has been strong and steady and roughly proportional to the growth of knowledge of biology and embryology. For centuries the law of property has recognized the unborn as living persons and the criminal law, although unevenly, has accorded them substantial protection. The law of torts, because of biological misconceptions among judges and practical difficulties of medical proof, was something of a laggard, but since World War II there has been an explosive recognition “that the unborn child in the path of an automobile is as much a person in the street as the mother.” Judicial acknowledgment “that the unborn child is entitled to the law’s protection” has resulted in ordering blood transfusion necessary to save his life, over the cogent countervailing claims to the free exercise of religion. In a word, the unborn child is a person to be protected in his property rights and against negligence, and to be afforded the reach of equity’s affirmative arm for support and sustenance.¹³⁹

Although abortion law was virtually abolished by the Supreme Court in 1973, *Roe* did not touch assaults on the unborn child *outside the context of abortion*. *Roe* may have stifled an ongoing process of increasing state protection for unborn human life in the field of criminal and tort law,¹⁴⁰ but, despite *Roe*, that process has progressively continued outside the immediate context of abortion.¹⁴¹ The upshot of this progressive protection has been a gradual abolition of the artificial born alive rule and a growth in protection of the unborn child, even if stillborn, and without regard to the stage of gestation.

In tort law today, virtually all states allow suits for prenatal injuries for children later born alive. (Obviously, if the child is not born alive, the suit would be for wrongful death.) Today, at least thirty-six jurisdictions allow wrongful death actions for a stillborn child, while a dwindling minority of eight to ten states reject the cause of action.¹⁴² A majority of state courts have expressly or implicitly rejected viability as a limitation for liability for nonfatal prenatal injuries.¹⁴³ As recently as 1993, the Pennsylvania Supreme Court pointed out that “no jurisdiction accepts the . . . assertion that a child must be viable at the time of birth in order to maintain an action in wrongful death” (i.e., where the child is born alive and dies thereafter).¹⁴⁴

2. Criminal Law

Progressive development has continued in the criminal law as well. At the time of *Roe*, several states treated the killing of an unborn child as a homicide at some stage of gestation without regard to live birth. The born alive rule, created as a bright line evidentiary rule in a time of primitive medicine, became illogical when medical science advanced to the point that the elements of homicide could be reliably demonstrated even if the child died before birth (stillborn). The born alive rule has been discarded by an increasing number of states at some stage of gestation. Today, more than half of the states treat the killing of an unborn human being as a form of homicide, even though not born alive (stillborn), at some stage of gestation. Eleven states, including Illinois and Minnesota, define (by statute) the killing of an unborn child as a form of homicide, regardless of the stage of pregnancy.¹⁴⁵ One state defines (by statute) the killing of an unborn human being after eight to ten weeks gestation as a form of homicide.¹⁴⁶ Eight states define (by statute) the killing of an unborn child after quickening as a form of homicide.¹⁴⁷ Five states define (by statute or caselaw) the killing of an unborn human being after viability as a form of homicide.¹⁴⁸ Constitutional challenges to statutes of this type, include statutes applying throughout gestation, have been rejected in several decisions.¹⁴⁹

It is important to remember that even under the original application of the born alive rule, the killing of an early, developing, human being was still counted as a homicide if the assault on the mother resulted in a miscarriage that produced expulsion from the womb and death after that expulsion, at any stage of development. In the course of things, the unborn human being might not survive the initial assault or the miscarriage, but if it did, it did not matter to the law of homicide how premature the human being was, as long as it survived expulsion from the womb and was observed outside. However, as medical science has developed, and the cause of the death of the unborn human being is more easily determined, the born alive rule has come under increasing criticism and has been increasingly rendered meaningless.

By eliminating the born alive rule in the 20th century, state homicide laws have abandoned the arbitrary matter of location (outside or inside) because location no longer matters to medical determination. This has allowed the law to focus on the *cause* of death at any stage of development, without regard to *location*. As a result, cases like *State v. Merrill* have followed.¹⁵⁰ *Merrill* involved a double homicide, when a man killed his estranged girlfriend when she was pregnant with a 28-day-old embryonic human being, who died in the womb. The assailant was charged with a double homicide and that indictment was upheld on appeal. Many similar cases involving previable unborn human beings have arisen in Illinois, another state with a similar law that has abandoned the born alive rule without establishing arbitrary gestational limitations.¹⁵¹

In California, because of the supreme court's decision in *People v. Davis*¹⁵² a charge of homicide can be brought for the killing of an unborn human being at any time after 8–10 weeks gestation. The court arrived at this result from a strict, biological reading of the statutory term, "fetus."¹⁵³ These developments in homicide law continue. In 1998, Indiana became the 26th state to treat the killing of an unborn human being as a homicide at some stage of gestation when it enacted a law, over the Governor's veto, to treat the killing of a unborn child as a homicide, whether born alive or not.¹⁵⁴ Because the publicized incidents that gave rise to the legislation involved the shooting of a pregnant woman carrying a presumably viable child, the legislation contained a viability limitation. In addition, Michigan enacted legislation to protect the unborn child ("embryo" and "fetus") at all stages of gestation. Legal protection of the unborn human being throughout gestation is a dynamic process that continues. Outside the context of abortion, there is a remarkable legal consensus across at least thirty-eight states that the life of a human being is considered to begin at fertilization (conception).¹⁵⁵ This history demonstrates that congressional prohibitions on human cloning would represent a consistent and logical growth in state and federal legal protection for human life.

CONCLUSION

As Professor Gilbert Meilaender testified to the National Bioethics Advisory Commission (NBAC) on human cloning, "sometimes we may only come to understand the nature of the road we are on when we have already traveled fairly far along it."¹⁵⁶ Human cloning is the logical outcome and most recent extension of 20 years of embryo experimentation and manipulation and may be the most subtle extension of that technique and philosophy in its denigration of the dignity of the human being. It proceeds on a cramped, artificial, and impersonal view of human beings and reflects the dehumanizing spirit of Aldous Huxley's *Brave New World*. The impersonal

instinct that leads to controlling the genetic destiny of one's progeny comes from the same instinct that treats the human embryo as just a clump of cells. Hopefully, the publicity and analysis given to human cloning will illuminate and educate Americans on the entire misguided effort of human embryo experimentation and manipulation.

At important junctures in this century, scientists have recognized, as a basic tenet of medical ethics, that protection of the human being is more important than the interests of science or society. That is the essence of the Nuremberg Code, which reaffirmed limits on research on human subjects. As the 1975 Helsinki Declaration of the World Medical Association stated, "Concern for the interests of the subject must always prevail over the interest of science and society."¹⁵⁷ Twenty-seven years ago, Nobel Prize-winning biologist James Watson noted that ethical decisions about human cloning could not be left to science:

This is a matter far too important to be left solely in the hands of the scientific and medical communities. The belief that surrogate mothers and clonal babies are inevitable because science always moves forward, an attitude expressed to me recently by a scientific colleague, represents a form of *laissez-faire* nonsense dismally reminiscent of the creed that American business, if left to itself, will solve everybody's problems. Just as the success of a corporate body in making money need not set the human condition ahead, neither does every scientific advance automatically make our lives more "meaningful." No doubt the person whose experimental skill will eventually bring forth a clonal baby will be given wide notoriety. But the child who grows up knowing that the world wants another Picasso may view his creator in a different light.¹⁵⁸

It is necessary for society through civil government to establish limits. As Paul Ramsey pointed out, some scientific knowledge, however, interesting or valuable, cannot be obtained by moral means. When that happens, we must seek it by other means or wait until it can be obtained by appropriate means.

Roe v. Wade and its progeny created a woman's "liberty interest" in "terminating a pregnancy." The Supreme Court limited state protection of unborn human life only when balanced against the woman's personal abortion liberty. In that context, a physician is only an agent of the mother and has no personal constitutional liberty interest at stake. Outside that limited context, when the woman's interest in terminating pregnancy is not at stake, the states are free to protect the unborn human being from homicide at every stage of gestation, including fertilization, as some states have done. When extracorporeal human embryos are at stake, no woman is pregnant, and the considerations of *Roe* are absent. This state interest has a long tradition that is actively exercised by states today. Scientists and doctors, as third parties, have no personal constitutional liberty to deprive an unborn human being of life or dignity. No broader constitutional liberty in "procreation" encompasses a right to use technology to clone *in vitro* human embryos. Accordingly, the Constitution leaves broad authority to the representative branches to ban or regulate the practice of human cloning.

ENDNOTES

1. George Annas, Human Cloning: Should the United States Legislate Against It?, *A.B.A. Journal* at 80 (May 1997).

2. See e.g., Tom L. Beauchamp & James F. Childress, *Principles of Biomedical Ethics* 7 (1979).

3. See e.g., Robert Edwards, Ethics and embryos: the case for experimentation, in Anthony Dyson & John Harris, *Experiments on Embryos* 42, 50 (1990); John Harris, Embryos and hedgehogs: on the moral status of the embryo, in Anthony Dyson & John Harris, *Experiments on Embryos* 75-76 (1990).

4. National Bioethics Advisory Commission, *Cloning Human Beings: Report and Recommendations of the National Bioethics Advisory Commission* ii (1997) (hereinafter NBAC Report).

5. John A. Robertson, The Question of Human Cloning, *Hastings Center Rep.* (Mar.-Apr. 1994), at 7.

6. Jerome P. Kassirer & Nadia A. Rosenthal, Should Human Cloning Research Be Off Limits?, 338 *New Eng. J. Med.* 905, 905 (1998).

7. Laurence Tribe, Second Thoughts on Cloning, *New York Times*, Dec. 5, 1997, p. A23.

8. Declaration of Helsinki, World Medical Association (1989), reprinted in 5 Warren T. Reich, *Encyclopedia of Bioethics* 2766, 2767 (Rev. ed. 1995).

9. See Leon R. Kass, The Wisdom of Repugnance: Why we should ban the cloning of humans, *The New Republic*, June 2, 1997, at 17. See also Leon R. Kass, The Wisdom of Repugnance, 32 *Val. U.L. Rev.* 679; Gilbert Meilaender, Cloning in Protes-

tant Perspective, 32 Val. U.L. Rev. 707 (1998); Lori B. Andrews, Is There a Right to Clone? Constitutional Challenges to Bans on Human Cloning, 11 Harv. J.L. & Tech. 643 (1998); George Annas, Human Cloning: A Choice or an Echo?, 23 U. Dayton L. Rev. 247 (1998); Marc Lappe, Four reasons to step back from cloning, Chicago Tribune, March 8, 2001, sec. 1, p. 21 (“According to the original Nuremberg Code developed at the end of WWII to prevent future abuses of medical research subjects, every experimental subject should have the right to terminate his experiment. How would we ever get an acceptable consent from future generations?”).

10. See generally, Christine L. Feiler, Human Embryo Experimentation: Regulation and Relative Rights, 66 Fordham L. Rev. 2435 (1998).

11. See e.g., Webster’s Ninth New Collegiate Dictionary 661 (1987) (“Kill merely states the fact of death caused by an agency in any manner.”); American Heritage Student Dictionary 546 (1994) (kill: “To cause the death of; deprive of life”).

12. John Robertson vividly describes the casual treatment of *ex utero* embryos. John A. Robertson, The Question of Human Cloning, Hastings Ctr. Rep. Mar.-Apr. 1994 at 7. See also Margaret Talbot, A Desire to Duplicate, New York Times Magazine, February 4, 2001, at 140 (“Cloning mammals is a wildly inefficient process that can require hundreds of attempts both to create an embryo and to implant it successfully.”).

13. NBAC Report, *supra* note 4, at 63–64. See e.g., Marc Lappe, Four reasons to step back from cloning, Chicago Tribune, March 8, 2001, sec. 1, p. 21 (“Much of the more subtle damage in animal clones has shown up only one or more generations after the first one was cloned.”).

14. Warren Thomas Reich, ed., Encyclopedia of Bioethics 2763 (Rev. ed.) (vol. 5, Appendix).

15. See e.g., Marc Lappe, Four reasons to step back from cloning, Chicago Tribune, March 8, 2001, sec. 1, p. 21 (“According to the original Nuremberg Code developed at the end of WWII to prevent future abuses of medical research subjects, every experimental subject should have the right to terminate his experiment. How would we ever get an acceptable consent from future generations?”).

16. NBAC Report, *supra* note 4, at ii. See Kass, 32 Val. U.L. Rev. at 694–95.

17. See generally, Paul Ramsey, Fabricated Man: The Ethics of Genetic Control (1970); C.S. Lewis, The Abolition of Man (1950).

18. C.S. Lewis, The Abolition of Man 72 (1950).

19. *Id.* at 73–74.

20. NBAC Report, *supra* note 4, at ii. See Kass, 32 Val. U. L. Rev. at 697–98.

21. Allen Verhey, Theology after Dolly, Christian Century, March 19–26, 1997, at 285.

22. Leon R. Kass, The Wisdom of Repugnance: Why We Should Ban the Cloning of Humans, 32 Val. U.L. Rev. 679, 691 (1998).

23. *Buzzanca v. Buzzanca*, 72 Cal. Rptr. 2d 280 (Cal. App. 1998).

24. Ann Davis, Artificial-Reproduction Arrangers Are Ruled Child’s Legal Parents, Wall Street Journal, March 11, 1998, at B2.

25. *Buzzanca*, 72 Cal. Rptr. 2d at 293.

26. 1 Blackstone 440.

27. 2 The Works of James Wilson 596–97 (R.G. McCloskey ed. (1967)). See also Adam Smith, Lectures on Jurisprudence 172–75 (R. Meek, D. Raphael, P. Stein, eds. 1978) (Liberty Classics Reprint 1982).

28. 2 Works of James Wilson at 604. This sentiment was apparently familiar to lawyers during the Founding era, because it is reflected as well in the legal training of John Quincy Adams, who observed that the common law “has restrained within proper bounds, even the sacred rights of parental authority, and shewn the cruelty, and the absurdity of abandoning an infant to destruction for any deformity in its bodily frame.” 2 JQA, Diary of John Quincy Adams 193 (March 1786–December 1788) (entry of April 2, 1787).

29. Amicus Brief for Senator Orrin Hatch et al. at 1, *Vacco v. Quill*, 117 S.Ct. 2293 (1997) (No. 95–1858), 1996 WL 657755. See also Michael W. McConnell, The Right to Die and the Jurisprudence of Tradition, 1997 Utah L. Rev. 665 (1997).

30. 321 U.S. 158 (1944).

31. 262 U.S. 390 (1923).

32. 268 U.S. 510 (1925).

33. 316 U.S. 535 (1942).

34. See e.g., Justice Stewart’s reference to Skinner as involving “procreation” in a footnote in *Harris v. McRae*, 448 U.S. at 312 n.18.

35. 497 U.S. 261 (1990).

36. *Pierce v. Society of Sisters*, 268 U.S. 510 (1925); *Meyer v. Nebraska*, 262 U.S. 390 (1923); *Skinner v. Oklahoma*, 316 U.S. 535 (1942); *Griswold v. Connecticut*, 381 U.S. 479 (1965); *Eisenstadt v. Baird*, 405 U.S. 438 (1972).

37. 405 U.S. 438 (1972).
38. *Meyer v. Nebraska*, 262 U.S. 390, 399 (1923) (“to enjoy those privileges long recognized at common law as essential to the orderly pursuit of happiness by free men”); *Pierce v. Society of Sisters*, 268 U.S. 510, 534–35 (1925) (“the liberty of parents and guardians to direct the upbringing and education of children under their control”, “engaged in a kind of undertaking . . . long regarded as useful and meritorious”); *Moore v. City of East Cleveland*, 431 U.S. 494, 503–04 (1977) (“the Constitution protects the sanctity of the family precisely because the institution of the family is deeply rooted in this Nation’s history and tradition”).
39. Justice Souter’s concurring opinion in *Washington v. Glucksberg*, 521 U.S. 702, 752, 117 S.Ct. 2258, 2275 (1997), ignores the limitations of *Poe*, enormously expands its implications, and thereby distorts Harlan’s opinion. See Michael W. McConnell, *The Right to Die and the Jurisprudence of Tradition*, 1997 Utah L. Rev. 665 (1997).
40. See also Marc Lappe, *Four reasons to step back from cloning*, Chicago Tribune, March 8, 2001, sec. 1, p. 21 (“No one has an inalienable right to reproduce, much less perpetuate her own genetic makeup, no matter how unique.”); Lori B. Andrews, *Is There a Right to Clone? Constitutional Challenges to Bans on Human Cloning*, 11 Harv. J.L. & Tech. 643, 666 (1998); George Annas, *Human Cloning: A Choice of an Echo?*, 23 U. Dayton L. Rev. 247, 254 (1998) (“Asexual cloning by nuclear substitution represents such a discontinuity in the way humans reproduce . . . This discontinuity means that although the constitutional right not to reproduce would seem to apply with equal force to a right not to replicate, to the extent that there is a constitutional right to reproduce if one is able, no existing liberty doctrine would extend this right to replication by cloning.”); George Annas, *Human Cloning: Should the United States Legislate Against It?*, A.B.A.J. at 80 (May 1997) (“Cloning is replication, not reproduction, and represents a difference in kind, not in degree, in the way humans continue the species.”).
41. John A. Robertson, *Children of Choice: Freedom and the New Reproductive Technologies* 32 (1994).
42. John A. Robertson, *Decisional Authority over Embryos and Control of IVF Technology*, 28 *Jurimetrics Journal* 285, 292 (1988).
43. John A. Robertson, *Children of Choice* at 42.
44. John A. Robertson, *Children of Choice* at 220.
45. *Id.* at 32.
46. John A. Robertson, *Procreative Liberty and the Control of Conception, Pregnancy, and Childbirth*, 69 VA L. Rev. 405, 415 (1983).
47. 367 U.S. 497, 554–55 (1961) (Harlan, J., dissenting from dismissal on jurisdictional grounds). See also *Griswold v. Connecticut*, 381 U.S. 479, 499 (1965) (Harlan, J., concurring in the judgment).
48. Indeed, in *Eisenstadt v. Baird*, the Court implicitly acknowledged the state’s authority to prohibit “extramarital and premarital sexual relations.” 405 U.S. at 448. And *Eisenstadt* was based on the Equal Protection Clause, not the Due Process Clause. Likewise, *Carey v. Population Services Inter'l*, 431 U.S. 678 (1977), decided after *Roe*, did not create a right to premarital or extramarital sexual activity. 431 U.S. at 688 n.5, 694 & n.17. See also *Id.* at 702 (White, J., concurring in part and concurring in the judgment), *Id.* at 713 (Stevens, J., concurring in part and concurring in the judgment).
49. See 410 U.S. at 170 (Stewart, concurring) (“the right of a woman to decide whether or not to terminate her pregnancy”).
50. *Roe*, 410 U.S. at 150 (discussing the risk to the woman, state has interest in protecting the woman’s own health and safety; 153 (detailing “detriment” to pregnant woman by “denying this choice”), 162 (“the rights of the pregnant woman at stake”). See also *Casey*, 112 S.Ct. at 2807 (“The mother who carries a child to full term is subject to anxieties, to physical constraints, to pain that only she must bear”), 2816 (“the urgent claims of the woman to retain the ultimate control over her destiny and her body”).
51. Robertson, 69 VA L. Rev. at 416.
52. 448 U.S. at 316.
53. 431 U.S. 678, 688 (1977) (“an individual’s right to decide to prevent conception or terminate pregnancy. . . .”).
54. 112 S.Ct. at 2804 (“the legitimate authority of the State respecting the termination of pregnancies by abortion procedures”), *Id.* (referring to “essential holding” of *Roe* as including “right of the woman to choose to have an abortion”), 2806 (“the profound moral and spiritual implications of terminating a pregnancy”), 2807 (“the woman’s interest in terminating her pregnancy”), 2810 (describing *Roe* as “a rule . . . of personal autonomy and bodily integrity”), 2816 (“freedom to terminate her pregnancy”), 2816 (“the right of the woman to terminate her pregnancy”), 2816 (“the woman’s liberty to determine whether to carry her pregnancy to full term”), 2816

(“a right to choose to terminate her pregnancy”), 2817 (“[t]he woman’s right to terminate her pregnancy”), 2818 (“a right to choose to terminate or continue her pregnancy”), 2820 (“the right to decide whether to terminate a pregnancy”).

55. 112 S.Ct. at 2819.

56. 405 U.S. 438, 453 (1972).

57. See *Casey*, 112 S.Ct. at 2819 (quoting passage from *Eisenstadt*).

58. See e.g., *Casey*, 112 S.Ct. at 2486–87 (“a woman’s right to terminate her pregnancy”) (“continue pregnancies they might otherwise terminate”) (“the right to terminate pregnancies”).

59. 432 U.S. 464, 473–74 (1977) (“the right protects the woman from unduly burdensome interference with her freedom to decide whether to terminate her pregnancy”).

60. 432 U.S. at 473–74.

61. 448 U.S. 297 (1980).

62. 448 U.S. at 312. See also *Id.* at 316 (“the freedom of a woman to decide whether to terminate her pregnancy”) (three times on the same page).

63. 112 S.Ct. at 2817.

64. See e.g., *Conn. v. Conn.*, 525 N.E.2d 612 (Ind. Ct. App), *aff’d*, 526 N.E.2d 958 (Ind.), *cert. denied*, 488 U.S. 955 (1988); *Smith v. Doe*, 530 N.E.2d 331 (Ind. Ct. App. 1988), *cert. denied*, 492 U.S. 919 (1989).

65. 410 U.S. at 156.

66. 112 S.Ct. at 2821.

67. 112 S.Ct. at 2826–31.

68. See e.g., Lori Andrews, *The Legal Status of the Embryo*, 32 *Loyola L. Rev.* 357, 359 (1986).

69. It is important to point out that this misrepresents the scope of the *Roe-Casey* liberty. *Roe* did not limit the abortion liberty to viability. Instead, with the companion decision of *Doe v. Bolton*, 410 U.S. 179 (1973), *Roe* established a right to a “health” abortion throughout pregnancy (defined as “all factors—physical, emotional, psychological, familial, and the woman’s age—relevant to the well-being of the patient. All these factors may relate to health”). *Id.* at 192. This is clear from *Stenberg v. Carhart*, 120 S.Ct. 2597 (2000), and emphasized by Justice Thomas’ dissenting opinion. *Id.* at 2652 & n.21. In addition, several federal courts have given such a broad reading to the “health” exception after viability. See e.g., *Women’s Med. Prof. Corp. v. Voinovich*, 130 F.3d 187 (6th Cir. 1997), *cert. denied*, 523 U.S. 1036, 1039 (1998) (Thomas, J., dissenting from the denial of *certiorari*); *American College of Obstetricians and Gynecologists v. Thornburgh*, 737 F.2d 283, 298–99 (3d Cir. 1984), *aff’d*, 476 U.S. 747 (1986); *Margaret S. v. Edwards*, 488 F.Supp. 181 (E.D. La. 1980); *Schulte v. Douglas*, 567 F.Supp. 522 (D.Neb. 1981), *aff’d per curiam, sub nom. Women’s Servs., P.C. v. Douglas*, 710 F.2d 465 (8th Cir. 1983). The breadth of this “health” exception after viability was not altered in the *Casey* decision. *Planned Parenthood v. Casey*, 505 U.S. 833, 846 (1992) (reaffirming “State’s power to restrict abortion after fetal viability, if the law contains exceptions for pregnancies which endanger a woman’s life or health”), *Id.* at 878 (reaffirming *Roe*’s holding “that subsequent to viability, the State . . . may . . . regulate, and even proscribe, abortion except where it is necessary, in appropriate medical judgment, for the preservation of the life or health of the mother.”), *Id.* at 871 (“when the fetus is viable, prohibitions are permitted provided the life or health of the mother is not at stake”).

70. John A. Robertson, *Decisional Authority over Embryos and Control of IVF Technology*, 28 *Jurimetrics J.* 285, 290 (1988).

71. Robertson, *Procreative Liberty and the Control of Conception, Pregnancy, and Childbirth*, 69 *VA L. Rev.* 405, 405 n.3 (1983).

72. Paul B. Linton, *Planned Parenthood v. Casey: The Flight from Reason in the Supreme Court*, 13 *St. Louis U. Pub. L. Rev.* 15, 31 (1993).

73. *Washington v. Glucksberg*, 521 U.S. 702, 117 S.Ct. 2258 (1997) (no right to assisted suicide); *Roe*, 410 U.S. at 154 (“it is not clear to us that the claim asserted by some amici that one has an unlimited right to do with one’s body as one pleases bears a close relationship to the right of privacy previously articulated in the Court’s decisions”); *Jacobson v. Massachusetts*, 197 U.S. 11 (1905) (*vaccination*).

74. Cf. Robertson, *The Question of Human Cloning*, 24 *Hastings Center Report* No. 2 at 6 (1994), with McCormick’s response, Richard A. McCormick, *Blastomere Separation: Some Concerns*, 24 *Hastings Center Report* No. 2 at 14 (1994).

75. McCormick, *supra* note 82, at 14.

76. 112 S.Ct. at 2809 (“for two decades of economic and social developments, people have organized intimate relationships and made choices that define themselves and their places in society, in reliance on the availability of abortion in the event that contraception should fail”).

77. 410 U.S. at 159.

78. *Lifchez v. Hartigan*, 735 F.Supp. 1361 (N.D.Ill.), *aff'd* without opinion, 914 F.2d 260 (7th Cir. 1990), *cert. denied sub. nom. Scholberg v. Lifchez*, 498 U.S. 1069 (1991); *Margaret S. v. Edwards*, 794 F.2d 994 (5th Cir. 1986); *Jane L. v. Bangerter*, 61 F.3d 1493, 1502 (10th Cir. 1995), *rev'd* on other grounds, *Leavitt v. Jane L.*, 116 S.Ct. 2068 (1996). See 102 F.3d 1112, 1114 n.1 (10th Cir. 1996).

79. Robertson, 28 *Jurimetrics J.* at n.16.

80. 505 U.S. 833 (1992).

81. 505 U.S. at 851.

82. See e.g., Yale Kamisar, *Against Assisted Suicide—Even a Very Limited Form*, 72 U. Det. Mercy L. Rev. 735, 765–68 (1995); Richard S. Myers, *An Analysis of the Constitutionality of Laws Banning Assisted Suicide from the Perspective of Catholic Moral Teaching*, 72 U. Det. Mercy L. Rev. 771, 777–78 (1995).

83. 521 U.S. 702, 117 S.Ct. 2258 (1997).

84. 117 S.Ct. at 2268.

85. *Id.* at 2268.

86. 117 S.Ct. at 2271.

87. 497 U.S. 261 (1990).

88. 117 S.Ct. at 2270.

89. *Id.* at 2270.

90. 117 S.Ct. at 2272 (quoting *Cruzan*, 497 U.S. at 282 and the Model Penal Code “The interests in the sanctity of life that are represented by the criminal homicide laws are threatened by one who expresses a willingness to participate in taking the life of another”).

91. 117 S.Ct. at 2272.

92. See e.g., Richard Posner, *Sex and Reason* 339–40 (1992) (noting such a shift).

93. For purposes of this testimony, I adopt Congress’ definition of “human embryo” in Pub. L. No. 106–554, sec. 510(b) (“any organism . . . that is derived by fertilization, parthenogenesis, cloning, or any other means from one or more human gametes or human diploid cells”) and the definition of “human cloning” in the bill, S. 790, introduced by Senator Brownback on April 26, 2001: “human asexual reproduction, accomplished by introducing the nuclear material of a human somatic cell into a fertilized or unfertilized oocyte whose nucleus has been removed or inactivated to produce a living organism (at any stage of development) with a human or predominantly human genetic constitution.”

94. See e.g., John A. Robertson, *Embryos, Families, and Procreative Liberty: The Legal Structure of the New Reproduction*, 59 S. Cal. L. Rev. 942, 973 (1986) (“With the exception of former laws that prohibited abortion, the law has never regarded fetuses as rights-bearing entities”); John A. Robertson, *In the Beginning: The Legal Status of Early Embryos*, 76 Va. L. Rev. 437, 450 n.38 (1990) (citing four articles for legal background, all of which contain only a sketchy, incomplete, and superficial review of the history of the legal protection for the unborn: Lori B. Andrews, *The Legal Status of the Embryo*, 32 *Loyola L. Rev.* 357, 361 (1986) (citing *Roe v. Wade* for the legal status of the human embryo in history); Patricia A. King, *The Juridical Status of the Fetus: A Proposal for Legal Protection of the Unborn*, 77 *Mich. L. Rev.* 1647 (1979); Robertson, *Embryos*, 59 S. Cal. L. Rev. 942; Marcia Joy Wurmsbrand, *Note, Frozen Embryos: Moral, Social, and Legal Implications*, 59 S. Cal. L. Rev. 1079 (1986) (citing Robertson, *Embryos*, *supra*, and John A. Robertson, *Procreative Liberty and the Control of Conception, Pregnancy, and Childbirth*, 69 Va. L. Rev. 405 (1983)).

95. Robertson, *The Question of Human Cloning*, *Hastings Ctr. Rep.* Mar.–Apr. 1994, at 6.

96. 4 William Blackstone, *Commentaries on the Laws of England* 177 (U. Chicago Reprint 1979) (hereafter *Blackstone*). See also 4 *Blackstone* 188 (“Felony homicide” defined as “the killing of a human creature”); 6 *The New Encyclopaedia Britannica* 26 (15th ed. 1995) (“homicide, the killing of one human being by another”).

97. See e.g., Robertson, 76 VA. L. Rev. at 444 n.24 (“The abortion debate has often been confused by loose use of terms such as person, human life, human being, etc. Clearly the fertilized egg, embryo, and fetus are human and are living. The question is whether they merit the moral protection accorded to clearly defined persons.”).

98. 1 *Blackstone* 125.

99. 1 *Blackstone* 126. See also *Stemmer v. Kline*, 19 N.J.Misc. 15, 17 A.2d 58, 59 (1940) (“At common law, a child en ventre sa mere was separate entity entitled to recognition and protection by courts and recognized as a ‘person.’”).

100. See e.g., Dennis J. Horan, Clarke D. Forsythe & Edward R. Grant, *Two Ships Passing in the Night: An Interpretivist Review of the White-Stevens Colloquy on Roe v. Wade*, 6 *St. Louis U. Pub. L. Rev.* 229, 276 & n.276 (1987) (citing writings of *Paulus* and *Marcianus in Corpus Juris Civilis*).

101. John Keown, *Abortion, Doctors and the Law* 26–48 (1988).

102. Glanville Williams, *The Sanctity of Life and the Criminal Law* 227 (1957); Keown, *supra* note 10, at 20.
103. Keown, *supra* note 10, at 26–48.
104. 1 Blackstone 450 (“his child, either born or unborn”)
105. Horan, Forsythe & Grant, 6 St. Louis at 289–90 & nn.359–378.
106. 1 Blackstone 446 (“declares herself with child”)
107. Horan, Forsythe & Grant, 6 St. Louis U. Pub. L. Rev. at 290 n.369; Clarke D. Forsythe, *Homicide of the Unborn Child: The Born Alive Rule and Other Legal Anachronisms*, 21 Val. U.L. Rev. 563 (1987).
108. Parker, 50 Mass. at 266 (citing 1 Blackstone 129).
109. 22 N.J. 52, 56–57 (1849). The court finished this statement by saying that “yet it seems no where to regard it as *in life*, or to have respect to its preservation as a living being.” *Id.* The answer here is the difference between different burdens of proof in civil and criminal law, as well as the evidentiary issues involved.
110. Lennart Nilsson, *A Child Is Born* 15 (1990).
111. Valentine Seaman, *The Midwives Monitor and the Mothers Mirror* 70–72 (1800).
112. See generally, Forsythe, 21 Val. U.L. Rev. at 571 n.42, 572–73.
113. Thomas Denman, *An Introduction to the Practice of Midwifery* 287 (3d ed. 1829).
114. 1 John Beck, *Elements of Medical Jurisprudence* 276 (11th ed. 1860).
115. 3 Wharton and Stille, *Medical Jurisprudence* 7 (5th ed. 1905).
116. 6 St. Louis at 279–280 (collecting authorities); 21 Val. U.L. Rev. at nn. 39–53 (collecting authorities).
117. 6 St. Louis Pub. L. Rev. at 285 & n.338. For a description of the common law history of abortion, see Horan, Forsythe & Grant, 6 St. Louis U. Pub. L. Rev. at 278–300; Robert Byrn, *An American Tragedy: The Supreme Court on Abortion*, 41 *Fordham L. Rev.* 807 (1973); Robert Destro, *Abortion and the Constitution: The Need for a Life-Protective Amendment*, 63 *Cal. L. Rev.* 1250 (1975); Joseph Dellapenna, *The History of Abortion: Technology, Morality and Law*, 40 *U. Pitt. L. Rev.* 359 (1979); Shelley Gavigan, *The Criminal Sanction as it Relates to Human Reproduction: The Genesis of the Statutory Prohibition of Abortion*, 5 *J. Legal Hist.* 20 (1984).
118. *Lamb v. State*, 10 A. 208, 208 (Md. Ct. App. 1887).
119. Joel Prentiss Bishop, *Bishop on Statutory Crimes* sec. 744, at 447 (2d ed. 1883); Frances Wharton, *American Criminal Law* secs. 1220–30, at 210–218 (6th rev. ed. 1868).
120. Wharton at secs. 1220–1230 (cit. omit.).
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131. See Horan, Forsythe & Grant, 6 St. Louis at 281–82 n.306–311 (collecting authorities).
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135. See generally, Clarke D. Forsythe, *The Legacy of Oliver Wendell Holmes*, 69 U. Det. Mercy L. Rev. 677, 685–89 (1992).

136. William Prosser, *Law of Torts* 335–36 (4th ed. 1971) (emphasis added); Prosser & Keeton on Torts 367–72 (5th ed. 1984); Prosser Wade & Schwartz, *Torts* 421–36 (9th ed. 1994).

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138. Prosser, *Law of Torts*, at 337 (4th ed. 1971) (emphasis added). See generally, David Kadar, *The Law of Tortious Prenatal Death Since Roe v. Wade*, 45 Mo. L. Rev. 639 (1980).

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140. Some courts concluded that *Roe* prevented protection of the unborn child even outside the context of abortion. See e.g., Bopp & Coleson, *The Right to Abortion: Anomalous, Absolute, and Ripe for Reversal*, 3 B.Y.U. J. Pub. L. at 256–57 (citing cases). But that erroneous understanding has been abandoned in recent years. See e.g., *People v. Davis*, 7 Cal.4th 797, 30 Cal.Rptr.2d 50 872 P.2d 591 (1994).

141. See e.g., *People v. Davis*, 7 Cal.4th 797, 30 Cal.Rptr.2d 50 872 P.2d 591 (1994); *State v. Merrill*, 450 N.W.2d 318 (Minn. 1990), *cert. denied sub. nom. Merrill v. Minnesota*, 496 U.S. 931 (1990). For various surveys of the current status of legal developments protecting the unborn child in criminal and tort law, see Forsythe, 32 Val. U.L. Rev. at 494–501; Bopp & Coleson, *The Right to Abortion: Anomalous, Absolute, and Ripe for Reversal*, 3 B.Y.U. J. Pub. L. 247–261; Horan, Forsythe & Grant, 6 St. Louis Pub. L. Rev. at 307–309.

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145. Ariz. Rev. Stat. 13–1103(A)(5) (West 1989 & Supp. 1995); Ill. Comp. Stat. ch. 720, 5/9–1.2, 5/9–2.1, 5/9–3.2 (1994); Ind. Code Ann. 35–42–1–6 (Burns 1994) (feticide); La. Rev. Stat. Ann. tit. 14, 32.5–32.8 (read in conjunction with tit. 14, 2(11) (West 1996 Supp.); Minn. Stat. Ann. 609.266, 209.2661–609.2665, 609.268(1) (1987 & Supp. 1996); Mo. Rev. Stat. 1.205, 565.024 (Vernon 1996 Supp.) (see *State v. Knapp*, 843 S.W.2d 345 (Mo. 1992); N.D. Cent. Code 12.1–17.1–01 to 12.1–17–04 (1995 Supp.); Ohio Sub. Senate Bill No. 239 (1996); PA Senate Bill No. 45 (1997); S.D. Cod. Laws Ann 22–17–6 (1988); 22–16–1, 22–16–1.1, 22–16–4, 22–16–15, 22–16–20, 22–16–41, read in conjunction with 22–1–2(31), 22–1–2(50A) (1996 Supp.); Utah Code Ann. 76–5–201 (1995). Prosecutions under the Illinois law, without regard to time of gestation, are common. See e.g., Steven J. Stark, “Boyfriend, 21, is charged in pregnant teen’s slaying,” *Chicago Tribune*, Sunday, March 8, 1998, sec. 4, p. 3, col. 5 (defendant charged with “intentional homicide of an unborn child”).

146. Cal. Pen Code 187(a) (1988). See *People v. Davis*, 7 Cal.4th 797, 30 Cal.Rptr.2d 50, 872 P.2d 591 (1994).

147. Fla. Stat. Ann. 782.09 (West 1992); Ga. Code Ann. 16–5–80, 40–6–393.1 (Harrison 1994), 52–7–12.3 (Harrison 1996 Supp.); Mich. Comp. Laws Ann. 750.322 (West 1991) (*Larkin v. Cahalan*, 389 Mich. 533, 208 N.W.2d 176 (1973)); Miss. Code Ann. 97–3–37 (1994); Nev. Rev. Stat. 200.210 (1995); Okla. Stat. Ann. tit. 21, 713 (West 1983); Wash. Rev. Code Ann. 9A.32.060(1)(b) (1988); Wis. Rev. Stat. 940.04(2)(a) (West 1996).

148. Iowa Code Ann. 707.7 (West 1993) (as amended by H.F. 2109 (1996)); *Commonwealth v. Cass*, 392 Mass. 799, 467 N.E.2d 1324 (1984), *Commonwealth v. Lawrence*, 404 Mass. 378, 536 N.E.2d 571 (1989); *State v. Horne*, 282 S.C. 444, 319 S.E.2d 7093 (1984); Tenn. Code Ann. 39–13–201 (Michie 1991 & Supp. 1995); R.I. Gen. Laws 11–23–5 (Michie 1994).

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153. See e.g., J.M. Tanner, *Fetus into Man: Physical Growth from Conception to Maturity* (Harvard University Press 1978) (where conception and fertilization are properly treated as equivalent, and “true foetal age” is counted as beginning with fertilization (p.38–39)).
154. Ind. Code Ann. Sec. 35–42–1–3 through 35–42–1–6 (2000).
155. Paul Linton, 13 St. Louis U. Pub. L. Rev. at 120 (Appendix B, collecting legislation and caselaw from 38 states). The exception to this general trend has been state judicial decisions addressing the status of human embryos in divorce proceedings. See Daniel Avila, *The Present Standing of the Human Embryo in United States Law*, 1 Nat’l Catholic Bioethics Q. 197 (2000) (forthcoming) (citing *Davis v. Davis*, 842 S.W.2d 588 (Tenn. 1992), cert. denied, 507 U.S. 911 (1993); *Kass v. Kass*, 696 N.E.2d 174 (N.Y. 1998); *A.Z. v. B.Z.*, 725 N.E.2d 1051 (Mass. 2000); *J.B. v. M.B.*, 751 A.2d 613 (N.J.App. 2000), cert. granted, 760 A.2d 783 (N.J. 2000); *Litowitz v. Litowitz*, 10 P.3d 1086 (Wash.App. 2000)). However, these decisions have been decided upon contract, not constitutional, principles (except for *Davis*) and have been decided in the absence of legislation governing such decisions. State law, of course, does not govern federal legislation.
156. Reprinted as Gilbert Meilaender, “Begetting and Cloning,” *First Things* 41, 43 (June/July 1997). See also Gilbert Meilaender, *Cloning in Protestant Perspective*, 32 Val. U.L. Rev. 707 (1998).
157. Declaration of Helsinki, World Medical Association (1989), reprinted in 5 Warren T. Reich, *Encyclopedia of Bioethics* 2766 (Rev. ed. 1995). See also id at 2767 (“In research on man, the interest of science and society should never take precedence over considerations related to the well-being of the subject.”). See also Declaration of Geneva, World Medical Association (1948) (“I will maintain the utmost respect for human life from the time of conception.”), reprinted in 5 Warren T. Reich, *Encyclopedia of Bioethics* 2646–47 (Rev. ed. 1995).
158. James Watson, *Moving Toward the Clonal Man*, 227 *The Atlantic* 50, 53 (May, 1971).

Senator BROWNBACK. Thank you, Mr. Forsythe. I appreciate you coming forward and testifying. I believe you have a law review article that was done on this point as well. What was that law review article?

Mr. FORSYTHE. The Valparaiso Law Review article. It was published in the 32 Valparaiso University Law Review 469 in 1998.

Senator BROWNBACK. Very good. I look forward to talking with you, too, about the legal issues with banning implantation of a cloned entity as we go into questioning.

Dr. Jaenisch.

STATEMENT OF DR. RUDOLF JAENISCH, PROFESSOR OF BIOLOGY, MIT, WHITEHEAD INSTITUTE (REPRESENTING THE AMERICAN SOCIETY FOR CELL BIOLOGY)

Dr. JAENISCH. Thank you, Mr. Chairman, for allowing me to testify today. My name is Rudolf Jaenisch. I am here today as a representative of the American Society of Cell Biology. I am a professor of biology at MIT and at the Whitehead Institute in Boston, and a basic scientist with long-term interest in understanding the mechanism of human development and, more recently, to understand the problems of mammalian cloning. Why do most clones act abnormal?

I want to emphasize, I do not work with human stem cells. I do not intend to work with human stem cells in the future. I only work with mice. I have no vested interest in this topic. In March, I testified before the House Subcommittee on Human Cloning Research. I emphasized there the scientific concerns of human cloning. Animal research predicts that most human clones, if they would ever be produced, would be not normal. Together with the creator of Dolly, the sheep, we wrote an article in *Science* where

we outlined our concerns and summarized the problems. I would like to submit this article for the record.

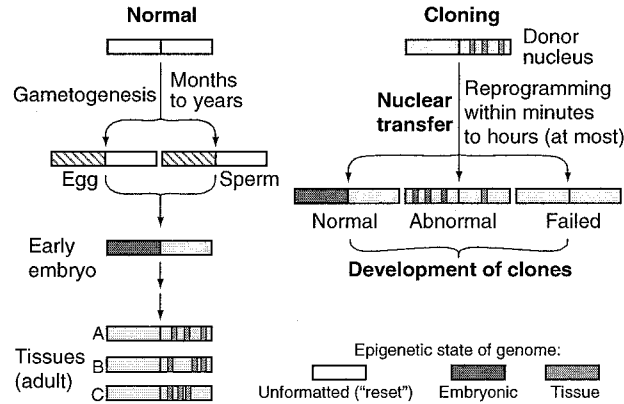
Senator BROWNBACK. It will be in the record.
[The information referred to follows:]

ARTICLE SUBMITTED BY RUDOLF JAENISCH AND IAN WILMUT
ENTITLED "DON'T CLONE HUMANS!"

The successes in animal cloning suggest to some that the technology has matured sufficiently to justify its application to human cloning. An *in vitro* fertilization specialist and a reproductive physiologist recently announced their intent to clone babies within a year's time (1). There are many social and ethical reasons why we would never be in favor of copying a person. However, our immediate concern is that this proposal fails to take into account problems encountered in animal cloning.

Since the birth of Dolly the sheep (2), successful cloning has been reported in mice (3), cattle (4), goats (5), and pigs (6, 7), and enough experience has accumulated to realize the risks. Animal cloning is inefficient and is likely to remain so for the foreseeable future. Cloning results in gestational or neonatal developmental failures. At best, a few percent of the nuclear transfer embryos survive to birth and, of those, many die within the perinatal period. There is no reason to believe that the outcomes of attempted human cloning will be any different. The few cloned ruminants that have survived to term and appear normal are often oversized, a condition referred to as "large offspring syndrome" (8). Far more common are more drastic defects that occur during development. Placental malfunction is thought to be a cause of the frequently observed embryonic death during gestation. Newborn clones often display respiratory distress and circulatory problems, the most common causes of neonatal death. Even apparently healthy survivors may suffer from immune dysfunction, or kidney or brain malformation, which can contribute to death later. So, if human cloning is attempted, those embryos that do not die early may live to become abnormal children and adults; both are troubling outcomes.

The fetal abnormalities and abnormalities in those few clones that are born live are not readily traceable to the source of the donor nuclei. The most likely explanation may be failures in genomic reprogramming. Normal development depends upon a precise sequence of changes in the configuration of the chromatin and in the methylation state of the genomic DNA. These epigenetic alterations control tissue-specific expression of genes. For cloning technology, the crucial question is a simple one: Is the configuration of chromatin changes acquired by a donor nucleus in the injected oocyte functionally identical to that resulting from gametogenesis and fertilization?



Reprogramming in normal development renders the egg and sperm genome competent to express embryonic genes (red box). During differentiation, tissue-specific genes are activated (small green boxes in tissues A, B, C). Cloning of a somatic nucleus (tissue A) may lead to three outcomes: no reprogramming (no activation of embryonic genes and early death—"failure"); partial reprogramming (some embryonic genes are activated—"abnormal" development); complete reprogramming (faithful activation of embryonic genes—"normal" development).

Epigenetic reprogramming is normally accomplished during spermatogenesis and oogenesis, processes that in humans take months and years, respectively. During nuclear cloning, the reprogramming of the somatic donor nucleus must occur within minutes or, at most, hours between the time that nuclear transfer is completed and the onset of cleavage of the activated egg begins. Prenatal mortality of nuclear clones could be due to inappropriate reprogramming, which could lead in turn to dysregulation of gene expression. Some long-term postnatal survivors are likely to have subtle epigenetic defects that are below the threshold that threatens viability.

Circumstantial evidence begins to hint at defects in programming of gene expression in cloned animals (9, 10). Expression of imprinted genes was significantly altered when mouse or sheep embryos were cultured *in vitro* before being implanted into the uterus (11, 12). Thus, even minimal disturbance of the embryo's environment can lead to epigenetic dysregulation of key developmental genes. Also, preliminary observations suggest that widespread gene dysregulation in cloned mice is associated with neonatal lethality (13).

There is every reason to think that the human cloning experiments announced by P. Zavos and S. Antinori will have the same high failure rates as laboratories have experienced when attempting animal cloning. Zavos tried to reassure the public by saying that: "We can grade embryos. We can do genetic screening. We can do quality control." (1). The implication is that they plan to use the methods of routine prenatal diagnosis employed for the detection of chromosomal and other genetic abnormalities. However, there are no methods available now or in the foreseeable future to examine the overall epigenetic state of the genome.

Public reaction to human cloning failures could hinder research in embryonic stem cells for the repair of organs and tissues. Research is being conducted into programming these cells to turn into specific tissues types, which could (for example) be used to regenerate nerve cells and those in the heart muscle, benefiting patients with Parkinson's, Alzheimer's, and heart disease. The potential benefit of this therapeutic cell cloning will be enormous, and this research should not be associated with the human cloning activists.

We believe attempts to clone human beings at a time when the scientific issues of nuclear cloning have not been clarified are dangerous and irresponsible. In the United States, the National Bioethics Advisory Commission (14) reached that conclusion 5 years ago, "At present, the use of this technique to create a child would be a premature experiment that would expose the fetus and the developing child

to unacceptable risks.” All the data collected subsequently reinforce this point of view.

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15. We thank R. Weinberg, G. Fink, D. Page, A. Chess, W. Rideout, L. Young, H. Griffin, and L. Paterson.

Dr. JAENISCH. A major concern for us was that the irresponsible proposals of cloning activists to propose human cloning may lead to an unfortunate confusion in public opinion with very valuable research. We were worried that reproductive cloning, what these cloning activists propose, would be mixed up with serious and beneficial research on embryonic stem cells and then stop therapeutic cloning. This is the topic I want to address.

Since I am the only scientist on this panel, I think I would like to clarify the scientific issues here, so I would sharply differentiate between reproductive cloning and therapeutic cloning. In reproductive cloning, the intent is to create a new human being. There are not only scientific problems, but there are serious ethical and social problems, and they have been addressed.

In therapeutic cloning, the intent is to generate cells for transplantation, not to create a human being. It never involves transfer of the embryo into the uterus of a woman. It involves the transfer of a somatic nucleus into the egg, with the intent to generate in a culture an embryonic stem cell line which could be the source for tissue repair of any cell of the body of the patient.

I disagree with Representative Weldon. The ES (Embryonic Stem) cells do not have the potential to become, ever, a human being. They are exclusively created for the benefit of the donor person, not for the benefit of other people.

So my stand is very clear. I am opposed to human reproductive cloning, even if it was safe, but I believe it would be very unfortunate if the door was closed to therapeutic cloning, which has potentially great benefits, and this is outlined in the Science paper I submitted. I do not want to further waste words on reproductive cloning.

So, what are embryonic stem cells, what is their promise, and what are the alternatives? Somatic stem cells, or adult stem cells, I believe will be a major topic today. So I would like to differentiate and define those two approaches. Embryonic stem cells are the only truly pluripotent stem cells that can develop into any tissue type.

Most importantly, and I want to reemphasize this point, embryonic stem cells have unlimited number of divisions. They are im-

mortal. It is easy to generate kilograms of cells derived from an embryonic stem cell if so desired.

Adult stem cells, or somatic stem cells, is a recent very exciting area of research. The unexpected finding is that some cells, even the adult, have the potential to differentiate into mature, functional cells. The question is, I think, and this has been raised before, is this an alternative to using embryonic stem cells for transplantation medicine?

Now, let me point out a few problems with the adult stem cells. Many of their properties are not known. For example, these cells are not defined. They are a rare population and we do not know how to define them. They cannot grow *in vitro*, in culture; the problem is, they stop dividing, they lack the potential for differentiation in a defined way. These are a few of the problems which we encountered, and there is a serious lack of understanding of the biology of this interesting population of cells. Extensive research is needed to create the foundation for their medical use.

Let me compare this situation with embryonic stem cells. After two decades of research on embryonic stem cells, we know we can create specific, differentiated derivatives of these embryonic stem cells. We know it works. One of the most exciting experiments was published last week in Science Magazine, where a group from NIH reported generation of a mini organ in the culture dish of a pancreas, of islet cells which showed that it functions properly upon physiological stimuli—glucose—to secrete insulin. These cells are the ones that are defective in diabetic patients.

Embryonic stem cells have been shown to generate efficiently functional dopaminergic cells, neurons, which are defective in Parkinson's patients, and stem cells very efficiently generate cardiac muscle cells, which I think is very important.

So at this point I think the most promising progress of generating insulin-producing cells, or cells treating Parkinson's, are really the embryonic stem cells. The somatic stem cells are much less defined at this point. There are serious problems which we have not solved yet. One of the most important problems: they stop dividing in culture. Adult neural stem cells, for example, stop dividing after 1 week in culture.

Only fetal somatic stem cells divide longer, which, of course, are not useful for this type of problem we are discussing. There is no evidence that somatic stem cells can grow long-term and give rise to useful cell types for clinical applications, and it is very difficult to predict the progress of science. It is safe to state, however, that the embryonic stem cell approach is predictable, and it will work. It may be in the clinic in 2, 3, or 4 years.

In contrast, for somatic stem cells, we do not understand many of the basic biological parameters. This approach, if it works at all, may be in clinical use in 5, 8, 10, 15 years. I do not volunteer to predict. This is the main question you, as U.S. legislators, have to struggle with: do we want to close the door to the most advanced and promising research and deny many patients who suffer from these diseases we mentioned a predictable route for potential cure, which will be available soon?

Let me make a final point, and this is the economical implications. This research is not only of high medical relevance, but it

has enormous economic implications. It will go on in other countries like Great Britain and Japan and other European countries, regardless of what is decided in this country. They will reap the benefits of the research. The U.S. will be left behind.

I want to give you an example. The example is Germany. I grew up in Germany, so I am very familiar with Germany. When in the seventies molecular cloning came on line, Germany decided to ban molecular cloning. The U.S., very wisely, allowed in a controlled way for this research to go on. The result is clear. The biotech industry in the U.S. is the most advanced in the world. Germany still struggles to recover from its former political decision.

So my question is, do you really want a situation when in 2 or 3 years a patient suffering from Parkinson's or diabetes in Great Britain would have available to him the most advanced technology and therapeutic intervention to cure his disease, but the same patient living in this country would be denied that therapy and might have to be consoled by the fact that it might be available in 10 or 15 years? I think this is a serious ethical dilemma which you are facing here. The American Society of Cell Biology and all serious colleagues I know urge you, if legislation is needed, you should specifically direct this legislation to reproductive cloning.

I believe reproductive cloning should not be allowed, even if it was safe, although I recognize there are other people who think differently. However, any legislation should not impede or interfere with the exciting recent and potentially very important developments for preventing and curing human disease. If we prevent this research, we will probably regret this in the years to come, as Germany does now regret its former policy toward molecular cloning. It is very difficult to catch up.

Thank you very much for giving me the opportunity to talk to you.

[The prepared statement of Dr. Jaenisch follows:]

PREPARED STATEMENT OF RUDOLF JAENISCH, M.D., PROFESSOR OF BIOLOGY, MIT, WHITEHEAD INSTITUTE (REPRESENTING THE AMERICAN SOCIETY FOR CELL BIOLOGY)

Mr. Chairman and members of the Subcommittee, I am Rudolf Jaenisch and I am here today as a representative of the American Society For Cell Biology. The Society represents more than 10,000 basic biomedical researchers throughout the United States and the world, most of whom work in our Nation's leading research universities and institutes. It is my pleasure to appear before you today.

I am a founding Member of the Whitehead Institute and Professor of Biology at MIT. Before coming the Whitehead Institute I was the head of the Department of Tumor Virology at the Heinrich Pette Institute of the University of Hamburg in Germany. I am privileged to have helped establish the field of transgenic science. Transgenic science deals with the transfer of genes to create mouse models of human disease.

On March 28, I testified before the House Subcommittee on Oversight and Investigations at a hearing entitled "Issues Raised by Human Cloning Research." There I emphasized the scientific concerns of human cloning that have resulted from the problems encountered in animal cloning. Our experience with animal cloning allows us to predict with a high degree of confidence that few cloned humans will survive to birth and, of those, the majority will be abnormal. The most likely cause of abnormal clone development is faulty reprogramming of the genome. This may lead to abnormal gene expression of any of the 30,000 genes residing in the animal. Faulty reprogramming does not lead to chromosomal or genetic alterations of the genome, so methods that are used in routine prenatal screening to detect chromosomal or genetic abnormalities in a fetus cannot detect these reprogramming errors. There are no available methods now or in the foreseeable future to assess whether the genome of cloned embryo has been correctly reprogrammed. The ASCB stated in

1998 its clear opposition to the cloning of a human being and remains a steadfast opponent today.

There is, however a critical distinction between the cloning of a human being—which is both morally questionable and scientifically dangerous—and the therapeutic cloning of cells for the purpose of developing tissue that may ultimately allow defective cells in people to be replaced by healthy cells. The Human Cloning Prohibition Act of 2001 prohibits the use of somatic cell nuclear transfer for the purposes of human cloning. This undoubtedly intended to prevent the cloning of a human being, but it also, perhaps inadvertently, would tragically limit biomedical research. Therapeutic cloning has the capability to turn human cells into specific tissue types, for example, to regenerate nerve cells and heart muscle cells, benefiting patients with Parkinson's, Alzheimer and heart disease. The potential benefits of therapeutic cell cloning are indisputable—the only uncertainty is when they will be realized.

Public reaction to animal cloning and the disreputable threats of human cloning are in grave danger of hindering critical research in embryonic stem cells for the repair of organs and tissues. Just over a year ago, a milestone in biomedical research was achieved when human embryonic stem lines were obtained by growing cells from the inner cell mass of early stage human embryos. Research work over the past 20 years using mouse embryonic stem cells has demonstrated the promise of these cells for basic research and potential disease therapy. ES cells by themselves cannot form a mouse, but they can differentiate into any of the cell types that comprise a mouse. Mouse ES cells have been used to elucidate many important aspects of normal mouse embryology and development, but, most important, mouse ES cells are currently being used in a variety of “proof of therapeutic principle” experiments in several animal models of human disease. For example, these cells appear to be able to produce neural progenitors that can repair spinal cord damage and reconstitute brain cells that produce the chemicals that control cognition, motion and sensory perception. If reproducible with human ES cells, this could lead to effective treatment of Parkinson's disease and Alzheimer's disease. Similarly, the production of healthy bone marrow cells to treat cancer and other hematopoietic diseases, and pancreatic cells to alleviate diabetes are all within reach, so long as well-intentioned efforts to prevent the cloning of human beings—living, talking, feeling, walking around human beings—do not have unintentionally interfere.

We may be on the cusp of a new era of medicine, one in which cell therapy could restore normal function to a variety of affected tissues using stem cells. To understand the need for rapid research progress with human pluripotent stem cells, one need look no further than many common, and often fatal, diseases such as cancer, heart disease and kidney disease. These diseases are treatable in whole or in part by tissue or organ transplants, but there are persistent and deadly problems of rejection and a woefully inadequate supply of suitable donor organs and tissues. In addition, the grim arithmetic of most organ transplants requires those who are seriously ill to wait for the tragic accidental death of another person so that they may live. Worse, for juvenile diabetes and many other diseases, there is not even a suitable transplantation therapy or other cure. Unless we use federal funds for all aspects of human pluripotent stem cell research new treatments for these conditions may be delayed by years, and many who might otherwise have been saved will surely die or endure needless suffering.

Cloning is an extremely complex area of biology in which the process itself is only now beginning to be understood. It is premature to ban a technique that is still in the process of evolving. At no point in our nation's history has Congress banned an area of scientific exploration or technology by federal legislation. We were at a similar crossroads 25 years ago with recombinant DNA technology, which indeed, as predicted, revolutionized science by spawning biotechnology and all of its medical and economic returns to this country. There is widespread support of the National Bioethics Advisory Commission's call for a voluntary international moratorium on human nuclear transfer for the purpose of creating a new human being. In addition, the Food and Drug Administration has specifically claimed that clinical research using cloning technology to create a human being is subject to FDA regulation under the Public Health Service Act and the Federal Food, Drug and Cosmetic Act. The ASCB urges that if legislation is needed, it should specifically be concerned with the reproduction of a human being by nuclear transfer. At the same time, any legislation should not impede or interfere with existing and potential critical research fundamental to the prevention or cure of human disease. This research often includes the cloning of human and animal cell lines and DNA, but not whole human beings.

Thank you for the opportunity to provide testimony on this important issue.

Senator BROWNBACK. Thank you, Dr. Jaenisch. I might point out to you that in the bill, I do not know if you had a chance to look at this section in the bill, but the bill does not prevent the cloning of tissue. What the bill prevents is the cloning of a full human embryo. Let me just read this section to you. I want to make sure you are aware of it. This is a quote from the bill:

“Nothing in this section shall restrict areas of scientific research not specifically prohibited by this section, including research in the use of nuclear transfer or other cloning techniques to produce molecules, DNA, cells other than human embryos, tissues, organs, plants or animals, other than humans.”

So the prevention, the ban in the bill is on the cloning of a human—the cloning of a human embryo. So I do not know if we are talking past each other on this, but that is the specific language that is in the bill.

Dr. JAENISCH. But what I tried to argue is that the so-called therapeutic cloning, which involves the somatic transfer of a somatic cell into the egg, the nucleus being from the patient, would be used to derive an embryonic stem cell, which is totally compatible with this patient, and that can be used for transplantation. This would not be possible with another embryonic stem cell which is derived from some other embryo, from *in vitro* fertilization. I think this is a very important difference.

Senator BROWNBACK. I look forward to pursuing this with you in questioning to make sure I understand what you are talking about, and if it is covered here or not. Thank you for being here.

Dr. Kass, thank you for coming.

STATEMENT OF DR. LEON R. KASS, PH.D., ADDIE CLARK HARDING PROFESSOR, COMMITTEE ON SOCIAL THOUGHT, UNIVERSITY OF CHICAGO

Dr. KASS. Thank you very much, Mr. Chairman. My name is Leon Kass. I am a professor at the University of Chicago. I was originally trained in medicine and biochemistry. I have been for 30 years professionally concerned with the ethical implications of biomedical advance, and I cut my teeth on this subject of human cloning in 1967.

I am profoundly grateful to you, Senator Brownback, for your vision in recognizing the momentous choice that is now before us, and for your courage in stepping up to steer us away from what is surely a very great danger to the future of our humanity.

I am here to testify in favor of the Human Cloning Prohibition Act, because I believe that efforts to clone a human being constitute unethical experiments on the child-to-be, indeed, represent a radical form of child abuse. I also oppose this practice because it represents a giant step toward turning procreation into manufacture, leading to (and certainly legitimating in advance) the eugenic redesigning of our children according to our specifications. This is a fork in the road, and down one path is the Brave New World.

As you pointed out, Mr. Chairman, the overwhelming majority of the American people are opposed to cloning human beings, to the reproductive cloning of human beings. I believe a majority of Members of Congress are also opposed to this practice. But it is not enough to be opposed to it, for if we do nothing about it, we shall have it, and we shall have it soon. By our silence we will have said

“yes” to it, when it comes along in the very near future. And if we try to go about stopping it in the wrong way, we shall also have it.

I have submitted lengthy written testimony, the argument of which boils down to this. The situation is urgent. Even as we speak, reputable scientists whose names we know are engaged in the practice of trying for the first time to bring a human child into being through the process of cloning.

Second—and others have already alluded to this—the consequences of doing so are grave. This is a fork in the road. Once we take it, there will be no turning back, for we will have established a principle that it is OK to choose in advance what kind of a child our children will be. Therefore, if we do not want to go down this road, an effective ban is needed, and needed now, before we are overtaken by events. That leaves us with the question: What, then, is the most effective way to ban reproductive human cloning?

Two legislative bans competed with each other the last time Congress took up this issue in 1998. One bill would have banned only so-called reproductive cloning by prohibiting the transfer of a cloned embryo to a woman to initiate a pregnancy. The other bill would have banned all cloning by prohibiting the creation, even, of the embryonic human clones.

Both sides oppose reproductive cloning, but because of the divide over the question of embryo research we got no ban at all. It would be tragic if we again failed to produce an effective ban on cloning, cloning human beings, especially now that certain people are going ahead with it, and defying us to try to stop them.

A few years ago, I was looking for a middle way between the two alternatives that we had last time, but I am now convinced we need an all-out ban on human cloning, including the creation of the embryonic clones. Anyone truly serious about preventing human reproductive cloning must seek to stop the process from the beginning, and I am convinced that no other approach will work, and here is why.

In a word, a ban on only reproductive cloning will turn out to be unenforceable. Once cloned embryos are produced and available in laboratories and assisted reproduction centers, it will be virtually impossible to control what is done with them. Biotechnical experiments take place in laboratories hidden from public view, and huge stockpiles of cloned human embryos could then be produced and bought and sold without anybody’s knowing about it.

As we have seen with *in vitro* embryos created to treat infertility, embryos produced for one reason can be used for any reason. Today, spare embryos once created to begin a pregnancy are now used in research. Tomorrow, clones created for research will be used to begin a pregnancy.

Assisted reproduction takes place in the privacy of a doctor-patient relationship, making outside scrutiny extremely difficult. Many infertility experts will probably obey a ban on reproductive cloning, but others can and will defy it with impunity, their doings covered by the veil of secrecy that is the principle of medical confidentiality. Even should the illegal deed become known, governmental attempts to enforce the reproductive ban would run into a

swarm of moral and legal challenges, both to any efforts aimed at preventing transfer to the woman and, even worse, to efforts seeking to prevent birth after the transfer has occurred.

Consider, a woman who wished to receive the embryonic clone would no doubt seek a judicial restraining order, suing to have the law overturned in the name of a constitutionally protected liberty interest in her own reproductive choice to clone. And should an "illicit clonal pregnancy" be discovered, no Government agency is going to compel a woman to abort the clone, and there would be an understandable swarm of protest should she be fined or jailed after she gives birth. I predict there would even be sentimental opposition to punishing the doctor for violating the law once the clone is born, unless, of course, it turns out to be severely abnormal.

For all these reasons, the only practically effective and legally sound approach is to block human cloning at the start, at the production of the embryonic clone. Such a ban can be rightly characterized not as interference with reproductive freedom, nor even as an interference with scientific inquiry, but as an attempt to prevent the unhealthy, unsavory, and unwelcome manufacture of and traffic in human clones.

This bill that you have introduced, Mr. Chairman, is in my view extremely carefully drafted, and it provides substantial criminal and monetary penalties for violating the law, shifting the incentives against the current renegades who want to proceed. And as you have pointed out, the bill makes very clear that there is to be no interference with the scientifically and medically useful practices of cloning DNA fragments, the duplication of somatic cells, or stem cells and tissue culture, et cetera.

If enacted, by the way, this bill would bring the United States into line with the already and soon-to-be-enacted practices of many other nations, and, I repeat, it offers us the best and, I think, the only realistic chance we have of keeping human cloning from happening, or happening much.

The issue of cloning is most emphatically not an issue of pro-life versus pro-choice. It is not mainly about death and destruction, and it is not about a woman's right to choose. It is only and emphatically about baby design and manufacture, the opening skirmish of a long battle against eugenics and against the post human future. It is an issue that should not divide what is usually called the left and the right. It is an issue that should unite everyone interested in keeping human procreation human.

Everyone needs to understand that, whatever they may think about the moral status of embryos, once embryonic clones are produced in laboratories, yes, for their stem cells, the eugenic revolution will have begun, and we will have lost our best chance to do anything about it.

The present danger posed by human cloning is, paradoxically, also a golden opportunity. In a truly unprecedented way, we can strike a blow for the human control of the technological project, for wisdom, for prudence, and for human dignity. The prospect of cloning, so repulsive to contemplate, is the occasion for deciding whether we shall be slaves of unregulated innovation and, ultimately, its artifacts, or whether we shall remain free human beings who guide our medical powers toward the enhancement of human

dignity. The preservation of the humanity of the human future is in our hands, and we must seize this occasion.

Thank you.

[The prepared statement of Dr. Kass follows:]

PREPARED STATEMENT OF LEON R. KASS, M.D., PH.D., ADDIE CLARK HARDING
PROFESSOR, UNIVERSITY OF CHICAGO

Senator Brownback and Members of the Committee. My name is Leon Kass, and I am the Addie Clark Harding Professor in the Committee on Social Thought and the College at the University of Chicago. Originally trained both as a physician and a biochemist, I have for more than thirty years been professionally concerned with the social and ethical implications of biomedical advance. In fact, my first writing on this subject was in 1967 on the dangers of human cloning. I am therefore very grateful for the opportunity to testify before this Committee in support of the bill to prohibit human cloning. And I profoundly grateful to you, Senator Brownback, for your vision in recognizing the momentous choice that is now before us and for your courage in stepping up to steer us away from what is surely a very great danger to the future of our humanity.

My testimony in support of this bill is in the form of an essay written precisely to gain support for such a bill. (The essay will appear soon in *The New Republic*.) I begin by calling attention to what is humanly at stake in the decision about human cloning and also to the fact that we have here a golden opportunity to exercise deliberate human command over where biotechnology may be taking us. I next present four arguments against reproductive cloning of human beings: (1) it constitutes unethical experimentation; (2) it threatens identity and individuality; (3) it turns procreation into manufacture (especially when understood as the harbinger of manipulations to come); and (4) it means despotism over children and perversion of parenthood. I conclude by arguing, on multiple grounds, that the only effective way to prevent reproductive cloning is to stop the process at the start, at the stage of creating the embryonic clones, just as is provided for in the present bill, and I show the weaknesses of the other widely discussed alternative. I heartily endorse this bill not only because it offers our only real hope of preventing the cloning of human beings, but also because it will give us for the first time some control over those biotechnological powers that threaten to bring about a "post-human" future.

Here is the essay, in full.

PREVENTING A BRAVE NEW WORLD: WHY WE SHOULD BAN HUMAN CLONING NOW

The urgency of the great political struggles of the twentieth century, successfully waged against totalitarianisms first right and then left, seems to have blinded many people to a deeper and ultimately darker truth about the present age: all contemporary societies are travelling briskly in the same utopian direction. All are wedded to the modern technological project; all march eagerly to the drums of progress and fly proudly the banner of modern science; all sing loudly the Baconian anthem, "Conquer nature, relieve man's estate." Leading the triumphal procession is modern medicine, becoming daily ever more powerful in its battle against disease, decay, and death thanks especially to astonishing achievements in biomedical science and technology—achievements for which we must surely be grateful.

Yet contemplating present and projected advances in genetic and reproductive technologies, in neuroscience and psychopharmacology, and in the development of artificial organs and computer-chip implants for human brains, we now clearly recognize new uses for biotechnical power that soar beyond the traditional medical goals of healing disease and relieving suffering. Human nature itself lies on the operating table, ready for alteration, eugenic and psychic "enhancement," and wholesale redesign. In leading laboratories, academic and industrial, new creators are confidently amassing their powers and quietly honing their skills, while on the street their evangelists are zealously prophesying a post-human future. For anyone who cares about preserving our humanity, it is time to pay attention.

Some transforming powers are already here. The pill. *In vitro* fertilization. Bottled embryos. Surrogate wombs. Cloning. Genetic screening. Genetic manipulation. Organ harvests. Mechanical spare parts. Chimeras. Brain implants. Ritalin for the young, Viagra for the old, and Prozac for everyone. And, to leave this vale of tears, a little extra morphine accompanied by Muzak.

Years ago Aldous Huxley saw it coming. In his charming but disturbing novel, *Brave New World* (published in 1932, yet more powerful on each re-reading), he made its meaning strikingly visible for all to see. Unlike other frightening futuristic novels of the past century, such as Orwell's already dated *Nineteen Eighty-four*,

Huxley shows us a dystopia that goes with, rather than against, the human grain—indeed, it is animated by our own most humane and progressive aspirations. Following those aspirations to their ultimate realization, Huxley enables us to recognize those less obvious but often more pernicious evils that are inextricably linked to successful attainment of partial goods.

Huxley paints human life seven centuries hence, living under the gentle hand of humanitarianism rendered fully competent by genetic manipulation, psychoactive drugs, hypnopaedia, and high-tech amusements. At long last, mankind has succeeded in eliminating disease, aggression, war, anxiety, suffering, guilt, envy, and grief. But this victory comes at the heavy price of homogenization, mediocrity, trivial pursuits, shallow attachments, debased tastes, spurious contentment, and souls without loves or longings. The Brave New World has achieved prosperity, community, stability, and nigh-universal contentment, only to be peopled by creatures of human shape but of stunted humanity. They consume, fornicate, take “soma,” enjoy “centrifugal bumble-puppy,” and operate the machinery that makes it all possible. They do not read, write, think, love, or govern themselves. Art and science, virtue and religion, family and friendship are all passe. What matters most is bodily health and immediate gratification: “Never put off till tomorrow the fun you can have today.” Brave new man is so dehumanized that he does not even recognize what has been lost.

Huxley’s novel is, of course, science fiction. Prozac is not yet Huxley’s soma; cloning by nuclear transfer or splitting embryos is not exactly Bokanovskification; MTV and virtual-reality parlors are not quite the “feelies”; and our current safe-and-consequenceless sexual practices are not universally as loveless or as empty as in the novel. But the kinships are disquieting, all the more so since our technologies of bio-psycho-engineering are still in their infancy—yet in ways that make all too clear what they might look like in their full maturity. Indeed, the cultural changes technology has already wrought among us should make us even more worried than Huxley would have us be.

In Huxley’s novel, everything proceeds under the direction of an omnipotent—albeit benevolent—world state. But the dehumanization he portrays does not really require despotism or external control. To the contrary, precisely because the society of the future will deliver exactly what we most want—health, safety, comfort, plenty, pleasure, peace of mind and length of days—we can reach the same humanly debased condition solely on the basis of free human choice. No need for World Controllers. Just give us the technological imperative, liberal democratic society, compassionate humanitarianism, moral pluralism, and free markets and we can take ourselves to Brave New World all by ourselves—and, what is most distressing, without even deliberately deciding to go. In case you hadn’t noticed, the train has left the station and is gathering speed, but no one seems to be in charge.

Some among us are, of course, delighted by this state of affairs: some scientists and biotechnologists, their entrepreneurial backers, and a cheering claque of sci-fi enthusiasts, futurologists, and libertarians. There are dreams to be realized, powers to be exercised, honors to be won, and money—big money—to be made. But most of us are worried, and not, as the proponents self-servingly claim, because we are either ignorant of science or afraid of the unknown. To the contrary, we can see all too clearly where the train is headed, and we do not like the destination. We can distinguish mere cleverness about means from wisdom about ends, and we are loath to entrust the future of the race to those who can’t tell the difference. No friend of humanity cheers for a post-human future.

Yet for all our disquiet, we have until now done nothing to prevent it. We either hide our heads in the sand because we enjoy the blessings medicine keeps supplying, or we rationalize our inaction by declaring that human engineering is inevitable and we can do nothing about it. In either case, we are complicit in preparing for our own degradation, in some respects more to blame than the biozealots who, however misguided, are putting their money where their mouth is. Denial and despair, unattractive outlooks in any situation, become morally reprehensible when circumstances summon us to keep the world safe for human flourishing. Our immediate ancestors, taking up the challenge of their time, rose to the occasion and rescued the human future from the cruel dehumanizations of Nazi and Soviet tyranny. It is our more difficult task to find ways to preserve it from the soft dehumanizations of well-meaning but hubristic bio-technical “re-creationism”—and to do it, of course, without undermining biomedical science or rejecting its genuine contributions to human welfare.

IMPEDIMENTS TO EXERCISING RESPONSIBILITY

Truth to tell, it will not be easy for us to do so, and we know it. But rising to the challenge requires recognizing the difficulties. For there are indeed many features of modern life that will conspire to frustrate efforts aimed at the human control of the biomedical project. First, we Americans believe in technological automatism: where we do not foolishly believe that all innovation is progress, we fatalistically believe that it is inevitable (“if it can be done, it will be done, like it or not”). Second, we believe in freedom: freedom of scientists to inquire, technologists to develop, and entrepreneurs to invest and profit, and freedom of private citizens to make use of existing technologies to satisfy any and all personal desires, including the desire to reproduce by whatever means. Third, the biomedical enterprise occupies the moral high ground of compassionate humanitarianism, upholding the supreme values of modern life—cure disease, prolong life, relieve suffering—in competition with which other moral goods rarely stand a chance. (“What the public wants is not to be sick,” says James (DNA) Watson, “and if we help them not to be sick, they’ll be on our side.”) Fourth, regarding other moral goods, our cultural pluralism and easy-going relativism make it difficult to reach consensus on what we should embrace and what we should oppose: moral objections to this or that biomedical practice are often facetiously dismissed as religious or sectarian. Many people are unwilling to pronounce judgments about what is good or bad, right and wrong, even in matters of great importance, even for themselves, never mind for others or society as a whole. Fifth, the biomedical project is now deeply entangled with commerce: there are increasingly powerful economic interests in favor of going full steam ahead, and no economic interests in favor of going slow. Sixth, because we live in a democracy, we face political difficulties in gaining a consensus to direct our future, and we have almost no political experience in trying to curtail the development of any new biomedical technology. Finally, and perhaps most troubling, our views of the meaning of our humanity have been so transformed by the scientific-technological approach to the world that we are in danger of forgetting what we have to lose, humanly speaking.

But though the difficulties are real, our situation today is far from hopeless. Regarding each of the aforementioned impediments, there is another side to the story. Though we love our gadgets and believe in progress, we have lost our innocence regarding technology. The environmental movement especially has alerted us to unintended damage caused by unregulated technological advance and has taught us how certain dangerous practices can be curbed. Though we favor freedom of inquiry, we recognize that experiments are deeds not speeches, and we prohibit experimentation on human subjects without their consent, even when cures from disease might be had by unfettered research. And we limit so-called reproductive freedom by proscribing incest, polygamy, and the buying and selling of babies. Although we esteem medical progress, biomedical institutions have ethics committees that judge research proposals on moral grounds, and, when necessary, uphold the primacy of human freedom and dignity even over scientific discovery. Notwithstanding our moral pluralism, national commissions and review bodies have sometimes reached moral consensus to recommend limits on permissible scientific research and technological application. On the economic front, the patenting of genes and life forms and the rapid rise of genomic commerce have elicited strong concerns and criticisms, leading even former enthusiasts for the new biology to recoil from the impending commodification of human life. Though we lack political institutions experienced in setting limits on biomedical innovation, federal agencies years ago rejected the development of the plutonium-powered artificial heart, and we have nationally prohibited commercial traffic in organs for transplantation, even though a market would increase the needed supply. In recent years, several American states and many foreign countries have successfully taken political action, making certain practices illegal and placing others under moratoria (e.g., creation of human embryos solely for research; human germline genetic alteration). Finally, most of us are not yet so degraded or cynical as to fail to be revolted by the society depicted in Huxley’s novel. Though the obstacles to effective action are significant, they offer no excuse for resignation. Besides, it would be disgraceful to concede defeat even before we enter the fray.

Not the least of our difficulties in trying to exercise control over where biology is taking us is the fact that we do not get to decide, once and for all, for or against the destination of a post-human world. The scientific discoveries and technical powers that will take us there come to us piecemeal, one at a time and seemingly independent from one another, each often attractively introduced as a measure that will “help us not to be sick.” But sometimes we come to a clear fork in the road where decision is possible and where we know that the decision we make will make a world of difference, indeed, will make a permanently different world. Fortunately,

we stand now at the point of such a momentous decision. Events have conspired to provide us with a perfect opportunity to seize the initiative and to gain some control of the biotechnical project. I refer to the prospect of human cloning, a practice absolutely central to Huxley's fictional world. Indeed, creating and manipulating life in the laboratory is the gateway to the Brave New World, not only in fiction but also in fact.

CLONING: A PERFECT OPPORTUNITY FOR RESPONSIBILITY

"To clone or not to clone a human being" is no longer a fanciful question. Success in cloning first sheep, then also cows, mice, pigs, and goats, make it perfectly clear that a fateful decision is now at hand: whether we should welcome or even tolerate the cloning of human beings. If recent newspaper reports are to be believed, reputable scientists and physicians have announced their intention to produce the first human clone in the coming year, and efforts may already be underway as you read.

The media, gawking and titillating as is their wont, have been softening us up for this possibility, by turning the bizarre into the familiar. In the four years since the birth of Dolly the cloned sheep, the tone of discussing the prospect of human cloning has gone from "Yuk," through "Oh?" and "Gee whiz," to "Why not?" The sentimentalizers, aided by leading bioethicists, have downplayed talk about eugenically cloning the beautiful and the brawny or the best and the brightest. They have taken instead to defending clonal reproduction for humanitarian or compassionate reasons: to treat infertility in people who are said to "have no other choice," to avoid the risk of severe genetic disease, to "replace" a child who has died. For the sake of these rare benefits, they would have us countenance the entire practice of human cloning, the consequences be damned.

But we dare not be complacent about what is at issue, for the stakes are very high indeed. Human cloning, though partly continuous with previous reproductive technologies, is also something radically new, both in itself and in its easily foreseeable consequences—especially when coupled to powers for genetic "enhancement" and germ-line genetic modification that may soon become available, thanks to the recently completed Human Genome Project. I exaggerate, but in the direction of the truth: we are compelled to decide nothing less than whether human procreation is going to remain human, whether children are going to be *made-to-order* rather than begotten, and whether we wish to say yes in principle to the road that leads to the dehumanized hell of Brave New World.

Four years ago, I addressed this subject in these pages, defending and trying to articulate the moral grounds of our repugnance at the prospect of human cloning ("The Wisdom of Repugnance," *TNR*, June 2, 1997; see also Leon R. Kass and James Q. Wilson, *The Ethics of Human Cloning*, 1998). Though I will (without apology) revisit some of my former arguments—events since then have only strengthened my conviction that cloning is a bad idea whose time should not come—my emphasis this time is more practical. To be sure, I would still like to persuade undecided readers that cloning is a serious evil, both in itself and in what it leads to. But I am more interested in encouraging those who oppose human cloning but who think we are impotent to prevent it; and I hope to mobilize them to support new and solid legislative efforts to stop it. In addition, I want readers who may worry less about cloning and more about impending prospects of germline genetic manipulation or other eugenic practices to realize the unique practical opportunity now available to us.

For we have here a golden opportunity to exercise some control over where biology is taking us. Cloning technology is discrete and well-defined, and requires considerable technical know-how and dexterity; we can therefore know by name many of the likely practitioners. The public demand for cloning is extremely low; most people are decidedly against it; nothing scientifically or medically important would be lost by banning clonal reproduction; alternative and non-objectionable means are available to obtain some of the most important medical benefits claimed for (non-reproductive) human cloning; commercial interests in human cloning are, for now, quite limited; and the nations of the world are actively seeking to prevent it. Now may be as good a chance as we will ever have to get our hands on the wheel of the runaway train now headed for a post-human world and to steer it toward a more dignified human future.

Before making my case, that we might proceed on common ground, I offer a brief synopsis of the state of the art.

WHAT'S WRONG WITH CLONING?

What is cloning? Cloning, or asexual reproduction, is the production of individuals who are genetically identical to an already existing individual. The procedure's name is fancy—somatic cell nuclear transfer—but its concept is simple. Take a ma-

ture but unfertilized egg; remove or inactivate its nucleus; introduce a nucleus obtained from a specialized (i.e., somatic) cell of an adult organism. Once the egg begins to divide, transfer the little embryo to a woman's uterus to initiate a pregnancy. Since almost all the hereditary material of a cell is contained within its nucleus, the re-nucleated egg and the individual into which it develops are genetically identical to the organism that was the source of the transferred nucleus.

An unlimited number of genetically identical individuals—a clone—could be produced by nuclear transfer. In principle, any person, male or female, newborn or adult, could be cloned, and in any quantity; and, because stored cells can outlive their sources, one may even clone the dead. Because cloning requires no personal involvement by the person whose genetic material is used, it could easily be used to reproduce living or deceased persons without their consent—a threat to reproductive freedom that has received relatively little attention.

Some possible misconceptions need to be avoided. First, cloning is not Xeroxing: the clone of Bill Clinton, though his genetic double, would enter the world hairless, toothless, and peeing in his diapers, like any other human infant. But neither is cloning just like natural twinning: the cloned twin will be identical to an older, existing adult; it will arise not by chance but by deliberate design; and the entire genetic make-up will be pre-selected by the parents and/or scientists. Further, the success rate, at least at first, will probably not be very high: the Scots transferred 277 adult nuclei into sheep eggs, implanted 29 clonal embryos, but achieved the birth of only one live lamb clone. For this reason among others, it is unlikely that, at least for now, the practice would be very popular (except among the Raelians!), and there is little immediate worry of mass-scale production of multicopies. Still, for the tens of thousands of people who sustain over 300 assisted-reproduction clinics in the United States and already avail themselves of *in vitro* fertilization and other techniques, cloning would be an option with virtually no added fuss. Dr. Panos Zavos, the Kentucky reproduction specialist who has announced his plans to clone a child, claims that he has already received thousands of e-mailed requests from people eager to clone, despite the known risks of failure and damaged offspring. Should commercial interests develop in “nucleus-banking,” as they have in sperm-banking and egg-harvesting; should famous athletes or other celebrities decide to market their DNA the way they now market their autographs and nearly everything else; should techniques of embryo and germline genetic testing and manipulation arrive as anticipated, increasing the use of laboratory-assistance in order to obtain “better” babies-then, cloning, if permitted, could become more than a marginal practice simply on the basis of free reproductive choice.

What to think about this prospect? Nothing good. Indeed, most people are repelled by nearly all aspects of human cloning: the possibility of mass production of human beings, with large clones of look-alikes, compromised in their individuality; the idea of father-son or mother-daughter twins; the bizarre prospect of a woman bearing and rearing a genetic copy of herself, her spouse, or even her deceased father or mother; the grotesqueness of conceiving a child as an exact “replacement” for another who has died; the utilitarian creation of embryonic duplicates of oneself, to be frozen away or created when needed to provide homologous tissues or organs for transplantation; the narcissism of those who would clone themselves and the arrogance of others who think they know who deserves to be cloned; the Frankensteinian hubris to create human life and increasingly to control its destiny; men playing at being God. Almost no one finds any of the suggested reasons for human cloning compelling; almost everyone anticipates its possible misuses and abuses. And the popular belief that human cloning cannot be prevented makes the prospect all the more revolting.

Revulsion is not an argument; and some of yesterday's repugnances are today calmly accepted—though, one must add, not always for the better. In crucial cases, however, repugnance is the emotional expression of deep wisdom, beyond reason's power fully to articulate it. Can anyone really give an argument fully adequate to the horror which is father-daughter incest (even with consent), or having sex with animals, or mutilating a corpse, or eating human flesh, or raping or murdering another human being? Would anybody's failure to give full rational justification for his revulsion at those practices make that revulsion ethically suspect? Not at all.

Let me suggest that our repugnance at human cloning belongs in that category. We are repelled by the prospect of cloning human beings not because of the strangeness or novelty of the undertaking, but because we intuit and feel, immediately and without argument, the violation of things that we rightfully hold dear. We sense that cloning represents a profound defilement of our given nature as procreative beings and of the social relations built on this natural ground. We also sense that cloning is a radical form of child abuse. In this age in which everything is held to be permissible so long as it is freely done and in which our bodies are regarded as

mere instruments of our autonomous rational wills, repugnance may be the only voice left that speaks up to defend the central core of our humanity. Shallow are the souls that have forgotten how to shudder.

Yet repugnance need not stand naked before the bar of reason. The wisdom of our horror at human cloning *can* be partially articulated, even if that is finally one of those instances about which the heart has its reasons that reason cannot entirely know.

I offer four objections to human cloning: (1) it constitutes unethical experimentation; (2) it threatens identity and individuality; (3) it turns procreation into manufacture (especially when understood as the harbinger of manipulations to come); and (4) it means despotism over children and perversion of parenthood. Please note: I speak only about so-called reproductive cloning, not about the creation of cloned embryos for research (a subject to which I will have to return). The objections that may be raised against creating (or using) embryos for research are entirely independent of whether the research embryos are produced by cloning. What is radically distinct and radically new is reproductive cloning.

First, any attempt to clone a human being would constitute an unethical experiment upon the resulting child-to-be. In all the animal experiments, fewer than two to three percent of all cloning attempts succeed. Not only are there fetal deaths and stillborn infants, but many of the so-called “successes” are in fact failures. As has only recently become clear, there is a very high incidence of major disabilities and deformities in cloned animals that attain live birth. Cloned cows often have heart and lung problems; cloned mice later develop pathological obesity; other live-born cloned animals fail to reach normal developmental milestones. The problem, scientists suggest, may lie in the fact that egg with the new somatic nucleus must reprogram itself in a matter of minutes or hours (whereas the nucleus of an unaltered egg has been prepared over months and years). There is thus a greatly increased likelihood of error in translating the genetic instructions, leading to developmental defects some of which will show themselves only much later. (Note well: these induced abnormalities may also affect the stem cells that scientists hope to harvest from cloned embryos. Lousy embryos, lousy stem cells.)

Nearly all scientists now agree that attempts to clone a human being carry massive risks of producing unhealthy, abnormal, and malformed children. What are we to do with them? Shall we just discard the ones that fall short of expectations? Considered opinion is today nearly unanimous, even among scientists: attempts at human cloning are irresponsible and unethical. We cannot ethically even get to know whether or not human cloning is feasible.

Second, cloning, if successful, would create serious issues of identity and individuality. The clone may experience concerns about his distinctive identity not only because he will be in genotype and appearance identical to another human being, but, in this case, because he may also be twin to the person who is his “father” or “mother”—if one can still call them that. Unaccountably, people treat as innocent the homey case of intrafamilial cloning—cloning of husband or wife (or single mother); they forget about the unique dangers of mixing the twin relation with the parent-child relation. (For that situation, the relation of contemporaneous twins is no precedent; yet even this less problematic situation teaches us how difficult it is to wrest independence from the being for whom one has the most powerful affinity.) Virtually no parent is going to be able to treat a clone of himself or herself as one does a child generated by the lottery of sex. What will happen when the adolescent clone of Mommy becomes the spitting image of the woman Daddy once fell in love with? In case of divorce, will Mommy still love the clone of Daddy, even though she can no longer stand the sight of Daddy himself?

Most people think about cloning from the point of view of adults choosing to clone. Almost no one thinks about what it would be like to be the cloned child. Almost certainly, his or her new life will constantly be scrutinized in relation to that of the older copy. Even in the absence of unusual parental expectations for the clone—say, to live the same life, only without its errors—the child is likely to be ever a curiosity, ever a potential source of *deja vu*. Unlike “normal” identical twins, a cloned individual—copied from whomever—will be saddled with a genotype that has already lived. He will not be fully a surprise to the world: people are likely always to compare his doings in life with that of his alter ego, especially if he is a clone of someone gifted or famous. True, his nurture and circumstance will be different; genotype is not exactly destiny. But one must also expect parental efforts to shape this new life after the original—or at least to view the child with the original version always firmly in mind. For why else did they clone from the star basketball player, mathematician, and beauty queen—or even dear old Dad—in the first place?

Third, human cloning would represent a giant step toward turning begetting into making, procreation into manufacture (literally, something “hand made”), a process

already begun with *in vitro* fertilization and genetic testing of embryos. With cloning, not only is the process in hand, but the total genetic blueprint of the cloned individual is selected and determined by the human artisans. To be sure, subsequent development is still according to natural processes; and the resulting children will be recognizably human. But we here would be taking a major step into making man himself simply another one of the man-made things.

How does begetting differ from making? In natural procreation, human beings come together to give existence to another being who is formed exactly as we were, by *what we are*—living, hence perishable, hence aspiringly erotic, hence procreative human beings. But in clonal reproduction, and in the more advanced forms of manufacture to which it will lead, we give existence to a being not by what we are but by *what we intend and design*.

Let me be clear. The problem is not the mere intervention of technique, and the point is not that “nature knows best.” The problem is that any child whose being, character, and capacities exist owing to human design does not stand on the same plane as its makers. As with any product of our making, no matter how excellent, the artificer stands above it, not as an equal but as a superior, transcending it by his will and creative prowess. In human cloning, scientists and prospective “parents” adopt a technocratic attitude toward human children: human children become their artifacts. Such an arrangement is profoundly dehumanizing, no matter how good the product.

Procreation dehumanized into manufacture is further degraded by commodification, a virtually inescapable result of allowing baby-making to proceed under the banner of commerce. Genetic and reproductive biotechnology companies are already growth industries, but they will soon go into commercial orbit now that the Human Genome Project has been completed. “Human eggs for sale” is already a big business, masquerading under the pretence of “donation.” Newspaper advertisements on elite college campuses offer up to \$50,000 for an egg “donor” tall enough to play women’s basketball and having high enough SATs to get into Stanford; to no one’s surprise, at such prices there are many young coeds eager to help shoppers obtain the finest babies money can buy. (The egg and womb-renting entrepreneurs shamelessly proceed on the ancient, disgusting misogynist premise that most women will give you access to their bodies, provided that the price is right.) Even before the capacity for human cloning is perfected, established companies will have invested in the harvesting of eggs from ovaries obtained at autopsy or through ovarian surgery, practiced embryonic genetic alteration, and initiated the stockpiling of prospective donor tissues. Through the rental of surrogate-womb services and through the buying and selling of tissues and embryos, priced according to the merit of the donor, the commodification of nascent human life will be unstoppable.

Finally, the practice of human cloning by nuclear transfer—like other anticipated forms of genetically engineering the next generation—would enshrine and aggravate a profound and mischief-making misunderstanding of the meaning of having children and of the parent-child relationship. When a couple normally chooses to procreate, the partners are saying yes to the emergence of new life in its novelty, are saying yes not only to having a child but also to having whatever child this child turns out to be. In accepting our finitude and opening ourselves to our replacement, we tacitly confess the limits of our control. Embracing the future by procreating means precisely that we are relinquishing our grip, in the very activity of taking up our own share in what we hope will be the immortality of human life and the human species. This means that our children are not our children: They are not our property, they are not our possessions. Neither are they supposed to live our lives for us, nor anyone else’s life but their own. Their genetic distinctiveness and independence are the natural foreshadowing of the deep truth that they have their own and never-before-enacted life to live. Though sprung from a past, they take an uncharted course into the future.

Much mischief is already done by parents who try to live vicariously through their children. Children are sometimes compelled to fulfill the broken dreams of unhappy parents. But whereas most parents normally have hopes for their children, cloning parents will have *expectations*. In cloning, such overbearing parents will have taken at the start a decisive step that contradicts the entire meaning of the open and forward-looking nature of parent-child relations. The child is given a genotype that has already lived, with full expectation that this blueprint of a past life ought to be controlling of the life that is to come. A wanted child now means a child who exists precisely to fulfill parental wants. Like all the more precise eugenic manipulations that will follow in its wake, cloning is thus inherently despotic, for it seeks to make one’s children after one’s own image (or an image of one’s choosing) and their future according to one’s will.

Lest you think me hyperbolic, consider concretely the new realities of responsibility and guilt in the households of the cloned. No longer only the sins but also the genetic choices of the parents will be visited on the children—and beyond the third and fourth generation—and everyone will know who is responsible. No parent will be able to blame nature or the lottery of sex for an unhappy adolescent's big nose, dull wit, musical ineptitude, nervous disposition, or anything else that he hates about himself. Fairly or not, children will hold their cloners responsible for everything, for nature as well as nurture. And parents, especially the better ones, will be limitlessly liable to guilt. Only the truly despotic souls will sleep the sleep of the innocent.

The arguments against cloning I have just presented I have prepared, necessarily, for adults, addressing my readers as fellow citizens faced with a momentous policy decision: shall we permit our neighbors to clone and be cloned? As I indicated when I began, I know that such moral and philosophical arguments may not be equal to the task. So let me put them to you again in a nutshell, asking you to think this time about cloning as if you were not a person being cloned but the younger duplicated copy. Even if you were a healthy clone, would you want to be constantly compared with the adult original in whose image you have been made? Wouldn't you want to have your own unique identity and an open-ended future, fully a surprise to yourself and the world? Are you happy being the copy of Mom, even though she drives you crazy? Are you pleased that everyone expects you to play chess just because you were cloned from Bobby Fisher? Don't you think that it is a form of child abuse for parents to attempt to determine in advance just exactly what kind of a child you are supposed to be? Do you want to live under the tyranny of their biologically determined expectations? Knowing what you know, would you like to turn human procreation into manufacture, producing children as artifacts?

ANSWERING THE CRITICS

The defenders of cloning, of course, are not wittingly friends of despotism. Indeed, deaf to most other considerations, they regard themselves mainly as friends of freedom: the freedom of individuals to reproduce, the freedom of scientists and inventors to discover and devise and to foster "progress" in genetic knowledge and technique, the freedom of entrepreneurs to profit in the market. They want large-scale cloning only for animals, but they wish to preserve cloning as a human option for exercising our "right to reproduce"—our right to have children, and children with "desirable genes." As some point out, under our "right to reproduce" we already practice early forms of unnatural, artificial, and extramarital reproduction, and we already practice early forms of eugenic choice. For that reason, they argue, cloning is no big deal.

We have here a perfect example of the logic of the slippery slope, and the slippery way in which it already works in that area. Only a few years ago, slippery slope arguments were used to oppose artificial insemination and *in vitro* fertilization using unrelated sperm donors. Principles used to justify those practices, it was said, will be used to justify more artificial and more eugenic practices, including cloning. Not so, the defenders retorted, since we can make the necessary distinctions. And now, without even a gesture at making the necessary distinctions, the continuity of practice is held by itself to be justificatory.

The principle of reproductive freedom currently enunciated by the proponents of cloning logically embraces the ethical acceptability of sliding all the way down: to producing children wholly in the laboratory from sperm to term (should it become feasible), and to producing children whose entire genetic makeup will be the product of parental eugenic planning and choice. If reproductive freedom means the right to have a child of one's own choosing, by whatever means, it knows and accepts no limits.

Proponents want us to believe that there are legitimate uses of cloning that can be distinguished from illegitimate uses, but by their own principles no such limits can be found. (Nor could any such limits be enforced in practice: once cloning is permitted, no one ever need discover whom one is cloning and why.) Reproductive freedom, as they understand it, is governed solely by the subjective wishes of the parents-to-be. The sentimentally appealing case of the childless married couple is, on those grounds, indistinguishable from the case of an individual (married or not) who would like to clone someone famous or talented, living or dead. Further, the principle here endorsed justifies not only cloning but, indeed, all future artificial attempts to create (manufacture) "better" or "perfect" babies.

The "perfect baby," of course, is the project not of the infertility doctors, but of the eugenic scientists and their supporters, who, for the time being, are content to hide behind the skirts of the partisans of reproductive freedom and compassion for the infertile. For them, the paramount right is not the so-called right to reproduce

but what biologist Bentley Glass called, a quarter of a century ago, “the right of every child to be born with a sound physical and mental constitution, based on a sound genotype . . . the inalienable right to a sound heritage.” But to secure that right and to achieve the requisite quality control over new human life, human conception and gestation will need to be brought fully into the bright light of the laboratory, beneath which the child-to-be can be fertilized, nourished, pruned, weeded, watched, inspected, prodded, pinched, cajoled, injected, tested, rated, graded, approved, stamped, wrapped, sealed, and delivered. There is no other way to produce the perfect baby.

If you think that such scenarios require outside coercion or governmental tyranny you are mistaken. Once it becomes possible, with the aid of human genomics, to produce or select for what some regard as “better babies”—smarter, prettier, healthier, or more athletic—parents will leap at the opportunity to “improve” their offspring. *Not* to do so will be socially regarded as a form of child neglect. Those who would ordinarily be opposed to such tinkering will be under enormous pressure to compete on behalf of their as yet unborn children—just as they scheme almost from birth on how to get their children into Harvard. Never mind that, lacking a standard of “good” or “better,” no one can really know whether any such changes will truly be improvements. Once the genetic genies put the babies into the bottle, there will be no way to get them out.

Proponents of cloning urge us to forget about the science fiction scenarios of laboratory manufacture or multiple-copied clones and to focus only on the sympathetic cases of infertile couples exercising their reproductive rights. But why, if the single cases are so innocent, should multiplying their performance be so off-putting? (Similarly, why do others object to people’s making money from that practice if the practice itself is perfectly acceptable?) The so-called science fiction cases—like *Brave New World*—make vivid the meaning of what looks to us, mistakenly, to be benign. They reveal how what looks like compassionate humanitarianism is, in the end, crushing dehumanization.

TOWARD AN EFFECTIVE BAN

Whether or not they share my reasons, most people today share my conclusion: human cloning is unethical in itself and dangerous in its likely consequences, including the precedent it will establish for designing our children. Some reach this conclusion for their own good reasons, different from my own: concerns about distributive justice in access to eugenic cloning; worries about the genetic effects of asexual “inbreeding”; aversion to the implicit premise of genetic determinism; objections to the embryonic and fetal wastage that must necessarily accompany the efforts; religious opposition to “man playing God.” Never mind why: the overwhelming majority of our fellow Americans remain firmly opposed to cloning human beings. For us, the real questions are: What should we do about it? How can we best succeed? These questions should concern everyone eager to secure deliberate human control over the powers that could redesign our humanity, even if cloning is not the place they would choose to make their stand.

What we should do is to work to prevent human cloning by making it illegal. We should aim for a global legal ban if possible and a unilateral national ban at a minimum—and soon, before the fact is upon us. To be sure, legal bans can be violated; but we do curtail much mischief by outlawing incest, voluntary servitude, and the buying and selling of organs and babies. To be sure, renegade scientists may secretly undertake to violate such a law, but we can deter them both by criminal sanctions and monetary penalties, as well as by removing any incentive they have to proudly claim credit for their technological bravado. Such a ban on clonal baby-making, moreover, will not harm the progress of basic genetic science and technology. On the contrary, it will reassure the public that scientists are happy to proceed without violating the deep ethical norms and intuitions of the human community. It will also protect honorable scientists from public backlash against the brazen misconduct of the rogues. As many scientists have publicly confessed, free and worthy science probably has much more to fear from a strong public reaction to a cloning fiasco than it does from a cloning ban, provided that it is judiciously crafted and vigorously enforced against those who would violate it.

Four states (Michigan, Louisiana, California, Rhode Island) have already enacted a ban on human cloning, and several others are likely to follow suit this year. Michigan, for example, has made it a felony, punishable by imprisonment for not more than 10 years or a fine of not more than \$10 million, or both, to “intentionally engage in or attempt to engage in human cloning,” where human cloning means “the use of human somatic cell nuclear transfer technology to produce a human embryo.” Internationally, the movement to ban human cloning gains momentum. France and

Germany have banned cloning (and germline genetic engineering), the Council of Europe is working to have it banned in all of its 41 member countries, and Canada is expected to follow suit. The United Nations, UNESCO, and the Group of Seven have called for a global ban on human cloning. Given the decisive actions of the rest of the industrialized world, the United States looks to some observers to be a rogue nation.

A few years ago, soon after the birth of Dolly, President Clinton called for legislation to outlaw human cloning and attempts were made to produce a national ban. Yet none was enacted, despite general agreement in Congress that it would be desirable to have one. Learning from this past failure, we can, I believe, do better this time around. Besides, circumstances have changed greatly in the intervening three years, making a ban both more urgent yet, happily, less problematic.

One might have thought that it would be easy enough to find clear statutory language for prohibiting attempts to clone a human being (and other nations have apparently not found it difficult). But, alas, in the last national go-around, there was trouble over the apparently vague term, "human being," and whether it includes the early (pre-implantation) embryonic stages of human life.

Two major anti-cloning bills were introduced into the Senate in 1998. The Democratic bill (Kennedy-Feinstein) would have banned so-called reproductive cloning by prohibiting transfer of cloned embryos into a woman to initiate a pregnancy. The Republican bill (Frist-Bond) would have banned *all* cloning by prohibiting the creation even of embryonic human clones. Both sides opposed "reproductive cloning," the attempt to bring to birth a living human child who is the clone of someone now (or previously) alive. But the Democratic bill sanctioned creating cloned embryos for research purposes; the Republican bill did not. The pro-life movement clearly could not support the former, whereas the scientific community and the biotechnology industry opposed the latter; indeed, they successfully lobbied a dozen Republican senators to oppose taking a vote on the Republican bill (which even its supporters now admit was badly drafted). Because of a deep and unbridgeable gulf over the question of embryo research, we did not get the Congressional ban on reproductive cloning that nearly everyone wanted. It would be tragic if we again fail to produce a ban on human cloning because of its seemingly unavoidable entanglement with the more divisive embryo research issue.

To find a way around this impasse, several people (I among them) advocated a legislative "third way," one that firmly banned only reproductive cloning but, unlike Kennedy-Feinstein, did not legitimate creating cloned embryos for research. This, it turns out, is hard to do. It is easy enough to state the necessary negative disclaimer that would set aside the embryo research question: "Nothing in this act shall be taken to determine the legality of creating cloned embryos for research; this act neither permits nor prohibits such activity." It is much more difficult to state the positive prohibition in terms that are unambiguous and acceptable to all sides. To indicate only one difficulty: indifference to the creation of the embryonic clones coupled with a ban (only) on their transfer would place the federal government in the position of *demanding* the destruction of nascent life—a bitter pill to swallow even for pro-choice advocates.

Given both these difficulties and the imminence of attempts at human cloning, I now believe that what we need is an all-out ban on human cloning, including the creation of embryonic clones. I am convinced that all half-way measures will prove to be morally, legally, and strategically flawed, and—most important—that they will not be effective in obtaining the desired result. Anyone truly serious about preventing human reproductive cloning must seek to stop the process from the beginning. Both our changed circumstances and the now evident defects of the less restrictive alternatives make this by far the most attractive and effective option. Here's why.

Creating cloned human children ("reproductive cloning") necessarily begins by producing cloned human embryos. Preventing the latter would prevent the former, and prudence alone might counsel building such a "fence around the law." Yet some scientists favor embryo cloning as a way of obtaining embryos for research or as sources of cells and tissues for the possible benefit of others. (This practice they misleadingly call "therapeutic cloning"—rather than the more accurate "cloning for research" or "experimental cloning"—in order to obscure the fact that the clone will be "treated" only to exploitation and destruction, and that any potential future beneficiaries and any future "therapies" are for now purely hypothetical). The prospect of creating new human life solely to be exploited in this way has been condemned on moral grounds by many people—including *The Washington Post*, former President Clinton, and many other supporters of a woman's right to abortion—as displaying a profound disrespect for life. Even those who are willing to scavenge so-called "spare embryos"—those products of *in vitro* fertilization made in excess of the

people's reproductive needs, and otherwise likely to be discarded—draw back from creating human embryos explicitly and solely for research purposes. They reject outright what they regard as shameless exploitation and instrumentalization of nascent human life. In addition, others who are agnostic about the moral status of the embryo, see the wisdom of not needlessly offending the sensibilities of their fellow citizens who are opposed to such practices.

But even setting aside these obvious moral first impressions, a few moments of reflection shows why an anti-cloning law that permitted cloning of embryos but criminalized their transfer to produce a child would be a moral blunder. Here would be a law that was not merely permissively “pro-choice” but emphatically and prescriptively “anti-life.” While permitting the creation of an embryonic life, it would make it a federal offense to try to keep it alive and bring it to birth. Whatever one thinks of the moral or ontological status of the human embryo, moral sense and practical wisdom recoil from having the government of the United States on record as *requiring* the destruction of nascent life and, what is worse, demanding the punishment of those who would act to preserve it by (feloniously!) giving it birth.

But the problem with the approach targeting only reproductive cloning (that is, the transfer of the embryo to a woman's uterus) is not only moral, but also legal and strategic. In a word, a ban on only reproductive cloning will turn out to be unenforceable. Once cloned embryos are produced and available in laboratories and assisted-reproduction centers, it will be virtually impossible to control what is done with them. Biotechnical experiments take place in laboratories hidden from public view, and, given the rise of high stakes commerce in biotechnology, secretly concealed from the competition. As we have seen with *in vitro* embryos created to treat infertility, embryos produced for one reason can be used for *any* reason: today, “spare embryos” once created to begin a pregnancy are now used in research; tomorrow, clones created for research will be used to begin a pregnancy. Assisted-reproduction takes place within the privacy of the doctor-patient relationship, making outside scrutiny extremely difficult. Many infertility experts probably will obey the law, but others can and will defy it with impunity, their doings covered by the veil of secrecy that is the principle of medical confidentiality. Moreover, the transfer of embryos to begin a pregnancy is a simple procedure (especially compared with manufacturing the embryo in the first place), simple enough that its final steps could be self-administered by the woman who would thus take the doctor off the hook of having “caused” the illegal transfer. (I have in mind something analogous to Kevorkian's suicide machine, which was designed to enable the patient to push the plunger and the good “doctor” to evade criminal liability.)

Even should the deed become known, governmental attempts to enforce the reproductive ban would run into a swarm of moral and legal challenges, both to any efforts aimed at preventing transfer to a woman and—even worse—to efforts seeking to prevent birth after transfer has occurred. A woman who wished to receive the embryo clone would no doubt seek a judicial restraining order, suing to have the law overturned in the name of an alleged constitutionally protected liberty interest in her own reproductive choices. (The cloned child would be born before the legal proceedings were complete.) And, should an “illicit clonal pregnancy” be discovered, no governmental agency is going to compel a woman to abort the clone, and there will be an understandable storm of protest should she be fined or jailed after she gives birth. There would even be sentimental opposition to punishing the doctor for violating the law—unless, of course, the clone turns out to be severely abnormal.

For all these reasons, the only practically effective and legally sound approach is to block human cloning at the start, at the production of the embryo clone. Such a ban can be rightly characterized not as interference with reproductive freedom, nor even as interference with scientific inquiry, but as an attempt to prevent the unhealthy, unsavory, and unwelcome manufacture of and traffic in human clones.

Some scientists, pharmaceutical companies, and bio-entrepreneurs will, of course, balk at this restriction. They want to get their hands on those embryos, and especially for their stem cells, those pluripotent cells that can, in principle, be turned into any cells and tissues in the body, potentially useful for transplantation to repair somatic damage. Embryonic stem cells need not come from *cloned* embryos, but, say the scientists, stem cells obtained from clones could be therapeutically injected into the embryo's adult “twin” without any risk of immunological rejection. It is the promise of rejection-free tissues for transplantation that has been, to date, the most successful argument in favor of experimental cloning. But new discoveries have shown that we can probably obtain the same benefits without the need for embryo cloning. The facts are much different than they were three years ago and the weight in the debate about cloning for research should shift to reflect them.

Numerous recent studies have shown that it is possible to obtain highly potent stem cells from the bodies of children and adults—from blood, bone marrow, brain,

pancreas, and, most recently, from fat. Beyond all expectations, these *non-embryonic* stem cells have been shown to have the capacity to turn into a wide variety of specialized cells and tissues. (At the same time, early human therapeutic efforts with stem cells derived from embryos have produced some horrible results, the cells going wild in their new hosts and producing other tissues in addition to those in need of replacement. If an *in vitro* embryo is undetectably abnormal—as so often they are—the cells derived from it may also be abnormal.) Because cells derived from our own bodies are more easily and cheaply available than cells harvested from specially manufactured clones, we will almost surely be able to obtain from ourselves any needed homologous transplantable cells and tissues, without the need for egg donors and cloned embryonic copies of ourselves. By pouring our resources into *adult* (or, more accurately, “non-embryonic”) stem cell research, we can also avoid the morally and legally vexing issues in embryo research. And more to our present subject, by eschewing the cloning of embryos, we make the cloning of human beings much less likely.

Last week an excellent federal anti-cloning bill was introduced in Congress, sponsored by Senator Sam Brownback in the Senate and Representative David Weldon in the House. Very carefully drafted, this legislation seeks to prevent the cloning of human beings at the very first step, by preventing somatic cell nuclear transfer to produce embryonic clones, and provides substantial criminal and monetary penalties for violating the law. The bill makes very clear that there is to be no interference with the scientific and medically useful practices of cloning of DNA fragments (molecular cloning), the duplication of somatic cells (or stem cells) in tissue culture (cell cloning), and whole-organism or embryo cloning of non-human animals. If enacted, this law would bring the United States into line with the already and soon to be enacted practices of many other nations. Most important, it offers us the best—indeed, the *only* realistic—chance we have to keep human cloning from happening, or happening much.

Getting this bill passed will not be easy. The pharmaceutical and biotech companies and some scientific and patient-advocacy associations will claim that the bill is the work of Bio-Luddites: anti-science, a threat to free inquiry, and an obstacle to obtaining urgently needed therapies for disease. Some feminists and pro-choice groups will claim that this legislation is really only a sneaky device for fighting *Roe v. Wade*, and they will resist anything that might be taken even to hint that a human embryo has any moral worth. On the other side, some right-to-life purists, who care not how babies are made only so long as life not be destroyed, will withhold their support because the bill does not take a position against embryo twinning or embryo research in general.

These arguments, all of them wrong, must be resisted. This is most emphatically not an issue of pro-life versus pro-choice. It is not about death and destruction or about a woman’s right to choose. It is only and emphatically about baby design and manufacture, the opening skirmish of a long battle with eugenics and against the post-human future. As such, it is an issue that does not and should not divide what is usually called “the left” and “the right”; indeed, there are people across the political spectrum who are coalescing in the efforts to stop human cloning. (The prime sponsor of Michigan’s comprehensive anti-cloning law is a pro-choice Democratic legislator.) Everyone needs to understand that—whatever we may think about the moral status of embryos—once embryonic clones are produced in the laboratories, the eugenic revolution will have begun. And we shall have lost our best chance to do anything about it.

As we argue in the coming weeks about this legislation, let’s be clear about the urgency of our situation and the meaning of our action or inaction. Scientists and doctors whose names we know, and probably many others we don’t know, are today working to clone human beings. They know the immediate hazards, but they are undeterred. They are prepared to screen and destroy anything that looks abnormal. They don’t care that they won’t be able to detect most of the possible defects. So confident are they in their rectitude that they are willing to ignore all future consequences of the power to clone human beings. They are prepared to gamble with the well-being of any live-born clones, and, if I am right, with a great deal more, all for the glory of being the first to replicate a human being. They are, in short, daring the community to defy them. Under these new circumstances, our silence can only mean acquiescence. To do nothing now is, in effect, to accept the responsibility for the deed and for all that follows predictably in its wake.

SHIFTING THE BURDEN OF PROOF

I appreciate that a federal legislative ban on human cloning is without American precedent, at least in matters technological. Perhaps such a ban will prove ineffec-

tive; perhaps it will eventually be shown to have been a mistake. (If so, it could later be reversed.) But, if enacted, it will have achieved one overwhelmingly important result, in addition to its contribution to thwarting cloning: it would place the burden of practical proof where it belongs, requiring proponents to show very clearly what great social or medical good can be had only by the cloning of human beings. Only for such a compelling case, yet to be made or even imagined, should we wish to risk this—or any future—major departure in human procreation. (The Brownback bill explicitly allows for such future reconsideration through its explicit provision mandating further study.)

We Americans have lived by and prospered under a rosy optimism about scientific and technological progress. The technological imperative has, on balance, probably served us well, though we should admit that there is no accurate method for weighing benefits and harms. Even when we recognize the unwelcome outcomes of technological advance, we Americans remain confident in our ability to fix all the “bad” consequences—whether by regulation or by means of still newer and better technologies. But there is very good reason for shifting the paradigm around, at least regarding those technological interventions into the human body and mind that will surely effect fundamental (and likely irreversible) changes in human nature, basic human relationships, and what it means to be a human being. Here we surely should not be willing to risk everything in the naive hope that, should things go wrong, we can later set them right again.

Some have argued that cloning is almost certainly going to remain a marginal practice, and that we should therefore permit people to practice it. But such a view is shortsighted. Even if cloning is rarely undertaken, a society in which it is tolerated is no longer the same society—any more than is a society that permits (even small-scale) incest or cannibalism or voluntary slavery. A society that allows cloning has, whether it knows it or not, tacitly said yes to converting procreation into manufacture and to treating children as pure projects of our will. Willy-nilly, it has said yes to the eugenic redesign of future generations. The principles thus legitimated could—and will—be used to legitimate the entire humanitarian superhighway to Brave New World.

The present danger posed by human cloning is, paradoxically, also a golden opportunity. In a truly unprecedented way, we can strike a blow for the human control of the technological project, for wisdom, prudence, and human dignity. The prospect of human cloning, so repulsive to contemplate, is the occasion for deciding whether we shall be slaves of unregulated innovation, and ultimately its artifacts, or whether we shall remain free human beings who guide our technique toward the enhancement of human dignity. The preservation of the humanity of the human future is in our hands. Let us seize the occasion.

Senator BROWNBACK. Thank you, Dr. Kass. I can tell you have thought about this a great deal for a long time.

Mr. Kristol, welcome to the Committee. We look forward to your testimony.

**STATEMENT OF MR. WILLIAM KRISTOL, CHAIRMAN, THE
BIOETHICS PROJECT OF THE NEW CITIZENSHIP PROJECT**

Mr. KRISTOL. Thank you, Mr. Chairman. Mr. Chairman, Senator Dorgan, you will recall that when President Bush addressed you in the State of the Union address 2 months ago, he quoted only one thinker, Yogi Berra, and he quoted Yogi Berra as giving you this important advice: “When you come to a fork in the road, take it.”

I think we are genuinely now at a fork in the road in the area of bioethics, in particular with respect to cloning. That is not true, obviously, in other areas of politics, where we try to make sensible compromises between different constituencies, different claims.

Politicians—often like to avoid going down one or another fork in the road, because much of politics is compromising and judging between competing demands, both of which often have some merit. But in this case I think the choice has to be made.

To govern is to choose, as Churchill said, and now we do face a momentous choice: do we stumble heedlessly, into a brave new

world of eugenic enhancement and technological manufacture of human beings, or do we avert such a future?

This battle over cloning is only the first battle in trying to draw a distinction between medicine, between gene therapy and other forms of healing and advanced forms of healing, which all of us welcome, and the eugenic enhancement and the technological manufacture of human beings. I do not believe there is any way to stop ourselves from going down the path of eugenic enhancement and technological manufacture without stopping all human cloning, including embryonic human cloning, today.

I commend you, therefore, for your courage in stepping up to the plate on this issue. It is an easy one to want to avoid. The promise of scientific advances is a real promise. Obviously, we are all very keen on scientific advances, and it is hard to face the criticism that somehow what one is doing is slowing down the march of science. But there are times when one has to stand up and say yes, certain kinds of scientific advance are not worth the price we pay, if the price really is the moral price of what it means to be human, and if the price is starting down a road that, however attractive it seems at first, turns out to be something of a nightmare.

Is it hopeless? Often, in discussions on this topic, people say, "Well, that is very interesting, but come on, you cannot stop scientific progress." It *is* difficult to stop the march, or to change the course of the march of science and technology. On the other hand, we were told that it was hopeless to overthrow communism just a generation ago. We were told that it was hopeless to remove sentiments of racial bigotry two generations ago. They were deeply embedded in human nature certainly in the history of this country.

Surely mere legislation in Congress could not establish equality of civil rights for all Americans, we were told. Surely a mere foreign policy initiative by the President could not undo communism, which seemed so deeply entrenched and so formidable. Yet we did not listen to those who told us that it was hopeless, or that the current situation was inevitable, that there was no point in even trying.

Lyndon Johnson led us to try to overcome segregation and discrimination, and in large measure we have. We have certainly been on the right path since then. Ronald Reagan led us to work to overcome communism. In large measure, we have. I think we are at a similar moment of choice now.

In the Federalist Papers over two centuries ago, Madison wrote that the American experiment is based on the honorable determination to rest all our political experiments on the capacity of mankind for self-government. Science and technology pose a challenge sometimes to that capacity, just as slavery did, just as communism did, but to succumb is to forego our claim to self-government, our claim that we can govern ourselves by reflection and choice.

We ought not simply say, "Well, this seems to be science, it is too hard to regulate, it is too difficult, it is too controversial, let us not do anything". Not to choose is, of course, to make a choice. It is to allow us to go down the road, to a brave new world.

I would just make two final points, briefly. Remember, if we stop the so-called progress of science at this point we are not making

an irrevocable decision. Of course, if we go down this road, we are making an irrevocable decision. Once the genie is out of the bottle here, I do not think it can be put back in.

In my view, if a responsible legislator is willing to acknowledge that there are doubts about human cloning, doubts about the morality and ethical propriety of embryonic cloning, then he or she has a responsibility to stop it now. Five years from now, if we have learned more, if we have become convinced that this does not open the door to a horrible brave new world, then fine, we can always remove the ban.

We cannot undo what will have happened, however, in the next 5 or 10 years if there is no ban.

If one is uncertain about the implications of going ahead with embryonic cloning, or so-called therapeutic cloning, one has to err on the side of stopping it, at least for now.

President Bush has spoken eloquently about his hope of ushering in a new responsibility era. Leaders from both parties have embraced this concept, as I think they ought to. What greater responsibility do we have than halting a brave new world in which the programmed reproduction of man will, in fact, dehumanize him?

Thank you.

[The prepared statement of Mr. Kristol follows:]

PREPARED STATEMENT OF WILLIAM KRISTOL, CHAIRMAN, THE BIOETHICS PROJECT OF
THE NEW CITIZENSHIP PROJECT

Mr. Chairman, members of the committee, thank you for the opportunity to appear today to address the issue of cloning.

President Bush quoted only one thinker in his unadorned—and quite effective—State of the Union address two months ago: Yogi Berra. The president commended to his congressional audience Mr. Berra's famous dictum, "When you come to a fork in the road, take it."

The president was preaching to the choir. American politicians don't like having to make difficult choices. Who can blame them? They have to balance diverse interests and juggle competing demands while doing justice to differing views among the citizens they represent. To govern is to choose, we're sometimes told. But, often, to govern in a big, pluralistic democracy like ours is *not* to choose, or not to choose too starkly, certainly not to choose irrevocably. After all, lots of choices are false choices; lots of bold decisions turn out badly. Avoiding forks in the road often isn't a bad idea.

George W. Bush knows this. After all, he's neither a conservative nor a moderate—he's a compassionate conservative. He wants to cut taxes—but also to increase government spending. He wants to cut back regulations—but also to reassure environmentalists. He wants to strengthen our commitment to Taiwan—but also to work with Beijing. All of this is reasonable enough. And it's characteristic of politics in a Madisonian republic.

But a Madisonian republic has its Lincolnian moments. Occasionally, there really *is* a fork in the road. Occasionally, to govern *is* to choose—and not to choose is not to govern. Two generations ago, we had to choose whether to overcome segregation and discrimination. Under Lyndon Johnson's leadership, we made that choice. One generation ago, we had to choose whether we would try to overcome Communism abroad. Ronald Reagan led us in making that choice.

Today, we face a decision at least as momentous: whether we stumble heedlessly into a brave new world of eugenic enhancement and technological manufacture of human beings, or whether we will avert such a future. President Bush will lead us—or will fail to lead us—in that choice.

We are at an extraordinary moment of scientific progress, and scientific peril. The genetic revolution offers great hope for the medical treatment of disease, through gene therapy and other forms of healing. But if this revolution is not subject to human guidance and limitation, it will produce consequences that will be detrimental—no, devastating—to human liberty and human dignity.

These consequences have been laid out in detail, and the arguments against them made with great distinction, by thinkers ranging from Hans Jonas and Paul Ramsey

a few decades ago to Leon Kass and Gilbert Meilaender today. But for current, practical purposes, our political leaders do not have to have studied all these arguments. All our politicians have to do now is to realize that, if they do not call a halt to certain experiments, if they do not limit the “progress” of science in certain ways, it will be virtually impossible to do so later. “Containment” is necessary now if we are to have a hope for a humane future later. Perhaps we who fear that the programmed reproduction of man will dehumanize him are wrong. Still, as a nation we surely owe ourselves, and our descendants, a serious debate before we march blindly down one fork of the road.

But isn't it hopeless? Doesn't modernity mean that technology always trumps politics? Isn't scientific “progress” unstoppable?

No. No more than Communist domination of half the world was unstoppable, or that the further use of nuclear weapons after 1945 was unstoppable. No more than racial bigotry was unchangeable.

And in any case, to bow to the inevitability of this kind of scientific “progress” is to give up on the core of the American experiment: “that honorable determination,” as Madison put it in Federalist #39, “to rest all our political experiments on the capacity of mankind for self-government.” Science and technology may pose an even greater challenge to this determination than did slavery or communism. But to succumb is to forego our claim to self-government.

What, now, is to be done? The cloning of human beings is on the horizon. Ban it, Mr. Chairman, you have introduced carefully drafted legislation to prohibit all human cloning. The legislation deserves the support of serious political leaders in both parties.

President Bush has spoken eloquently about his hope of ushering in a new “responsibility era.” What greater responsibility do we have than halting a brave new world—one that, to quote Leon Kass, would put “human nature itself on the operating table, ready for alteration, ‘enhancement,’ and wholesale redesign?” A ban on human cloning would only be a first step down the road of responsibility and self-government—but it would be an important first step.

Yogi Berra and George W. Bush are both baseball fans. The superiority of baseball to football is beautifully captured by one of Mr. Berra's insights: Baseball “ain't like football. You can't make up no trick plays.” There are no trick plays for politicians in the area of bioethics. President Bush—and our other political leaders—will have to step up to the plate and vindicate the capacity of mankind for self-government.

Mr. Chairman, thank you for this opportunity to appear before you and the committee.

THE BIOETHICS PROJECT

STATEMENT OF PURPOSE

Each day's headlines confront us with fresh evidence of the prospect of a “brave new world.” Human cloning, transgenic chimeras, and “designer” babies are no longer the domain of science fiction; they are imminent possibilities. These “advances” are part of a revolution in bioscience and genetics that has tremendous promise to heal disease and relieve human suffering. But this revolution—if divorced from ethical guidance—poses a grave threat to human dignity and liberty.

The Bioethics Project seeks to confront that threat. We support the achievements of human investigation in the biosciences. But we believe scientific progress also needs to be governed by moral principles that protect the dignity and worth of each individual. Without such constraints, we face the prospect of a tyranny of technology over humanity.

The American people sense the dangers as well as the rewards of the emerging era of biotechnology. But our political and legal systems seem unprepared to confront these risks. The Bioethics Project intends to encourage debate and inform public opinion about these fundamental issues. We aim to consider what are the appropriate limits in public policy, regulation and law to ensure that science enhances human dignity, rather than debases it. We aim to help draw the lines between a better human world and a new inhuman one.

The issues we face today require us to decide whether children will be made or manufactured; whether biotechnology will serve mankind or enslave it; whether, as C. S. Lewis put it in *The Abolition of Man*, “what we call Man's power over nature turns out to be a power exercised by some men over other men with Nature as its instrument.” Before this prospect, other issues pale in significance. The challenge

of scientific “progress” loosed from natural, human, or religious moorings is the challenge before us. We intend to help our fellow Americans meet it.

Senator BROWNBACK. Thank you, Mr. Kristol. Let us run the time clock at 10 minutes. This has been an excellent panel. I appreciate the discussion, appreciate the points of view each of you put forward.

Mr. Forsythe, I want to start with you. On the issue of the legal status of the clone—and you have written on this, in law review articles—if we have a cloned embryo, whether it is for reproductive or so-called “therapeutic” purposes, what is its legal status?

Mr. FORSYTHE. Well, Senator, I think it is quite clear that it is born for purposes, for legal purposes, and it is subject, it is entitled to the full protection of the law as a matter of theory, as a matter of criminal law, as a matter of homicide law. However, no prosecutor in the country that I know of has yet to try to protect human embryos in the laboratory under a homicide law, but it is important to point out that there is no question that it is living. There is no question that it is human.

Senator BROWNBACK. This is at all stages?

Mr. FORSYTHE. Correct. As you know, specifically, some States, perhaps 9 or 10 States, Louisiana among them, have specifically legislated on prohibiting destructive human embryo research. They have gone beyond the generalities of criminal law and homicide law, and have specifically prohibited destructive human embryo research, and I believe that in those States that legislation has been effective without deterring scientific progress.

Senator BROWNBACK. Now, if there is a cloned human embryo, who makes the determination as to its future? Who has the legal right to make the determination of the future of this cloned human embryo?

Mr. FORSYTHE. Well, if no governmental official, no prosecutor steps in to exert the protection of the criminal law, it is probably the subject of contract law, agreement between the institution and the donor of the cells.

In the case of—as you know, in various States there have been cases involving husbands and wives who have divorced, and the question is, what is the status of preserved human embryos during that custody dispute, and some State courts have primarily looked to contract law between the institution and the husband and wife, or between the husband and wife in the absence of specific State legislation on that question.

Senator BROWNBACK. So it would be decided by the agreement between, in this case if we have a cloned human embryo, it would be the contract law between the laboratory and the donator of the genetic material?

Mr. FORSYTHE. Correct, and these—of course, these laboratories are becoming very sophisticated in producing standard documents and contracts to establish the relationship between the institution and the laboratory or the fertility center, and the donor of the cells, or the married couple who are the parents.

Senator BROWNBACK. But it is your first statement, though, that they have the legal status and rights of a human being from the very start?

Mr. FORSYTHE. Correct.

Senator BROWNBACK. Dr. Jaenisch, I want to make sure that I am clear where you stand on this issue. Now, you are here representing your association and yourself as well. You are here representing the association?

Dr. JAENISCH. I represent the association and myself and my colleague scientists.

Senator BROWNBACK. OK. You oppose reproductive human cloning?

Dr. JAENISCH. Yes.

Senator BROWNBACK. You would support a Federal ban on reproductive human cloning?

Dr. JAENISCH. I believe it should be prevented.

Senator BROWNBACK. So we are just talking about the research in human cloning. You would call it "therapeutic" human cloning, others would call it destructive human cloning, but you do not want this person to be born?

Dr. JAENISCH. I think I would like to make these points once more. I think this is a very important point you bring up.

Senator BROWNBACK. I want to make sure I understand where you are on this.

Dr. JAENISCH. Yes, I would support that point. I would support that, the so-called "therapeutic" cloning which involves the transfer of somatic cells of a person who has given his or her consent to generate an embryonic stem cell exclusively for the therapeutic benefit of this particular person.

I would support that, because this is the only source, I think, of cells of any tissue type which could help this patient in transplantation therapy, where no rejection will occur, because these cells, which come from this cloned embryonic stem cell, are of the same immunological makeup as the patient.

Senator BROWNBACK. All right. So you do support the creation of a human embryo made out of somebody else's DNA material if they consented to the use of that person to create, a human embryo clone. Is that correct?

Dr. JAENISCH. Up to that stage when normally the embryo would be implanted, about the 100-cell stage, a ball of cells. Actually, I have a picture of a human embryo if you would like to see it. At this point the embryo is not implanted. It is kept in a Petri dish, and it gives rise to embryonic stem cells. These embryonic stem cells, and I think this point is very important, have not the potential, ever, to produce a human being. However, in culture, they can produce any type of tissue cell which you desire.

Senator BROWNBACK. OK. Now, I want to pursue this line here with you. So you do support the cloning of a human embryo, but not the implantation of that human embryo?

Dr. JAENISCH. I am opposed to the implantation, because then it becomes a very difficult to control process, and I think there are many ethical problems.

Senator BROWNBACK. How long will this human embryo that has been cloned, how long do you support its continued existence as a human embryo?

Dr. JAENISCH. It is like a normal *in vitro* fertilization. You let these embryos develop to a stage of pre-implantation development,

when they would implant, or you put the embryo in a Petri dish and let it grow to become an embryonic stem cell.

Senator BROWNBACk. Now, who makes the legal decision for the future of this cloned human embryo? Is it the laboratory, or is it the person who donated the DNA?

Dr. JAENISCH. That is an important point that should be addressed by the legislation. I believe it should be the donor, because these clones—these cloned embryonic stem cells I believe should be exclusively for the use for this particular person. One could consider the cloned embryonic stem cell line derived by this therapeutic cloning approach is like a tissue from a donor where the donor has consented to give an organ to another person, to a sibling, only this would be for himself.

Senator BROWNBACk. Now, if I understand, Mr. Forsythe is saying this human embryo, once created, has the rights of a person under our legal code.

Dr. JAENISCH. It may be of interest to compare how the British Government has solved that problem. I have with me a document on how they have considered this very important problem.

Senator BROWNBACk. Well, you can certainly submit it for our record if you would like. I think we have solved it for our country.

Senator DORGAN. I wonder if I could ask a question at this point, for my benefit.

Dr. JAENISCH. The summary is that there are two extreme views of a human embryo. One is that a person is created with fertilization. I think in this view there are serious ethical problems with therapeutic cloning. The other extreme view, is that the fertilized embryo is just a tissue from the patient.

The British Government adopted, after long, and I think very exemplary discussion, the middle ground, which says that one accepts a special status of the early human embryo, before implantation, but this property is weighed against the potential benefits arising from the proposed research which has been approved. The current restriction and controls of embryo use research reflect this latter view, providing the human embryo with a degree of protection in law, but allowing the benefits of the proposed research be weighed against the respect due to the embryo. This was the position of the British Government, and I believe this is the position of other countries in Europe and in Japan.

Senator BROWNBACk. Thank you, Mr. Jaenisch. Now, you support the creation of a cloned human embryo for research purposes, is that what you and your association supports?

Dr. JAENISCH. May I clarify what I mean, which is my personal opinion. I believe that anything done with human material is not any more basic research, but it is applied research. It has to serve the patient or medical application. I think basic research is done with animals with the goal of understanding the basic principles. If you do it with humans, I think it is applied research, which we have to consider in a different frame.

Senator BROWNBACk. Well, I am trying to deal with the laws, and trying to frame laws, and I am making sure that I understand what you would support. You want to see the destruction of a human embryo for the use of its stem cells codified in law, is that correct?

Dr. JAENISCH. Yes, but I would like to——

Senator BROWNBACk. And then it not be implanted?

Dr. JAENISCH. It should not be implanted. It cannot be implanted. It has lost the potential to become a human being.

Senator BROWNBACk. It has lost the potential to become a human being?

Dr. JAENISCH. It has lost the potential to become a human being.

Senator BROWNBACk. OK, now tell me how it has lost the potential to become a human being.

Dr. JAENISCH. Embryonic stem cells cannot, for example, give rise to a placenta, embryonic stem cells are not totipotent, only the egg is totipotent. The egg can do everything, placenta and embryo. The embryonic stem cell can only do somatic tissues of the embryo.

Senator BROWNBACk. But I am talking about a human embryo, a cloned human embryo. You stated you support cloning for so-called “therapeutic” purposes, so at that point it could be implanted, when it is cloned—and you support that.

Dr. JAENISCH. I support this because it is not, I believe, the creation of new life. It is really taking a copy of your own cell and making an embryo for a very, very specific purpose, for therapeutic reasons.

Senator BROWNBACk. Now, I understand that point, but the cloned human embryo for this purpose could be implanted, and could lead to a full human being, is that correct?

Dr. JAENISCH. Yes. It has the ability.

Senator BROWNBACk. Just as a scientist, it has the ability to do this?

Dr. JAENISCH. The potential to become a human being, I totally agree with you, but this potential, I think, is very difficult to realize.

Senator BROWNBACk. Now, Dr. Jaenisch, what if, then, we create this cloned human embryo, the person that donated the DNA, who you are saying you think they are the ones who should make the legal decision for this, decides they do not want it destroyed. They want it implanted.

Dr. JAENISCH. I believe this would be illegal, but I am not a legislator.

Senator BROWNBACk. Now, you put yourself in my shoes. We have made this now illegal, but the person decides to do it anyway.

Dr. JAENISCH. I think this is a very important issue which has been brought up several times before. Let me say clearly what the British Government decided, and I read through the law. The point was made before: once you allow transfer of a somatic nucleus into an egg, it should not be implanted, and you should control this.

The British Government has clearly addressed this point. It made it a criminal offense to implant an embryo produced this way into the uterus. This is a criminal offense, whereas the generation of an embryonic stem cell would be permitted, so they clearly distinguish between those two approaches, and I would support that view.

Senator BROWNBACk. And I think we tried to as well, but I want to get to Mr. Forsythe, the lawyer in this, if I could. What happens if we are at that point where we have banned reproductive human cloning, but we have not banned the “therapeutic” cloning, and

somebody has created a human embryo, and then decided they do not want the embryo destroyed, they want it implanted. What is the legal status then of the human clone that has been implanted?

Mr. FORSYTHE. Well, I think the legal status is the same. I think perhaps, Senator, you are touching on constitutional implications, or the implications under our current constitutional law of prohibiting implantation versus prohibiting the cloning of the embryos at the outset. I do believe that prohibiting implantation would create unique legal problems, and certainly make the bill much more susceptible to a constitutional challenge, because it would be interfering with the desires of a particular woman to obtain a pregnancy, to initiate a pregnancy.

Senator BROWNBAC. Does she have that constitutional right?

Mr. FORSYTHE. The Supreme Court case law does not currently guarantee that. That is beyond, it is outside the scope of *Roe v. Wade*, which, as the Court has defined it, is—the abortion liberty, as the Court has defined it, is the right to terminate pregnancy—to terminate pregnancy, not initiate it through *in vitro* fertilization, and that has never been held to be a constitutional right yet, but this would certainly provoke perhaps a test case.

Senator BROWNBAC. Well, it strikes me as extraordinary to think that we, as a Government, would then force this person to abort this child. I cannot fathom that we would do that.

Mr. FORSYTHE. No, Senator, that is not going to happen. No court is going to permit it.

Senator BROWNBAC. Mr. Dorgan, I do want to come back for another round.

Senator DORGAN. Mr. Chairman, thank you very much. This is obviously a complicated and controversial set of issues, and I must confess I know relatively little about it, and certainly not much about the science of it.

I would like to ask a couple of questions, having learned just a bit with this exchange. I would like to ask Mr. Forsythe the distinction between someone who used a clone of a human embryo and implanted it, if, in fact, the Congress had seen fit to make that implantation illegal, what is the distinction between that and someone else who simply decided we are going to clone a human being after Congress had made that illegal? What is the distinction?

Mr. FORSYTHE. I am not sure there is a distinction there, if you say, cloning a human being is creating the embryo and implanting it.

Senator DORGAN. Right. I am asking this question because I think it is settled in the Congress that we do not support human cloning. We believe it is inappropriate. We believe it ought to be prohibited. I do not know of one of my colleagues in the Senate who would come to this body and say, “No, we support human cloning”. I think that issue is settled, and to the extent that someone proceeds with the cloning of a human being after we have made it illegal, there are certain sanctions.

I suppose it would beg the same question you just asked about aborting a fetus in that circumstance, would it not? I am trying to understand the distinction.

Mr. FORSYTHE. Yes, exactly. You collide with the woman’s reproductive freedom at that point. I think it would be obviously uncon-

stitutional. Under *Roe v. Wade* it would be unconstitutional. It would be illegal under preexisting law.

No Government, no State in this Union has ever tried to forcibly abort someone, and so that would simply be——

Senator DORGAN. It occurred to me while you were having this conversation, Mr. Chairman, with Dr. Jaenisch, that one could decide that the value to society is significant with respect to therapeutic research and “therapeutic” cloning of cells only for the purposes of developing embryonic stem cells, which Dr. Jaenisch says cannot produce a human being. If that is the only purpose of the cloning, then one would decide down the road that is something that we should allow. But we would not allow the implantation. We would sanction that by providing criminal penalties. In that case, it seems to me that you are in the same circumstance with respect to our decision about human cloning. We would provide criminal penalties for those who would engage in human cloning. We would provide criminal penalties for those who would implant that cloned cell.

Let me go in a slightly different direction, if I might. Dr. Kass, you indicated this is only about baby design and manufacture. Dr. Jaenisch says it is about “therapeutic” cloning. Do you just dismiss everything Dr. Jaenisch says? Is it the case that you believe this is only about baby design and manufacture?

Dr. KASS. I think the intent of the law, the agreement amongst the Members of Congress is, they want to stop reproductive cloning because they believe, for whatever reason, that this is unethical, both now and even should it become safe. That is what we are trying to stop.

The second question is, how can you stop it, and I argue the only way to stop it is by stopping reproduction of the embryonic clones right from the beginning, before they reach that blastocyst stage, when Dr. Jaenisch wants and says quite rightly that the stem cells could be taken. I do not think you can simply control the practice once the embryonic clones are here.

Senator DORGAN. On that point, might I ask what is the difference between controlling the human cloning and controlling the implantation of the cloned embryo?

Dr. KASS. My argument is, it is a difficult technical procedure to produce the embryonic clone, but the transfer is easy. If you are really interested in stopping reproductive cloning—because you cannot keep control of the embryos once they are available and in multiple copies, because you cannot simply confine their use to those therapeutic purposes of which Dr. Jaenisch speaks, and because you cannot enforce the law either at the point of transfer or afterwards—it seems to me that to be effective as a ban on baby-making, it has to stop the process at the start. Otherwise you will have an ineffective law. The law would be made an ass of, and we will not be able to stop it.

Senator DORGAN. Dr. Jaenisch, would you like to respond to that?

Dr. JAENISCH. Well, I think the purpose in what you call therapeutic cloning is very clear. It is not to produce a human being. I think we agree on this. Rather the purpose is a very beneficial one, to produce tissues for transplantation, and I believe the law should,

but I am not a lawyer, distinguish between these two scenarios. It is criminal to implant the cloned embryo with the purpose to produce a fetus.

I support this view, and certainly the British Government and other Governments have made the distinction very clear. Implantation is criminal in these countries, and I would hope this distinction could be made in this country.

Dr. KASS. The question is whether that distinction can be upheld in the law. The British have put it on the books. The question is, can they make it work?

Senator DORGAN. I am not clear at this point what the Chairman's intentions are with his bill with respect to the issue of dividing at the level of implantation. Again, let me say to you, Mr. Chairman and to others, I do not pretend to be an expert in these areas. These are very complicated, very difficult areas of science, medicine, and ethics.

I have lost a daughter to heart disease. I will not ever decide to be a part of shutting off research that will give life to people, or give hope to people who are suffering from heart disease, diabetes, ALS, MS and so forth. But again, medical research, while breathtaking and exciting in its search for answers, is a very complicated area.

I do not come here to dismiss one side or the other. I think this is a real, honest-to-goodness, thoughtful debate that this country has to have, and I do not think either side has much of an edge at this moment. As someone who has a very personal interest in medical research, I do not want to see anyone, for illogical purposes, shut off from promising areas of research.

I am interested, Mr. Chairman, in trying to work with you and understand exactly what your bill does and what your bill does not do. As I indicated, I think you are raising a lot of the right issues on human cloning. As I said, I do not know one member of the Senate who supports the cloning of a human being, but we have gradations of complexity and difficulty well below those decisions, and that is what this panel is all about. Did you want to add something?

Senator BROWNBACK. I was just going to say the bill that I put forward bans human cloning. It does not ban the multiplication of cells, of DNA material, of anything along that nature at all. But it says that you cannot clone another human being, whether for research purposes or for "therapeutic" or for reproductive purposes. And the reason we had Mr. Forsythe there was to point out the legal status. Once that clone is created, actually, somebody could sue on behalf of the clone, that is to be implanted, because of its legal status, and that that is a likelihood taking place if you start down one of these forks in the roads, and that is——

Senator DORGAN. You are dealing in areas that I certainly confess I do not understand. I do not understand how that embryo can be a human being if not implanted. It seems to me that the act of implanting that embryo gives it some form toward viability. We are dealing with areas that I do not spend a lot of time in, but this is interesting. As I understand what you are saying, Mr. Chairman, the point to which Dr. Jaenisch took us, that is, the cloning of that

embryo prior to implantation would be impossible under your legislation; is that correct?

Senator BROWNBACk. If it is a human embryo clone, yes. So not if it is just DNA material, cells that are not in the embryo, so it is a human embryo.

Senator DORGAN. Yes. The ability to derive the embryonic stem cells, even though they cannot produce a human being, that Dr. Jaenisch describes, would not be available under your legislation?

Senator BROWNBACk. If they can come at it with a way other than creating a human embryo, it is legal under the legislation, but not in the creation of a human embryo. Yes, Dr. Kass.

Dr. KASS. I think there is no one on this panel who is on my side of the question that belittles the therapeutic possibilities of stem cell research. This is a great great thing that is coming. But the question is whether we have alternatives to getting these stem cells from the embryonic clones. Dr. Jaenisch, in his prepared remarks, made some comparisons between stem cells derived from embryos and stem cells derived from adult tissue, and he does make certain arguments that one field seems to be ahead of the other, but he did not say that it would be impossible to get these therapeutically beneficial stem cells from our own bodily tissues.

Now compare the following things: If I need new heart tissue, would it not be easier to obtain some stem cells from my fat or from my blood or from my bone marrow, and get them to grow heart tissue and use them? It would be morally unproblematic and much more economical. One wouldn't have to create an embryo, one wouldn't have to decide all these metaphysical and legal questions and the constitutional status of the embryo. Nobody thought 3 or 4 years ago that this adult stem cell research was going where it is.

If we slow down on the embryonic side for prudential reasons and put a lot of money into adult stem research, it's not clear that we would not do as well with the latter. And Dr. Jaenisch, I would be interested in his comments. Does he really say that we cannot get the therapeutic benefits from the adult stem cells, that we have to have embryos for research?

Senator BROWNBACk. Dr. Jaenisch.

Dr. JAENISCH. I think it's an important issue that you bring up, and I believe that the somatic stem cells have great potential. But we are now at the stage with somatic stem cells where we were with embryonic stem cells two decades ago. We have to learn the basic problems and properties of these cells. And I'm not alone to say that. Last week in Science, David Baltimore, Nobel laureate and president of Rockefeller, and Irv Weisman, professor at Stanford, the premier scientist of stem cell research in bone marrow, wrote a Science article that exactly says the same thing: Adult stem cells at this point of our understanding do not have the potential to be useful, at least given our current knowledge. I think the point is, we need much more research.

The point that I was trying to make is, the usefulness of embryonic stem cells has been established by two decades of research: we know it's going to work, and this approach will be available in I think a short time, 2 or 3 years, for clinical application. So the patients who are now suffering from Parkinson's and diabetes may be

helped. I think these are the ones, that pose the ethical dilemma. Do you want to prevent them from using this most advanced technology to cure their illness, which they could obtain in Britain but not in this country? Living here, should they be asked to wait another decade or two? I don't know. I cannot volunteer to predict how fast this progress with somatic stem cell research will be, if it ever is realized.

I really think it is very exciting research, the somatic stem cells. I think these are great cells. The British Royal Society, which is the premier scientific body in Great Britain, addressed that issue, and came to exactly the same conclusion which I summarized, and I could read you some of the statements which were the basis for the British legislation.

I think there is uniform agreement among scientists working on somatic stem cells or embryonic stem cells that there is no reason at this point to stop embryonic stem cell research because somatic stem cells provide the alternative. We do not know yet if they do. I think there is a uniform agreement among all scientists in Britain, in this country and in other countries. I think this is very important; it is a problem of time here, and we don't know, we don't understand the basic problems of somatic stem cells.

We cannot grow them indefinitely. Adult neural stem cells quit growing after a week; only fetal neural stem cells grow for a longer time, and they are not useful for what we are talking about.

Senator DORGAN. Mr. Chairman, my time has expired. I have to be at the Dirksen Building for another hearing at 4 o'clock.

Senator BROWNBACK. Thanks for coming.

Senator DORGAN. I want to thank you for holding this hearing. I also thank the panel for being here today. I think I am probably more representative of the U.S. Senate than the chairman of this Subcommittee, in the sense that he spent a great deal of time on this subject, many of us have not. It is, as I indicated, very complicated, very controversial, and also very important. Your willingness to come and present statements, I think, is very helpful to us. I am sorry I am not able to hear the last panel, but I will be able to take their testimony with me this evening and read through it. But thank you very much for being a part of this discussion.

Senator BROWNBACK. Thank you. Let us call up the next panel, because we are getting short of time here.

Mr. Robert Best, President of Cultural Life Foundation; Mr. Richard Doerflinger, Associate Director for Policy Development, National Conference of Catholic Bishops; Mr. Carl Feldbaum, President of BIO; and Mr. Jaydee Hanson, Assistant General Secretary, General Board of Church and Society, United Methodist Church.

I want to advise the panel, I am supposed to preside at the overall Senate at 4 o'clock, and I am trying to find a substitute, and if we do not get a substitute, then we will reconvene if that is possible with this panel at probably about 10 minutes after 5. We are trying to get that—is that something that would work with the panelists if we are—we were supposed to get this hearing over by 4 o'clock.

[Pause.]

Senator BROWNBACK. I want to hold up just a minute here to see if I am supposed to run over to the floor and preside before we go on.

[Pause.]

Senator BROWNBACK. We are going to go ahead and get started. They have given me a 15-minute reprieve, so we are going to get started and hopefully they will get somebody to substitute on the floor chairing for me during that period of time.

Mr. Best, let us start with you, and I look forward to your testimony. If you can summarize, that would be good, so we can get as far down as we can as quickly as possible.

**STATEMENT OF MR. ROBERT A. BEST, PRESIDENT, THE
CULTURE OF LIFE FOUNDATION, INC.**

Mr. BEST. Thank you very much, Mr. Chairman. It's good to be back in this Senate where I spent 12 years of my life working on trade and tax issues for the Senate Finance Committee. I want to commend you for your leadership on an issue that transcends the economic issues that we debate in Congress, the issue of human life.

Our foundation supports your bill. We are a foundation of leaders in different fields. We have medical and scientific personnel, as well as legal scholars. We believe that the cloning of human embryos is antithetical to the root principles of any civilized society. These root principles include equal protection under the law, the rights of minorities and those least able to defend themselves.

Every human being has inviolable rights that cannot be trespassed upon by those who are strong, powerful and willing to use them for experiments to further their own scientific or health-related ends. Some may think that when it comes to human health and reproduction, science should be permitted to do anything it is capable of doing. However, the experience of the last century teaches us that science must be guided by morality.

Not only in Germany but in our own nation, scientific experiments were conducted on persons who could not defend themselves, and often for racial purposes disguised as "health". Cloning a human embryo constitutes a grave deformation of the nature of human generation, transforming a holy act within matrimony between a man and a woman into animal breeding or manufacturing. Cloning a human being threatens the humanness and lays the foundation for biological chaos.

If animal cloning is any precedent, there is a likelihood that human beings that are cloned may well have gross deformities and be considered subject for further lethal experiments or sentenced to an early death.

Cloning also threatens our democracy. If human beings become designed and manufactured goods, then the equality clause of the Declaration of Independence and the concept of one person, one vote lose their meaning.

There is close to universal repugnance to cloning for "reproductive purposes", but cloning for so-called "therapeutic purposes", meaning the cloning of embryos as a source of tissue for research and for medical treatment is equally objectionable. The Brownback-Weldon bill would prohibit cloning of human embryos for research

and medical purposes, as well as for “reproductive” purposes. This prohibition is wholly appropriate.

In cloning for research and medical purposes, embryos are created and then destroyed, which is to say killed. Some use euphemistic language to evade this fact, but to clone successfully is to create a new embryo, and cloning for medical and scientific purposes destroys that embryo and therefore kills a human person at the earliest stage of his or her existence, utterly incapable of self defense.

The humanity of the embryo is not a theoretical or faith based construct. It is an objective fact, that the newly created embryo possesses its genetic identity and the capability, if it receives the normal and routine nurturing and protection of a mother’s womb, to develop into a human being just as independent as any one of us.

It also possesses a soul principle which united to its specific physical characteristics, make it a unique, unrepeatable human person. Some would deny the embryo’s humanity because it requires nurturing and protection to develop, but at the earliest stages of life and often at the end stages, we all require nurturing. If lack of dependence on the nurturing care of others were to be a criterion for being human, then many people in hospitals and nursing homes, and airliners and coal miners would not be human.

People may be temporarily or even permanently in need of extensive care, but they are as human as the rest of us, in the same way human embryos are fully human. To willfully refuse to recognize this possibly inconvenient fact is to institute a tyranny of the strong over the weak, which would eventually be lethal to all of us.

Once the humanity of the embryo is understood, the objectionable nature of so-called therapeutic cloning becomes self-evident. It is a violation of the Hippocratic tradition of medicine which instructs a healer to first “do no harm”, because no greater harm could be done to the human embryo than its destruction.

Even if the use of human embryos for research purposes were not lethal, it would constitute medical experimentation on human persons without their individual voluntary consent, and would therefore violate the Nuremberg Code which was created after post-war trial of Nazi criminals. The Code is not a law or a treaty, but it is an important internationally-recognized ethical norm.

The Helsinki Declaration of the World Medical Association includes the basic principle that, and I quote,

“Every biomedical research project involving human subjects should be preceded by careful assessment of the predictable risks in comparison with the foreseeable benefits to the subject of others. Concern for the interest of the subject must always prevail over the interests of science and society.”

To create or use and, in the process, destroy a new human life for the sole reason of being a source of spare parts or as test beds for biomedical research, is deeply offensive to human dignity. To use people in this way would apply a qualitative and materialistic view of life even more harsh than what was prevalent in this country during the time of slavery. It is the ultimate in the manipulation of another person for one’s own benefit. Cloning embryos for such purposes turns a new human being into an object for lethal experiment rather than as a subject of love.

The advocates of so-called “therapeutic” cloning assert that the needs of those who meet their narrow and subjective definition of the living would benefit from the experimentation or treatment involving human embryos. They point to the very real and widespread suffering and needs ranging from diseases and injuries to the brain and nervous systems, to infertility, to justify the work they hope to undertake.

However, there is a growing mountain of evidence that alternatives exist. Adult neural stem cells can transform themselves into blood cells. Adult bone marrow cells can become liver cells. Cells from discarded umbilical cords can be used effectively. And the latest seems to be fat cells, of which we have an abundant supply in this country, including on me.

[Laughter.]

Mr. BEST. There is not the same rejection issue using adult stem cells that has already occurred using so-called embryonic stem cells.

In conclusion, Mr. Chairman, we thank you for this opportunity, we support your bill, and look forward to the full committee and the full Senate providing this ban.

I ask that the full statement and some appendices be included in the record as well.

Senator BROWNBACK. Without objection.

[The prepared statement of Mr. Best follows:]

PREPARED STATEMENT OF ROBERT A. BEST, PRESIDENT, THE CULTURE OF LIFE
FOUNDATION, INC.

Mr. Chairman, members of the Subcommittee, I applaud your determination to legislate a prohibition on the cloning of human embryos. Cloning of human embryos is antithetical to root principles of a civilized society. A civilized nation protects the weakest, most dependent human beings, believing and enshrining into law equal protection principles premised on the truth that we are all created equal with an inviolable dignity in the “image and likeness of God”, our Creator.

The issue of cloning a human embryo may seem to be scientifically and ethically perplexing, and there may be some who say that the role of government is to stand back and permit science to do anything it is capable of doing in the area of human health and reproduction. Thankfully, you correctly recognize the fundamental threat that human cloning poses to our civilized society, based on Judeo-Christian principles and the presumption of equality before the law. Cloning a human embryo involves a radical manipulation of our human nature. It is a grave deformation of the nature of human generation, transforming it into no more than animal breeding or the manufacture of some material device. If society loses the sense of the essential distinction of human life from animal life and material things, whether in theory or in the practice of attempting to clone a human embryo, it has lost its stature as a human society. It has lost the compass of humanness and is, instead, laying the foundation for the replacement of a human living with biological chaos.

If human beings become manufactured goods, with manufacturers competing to create the smartest or healthiest or fastest human being, then the equality clause of the Declaration of Independence and the concept of “one person, one vote” lose their meaning.

When the issue of human cloning has surfaced over the past years, most often the focus is on what some call “reproductive cloning.” Those who use the phrase generally mean implanting and bringing to birth a human being brought into existence initially as a one-celled embryo by the process of somatic cell nuclear transfer. At this time, there is almost unanimity in judging the wrong of even attempting “reproductive cloning” and a consensus on the need to prohibit legally anyone attempting it. Present divisions and violence within our society could be greatly magnified in civil strife between citizens if reproductive cloning were permitted. We would cease to be a democracy based on equal protection under the law. The temptation to play God in the creation of the “perfect human being” would set off the

lowest competitive instincts not only among the scientific community but among would be parents of the “perfect child”.

Reproductive cloning gets all the headlines, but there is another rationale being advanced for cloning—cloning human embryos as a source of embryonic tissue for research and for medical treatment, which I know also concerns the Subcommittee and which has also been appropriately addressed in the Brownback-Weldon bill. This so-called “therapeutic cloning” sounds benign, but it is as deadly as so-called “therapeutic abortion.” The successful transfer of the nucleus of a somatic cell to a de-nucleated egg leading to a fusion of the somatic cell nucleus with the egg creates an embryo. Terms like “totipotent cell”, “clump of embryonic cells”, and “fertilized oocyte” are used by some to evade the issue or to make the issue seem too arcane for laypeople to understand. But the science is unavoidably clear: to clone successfully by somatic cell nuclear transfer is to create a new embryo. *“Therapeutic cloning i.e., cloning of a human embryo for research and medical purposes, always results in the destruction, which is to say the death, of a human person.* To cause this death for any purpose would be immoral, as we know from the longstanding and widespread human and religious traditions, which have prohibited as immoral the direct taking of innocent human life—Judeo-Christian tradition. As was confirmed by the horrible experience of the last bloody century, when regimes used their willing scientists and medical professionals to attempt to create a “superior race” or simply to solve the problems of some at the expense of others—genetic engineering involving the taking of innocent life in pursuit of “perfection” leads to destruction.

Even if the goals of scientific research are commendable in terms of health needs of our citizens, they cannot be pursued by evil means, including the death of the “least among us”, the human embryo. In addition, to cause this death for so-called therapeutic reasons would violate the Hippocratic tradition of medicine which instructs a healer to “first, do no harm”. The harm to the embryo would be the greatest harm anyone can do to another person.

Even if the use of embryos for research purposes were not lethal, such a practice would fly in the face of the ethical and moral tradition of this country. Research on embryos produced through cloning, like research on any human embryos and fetuses, would constitute medical experimentation on human persons without their individual voluntary consent, and would violate the Nuremberg Code. This code, created following the trials of leading Nazis after World War II, is not a law or treaty obligation. But the Code is a fair summary of the civilized ethical standard of experimentation on living human beings.

It may appear that there is a big distinction between a Nazi medical experiment on an unwilling prisoner, on the one hand, and the pulling apart of what appears to be a small clump of tissue, on the other. But appearances deceive, and in this age of bioscience it is particularly important to be guided not by appearances but by underlying truth. *The truth is, the human embryo is a human being or person, temporarily unable to communicate and temporarily dependent on others.* Whether created by cloning or by the fertilization of an egg by a sperm, the resulting embryo is a new human being with its DNA, its genetic identity, in place, and the capability, if properly protected and nurtured over time, to become as independent as any one in this room. The protection and nurturing required is not extraordinary, but simply the normal development in a human uterus, the same protection and nurturing that brought each one of us to first blink at the delivery room lights.

It would be illogical to state that the embryo’s need for protection and nurturing is so great that its claim to humanity is forfeited. Each person requires protection and nurturing, to varying extents, at each stage of life. The only difference is degree. If we accord human status only to those who apparently do not in their current state require protection and nurturing, then the hospitals and nursing homes and airliners and coal mines are full of beings that are less than fully human. Of course, all of us instinctively reject such a definition: our Mom may be in a nursing home and extensively dependent on the care from other people, but she is still fully human. Similarly, the person at the earliest stage of life is also a human being, with all the rights pertaining thereto.

To view the embryo any other way, to limit and narrow our definition of personhood to a question of the person’s present, perhaps momentary, independence, would be to institute a tyranny of the strong over the weak that would eventually be lethal to all of us. One might say, “but I’m strong and smart and independent, what do I have to fear from limiting human rights to people like me?”. My response would be, we all start out weak, we end up weak, and we have unplanned moments of weakness throughout our lives. We therefore have a personal as well as a community interest in protecting life at all stages of development.

To permit human cloning, that is, the creation of that individual new human life, for the sole reason of ending that life in the interests of research or medical experimentation, is also deeply offensive to human dignity. The use of human embryos as spare parts sources and test beds not only kills a person, but it denigrates the dignity of being human by bringing a person into existence and then manipulating him or her for one's own purpose. It would denigrate the dignity of the persons involved in the killing and all those who would condone such killing. The cloning process turns a new human being into an object for lethal experiment, rather than a subject for love.

The advocates of so-called therapeutic cloning assert that the needs of those who meet their narrow and subjective definition of "the living" would benefit from experimentation on or treatment with tissue taken from human embryos. They raise very real and widespread cases of human suffering and need, ranging from diseases and injuries of the brain and nervous system to infertility, to justify the work they wish to undertake. No matter how noble the reason, however, the taking of an innocent human life is never justified. Fortunately, because of the continued success researchers are having with adult stem cells, there is even less basis for the insufficient but emotionally strong argument for lethal experimentation using human embryos. For example, in just the last thirty days we have read about some real breakthroughs:

- The April 2001 edition of *Tissue Engineering* described how researchers at the University of California at Los Angeles and the University of Pittsburgh isolated adult stem cells from human fat tissue to grow bone, cartilage, and muscle, as well as fat. Commenting on this breakthrough, Dr. Eric Olson, chair of the Department of Molecular Biology at the University of Texas Southwestern Medical Center in Dallas, was quoted by *The Washington Post* (April 10, 2001, p A1) as saying, "every other week there's another interesting finding of adult cells turning into neurons or blood cells or heart muscle cells. Apparently our traditional views need to be re-evaluated."

- The same issue of *Tissue Engineering* described how Dr. Douglas Smith of the University of Pennsylvania Medical School has stretched nerve cells to become the connections, or axons, between nerve cells in an effort to bridge the gap that occurs in spinal cord injuries, so that communications can be restored in the spinal column.

- On April 18 scientists at Cambridge University in England announced that they had also made progress against spinal column injury. Scar tissue, which forms at the injury site, blocks nerve cell regeneration that would otherwise restore communications along the severed link. The British scientists found that injection of an enzyme, chondroitinase, breaks down the scar tissue and facilitates regeneration of the nerve cells.

- On April 11, the Anthrogenesis Corporation of Cedar Knolls, N.J., announced that it had developed a way to extract human stem cells from the placenta, and that the cells were the equivalent of human embryonic stem cells (*The New York Times*, April 12, 2001).

There are other highly significant findings, such as the University of South Florida work, announced last August, in which adult stem cells from bone marrow grew into the brain cells appropriate to specific parts of the brain, or the research results announced last November by Dr. Fred Gage of the Salk Institute, demonstrating that adult stem cells taken from the spinal cords of rats can become neurons. In sum, research into the causes and rehabilitation of diseases and injuries of the brain and nervous system is producing spectacular results without the use of embryos, and there is every indication that the research results will continue to snowball. Although heavily funded and publicly touted by the scientists who are invested in it, research involving human embryos has had nowhere near the success that adult stem cells and other techniques have enjoyed. We don't need to kill human embryos, that is, human beings at the earliest days of their existence, in order to defeat these diseases and injuries. It is therefore especially appropriate that the cloning ban in the Brownback-Weldon bill would also prohibit cloning for so-called therapeutic purposes.

Human cloning is sometimes justified on the grounds that it is the last hope of those suffering from infertility, but the Culture of Life Foundation is aware of a completely natural and non-invasive infertility regimen which claims success rates of up to 80%. This regimen, called the Creighton Model System, was developed by Dr. Thomas Hilgers of the Pope Paul VI Institute of Omaha, Nebraska. I suggest the Subcommittee contact him for additional information. His address, phone, and fax information is: 6901 Mercy Road, Omaha, NE 68106-2621. Phone (402) 390-6600, Fax (402)390-9851, Internet: www.popepaulvi.com

There are many other reasons why all human cloning should be banned, and I stress that these reasons are real, practical, not theoretical, and are based on universal truths.

First, human cloning changes the nature and meaning of human sexuality. If a new person can be produced by taking the nucleus of a somatic cell from a man and injecting it into the de-nucleated egg of a woman, then human sexuality becomes superfluous. From its age-old purpose of transforming human love into new life, sexuality in an age of cloning would become, even more than it has unfortunately already become, simply an itch to scratch. We have seen in the past half-century, as the connection between sexuality and reproduction has weakened in the “sexual revolution”, a rise in negative social indicators such as divorces, abortions, an explosion of sexually transmitted diseases including one that is 100% fatal, and greatly increased exploitation of women in prostitution and pornography. By further weakening sexuality’s reproductive purpose, cloning would therefore further weaken families and communities.

Second, human cloning would weaken or even pervert basic human relationships such as family, fatherhood and motherhood, consanguinity, and kinship. For example, if a clone resulted from the nucleus of a somatic cell taken from his “father”, his biological tie to his “mother” would be vastly different than that of a natural child. Apart from mitochondria DNA, which is outside the nucleus and is always passed on the maternal side, the clone would inherit no characteristics, no other DNA, no genetic material, from his mother. This very different biological tie could contribute to a different emotional mother-son tie as well. Further, as the clone would likely be “the spitten image” of his father, the mother’s already different relationship with her child would become truly bizarre. Human cloning therefore perverts the relationships that are fundamental to our mental health and to the health of society.

Third, human cloning would compromise the dignity of the cloned person because she would forever know she was biologically identical to another person. Richard Seed, a scientist who wants to set up a cloning clinic in the U.S., has reportedly said that he wished he could have obtained a blood sample from Mother Teresa from which to clone a saint. Of course, the resulting little girl would only be *biologically* identical to Mother Teresa. The unique life-principle or soul would make her an entirely unique human person. Her own environment and experiences also contribute to her uniqueness. There will never be “another Mother Teresa”. But the expectations that others would put on that child, and the expectations she might place on herself, would possibly make for a miserable life. She would have lost the essential human freedom to be oneself. The children of the famous and notorious sometimes carry a heavy burden, but at least they retain the freedom of their own individuality. The cloned person would have lost that basic freedom because of the decision of another person.

The threat of power over others is a fourth reason to oppose human cloning. Most parents consciously choose to have children, and some try to influence the development of their child *in utero*. All responsible parents exercise authority over their children after birth and use their authority to educate and develop their children. This use of parental authority is natural. But human cloning gives a person absolute dominion over the existence of another. Whether the person comes into existence at all, when the person comes into existence, what the person’s genetic material will be, what the person’s intelligence and appearance and special skills will be—all this would be determined by another person. As I noted earlier, if people can have this kind of power over others, than the equality clause is just empty words from a quaint past. Those who would clone people seek a dominion over others which can only be termed “Godlike”. Like the bypassing of human sexuality to achieve reproduction, the calling into existence of a precisely specified new person is an exercise in apparent human omnipotence.

A fifth reason to oppose human cloning is that it will increase a trend which we need to reverse, if we want to retain our freedom: the trend toward evaluating other people on the basis of their qualities instead of on their existence. Human cloning will always be the outcome of a choice about the specific traits and qualities of a child. As we have seen, cloning turns human reproduction into a manufacturing process. In time, given our national genius at capitalism, particular qualities and the raw material needed to obtain them will be available in exchange for money. Health insurers, for example, have a financial incentive to favor healthier children. Wealthy parents will use cloning to get ever-higher “quality” children (“quality” meaning whatever the fashion of the time dictates) while poor people, reproducing in the traditional way, would possibly lag ever farther behind. Again, the strain imposed on our concept of equality will be too much, and self-government will end.

I said earlier that human cloning would be an exercise in apparent human omnipotence. I say "apparent" because, unlike the natural reproductive system, which has brought us to this point, cloning is fraught with physical risks. Many of those risks have already been displayed in the cloning of mammals. For example, Dolly the cloned sheep was the one live birth derived from 277 sheep embryos that were created in the experiment. Cloned embryos appear to develop into larger-than-normal fetuses, resulting in a high incidence of stillbirths and Caesarean section deliveries. Developmental problems associated with abnormal size of human clones would include a high incidence of death in the first few weeks from heart and circulatory problems, diabetes, underdeveloped lungs, or immune system problems. The January death from a common infection of a cloned wild gaur (an endangered South Asian species) at Trans-Ova Genetics in Sioux Center, Iowa, may indicate that cloned animals have a lower resistance to disease. Another problem is the potential for clones to have aging DNA and thus an accelerated aging process. Lord Robert Winston, one of the developers of *in vitro* fertilization, has stated that because of the faster aging process, he would not want a child of his to be cloned.

The current low rate of cloning success with mammals (two clones born per 100 implantations, according to one source, up to 17 per 100 according to another) suggests a similarly low success rate for human cloning. And even if a seemingly normal and healthy animal is born, a defect that was not apparent can suddenly cause death, as was the case with a cloned sheep born last December at the same center that produced Dolly. The March 25, 2001, *New York Times*, reporting on the cloning of animals, described a high rate of spontaneous abortion and post-natal developmental delays, heart defects, lung problems, and malfunctioning immune systems among cloned animals who had initially seemed normal. But let us stipulate that human ingenuity will gradually increase the success rate: who could live with having caused the pain of the many human clones who suffered and died along the way?

One section of the Brownback-Weldon bill is unneeded, in my view, and that is the section creating a commission to study the issues surrounding human cloning. There is no question that human cloning is profoundly wrong, regardless of the purpose for which it is undertaken. Every act of human cloning would be somewhere between cruel and lethal. It is a good example of science gone wild, without any guidance by ethics or morals. We recall from the twentieth century where science unfettered by ethics or morals can take us. We know cloning should not be done, and a commission is not needed to confirm what we already know. Morality and ethics are not the proper fields of government-created commissions. That said, the Culture of Life Foundation wholeheartedly supports the rest of the bill and appreciates the concern that this subcommittee has for the health and well-being of all Americans, at all stages of their lives.

Senator BROWNBACK. Gentlemen, I apologize, but they are calling me to the floor to preside, and I am going to have to do that until the hour of 5 o'clock. Can you stay until, it will probably be about 5:10 when I would get back, would that work for you? If not, I guess it is a problem, but we will be in recess until 5:10 and we will come back and reconvene the hearing. Thank you.

[Recess.]

Senator BROWNBACK. I apologize again for having to go over and preside. We thought we would be able to get done with the hearing by the time of 4 o'clock, and that obviously did not take place. So, my apologies to the panelists and those in attendance for the long break. We will continue from this point.

Next to present will be Mr. Carl Feldbaum, president of BIO, the Biotechnology Industry Organization. Mr. Feldbaum, I look forward to your testimony.

**STATEMENT OF MR. CARL B. FELDBAUM, PRESIDENT,
BIOTECHNOLOGY INDUSTRY ORGANIZATION**

Mr. FELDBAUM. Thank you, Senator Brownback. Just to set the stage, BIO represents 950 biotechnology company and academic institutions in all 50 states. Most of the hard work in our industry is directed toward currently unmet medical needs, new therapies

and cures for Alzheimer's and Parkinson's diseases, diabetes, various cancers, heart disease, and literally hundreds of debilitating, and perhaps thousands as we read out the human genome, life threatening genetic conditions.

Let me begin by making my position and the position of the Biotechnology Industry Organization perfectly clear. BIO opposes the use of cloning technology for reproductive uses to clone a human being. We are unalterably opposed to that, simply for reasons that have been stated, but they bear restatement and reemphasis. It is simply too unsafe technically, and raises far too many unresolved ethical and social questions, many of which have been referred to in earlier testimony.

It is obvious that this is a very sensitive issue, and we respect that. The issue and the quarrel here, if there is one, is not a religious one. We are searching for ways to treat thousands of individuals, indeed hundreds of thousands, who are currently suffering, and many of whom are likely to die young if ways are not found to help them. I did not anticipate that some of this earlier testimony would involve some questions about legal status.

I am formerly a prosecutor. Actually, in the earlier stage of my career I was an assistant district attorney in Philadelphia under District Attorney Arlen Specter, another good Kansan, some years ago, from Russell, Kansas originally, and I am a cancer patient as well. So I speak from a number of perspectives.

We have already heard just how unsafe human cloning is. It did take well over 270 attempts before Dolly was successfully cloned, and even if the odds of cloning a healthy child were brought down to one in three or one in two, it simply would remain unacceptable.

The Food and Drug Administration, the FDA, has publicly stated that it has jurisdiction over human reproductive cloning experiments and that it will not approve them. We support that view and hope that the next FDA commissioner, whoever that might be, will assert FDA's current statutory authority forcefully.

Let me remake a distinction that was attempted to be made earlier today. It is critical to distinguish the use of cloning technology, again, reproductive cloning, from what we have called therapeutic cloning. And these therapeutic cloning techniques are essential, we believe, to new therapies and cures for some of the diseases that I have mentioned and have been mentioned earlier, Parkinson's, Alzheimer's, diabetes, heart conditions in particular, but there may be many many others, particularly as we find that most human diseases have some genetic component.

As I wrote in a letter to President Bush on February 1st of this year, stating BIO's position, and I said to be perfectly clear, we support cloning of specific human cells, genes and other tissues that do not and cannot lead to a cloned human being. Therapeutic cloning technology can create pure populations of functional cells to replace damaged cells in the human body, and biomedical researchers are learning how to turn undifferentiated human stem cells into neurons, liver cells and heart muscle cells, among others.

This would for example, allow patients with heart disease to receive new heart muscle cells that would greatly improve their cardiac function.

And going further, specific cellular cloning techniques such as somatic cell nuclear transfer are critical to these developments. They are necessary steps in producing sufficient quantities of vigorous replacement cells for the clinical treatment of patients, cells that could be transplanted without triggering an immune response rejection. I think that is the critical distinction when we are talking about somatic cell nuclear transfer.

Let me just make a comment. I am abbreviating my testimony, which I would ask be put in the record in whole.

Senator BROWNBACK. Without objection.

Mr. FELDBAUM. Thank you. Mr. Chairman, we have debated reproductive cloning before, as you know. After the unveiling of Dolly the sheep, a few senators introduced legislation that would have not only banned human reproductive cloning, but it would have probably inadvertently prohibited critical and meaningful biomedical research. When opponents of the underlying bill staged a filibuster, supporters received only 42 votes for cloture. A review of the debate shows that while all senators appeared to oppose human reproductive cloning, a majority would not support legislation that would again perhaps inadvertently shut down some of this important research.

We all agree that the current safety and social factors make human reproductive cloning repugnant, but it is just as critical in our enthusiasm to prevent reproductive cloning that we not ban vital research.

Again, thank you for the opportunity to testify, and I will be happy to answer any questions.

[The prepared statement of Mr. Feldbaum follows:]

PREPARED STATEMENT OF CARL B. FELDBAUM, PRESIDENT,
BIOTECHNOLOGY INDUSTRY ORGANIZATION

Good afternoon. My name is Carl Feldbaum. I am the president of the Biotechnology Industry Organization, otherwise known as BIO. BIO represents more than 950 biotechnology companies, academic institutions and state biotechnology centers in all 50 U.S. states and 33 other nations. BIO's members are involved in the research and development of medical, agricultural, industrial and environmental biotechnology products. Most of the hard work in our industry is directed toward currently unmet medical needs: new therapies and cures for Alzheimer's and Parkinson's diseases, diabetes, various cancers, heart disease and hundreds of debilitating and many life-threatening genetic conditions.

Mr. Chairman, and members of the Subcommittee, thank you for the opportunity to testify today. Let me begin by making my position perfectly clear: BIO opposes human reproductive cloning. It is simply too unsafe technically and raises far too many unresolved ethical and social questions.

That's why I wrote to President Bush on February first of this year, urging him to extend the voluntary moratorium on human reproductive cloning, which was instituted in 1997. As I said in that letter, "Cloning humans challenges some of our most fundamental concepts about ourselves as social and spiritual beings. These concepts include what it means to be a parent, a brother, a sister and a family.

"While in our daily lives we may know identical twins, we have never experienced identical twins different in age or, indeed, different in generation. As parents, we watch with wonder and awe as our children develop into unique adults. Cloning humans could create different expectations. Children undoubtedly would be evaluated based on the life, health, character and accomplishments of the donor who provides the genetic materials to be duplicated. Indeed, these factors may be the very reasons for someone wanting to clone a human being." I respectfully ask for the entire letter to be included in the hearing record.

Perhaps even more compelling, it is extremely unsafe to attempt human reproductive cloning. In most animals, reproductive cloning currently has no better than a 3 to 5 percent success rate. In fact, scientists have been attempting to clone numer-

ous species for the past 15 years with no success at all. What that means, simply and graphically, is that very few of the cloned animal embryos implanted in a surrogate mother animal survive. The others either die *in utero*—sometimes at very late stages of pregnancy—or die soon after birth. Only in cattle have we begun to achieve some improvement. What I am saying is that we cannot extrapolate to humans the data from the handful of species in which reproductive cloning is now possible. This grim record emphasizes just how unsafe this procedure is, whether it's applied to sheep, goats, dogs, cats, whatever.

I understand that it took over 270 attempts before Dolly was successfully cloned. Even if the odds of cloning a healthy child were brought down to one in three or one in two, it would be simply unacceptable. Rogue and grandstanding so-called scientists who claim they can—and will—clone humans for reproductive purposes insult the hundreds of thousands of responsible, reputable scientists who are working hard to find new therapies and cures for millions of individuals suffering from a wide range of genetic diseases and conditions.

The Food and Drug Administration (FDA) has publicly stated that it has jurisdiction over human reproductive cloning experiments and that it will not approve them. BIO supports that view and hopes that the next FDA commissioner—whoever that might be—will assert FDA's current statutory authority forcefully.

BENEFICIAL USES OF CLONING TECHNOLOGY

Allow me to shift gears now, and make a critical distinction. It is critical to distinguish the use of cloning technology to create a baby—reproductive cloning—from therapeutic cloning. Therapeutic cloning techniques are central to the production of breakthrough medicines, diagnostics and vaccines to treat Alzheimer's, diabetes, Parkinson's, heart attacks, various cancers and hundreds of other genetic diseases. Therapeutic cloning could also produce replacement skin, cartilage and bone tissue for burn and accident victims and bring us ways to regenerate retinal and spinal cord tissue. Therapeutic cloning cannot produce a whole human being. This work should be allowed to move forward.

Allow me a minute or two to explain how therapeutic cloning can be used to develop products that will greatly improve the practice of medicine and, in turn, enormously improve the quality of life of individuals suffering from many of the most serious illnesses known to human kind.

Regenerative Medicine

Many diseases disrupt cellular function or destroy tissue. Heart attacks, strokes and diabetes are examples of common conditions in which critical cells are lost to disease. Today's medicine cannot completely restore this function. Regenerative medicine holds the potential to cause an individual's malfunctioning cells to work properly again or even to replace dead or irreparably damaged cells with fresh, healthy ones, thereby restoring organ function. The goal is to provide cells that won't be rejected when they are transplanted into the body.

Again, as I wrote in my letter to President Bush in February, "To be perfectly clear, we support cloning of specific human cells, genes and other tissues that do not and cannot lead to a cloned human being." Therapeutic cloning technology can create pure populations of functional cells to replace damaged cells in the human body. Biomedical researchers are learning how to turn undifferentiated human stem cells into neurons, liver cells and heart muscle cells. Thus far, these human replacement cells appear to function normally *in vitro*, raising the possibility that they can be used in the treatment of devastating chronic diseases affecting these particular tissue types. This would, for instance, allow patients with heart disease to receive new heart muscle cells that would greatly improve cardiac function.

Studies published in last week's issue of *Science* magazine confirm the enormous potential of using cloning techniques in regenerative medicine. In those studies, which were done with mice, researchers were able to generate new neural cells and islets (insulin-producing cells). We hope to perfect these techniques to successfully transplant those cells. The potential benefit from this research to millions of people with diabetes, Parkinson's disease and spinal cord injuries is extraordinary.

Specific cellular cloning techniques, such as somatic cell nuclear transfer, are critical to these developments. They are necessary steps in producing sufficient quantities of vigorous replacement cells for the clinical treatment of patients, cells that could be transplanted without triggering an immune-response rejection.

PREDICTIVE TOXICOLOGY/DRUG DISCOVERY

Companies also use therapeutic cloning techniques to develop research tools that help them determine if new drugs are safe for people. The use of normal, cloned human liver cells to test for certain toxic metabolites in drugs under development

would reduce the danger of human clinical trials by eliminating such compounds before they are tested in humans. This process could both safeguard and streamline the drug development process, bringing drugs to patients sooner and more safely, and reduce the current reliance upon animal testing.

LEGISLATIVE ACTION

Mr. Chairman, Congress has debated reproductive cloning before. After the unveiling of Dolly the sheep, a physicist named Richard Seed announced that he would perform human cloning experiments. The congressional debate that followed is instructive. At that time, a few senators introduced legislation that would have not only banned human reproductive cloning, but also would have prohibited critical meaningful, biomedical research. When opponents of the underlying bill staged a filibuster, supporters received only 42 votes for cloture. A review of the debate shows that while all senators opposed human reproductive cloning, a majority would not support far-reaching legislation that would—perhaps inadvertently—shut down important biomedical research.

As the current Congress pursues legislative prohibitions on human reproductive cloning, we urge both caution and a distinction between reproductive and therapeutic cloning. We all agree that given the current safety and social factors, human reproductive cloning is repugnant. However, it is critical that in our enthusiasm to prevent reproductive cloning, we not ban vital research, turning wholly legitimate biomedical researchers into outlaws, and thus squelching the hope of relief for millions of suffering individuals.

Our nation is on the cusp of reaping the rewards from our significant investment in biomedical research. The U.S. biotech industry is the envy of much of the world, especially our ability to turn basic research at NIH and universities into applied research at biotech companies and in turn, into new therapies and cures for individual patients. Using somatic cell nuclear transfer and other cloning technologies, biotech researchers will continue to learn about cell differentiation, oocyte “reprogramming” and other areas of micro and molecular biology. Armed with this information, they can eventually crack the codes of diseases and conditions that have plagued us for hundreds of years, indeed, for millennia.

CONCLUSION

In conclusion, Mr. Chairman, human reproductive cloning remains unsafe, and the ethical issues it raises have not been reasonably resolved. The voluntary moratorium on human reproductive cloning should remain in place, and no federal funds should be used for human reproductive cloning. If the Congress in its wisdom decides that legislation to outlaw reproductive cloning is needed, that legislation must be carefully drawn to ensure that it will not stop vital research using therapeutic cloning.

Again, thank you for the opportunity to testify. I'll be happy to answer any questions.

BIOTECHNOLOGY INDUSTRY ORGANIZATION,
Washington, DC, February 1, 2001.

Hon. GEORGE W. BUSH,
*President of the United States,
The White House,
Washington, DC.*

Dear Mr. President: Recently certain groups have announced plans to clone human beings. The Biotechnology Industry Organization (BIO) opposes these efforts, and we urge you to support continuation of the current voluntary moratorium on these experiments in the United States. BIO represents more than 940 biotechnology companies and academic institutions in all 50 states.

The moratorium on cloning human beings was implemented in March 1997 as an immediate response to concerns raised by the cloning of a sheep, named Dolly, from genetic material of an adult cell. The scientific breakthrough's implications riveted the world and generated calls in many nations for a ban on applications of cloning technology to create human beings.

To be perfectly clear, we support cloning of specific human cells, genes and other tissues that do not and cannot lead to a cloned human being. These techniques are integral to the production of breakthrough medicines, diagnostics and vaccines to treat heart attacks, various cancers, Alzheimer's, diabetes, hepatitis and other diseases. This type of cloning could also produce replacement skin, cartilage and bone tissue for burn and accident victims, and result in ways to regenerate retinal and

spinal cord tissue. More than a quarter billion people worldwide already have benefited from biotechnology therapies and vaccines.

BIO was among the first to support a moratorium on cloning human beings because we view this specific cloning technology as unsafe and because the prospect of cloning humans raises profound moral, religious and bioethical concerns.

The National Bioethics Advisory Commission (NBAC), following a 1997 study on the implications of human cloning, recommended the moratorium be continued. NBAC further urged a ban on federal funding of any attempt to create a child by cloning and urged compliance with a voluntary moratorium by private and non-federally funded sectors.

In its conclusions, NBAC called cloning human beings unsafe and morally unacceptable. The U.S. Food and Drug Administration affirmed that it had jurisdiction over any human cloning experiments and would not approve them.

Mr. President, today the technology to clone a human being still is not safe and the full range of moral and ethical concerns still has not been addressed.

Cloning humans challenges some of our most fundamental concepts about ourselves as social and spiritual beings. These concepts include what it means to be a parent, a brother, a sister and a family.

While in our daily lives we may know identical twins, we have never experienced identical twins different in age or, indeed, different in generation. As parents, we watch with wonder and awe as our children develop into unique adults. Cloning humans could create different expectations. Children undoubtedly would be evaluated based on the life, health, character and accomplishments of the donor who provides the genetic material to be duplicated. Indeed, these factors may be the very reasons for someone wanting to clone a human being.

The current moratorium on cloning humans should remain until our nation has had time to fully explore the impact of such cloning. Otherwise, we may risk a public backlash against responsible biotechnology research that is making progress daily in developing new treatments and cures for our most devastating and intractable diseases.

I welcome the opportunity to discuss this critical and timely issue with you and your staff.

Sincerely,

CARL B. FELDBAUM,
President, Biotechnology Industry Organization.

Senator BROWNBAC. I look forward to reading your letter to the President and your testimony. I think we are consistent with what your stance is in the bill that I have introduced, and so I look forward to some discussion of that point of view.

Mr. Hanson, thank you for joining us.

STATEMENT OF MR. JAYDEE HANSON, ASSISTANT GENERAL SECRETARY FOR PUBLIC WITNESS AND ADVOCACY, GENERAL BOARD OF CHURCH AND SOCIETY, THE UNITED METHODIST CHURCH

Mr. HANSON. Thank you. I am Jaydee Hanson, the Assistant General Secretary for Public Witness and Advocacy, for the General Board of Church and Society, of the United Methodist Church. I am pleased to be asked to testify before the Committee. I note with appreciation that the legislation that you have introduced, Senator Brownback, is legislation that supports the principles on cloning adopted a year ago by the United Methodist Church.

The General Conference of the United Methodist Church is the only church body that speaks for the entire 1.4 million member United Methodist Church. A year ago in May 2000, the General Conference both reaffirmed its support for legal abortions, albeit with a number of restrictions we would like, and called for a ban on all human cloning, including the cloning of human embryos. This, and I am quoting from General Conference policy, this would include all projects privately or government funded that are intended to advance human cloning.

Many other denominations have also issued statements opposing human cloning. The United Methodist Church opposition to cloning comes from our understanding of a theology of God's creation and how humans are to be stewards of God's creation.

The United Methodist Church is not an antiscience organization. We have 122 schools and colleges that include hospitals, and we teach that God works through science. But the new biological technologies including cloning force us to examine as never before the meaning of life, our understanding of ourselves as humans, and our proper role in God's creation.

The General Conference, and I quote again, cautions that the prevalent principle in research that what ought to be done should be done is insufficient rationale and should not be the prevalent principle in guiding the development of new technologies. Technologies need moral and ethical guidance.

As United Methodists, our reflections on these issues emerge from our faith. We remember that creation has its origin, value and destiny in God, and that humans are stewards of creation and that technology has brought both great harm and great benefit. As people of faith, we believe our identity as humans is more than our genetic inheritance, our social environment or the sum of the two. We are created by God and have been redeemed by Jesus Christ.

In light of these theological claims and other questions, fears and expectations, we recognize that our present human knowledge is incomplete and finite. We do not know all the consequences of cloning. It is important that the limits of human knowledge be considered as policy is made.

In the interests of time, I have shortened my comments as well, and ask that they be included in the record.

Senator BROWNBACK. Yes, without objection.

Mr. HANSON. The General Conference statement on human cloning notes a number of ways that human cloning would have social and theological implications. The use and abuse of people, the exploitation of women, the tearing of the fabric of the family, the compromising of human distinctiveness, the lessening of genetic diversity, the direction of research and development on cloning would likely be controlled by corporate profit.

The General Conference further noted that given the profound theological and moral implications, and the imperfection of human knowledge, that there should be a moratorium even on cloning related research.

When I teach Sunday school I remind my students that the most difficult choices that we face are not those that are clear right and wrong choices. The most difficult choices we face are to do good the wrong way. Jesus was tempted in the wilderness by the devil to do several good things, to turn stone into bread, to throw himself from the temple so that angels would save him to show the glory of God; to become an earthly ruler. Jesus resisted these temptations.

We have temptations we need to resist too. The temptations offered by those who would clone human embryos and humans are profound. They suggest that by these technologies alone will serious diseases be solved. Cloning human embryos was first presented as essential to providing enough stem cells for research, but we are learning every day that new adult stem cells are being found.

Be wary of the temptation to adopt today's latest technology as the final understanding of God's way of creating and healing humans. Be wary also of language. Avoid the temptation to call experimental procedures therapy. Cloning proponents will argue that cloning will soon become a normal way of reproducing humans and that the initial opposition will fade away when safety concerns are addressed. The cloning of humans should never be allowed to become normal.

The U.S. Congress has the opportunity to join with many other countries where the United Methodist Church has members and ban human cloning. The rest of the world is looking for the United States to provide leadership on this issue. The U.S. Congress, moreover, should not take halfway measures with regard to cloning. Some have argued that banning the reproduction of a human clone is sufficient, and that the cloning of human embryos should not be banned. We urge you to both ban the cloning of human embryos and to prohibit the patenting of human embryos. To allow the production of cloned human embryos makes it highly likely that any ban on reproductive cloning would be easily violated.

Thank you for your time.

[The prepared statement of Mr. Hanson follows:]

PREPARED STATEMENT OF JAYDEE HANSON, ASSISTANT GENERAL SECRETARY FOR PUBLIC WITNESS AND ADVOCACY, GENERAL BOARD OF CHURCH AND SOCIETY, THE UNITED METHODIST CHURCH

We are pleased to testify on the issue of cloning before this committee. We note with appreciation that the legislation introduced by Subcommittee Chair Senator Brownback is legislation that supports the principles on cloning adopted by The United Methodist Church.

The General Conference of The United Methodist Church is the only church body that speaks for the entire 8.4 million-member United Methodist Church. One year ago, in May 2000, the General Conference called "*for a ban on all human cloning, including the cloning of human embryos. This would include all projects, privately or governmentally funded, that are intended to advance human cloning.*" (The Book of Resolutions of The United Methodist Church, 2000, p. 254)

The General Conference based its position on the work of the United Methodist Genetic Science Task Force, which began its work in 1989, some 8 years before a Scottish laboratory succeeded in cloning "Dolly".

Since the cloning of Dolly, this issue of cloning has sparked enormous and sustained concern in the general public, including the church. Many other denominations other than the United Methodist Church have also issued statements opposing human cloning. The United Methodist Church opposition to cloning comes from our understanding of a theology of God's creation and how humans are to be stewards of God's creation. The new biological technologies, including cloning, force us to examine as never before, the meaning of life, our understanding of ourselves as humans, and our proper role in God's creation. The General Conference "*caution(s) that the prevalent principle in research that what can be done should be done is insufficient rationale . . . and should not be the prevalent principle guiding the development of new technologies . . . technologies need moral and ethical guidance.*" (Book of Resolutions, p. 248)

As United Methodists, our reflections on these issues emerge from our faith. We remember that creation has its origin, value, and destiny in God, that humans are stewards of creation, and that technology has brought both great benefit and harm to creation. As people of faith, we believe that our identity as humans is more than our genetic inheritance, our social environment, or the sum of the two. We are created by God and have been redeemed by Jesus Christ. In light of these theological claims and other questions, fears and expectations, we recognize that our present human knowledge on this issue is incomplete and finite. We do not know all of the consequences of cloning . . . it is important that the limits of human knowledge be considered as policy is made. (Book of Resolutions, p.254)

Dr. Rebekah Miles, associate professor of ethics, at Perkins School of Theology, Southern Methodist University and a member of the United Methodist Task Force on Genetic Science summarized the questions asked by our taskforce.

Will human cloning compromise our God-given uniqueness or distinctiveness?

How might human cloning be misused by sinful humans to further their selfish ends and objectify other people?

Is a desire to replicate one's genetic inheritance in a human clone an attempt to deny our inevitable finitude as human beings?

Will human cloning further social injustice . . . ?

When does human alteration of creation go so far as to become a violation of God's creation?

What is the difference between our human capacities for creation and God's?

Our Genetic Science Task Force concluded that cloning would compromise human distinctiveness, that it would be used as a way to further social injustice, and was a violation of their understanding of God's Creation and as such should be banned.

The General Conference statement on human cloning notes a number of ways that human cloning would have social and theological ramifications: *(the) use and abuse of people, exploitation of women, (the) tearing of the fabric of the family, the compromising of human distinctiveness, the lessening of genetic diversity, the direction of research and development (on cloning would likely be) . . . controlled by corporate profit . . .* (Book of Resolutions, p. 254) The General Conference further noted that *Given the profound theological and moral implications, the imperfection of human knowledge that there be a moratorium on cloning-related research.*

The most difficult choices we face are often to do good the wrong way.

Jesus was tempted in the wilderness by the devil to do several "good" things: To turn stone into bread; to throw himself from the temple so that angels would save him and show the glory of God; to become an earthly ruler. Jesus resisted these temptations.

The temptations offered by those who would clone human embryos and humans are profound. They suggest by these technologies alone will serious diseases be solved. Cloning human embryos was first presented as essential to providing enough stem cells for research, but we are learning every day that new adult stem cells are being found. Be wary of the temptation to adopt today's latest technology as the final understanding of God's ways of creating and healing humans.

Cloning proponents will argue that cloning will soon be come a normal way of reproducing humans and that initial opposition will fade away when safety concerns are addressed. The cloning of human humans should never be allowed to become "normal". The US Congress has the opportunity to join with many other countries where the United Methodist Church has members and ban human cloning. The rest of the world is looking to the United States for leadership on this issue. The US Congress, moreover, should not take halfway measures with regard to cloning. Some have argued that banning the reproduction of a human clone is sufficient and that cloning of human embryos should not be banned. We would urge you to both ban the cloning of human embryos and to prohibit the patenting of human embryos. To allow the production of cloned human embryos makes it highly likely that any ban on reproductive cloning would be easily violated.

Senator BROWNBACK. Thank you, Mr. Hanson, and thank you for those comments.

Mr. Doerflinger.

STATEMENT OF MR. RICHARD M. DOERFLINGER, ASSOCIATE DIRECTOR FOR POLICY DEVELOPMENT, SECRETARIAT FOR PRO-LIFE ACTIVITIES, NATIONAL CONFERENCE OF CATHOLIC BISHOPS

Mr. DOERFLINGER. Thank you, Mr. Chairman, for this opportunity to testify and to express the support of the National Conference of Catholic Bishops for a Federal ban on human cloning as proposed in your bill.

Human cloning shows disrespect for life in the very act of generating it, manufacturing human beings in the laboratory to specifications predetermined by the desires of others. Because cloning divorces human reproduction from the context of a loving union between man and woman, such children in fact have no parents in

the usual sense of the word. Hence they have no defenders against manipulation and abuse by unethical researchers, unless this body and others like it step forward.

A cloned human being, in our view, should be treated as a human person with fundamental rights. Cloning is not wrong because cloned humans lack human dignity. It is wrong because they have human dignity, and are being brought into the world in a way that fails to respect that dignity.

Cloning, as we have heard, is proposed as a way to make live born children, so-called “reproductive” cloning, and as a way to make human embryos for destructive experiments, which some call “therapeutic” cloning.

The difference is this. In the first, reproductive cloning, as Dr. Jaenisch has testified, very few cloned humans survive to live birth; in the second, none would.

Efforts to ban only “reproductive” cloning would not in our view ban cloning at all, but simply ban allowing cloned humans to survive. I do note that even Dr. Jaenisch referred to the child, the embryo, and the fetus in the womb as a cloned human. At least we have common ground there.

A law that banned “reproductive” cloning would allow researchers to use cloning for unlimited mass production of embryos for experimentation, and then require them to destroy the embryos. Faced with the problem of a 95 to 99 percent prenatal death rate from attempts at cloning, such proposals would solve the problem by simply increasing the death rate to 100 percent.

Politically motivated efforts to distinguish “reproductive” from “therapeutic” cloning or “baby cloning” from “embryo cloning”, tend to confuse the issue. We should subject these euphemisms to some reality therapy, toward which end I offer five statements or propositions.

One, all human cloning is embryo cloning. As Lee Silver of Princeton has said, real biological cloning can only take place at the level of the cell. When somatic cell nuclear transfer is used to replace the nucleus of an egg with the nucleus of a human body cell and the resulting cell is stimulated, a human embryo results and cloning has occurred, as your bill clearly recognizes.

Two, therefore, in an important sense, all human cloning is reproductive cloning. Once one creates a human embryo, one has engaged in reproductive behavior, albeit a very strange form of asexual reproduction in this case. Subsequent stages of development—gestation, birth, infancy—are simply those which normally occur in the growth of any human being. The complete human genome that once belonged to one member of the human species now also belongs to another. Even government commissions favoring embryo research call the early human embryo “a developing form of human life” which deserves our respect.

So once the embryo is created, we face new moral questions. We can no longer ask, “Should we clone?” but “What do we do with this human life we have produced by cloning?” If all available answers to that question are lethal to the cloned human 95 to 100 percent of the time, we have no business engaging in human cloning.

Three, all human cloning at present is experimental cloning. Even efforts to move toward bringing a cloned child to term would

first require many trials, perhaps many many hundreds of trials, using embryos not intended for live birth. Legislation allowing experimental cloning would facilitate efforts to refine the process and clear the way for production of live born children.

Four, no human cloning is “therapeutic” cloning. Labeling cloning for destructive experiments as “therapeutic” cloning is a stroke of marketing genius but it does considerable violence to the English language. In law and medical ethics, experiments that harm one member of the human species solely for the benefit of others is precisely *nontherapeutic* experimentation; that is the definition of a nontherapeutic experiment.

Nontherapeutic research on human embryos is a crime in Louisiana, Michigan, Pennsylvania and some other states. And the therapeutic need for human cloning is more doubtful than ever in light of recent advances in adult stem cell research and other alternatives. One of the more startling overviews of the issue is the recent April 5th issue of the British journal *Nature*, which concludes that therapeutic cloning has “fallen from favor” among scientists and is now expected not to have a “large clinical impact”. The therapeutic case for cloning is medically weak and morally abhorrent.

My final proposition, No. 5: Because cloned humans are humans, any proposal to prevent human cloning must not do to those humans anything that would be universally condemned if done to other humans at the same stage of development. Can we not agree, for example, that cloned embryos deserve as much respect as other human embryos of the same stage, whatever you say that level of respect may be, whether it is the respect due to a person or something less?

I ask this because we do have a consensus that cuts across the usual political and ideological lines on these matters. If the law allows cloning to produce embryos for research but prohibits transfer to the womb, then if transfer does occur, as others have said in this hearing, the only legal remedy seems to be government coerced abortion, or punishing women for getting pregnant and giving birth. That would be revolting to people on all sides of the abortion issue.

But even if such a law somehow stops the embryo at the very threshold of the womb, it would have to require the embryo to be killed, defining for the first time in our history a class of humans it is a crime not to destroy. That is impossible to reconcile with the respect and moral consideration that even supporters of embryo research have said should be accorded to all embryos.

And in such a proposal, our government would be approving the one practice in human embryo research that is widely condemned even by leading supporters of abortion rights—specially creating human embryos solely for the purpose of research that will kill them. This is a practice condemned as “unconscionable” by *The Washington Post*, and “grotesque at best” by the *Chicago Sun-Times*; a practice that is rejected by Senator Specter’s Stem Cell Research Act, by the NIH guidelines on embryonic stem cell research, and even by Members of Congress who have on other grounds contested other clauses of the current Federal law against funding embryo research.

And until now, even the biotechnology industry had seemed to accept this consensus. They praised the NIH guidelines for drawing a clear ethical line between research on so-called spare embryos and actually creating embryos specially for destructive research. They now seem to have abandoned that transitional political position.

My final point is this. Some would reject your bill, which I believe is the most effective legislation against human cloning, solely to protect the use of cloning for the practice of creating human embryos solely for research, which is of highly questionable benefit and has been rejected by policymakers on both sides of the abortion and stem cell debates. Such a position should not prevent Congress from taking the right course on this issue.

Thank you.

[The prepared statement of Mr. Doerflinger follows:]

PREPARED STATEMENT OF RICHARD M. DOERFLINGER, ASSOCIATE DIRECTOR FOR POLICY DEVELOPMENT, SECRETARIAT FOR PRO-LIFE ACTIVITIES, NATIONAL CONFERENCE OF CATHOLIC BISHOPS

I am Richard M. Doerflinger, Associate Director for Policy Development at the Secretariat for Pro-Life Activities, National Conference of Catholic Bishops. I am grateful for this opportunity to testify on human cloning, and to express our Conference's support for a federal ban on the practice as proposed in Senator Brownback's "Human Cloning Prohibition Act of 2001" (S. 790).

The sanctity and dignity of human life is a cornerstone of Catholic moral and social teaching. We believe a society can be judged by the respect it shows for human life, especially in its most vulnerable stages and conditions.

At first glance, human cloning may not seem to threaten respect for life because it is presented as a means for creating life, not destroying it. Yet it shows disrespect for life in the very act of generating it. Here human life does not arise from an act of love, but is manufactured in the laboratory to preset specifications determined by the desires of others. Developing human beings are treated as objects, not as individuals with their own identity and rights. Because cloning completely divorces human reproduction from the context of a loving union between man and woman, such children have no "parents" in the usual sense. As a group of experts advising the Holy See has written:

In the cloning process the basic relationships of the human person are perverted: filiation, consanguinity, kinship, parenthood. A woman can be the twin sister of her mother, lack a biological father and be the daughter of her grandmother. *In vitro* fertilization has already led to the confusion of parentage, but cloning will mean the radical rupture of these bonds.¹

From the dehumanizing nature of this technique flow many disturbing consequences. Because human clones would be produced by a means that involves no loving relationship, no personal investment or responsibility for a new life, but only laboratory technique, they would be uniquely at risk of being treated as "second-class" human beings.

In the present state of science, attempts to produce a liveborn child by cloning would require taking a callous attitude toward human life. Animal trials show that 95% to 99% of cloned embryos die. Of those which survive, many are stillborn or die shortly after birth. The rest may face unpredictable but potentially devastating health problems. Those problems are not detectable before birth, because they do not come from genetic defects as such—they arise from the disorganized expression of genes, because cloning plays havoc with the usual process of genetic reorganization in the embryo.²

Scenarios often cited as *justifications* for human cloning are actually *symptoms* of the disordered view of human life that it reflects and promotes. It is said that cloning could be used to create "copies" of illustrious people, or to replace a deceased loved one, or even to provide genetically matched tissues or organs for the person whose genetic material was used for the procedure. Each such proposal is indicative of a utilitarian view of human life, in which a fellow human is treated as a means to someone else's ends—instead of as a person with his or her own inherent dignity. This same attitude lies at the root of human slavery.

Let me be perfectly clear. In objective reality a cloned human being would not be an “object” or a substandard human being. Whatever the circumstances of his or her origin, he or she would deserve to be treated as a human person with an individual identity. But the depersonalized technique of manufacture known as cloning disregards this dignity and sets the stage for further exploitation. Cloning is not wrong because cloned human beings would lack human dignity—it is wrong because they *have* human dignity, and are being brought into the world in a way that fails to respect that dignity.

Ironically, startling evidence of the dehumanizing aspects of cloning is found in some proposals ostensibly aimed at *preventing* human cloning. These initiatives would not ban human cloning at all—but would simply ban any effort to allow cloned human embryos to survive. In these proposals, researchers are allowed to use cloning for the unlimited mass production of human embryos for experimentation—and are then required by law to destroy them, instead of allowing them to implant in a woman’s womb.

In other words: Faced with a 99% death rate from cloning, such proposals would “solve” the problem by ensuring that the death rate rises to 100%. No live clones, therefore no evidence that anyone performed cloning. This is reassuring for researchers and biotechnology companies who may wish the freedom to make countless identical human guinea pigs for lethal experiments. It is no great comfort to the dead human clones; nor is it a solution worthy of us as a nation.

Sometimes it is said that such proposals would ban “reproductive cloning” or “live birth cloning,” while allowing “therapeutic cloning” or “embryo cloning.” This may sound superficially reasonable. If banning all cloning is too difficult a task, perhaps we could ban half of it—and the half that is “therapeutic” sounds like the half we’d like to keep.

But this description relies on a fundamental confusion as to what cloning is. I can sum up the real situation in a few propositions.

1. **All human cloning is embryo cloning.** Some accounts of cloning seem to imagine that cloning for research purposes produces an embryo, while cloning for reproductive purposes produces a baby or even a fully grown adult—like new copies of Michael Keaton or Arnold Schwarzenegger springing full-grown from a laboratory. This is, of course, nonsense. In the words of Professor Lee Silver of Princeton University, a leading advocate of human cloning: “Real biological cloning can only take place at the level of the cell.”³

Cloning technology can also be used to produce other kinds of cells; these are not the subject of this hearing, and they are explicitly excluded from the scope of Senator Brownback’s legislation. But when somatic cell nuclear transfer is used to replace the nucleus of an egg with the nucleus of a human body cell and the resulting cell is stimulated, a human embryo results, whatever one’s ultimate plans on what to do next.⁴

2. **In an important sense, all human cloning is reproductive cloning.** Once one creates a live human embryo by cloning, one has engaged in reproduction—albeit a very strange form of asexual reproduction. All subsequent stages of development—gestation, birth, infancy, etc.—are simply those which normally occur in the development of any human being (though reaching them may be far more precarious for the cloned human, due to the damage inflicted by the cloning procedure).

To say this is not to make a controversial moral claim about personhood or legal rights.⁵ It is to state a biological fact: Once one produces an embryo by cloning, a new living being has arrived and the key event in reproduction has taken place. The complete human genome that once belonged to one member of the human species now also belongs to another. Anything that now happens to this being will be “environmental” influence upon a being already in existence—transfer to a womb and live birth, for example, are chiefly simple changes in location.

Moreover, even government study commissions favoring harmful human embryo experiments concede that with the generation of a new embryo, a new life has come into the world. They describe the early embryo as “a developing form of human life” which “warrants serious moral consideration.”⁶

Thus generating this new human life in the laboratory confronts us with new moral questions: Not “Should we clone?” but “What do we do with this living human we have produced by cloning?” If all the available answers are lethal to the cloned human 95% to 100% of the time, we should not allow cloning.

3. **All human cloning, at present, is experimental cloning.** The line between “reproductive” and “experimental” cloning is especially porous at present, because any attempt to move toward bringing a cloned child to live birth would first require many thousands of trials using embryos *not* intended for live birth. Years of destructive research of this kind may be necessary before anyone could bring a cloned human through the entire gestational process with any reasonable expectation of a

healthy child. Therefore legislation which seeks to bar implantation of a cloned embryo for purposes of live birth, while allowing unlimited experimental cloning, would actually facilitate efforts to refine the cloning procedure and prepare for the production of liveborn children. This would be irresponsible in light of the compelling principled objections to producing liveborn humans by cloning.

4. **No human cloning is “therapeutic” cloning.** The attempt to label cloning for purposes of destructive experiments as “therapeutic cloning” is a stroke of marketing genius by supporters of human embryo research. But it does serious damage to the English language and common sense, for two reasons.

First, the experiments contemplated here are universally called “nontherapeutic experimentation” in law and medical ethics—that is, the experiments harm or kill the research subject (in this case the cloned human embryo) without any prospect of benefitting that subject. This standard meaning of “nontherapeutic” research is found, for example, in various state laws forbidding such research on human embryos as a crime.⁷ Experiments performed on one subject solely for possible benefit to others are never called “therapeutic research” in any other context, and there is no reason to change that in this context.

Second, the “therapeutic” need for human cloning has always been highly speculative; it now seems more doubtful than ever in light of recent advances in adult stem cell research and other noncontroversial alternatives. In the stem cell research debate, as one recent news report observes, “There is one thing everyone agrees on: Adult stem cells are proving to be far more versatile than originally thought.”⁸ Adult stem cells have shown they can be “pluripotent”—producing a wide array of different cells and tissues.⁹ They can also be multiplied in culture to produce an ample supply of tissue for transplantation.¹⁰ Best of all, using a patient’s own cells solves all problems of tissue rejection, the chief advantage cited until now for use of cloning.¹¹

In its 1997 report on human cloning, the National Bioethics Advisory Commission reviewed the idea of cloning human embryos to create “customized stem cell lines” but described this as “a rather expensive and far-fetched scenario”—and added that a moral assessment is necessary as well:

Because of ethical and moral concerns raised by the use of embryos for research purposes it would be far more desirable to explore the direct use of human cells of adult origin to produce specialized cells or tissues for transplantation into patients.¹²

Now PPL Therapeutics, the Scottish firm involved in creating “Dolly” the sheep, says it has indeed found a way to reprogram ordinary adult cells to become stem cells capable of being directed to form almost any kind of cell or tissue—without creating or destroying any embryos.¹³

Even in the field of embryonic stem cell research, new developments have called into question the need for cloning. The problem of tissue rejection may not be as serious as once thought when cells from early human development are used, and there are other ways of solving the problem—for example, by genetically modifying cells to become a closer match to a patient.¹⁴

For all these reasons, a recent overview of the field concludes that human “therapeutic cloning” is “falling from favour,” that “many experts do not now expect therapeutic cloning to have a large clinical impact.” Even James Thomson of the University of Wisconsin, a leading practitioner and advocate of embryonic stem cell research generally, calls this approach “astronomically expensive”; in light of the enormous wastefulness of the cloning process and the damage it does to gene expression, “many researchers have come to doubt whether therapeutic cloning will ever be efficient enough to be commercially viable” even if one could set aside the grave moral issues involved.¹⁵

We should clearly understand what would be entailed by any effort to implement a “therapeutic cloning” regimen for stem cell transplants. This would not be a case in which human embryos are destroyed once to form a permanent cell line for future use. For *each individual patient*, countless human embryos—the patient’s genetic twin brothers or sisters—would have to be created in the laboratory and then destroyed for their stem cells, in the hope of producing genetically matched tissue for transplantation. Thus the creation and destruction of human life in the laboratory would become an ongoing aspect not only of medical research but of everyday medical practice. And what would become of those who have profound moral objections to cloning, and to having new lives created and destroyed for our benefit? Would we be told that we must choose between our life and our conscience?

In short, the “therapeutic” case for cloning is as morally abhorrent as it is medically questionable. Which brings me to a final proposition on how to assess proposals for preventing human cloning.

5. Because cloned humans are humans, any proposal to prevent human cloning must not do to cloned humans anything that would be universally condemned if done to other humans at the same stage of development.

This proposition can be universally endorsed by people on both sides of the cloning issue, and on both sides of the abortion issue. To quote Lee Silver once more: “Cloned children will be full-fledged human beings, indistinguishable in biological terms from all other members of the human species.”¹⁶ Thus, for example, cloned embryos deserve as much respect as other human embryos of the same stage—whatever that level of respect may be.

Silver’s point about cloned humans being “indistinguishable” from others raises a major practical problem for efforts to allow creation of cloned embryos while forbidding their transfer to a womb. Once the embryo is created in a fertility clinic’s research lab (as such a law would permit) and is available for transfer, *how could the government tell* that this embryo was or was not created by cloning? And if it cannot do so, how can it enforce a prohibition on transferring cloned embryos (but not IVF embryos) to a woman’s womb?

However, an even more serious moral and legal issue arises at this point. If the government allows use of cloning to produce human embryos for research but prohibits transfer to the womb, what will it be *requiring* people to do? If transfer has already occurred, the only remedy would seem to be government-mandated abortion—or at least, jailing or otherwise punishing women for remaining pregnant and giving birth. We need not dwell on the abhorrence such a solution would rightly provoke among people on all sides of the abortion issue. It would be as “anti-choice” as it is “anti-life.”

However, even if the law could act before transfer actually occurs, the problem is equally intractable. For the law would have to *require* that these embryos be killed—defining for the first time in U.S. history a class of human embryos that it is a crime *not* to destroy. It is impossible to reconcile such a law with the profound “respect” and “serious moral consideration” that even supporters of human embryo research say should be accorded to all human embryos.

If the law *permitted* creation of cloned embryos for research, while *prohibiting* their creation for any other purpose (or prohibiting any other use of them once created), the government would be approving the one practice in human embryo research that is widely condemned even by supporters of abortion rights: specially creating human embryos solely for the purpose of research that will kill them.

In 1994 the National Institutes of Health did propose funding such abuses, as part of a larger proposal for funding human embryo research generally. The moral outcry against this aspect of the proposal, however, was almost universal. Opinion polls showed massive opposition, and the NIH panel making the recommendation was inundated with over 50,000 letters of protest. *The Washington Post*, while reaffirming its support for legalized abortion, attacked the Panel’s recommendation:

The creation of human embryos specifically for research that will destroy them is unconscionable . . . [I]t is not necessary to be against abortion rights, or to believe human life literally begins at conception, to be deeply alarmed by the notion of scientists’ purposely causing conceptions in a context entirely divorced from even the potential of reproduction.¹⁷

The *Chicago Sun-Times* likewise editorialized:

We can debate all day whether an embryo is or isn’t a person. But it is unquestionably human life, complete with its own unique set of human genes that inform and drive its own development. The idea of the manufacture of such a magnificent thing as a human life purely for the purpose of conducting research is grotesque, at best. Whether or not it is federally funded.¹⁸

In the end, President Clinton set aside the recommendation for creation of “research embryos.”

Every year since then, Congress has prohibited funding for all harmful embryo research at the National Institutes of Health, through the Dickey amendment to the annual Labor/HHS appropriations bills.¹⁹ However, *even members of Congress who have led the opposition to the Dickey amendment agree with its rejection of special creation of human embryos for research*. On the only occasion when an amendment was offered on the House floor to weaken the Dickey amendment, the sponsors emphasized that it would leave intact the clause rejecting the creation of embryos for research.²⁰ Similarly, the recent NIH guidelines for embryonic stem cell research, as well as Senator Specter’s “Stem Cell Research Act of 2001,” explicitly reject the idea of using embryos specially created for research purposes.²¹

As mentioned above, at least nine states generally prohibit harmful experiments on human embryos living outside a woman’s body. A federal law that facilitates such experimentation, by approving it as the only *accepted* use for human embryo

cloning, would mark a radical departure from state precedents on respect for nascent human life.²² In short, human embryos produced by cloning would be created specifically, and solely, for destructive embryo experiments that are a crime in some states.

Ironically, it seems the cloning procedure is so demeaning and dehumanizing that people somehow assume that a brief life as an object of research, followed by destruction, is “good enough” for any human produced by this technique. The fact that the procedure invites such morally irresponsible policies is another reason to ban it. For if an embryo produced by cloning cannot even garner the respect that we all agree should be accorded to all other human embryos, but is treated as a dangerous entity that must not be allowed to survive, how will we view any human clone who *is* ultimately born alive? As a mere “organ farm” for others? Or could we compartmentalize our thinking, so that an embryo created solely for destructive research will be greeted as a new individual with full human rights if someone *does* bring him or her to full term? In light of some uses proposed even now for born human clones, it would be foolish to assume that our society will shift gears so easily.

We must remember that it is morally wrong and irresponsible to *make* human clones, not to *be* a human clone. The innocent victim of cloning should not receive a government-sanctioned death penalty simply for the crime of existing. Therefore the approach taken by the Brownback/Weldon bill, prohibiting the use of cloning to *initiate* the development of a new human organism, is the only morally responsible approach as well as the clearest and most effective one in practical terms.

In short: **Some would reject the most straightforward and effective legislation against human cloning, solely to protect the use of cloning for a practice (creating human embryos solely for research) which is of highly questionable use and has been rejected by policy makers on both sides of the abortion and stem cell debates. Such advocacy should not prevent Congress from taking the right course on this issue.**

Research in the cloning of animals, plants, and even human genes, tissues and cells (other than embryos) can be beneficial and presents no intrinsic moral problem. However, when research turns its attention to human subjects, we must be sure not to undermine human dignity in the pursuit of human progress. Human experimentation divorced from moral considerations might progress more quickly on a technical level—but at the loss of our humanity.

A ban on human cloning will help direct the scientific enterprise toward research that benefits human beings without producing, exploiting and destroying fellow human beings to gain those benefits. Creating human life solely to cannibalize and destroy it is the most unconscionable use of human cloning—not its highest justification.

ENDNOTES

1. Reflections from the Pontifical Academy for Life, “Human Cloning Is Immoral” (July 9, 1997), in *The Pope Speaks*, vol. 43, no. 1 (January/February 1998), p. 29. Also see: Congregation for the Doctrine of the Faith, *Donum Vitae* (Instruction on Respect for Human Life in its Origin and on the Dignity of Procreation)(March 10, 1987), I.6 and II.B.

2. See Testimony before the House Energy and Commerce Subcommittee on Oversight and Investigations, March 28, 2001, presented by Dr. Mark E. Westhusin and Dr. Rudolf Jaenishch (<http://energycommerce.house.gov/107/hearings/03282001Hearing141/hearing.htm>).

3. Lee M. Silver, *Remaking Eden: How Genetic Engineering and Cloning Will Transform the American Family* (Avon Books 1998) at 124.

4. See the Fact Sheet, “Does Human Cloning Produce an Embryo?”, Secretariat for Pro-Life Activities, National Conference of Catholic Bishops, March 31, 1998 (www.nccbuscc.org/prolife/issues/bioethic/fact398.htm).

5. Professor Silver, for example, agrees that cloning is accomplished at the embryonic level, while also claiming that the cloned embryo (and all other embryos) lack full moral significance until later in development. To his Princeton colleague Peter Singer and some other bioethicists, humans do not acquire the rights of persons until some time *after* birth. See P. Singer, “Justifying Infanticide,” in *Writings on an Ethical Life* (HarperCollins 2000), 186–193.

6. *Final Report of the Human Embryo Research Panel* (National Institutes of Health: September 27, 1994) at 2. The National Bioethics Advisory Commission, which defined the embryo as “the beginning of any organism in the early stages of development,” likewise said that “the embryo merits respect as a form of human life” (though not, the Commission thought, the level of respect owed to persons). See

Ethical Issues in Human Stem Cell Research (National Bioethics Advisory Commission: September 1999) at 85, 50. Also see the sources cited in the Fact Sheet, “What is an Embryo?”, Secretariat for Pro-Life Activities, National Conference of Catholic Bishops, Feb. 26, 1998 (www.ncbuscc.org/prolife/issues/bioethic/fact298.htm).

7. For example, see La. Rev. Stat. tit. 14 §87.2 (a crime to conduct any experiment or study on a human embryo except to preserve the health of that embryo) and tit. 40 §1299.35.13 (prohibiting experimentation on an unborn child unless it is therapeutic to that child); Mich. Comp. Laws §333.2685 (prohibiting use of a live human embryo for nontherapeutic research that will harm the embryo); Pa. Cons. Stat. tit. 18 §3216(a) (nontherapeutic experimentation on an unborn child at any stage is a felony; defining “nontherapeutic”); S.D. Codified Laws §§34-14-16 through 34-14-20 (prohibiting nontherapeutic research that harms or destroys a human embryo; defining “nontherapeutic research”).

8. A. Zitner, “Diabetes Study Fuels Stem Cell Funding War,” *Los Angeles Times*, April 27, 2001 (www.latimes.com/news/nation/updates2/lat-stemwar010427.htm).

9. Citing eleven other studies, a study funded by the National Institutes of Health (NIH) and the Christopher Reeve Paralysis Foundation states: “Pluripotent stem cells have been detected in multiple tissues in the adult, participating in normal replacement and repair, while undergoing self-renewal.” D. Woodbury et al., “Adult Rat and Human Bone Marrow Stromal Cells Differentiate Into Neurons,” 61 *Journal of Neuroscience Research* 364–370 (August 15, 2000) at 364.

10. See: D. Colter et al., “Rapid expansion of recycling stem cells in cultures of plastic-adherent cells from human bone marrow,” 97 *Proc. Natl. Acad. Sci. USA* 3213–8 (March 28, 2000)(adult stem cells amplified a billion-fold in six weeks, retaining their multipotentiality for differentiation); E. Rosler et al., “Cocultivation of umbilical cord blood cells with endothelial cells leads to extensive amplification of competent CD34+CD38- cells,” 28 *Exp. Hematol.* 841–52 (July 2000).

11. A recent report on use of adult stem cells to form new muscles, nerves, liver cells and blood vessels observes: “None of these approaches use embryonic stem cells, which some oppose on ethical grounds. Another advantage is that they use tissue taken from the patient’s own body, so there is no risk of rejection or need for drugs to suppress immune system defenses.” See “Approach may renew worn hearts,” Associated Press, November 12, 2000.

12. *Cloning Human Beings: Report and Recommendations of the National Bioethics Advisory Commission* (Rockville, MD: June 1997) at 30–31. The Commission outlined three alternative avenues of stem cell research, two of which seemed not to involve creating human embryos at all.

13. “PPL follows Dolly with cell breakthrough,” *Financial Times*, February 23, 2001.

14. P. Aldhous, “Can they rebuild us?,” 410 *Nature* 622–5 (5 April 2001) at 623.

15. *Id.* at 622.

16. Silver at 125.

17. Editorial, “Embryos: Drawing the Line,” *The Washington Post*, October 2, 1994 at C6.

18. Editorial, “Embryo Research Is Inhuman,” *Chicago Sun-Times*, October 10, 1994 at 25.

19. The current version is Section 510 of the Labor/HHS appropriations bill for Fiscal Year 2001, H.R. 5656 (enacted through Section 1(a)(1) of H.R. 4577, the FY ‘01 Consolidated Appropriations Act, Public Law 106–554). It bans funding any creation of human embryos (by cloning or other means) for research purposes, and any research in which human embryos are harmed or destroyed.

20. “Let me say that I agree with our colleagues who say that we should not be involved in the creation of embryos for research. I completely agree with my colleagues on that score,” said Rep. Nancy Pelosi, arguing in favor of research on “spare” embryos originally created for fertility treatment. The sponsor of the weakening amendment, Rep. Nita Lowey, said: “I want to make it very clear: We are not talking about creating embryos. . . . President Clinton again has made it very clear that early-stage embryo research may be permitted but that the use of Federal funds to create embryos solely for research purposes would be prohibited. *We can all be assured that the research at the National Institutes of Health will be conducted with the highest level of integrity. No embryos will be created for research purposes. . .*” 142 *Cong. Record* at H7343 (July 11, 1996)(emphasis added). The weakening amendment failed nonetheless, 167 to 256. *Id.* at H7364. While this debate concerned federal funding, supporters of the Lowey amendment said it was “very hard to understand” why standards for ethical research should be different for publicly funded and privately funded research. See remarks of Rep. Fazio at H7341-2.

21. The NIH guidelines deny funding for “research utilizing pluripotent stem cells that were derived from human embryos created for research purposes,” and “re-

search in which human pluripotent stem cells are derived using somatic cell nuclear transfer, *i.e.*, the transfer of a human somatic cell nucleus into a human or animal egg." *National Institutes of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 *Fed. Reg.* 51976–81 (August 25, 2000) at 51981. Senator Specter's bill supports embryonic stem cell research but insists that "the research involved shall not result in the creation of human embryos." 107th Congress, S. 723, Sec. 2.

22. In Louisiana, for example, a human embryo fertilized in the laboratory may generally be used *only* for efforts at a live birth, not for research. La. Rev. Stat. tit. 9 §122. What would happen if a new federal law turned this on its head, and banned live birth while allowing destructive research on cloned embryos—keeping in mind that cloned embryos may be biologically indistinguishable from IVF embryos once they are created?

Senator BROWNBACk. Thank you, Mr. Doerflinger, and thank you all, gentlemen. This is very interesting and instructive.

I want to go, if I could, to Mr. Feldbaum, because I want to make sure I understand the position of BIO, the Biotechnology Industry Organization. I have here the letter you sent to the President in February of this year, which you quoted as well.

You state in here and you read your quotation, to be perfectly clear, we support cloning of specific human cells, genes and other tissues that do not, and cannot lead to a cloned human being. Now I want to make sure I understand what you are talking about in the somatic cell cloning technology, or the terminology that you are using here.

Would you create and do you support the creation of a cloned human embryo for research or experimentation purposes?

Mr. FELDBAUM. No.

Senator BROWNBACk. OK, at all. You do not support that?

Mr. FELDBAUM. Trying to be very clear about this, and there are a number of semantic differences that have been thrown up here, that even within the biotech industry have various degrees of acceptance. There is a wide range of opinion among the scientists about some of the fundamental questions that have been raised by Dr. Doerflinger in particular, and earlier by Dr. Kass.

We are in favor of continuing the ability to do somatic cell nuclear transfer, because that is the one apparent technique that would allow cells that would be your cells or my cells, and would not be rejected by our immune systems if it developed into say liver or cardiac tissue.

Senator BROWNBACk. Right. What do you mean by that technique? Describe what you mean by that technique.

Mr. FELDBAUM. What I mean is somatic cell as distinguished—first, let me preface this. I am not a scientist. I have a degree in biology from the mesozoic period in this era. But what I am talking about is a somatic cell as opposed to a germ cell, a somatic cell taken perhaps from my skin, or the inside of my mouth, or a hair follicle.

Senator BROWNBACk. And put where?

Mr. FELDBAUM. And putting that, the nucleus of that somatic cell, in an egg cell from which the nucleus has been taken away, taken out.

Senator BROWNBACk. And then starting the growth of that?

Mr. FELDBAUM. Starting the cell division of that. Now we are against the act of implantation, and we would favor the type of bill that has already been passed in California and in Rhode Island,

that comes down very clearly with criminal penalties against the implantation leading to the implantation that could lead to the birth of a human child.

And the prosecution is not against the mother. It certainly never would be, or would we advocate, would it involve the abortion of that child, but it would go against the physician and the clinic, criminal penalties.

Senator BROWNBACK. OK. Now Mr. Feldbaum, then, if I could understand what you are saying, you would take, say for instance my DNA material, your DNA material, from a cell that we would have, you would denucleii an egg and insert that into the egg, and then restart the process of reproduction.

Now, Mr. Feldbaum, isn't it true then that that cloned human embryo could become a human being if it was implanted into a female?

Mr. FELDBAUM. I am told that it could, and I also am told, and we have been told several times this afternoon that it took 277 attempts to clone Dolly, that there are—technical is probably the wrong word. The results of all those experiments were anywhere from embryos that died at early or late stages in pregnancy, stillborns, animals that died soon after birth. I mean, that is intolerable when applied to a human child, and we are not in favor of that.

The California and the Rhode Island bills specifically come down on the implantation of that.

Senator BROWNBACK. But now if I can understand though, then your letter, when you say this, that do not and cannot lead to a cloned human being, then you are saying that while yes, this could become a human being, you are opposed to the implantation of this human embryo.

Mr. FELDBAUM. That is correct.

Senator BROWNBACK. OK. So it could become a human being if somebody implanted it?

Mr. FELDBAUM. That is correct. That is what I am told, it could be, but again, the odds of it becoming healthy, being born healthy, right now are really such long odds that it is something that every responsible scientist in the industry finds absolutely repugnant.

Dr. Kass said in his statement that reputable scientists, I hope to quote him correctly, reputable scientists are trying to do this. I do not think that is the case. I think reputed scientists are trying to do it, but if they announce that they are trying to do this, they are no longer reputable in our view.

Senator BROWNBACK. I think, Mr. Feldbaum, the problem that I am having here is that you would support a bill that would allow the creation of a cloned human embryo whose legal status would be no different from any other human embryo. Once it is a human embryo, it would have a legal status the same as any other. Would that not be correct?

Mr. FELDBAUM. Well, I have heard a great deal of legal opinion actually, to my surprise today, but I had to ask myself, without filing a legal brief in preparation for this testimony, whether it is different than the legal rights of thousands of embryos that have been created in *in vitro* fertilization clinics.

Senator BROWNBACK. Is it any different from those?

Mr. FELDBAUM. Physically, I believe it is the same. These are embryos that I understand for the most part, if not used, are discarded.

Senator BROWNBAC. In some cases they are and in some cases they are not, but still, the legal status would be the same and the possibility of it becoming a human remains.

Mr. FELDBAUM. It depends on implantation.

Senator BROWNBAC. You say that it depends on implantation. Now, you had supported, your organization had previously supported the guidelines put forward I believe, NIH guidelines on the differences between embryonic stem cell and cloned embryos, and you had supported and said that this is clearly a distinction, there is a distinction between a cloned embryo and the embryonic stem cells, and you supported that distinction. Is that correct?

Mr. FELDBAUM. I don't believe that—

Senator BROWNBAC. OK. Well maybe take me through, then, your position on that, because Mr. Doerflinger raises the point of view that you have changed positions on this particular issue, that you used to be against cloning human embryos and in favor of just the maintenance of embryonic stem cells, and now you are saying no, we do favor the cloning of a human embryo.

Mr. FELDBAUM. I am not saying that. What we have said is that we want to preserve the technique of somatic cell nuclear transfer because that allows cells to be produced that are uniquely yours or uniquely mine, that would not be rejected if they were, if they became liver cells or cardiac cells, or islet cells, pancreatic cells if we were diabetic. We are in favor of that.

We are also in favor of the ability to use the embryos currently in *in vitro* fertilization clinics that would be otherwise discarded, as a source of embryonic tissue.

Senator BROWNBAC. OK.

Mr. FELDBAUM. And to my knowledge, and I used to be a prosecutor, we have no enforcement as a trade association, enforcement or subpoena ability in this regard, but I am told quite authoritatively that no one is creating embryos to use, embryonic stem cells in research.

Senator BROWNBAC. What in your organization's opinion is the legal status of the human embryo, is it person or property?

Mr. FELDBAUM. We have not taken a position on the definition of a human embryo. Our organization does not have a statement or position on when life begins. In fact, there is a wide range of views about that. We have many religious and social perspectives within the industry that have a point of view that would agree with definitions that have been articulated here earlier, and many others who have not. What the industry appears to believe and have a great consensus on is the importance of this research going on in terms of somatic cell nuclear transfer and the ability to use embryonic tissues that would otherwise be discarded, is critical to the new field of regenerative medicine.

Senator BROWNBAC. Now, have you done a legal research or review as to the legal status? I mean, I would think if your organization, particularly if it is desirous of creating a cloned human embryo, would clearly want to know what is the legal status of this,

not talking about religious or moral, but that you would do the legal background work. Have you done that as an organization?

Mr. FELDBAUM. We have not. At your invitation, we would proceed.

Senator BROWNBAC. I would hope that you would. I would think you would definitely want to know what is the legal status here of something, before we start down this area of research that some would like to do.

Mr. FELDBAUM. Well, there has been no consensus on some of the issues, really some of the issues debated in the larger context of when life begins.

Senator BROWNBAC. You know, we have had a long debate in this country about legal status of personhood. We used to have it on, it used to be in our Constitution, of a question of personhood and what was the legal status of certain classes of human beings. I would request that you would. I would think that you would clearly want to know what this is before we proceed this route.

I would also ask you, if you would, because some will be doing this research as well, that once you create a cloned human embryo, and you are doing it for research purposes, but that is somebody's genetic material that is there. Who gets the final say as to whether or not this is then destroyed or implanted, and do you think you can stand the legal challenge if somewhere down the road somebody desires to have this cloned human embryo implanted? I would think you would clearly want to know that because of the responsibility of whatever organization that might be a part of your association takes upon itself if it funds the research, if it does the technical work into creating this human embryo, that then because of legal maneuvering or whatever else, becomes implanted.

Mr. FELDBAUM. Senator, I will certainly accept your invitation to initiate some legal research, but I just want to make it clear, we do not represent *in vitro* fertilization clinics, and any legal arrangements made with them do not involve my organization.

Senator BROWNBAC. I am not asking that either.

Mr. FELDBAUM. That is why I am just saying, I am unable to answer. I am standing on one leg right now.

Senator BROWNBAC. And I do not want you to answer regarding IV clinics, but I do want you to answer regarding the industry that is seeking to create human embryo clones, that then you would be doing the technical work, or members of your association would, would be doing the scientific experiment, would be doing the development of this young human embryo. Is that—Do you seek to do that?

Mr. FELDBAUM. Well, I, with all due respect, I do not know that I can accept the characterization as you state it, but I am happy to go back and look at the research as it is conducted, and present a legal view on it.

Senator BROWNBAC. How long does your association propose that the young human embryo be allowed to develop before destroying this for its cells?

Mr. FELDBAUM. We have not taken a position on that, although we have accepted the guidelines that were presented by NIH last year.

Senator BROWNBACk. And would continue to accept those guidelines?

Mr. FELDBAUM. Yes.

Senator BROWNBACk. And any put forward by FDA?

Mr. FELDBAUM. Not that I know of.

Senator BROWNBACk. OK.

Mr. FELDBAUM. Not that I know of, although I do know that FDA has asserted its jurisdiction in this area. That assertion, was not strong enough to inhibit further legislative action on this, but we would be also in favor of reexamining that authority to determine whether it is in fact strong enough.

Senator BROWNBACk. Do you know how long a human embryo can grow, not just be held at a frozen point, but grow outside of the womb?

Mr. FELDBAUM. I do not. I do not.

Senator BROWNBACk. Because I am wondering if techniques will be developed in the future that it would be able to prolong that growth for a lengthy period of time. Science is doing amazing things, and I am wondering how much, how long it is going to be able to maintain that human embryo growing outside. I do not know if any other members of the panel know the answer to that question.

Dr. Doerflinger?

Mr. DOERFLINGER. At least when the NIH Human Embryo Research Panel was meeting in 1994, the claim was that 2 weeks might be the outside time now during which an embryo could be maintained in a laboratory before it could go no further. There did not seem to be necessarily any outside barrier to ultimately doing complete extracorporeal development of an embryo. I suppose that if implantation in the womb is the mark for what makes you a human being, that means that if they succeed in that experiment, there would be adults walking around who would never be a human being. Implantation is simply a change of location.

Senator BROWNBACk. Mr. Feldbaum, do you have any thoughts regarding that comment?

Mr. FELDBAUM. No, I really—I do not have any expert opinion or even a strong personal view on that. We just, I think the implantation is a signal event that has worked legislatively already, and it is what I would suggest we go back to. I am not sure that the breadth and depth of this discussion will be able to be captured in any legislation, frankly, that is enactable.

Senator BROWNBACk. I hope you get a chance to review the legislation I proposed, of what its effort is.

One other question, if I could for you, Mr. Feldbaum, and I appreciate you coming forward here, as there are a lot of questions surrounding human cloning.

I continue to hear people suggest that in the future, they are looking at introducing genetic material into the human species from outside the human species, similar to what is taking place in animals and in plants, where they will take genetic material from different plant lines or even from animals, and insert them into humans, and I believe members of your organization have done that quite successfully, and that people are discussing taking material

from cattle, chickens, genetic material from outside the human species, grafts, and putting it into human species.

Is that being discussed by members of your association?

Mr. FELDBAUM. Not to my knowledge. That would qualify as a germ cell line research, which is altering the human reproductive cells in ways that those characteristics that would be introduced would be carried from one generation to the other, and there is a complete moratorium on germ line research, and we are not in favor of it. It raises, as you have said, many too many questions.

This is the distinction between germ line research and somatic cell research, and there is a—somatic cell research, frankly, from my condition or a number of other conditions, if there were a way to transfer DNA that would protect me from a certain cancer, from whatever source, but it wouldn't be passed on to future generations, I would have a choice of whether to welcome it or not, and frankly, I would welcome it, if it were a therapy or cure.

Senator BROWNBAC. So you would support the introduction of, say some genetic material from an animal, a pig, into the human gene line, into yours, if it would prevent cancer?

Mr. FELDBAUM. No, sir. I would not accept any introduction into my germ line or approve the introduction into any other individual's germ line. If there were some medicine that was basically DNA that could be injected or infused and I would be cured of one disease or another, and that would not affect my germ line ability to pass anything on, but it would cure me of any disease or condition, I probably would accept that.

Senator BROWNBAC. Would you categorically reject the introduction of other DNA material from outside the human species into the human species?

Mr. FELDBAUM. Into the germ line, yes, I would.

Senator BROWNBAC. And your organization would categorically, has it categorically rejected yet?

Mr. FELDBAUM. Yes, it has, sir.

Senator BROWNBAC. Good, thank you. Are there any comments that other members of the panel?

Mr. BEST. Yes, Mr. Chairman, it has been a very interesting afternoon. You know, it seems to me that the so-called "somatic cell nuclear transfer" is a "scientific" phrase to determine the moment of fertilization or conception, the beginning of life. Mr. Feldbaum's letter to the President, which indicates that he supports cloning of specific human cells, genes and other tissues that "do not and cannot lead to a cloned human being", is, I suggest, deceptive, because that human embryo is destroyed to use the cells, genes and other tissues. Therefore it cannot become a fully developed "human being".

So, I think it is a little bit disingenuous to say it cannot become a human being because it is destroyed as a human embryo, which is a human being. So, Mr. Chairman, the fancy "scientific" words of "somatic cell nuclear transfer" do not disguise the fact that we are creating a human embryo—a human being—that, if implanted, would continue to develop as we did. Under your cross-examination of Dr. Jaenisch, he admitted that an embryo, if implanted, would become or could become a fully developed human being, Mr. Feldbaum said the same thing. Thus, to mandate the destruction

of those embryos simply because they are manufactured seems to me to be terribly wrong. Frankly, Mr. Chairman, the manufacturing of human beings through IVF processes, is itself, terribly wrong. There are other technologies to help women with infertility problems which we refer to in our testimony. The British program of embryo creation and forced destruction is not the road to follow for a civilized society.

Senator BROWNBACk. Thank you for your comments. Thank you all, gentlemen, and thank you for waiting longer, and particularly Mr. Feldbaum for answering a number of questions. I have many others, looking at this. I think we can all agree, there is a great deal of repugnance of what is being discussed in our nation, and the question comes before us of a number of unintended consequences of what people may well, and I am sure from various science fields, desire to do for the good of mankind. But there are enormous questions about it.

I am sure in the past, other people have looked at things that they have proposed to do, in some cases to humans, and did it for the good of mankind, and we turned and looked back in hindsight and with great horror at what happened.

Thank you. This discussion will continue. I do have several letters that I am submitting into the record of testimony regarding this hearing. We will discuss this further in the future, I am sure.

Senator BROWNBACk. The hearing is adjourned.

[The hearing adjourned at 5:55 p.m.]

APPENDIX

PREPARED STATEMENT OF JOAN SAMUELSON, PRESIDENT,
PARKINSON'S ACTION NETWORK

Mr. Chairman and members of the Subcommittee, thank you for this opportunity to testify about important issues that arise on the cutting edge of high-tech, life-saving biomedical research. As one of more than a million Americans who suffer from Parkinson's disease, this issue has deep personal significance. I appreciate the opportunity to submit my testimony for the record and am sorry I could not appear before you in person.

The Parkinson's Action Network was created in 1991 to give voice to a community that has been largely invisible, and as a consequence has not received the federal research investment equal to its great potential. The Network's mission is to educate the country and its leaders about the need to speed research, deliver breakthroughs and cure this dreadful disease.

Parkinson's is a devastating progressive neurological disorder that makes it difficult to walk, causes uncontrollable tremors, and in its final states robs individuals of the ability to speak or move. Parkinson's is caused by the degeneration of brain cells that produce dopamine, a neurochemical controlling motor function. There is great reason for hope, however. In the last several years, scientists have made tremendous progress in the search for a Parkinson's cure.

One of the most promising lines of research involves using human embryonic stem cells—the cells made available by leftover frozen embryos created by and for couples undergoing the scientific miracle of *in vitro* fertilization. Stem cells are the building blocks of the body, with the ability to divide indefinitely and differentiate into virtually any type of cell in the human body. Scientific experts testifying before Congress in December of 1998 named Parkinson's as the first disorder that they expected to benefit from stem cells, and predicted it could be done within a decade—and as soon as five years—if the funds needed to tackle this problem were available.

Since embryonic stem cells were first isolated by scientists at the University of Wisconsin and Johns Hopkins University in 1998, their enormous potential to save the lives of untold millions of Americans has become increasingly evident. Their promise lies in their ability to become life-saving dopamine cells for Parkinson's patients, bone marrow cells to treat cancer, insulin producing islet cells for patients with juvenile diabetes, just to name a few possibilities.

Therapeutic cloning, a subject of this hearing, could potentially speed this line of research by providing a new source of stem cells. However, before I go any further, I want to state clearly and concisely that the Parkinson's Action Network steadfastly opposes human reproductive cloning. We agree with the other witnesses testifying at this hearing, who we believe represent the overwhelming view of the scientific community, Members of Congress and other Americans that human reproductive cloning is dangerous and ethically questionable and should not be pursued.

Having said that, the Parkinson's Action Network does support further research on **therapeutic cloning** of cells that could be used to replace damaged cells in patients with Parkinson's and many other diseases. Unlike reproductive cloning, therapeutic cell cloning will not lead to the creation of a human being. What it will do is provide another source of stem cells that could differentiate into dopamine producing cells, potentially producing a cure for Parkinson's disease.

I am not a scientist, but I am someone who struggles through each day with a chronic illness. I speak for the larger Parkinson's community for whom time is not neutral. We need a medical rescue and we need it now. Scientists agree it is possible this decade. To shut down one avenue of medical research that could speed the pace of a cure would be unthinkable—lives would be lost. With appropriate ethical safeguards, we must aggressively pursue all forms of stem cell research in order to realize its potential as soon as humanly possible.

Opponents of stem cell research have tried to lump together human reproductive cloning and therapeutic cloning and mislead the public into thinking they are the same thing. There is virtually unanimous agreement that cloning a human being—

creating a duplicate person—is not something that should be attempted. Cloning potentially life-saving cells—each smaller than a pinprick—is another story. Why shouldn't those of us suffering from deadly diseases be able to use one part of our bodies to cure another part? Therapeutic cloning could allow us to do just that by “growing” new cells that could replace those that are damaged or lost.

Additionally, some argue that embryonic stem cell research is not necessary at all. They say “adult” stem cells may be just as effective and have seized recent press accounts describing research on fat and placental cells as potential sources of stem cells and used them to argue that embryonic stem cell research may no longer be necessary. **This is simply untrue.**

The potential value of “adult” stem cells is much less certain and experts in this field of research agree that it will take years of further study to determine their therapeutic potential. As Doug Melton, Ph.D., Chairman of Harvard University's Department of Molecular and Cellular Biology, pointed out in an April 22 letter to *The Washington Post*, such claims are “extremely premature.” He explained that “. . . fat cells have not yet been shown to be able to differentiate into cells of any kind. Nor has it been shown that the cells studied are truly stem cells . . .”

As Congress begins to debate legislation that would regulate or ban human cloning, the Parkinson's Action Network urges you to ensure that such legislation does not impede cell research that could lead to cures for devastating diseases such as Parkinson's, Alzheimer's, cancer, diabetes and others. If Congress stands in the way of this research, millions of Americans will be forced to wait as the clock ticks, enduring unnecessary suffering and death.

Again, I thank the Subcommittee for the opportunity to submit testimony for the record.

