# NOTES

# DIPPING INTO UNCLE SAM'S POCKETS: FEDERAL FUNDING OF STEM CELL RESEARCH: IS IT LEGAL?

*If I could see [multiple sclerosis], it would look like a big monster. It takes up lots of room in my house. It has a very long tail to trip my mom and knock her down and try to hurt her. It is a very selfish monster. We try our best to ignore it and not let it push us around. Sometimes, the monster is quiet, and we forget about him. One day, we will get rid of it and say good-bye for ever.*[1]

## I. INTRODUCTION: A MIRACLE COME TRUE?

Countless Americans suffer from debilitating conditions. Diseases such as Alzheimer's,[2] multiple sclerosis ("MS"),[3] diabetes,[4] Lou Gehrig's, [5] Hunting-

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[1] *Through a Child's Eyes Touring Art Exhibit Features Works by Children Whose Lives are Touched by Multiple Sclerosis*, SPOKESMAN REV., Aug. 11, 1999, at D9, *available at* 1999 WL 20170522 (quoting eight-year old Max Mosher).

[2] Alzheimer's afflicts an estimate d four million Americans. *See* Alzheimer's Ass'n, *People with Alzheimer's Diseas e* (visited June 17, 2001) <http://www.alz.org/people/faq.htm#howmany>.

> Alzheimer's disease ("A D") is a progressive, neurodegenerative disease characterized by memory loss, language deterioration, impaired visuospatial skills, poor judgment, indifferent attitude, but preserved motor function. AD usually begins after age 65, however, its onset may occur as early as age 40, appearing first as memory decline and, over several years, destroying cognition, personality, and ability to function.

Nat'l Inst. of N eurological Disorders and Stroke, *NINDS Alzheimer's Disease Inform ation Page* (visited Sept. 15, 2001) <http://www.ninds.nih.gov/health_and_medical/disorders/alzheimersdisease_doc.htm>.

[3] Multiple sclerosis afflicts approximately 250,000 to 350,000 Americans. *See* Charles W. Henderson, *Naked DNA Vaccination May Conquer Arthritis and Multiple Sclerosis*, GENE THERAPY WKLY, Aug. 17, 2000, *available at* 2000 WL 11696295. Multiple sclerosis is a

> chronic, slowly progressive autoimmune disease in which the body's immune system attacks the protective myelin sheaths that surround the nerve cells of the brain and spinal cord (a process called demyelination), resulting in damaged areas that are unable to transmit nerve impulses. The disease also gradually damages the nerves themselves . . . . [I]ts many symptoms affect almost every system of the body. There may be visual difficulties, emotional disturbances, speech disorders, convul-

ton's, Parkinson's, [6] epilepsy, and cancer as well as incapacitating injuries such as spinal cord injuries, afflict hundreds of millions of Americans. Their ailments prevent them from living normal, healthy lives — lives that many of us take for granted.[7] Instead, these valetudinarians dream of the day that scientists discover a cure to their condition. Fortunately, that dream is about to ripen into reality. Researchers in recent years have made unprecedented progress with embryonic stem cells. They believe that these cells will enable scientists to find a cure to some, if not all, of these diseases.[8]

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sions, paralysis or numbness of various regions of the body, bladder disturbances, and muscular weakness.
Encyclopedia.com, (visited Sept. 15, 2001)
<http://www.encyclopedia.com/articles/08854.html>.

[4] Diabetes affects about 15.7 million Americans. *See* Am. Diabetes Ass'n, *Facts & Figures* (visited June 17, 2001) <htttp://www.diabetes.org/ada/facts.jsp>. Additionally, diabetes is currently the seventh leading cause of death in America. *See id.* "Diabetes can cause serious health complications including heart disease, blindness, kidney failure, and lower-extremity amputations." Nat'l Ctr. for Chro nic Disease Prevention and Health Promotion, *Frequently Asked Questions* (visited Sept. 15, 2001)
<http://www.cdc.gov/diabetes/faqs.htm#symptoms>.

[5] Lou Gehrig's diseas e affects an estimated 30,000 Americans. *See* Amyotrophic Lateral Sclerosis Ass'n, *Un derstanding ALS* (visited June 3, 2001)
<http://www.alsa.org/als/facts.cfm>. This disease is an "in evitable progression of wasting and paralysis of the muscles of the limbs and trunks as well as those that control vital functions such as speech, swallowing and breathing follows." *Id.*

[6] Today Parkinson's disease affects about one million Americans. *See* Am. Parkinson's Disease Ass'n, *Basic Information About Parkinson's Disease* (visited June 17, 2001) <http://www.apdaparkinson.org>. "Clinically, the disease is characterized by a decrease in spontaneous movements, gait difficulty, postural instability, rigidity and tremor." *Id.*

[7] *See* U.S. NEWSWIRE, *White House Fact Sheet on Embryonic Stem Cell Research*, Aug. 9, 2001, at Nat'l Desk ("Many scientists believe that embryonic stem cell research may eventually lead to therapies that could be used to treat diseases that afflict approximately 128 million Americans."). Note that twenty percent of Americans (about 50 million people) suffer from an autoimmune disease. *See* Am. Autoimmune Related Diseases Ass'n, *Questions and Answers* (visited Sept. 17, 2001) <http://www.aarda.org/questions_and_answers.html>. *See also Talk of the Nation: Politics and Ethics of Embryonic Stem Cell Research* (Nat.'l Pub. Radio Broad., Jan. 31, 2001) [hereinafter *Talk of the Nation*]; Marianne Means, *Don't Put Brakes On Medical Process*, SEATTLE POST-INTELLIGENCER, Feb. 9, 2001, at B5; Jim Warren, *President Bush Likely to Try Banning Federal Funds for Research Using Tissue, Stem Cells from Aborted Fetuses*, TRANSPLANT NEWS, Jan. 31, 2001.

[8] *See* Michael LaSalandra, *Study: Stem Cells Cured Parkinson's Symptoms in Mice*, BOSTON HERALD, Jan. 8, 2002, at 8 ("Boston researchers were able to cure Parkinson's disease symptoms in mice by implanting embryonic stem cells into their brains, and say the technique offers hope for a number of brain diseases."); NEWSHOUSE NEWS SERVICE, *Abortion Issues at Heart of Stem Cell Research Fight*, Apr. 13, 2001, at Domestic (quoting one of the founders of embryonic stem cell research, Dr. John Gearhart of Johns Hopkins University: "I believe in three to five years we will be in clinical trials with human be-

This paper investigates the controversy surrounding embryonic stem cell research and advocates its federal funding. Part I examines these Lilliputian cells and demonstrates why they are monumental to the future of modern medicine. Part II lays out the past and present state of embryonic stem cell research. Part III discusses the controversy behind embryonic stem cell research, including the arguments and weaknesses of both sides of the debate. Lastly, this paper argues the legality of federal funding of embryonic stem cell research.

## II. STEM CELLS

### *A. Stem Cell Types*

The stem cell is the alpha cell of all cells. Yet the stem cell is the most basic cell in the human body.[9] Scientists find stem cells in embryos, fetal tissue, umbilical cords, and in children and adults.[10] Remarkably, these elemental cells can develop into virtually any cell type.[11]

There are three different kinds of stem cells, the (1) totipotent, (2) pluripotent, (3) and multipotent. Each type of stem cell differs in its capabilities of differentiation.[12] The totipotent stem cell has the potential to become any cell, tissue, or or-

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ings."). *See also* Nicolle Charbonneau, *Stem Cells Repair Nerve Damage in Mice*, YAHOO! DAILY NEWS (visited Oct. 19, 2000) <http://dailynews.yahoo.com> (discussing study that "d escrib[ed] a medical advance that may one day allow doctors to replace damaged nervous system cells in patients with multiple sclerosis"); Rick Weiss, *New Potential for Stem Cells Suggested; Findings of Three Studies May Affect Treatment of Diabetes, Alzheimer's Disease*, WASH. POST, Apr. 27, 2001, at A2 (discussing three reports that showed success in embryonic stem cells treating Alzheimer's and diabetes, and their ability to grow "into virtually every kind of adult tissue"); Charles Osgood, *Major Advances in Stem Cell Research Morphing Mice Embryos into Usable Forms May Offer Hope as US Debates Use of Human Fetuses*, CBS NEWS TRANSCRIPTS, Apr. 27, 2001 (discussing reports evidencing the ability of stem cells to treat juvenile diabetes and Parkinson's disease); Nicholas Wade, *Team Says it Coaxed Human Stem Cells to Produce Blood*, N.Y. TIMES, Sept. 4, 2001, at A14 (discussing report that researchers "transformed human embryonic stem cells into blood-making cells" which could reduce the amount of tissue or organ rejection in transplant patients). *Cf.* Gina Kolata, *The Stem Cell Debate; A Thick Line Between Theory and Therapy, as Shown with Mice*, N.Y. TIMES, Dec. 18, 2001, at F3 (arguing that the ability to use stem cells to cure diseases is not in the near future).

[9] *See* Nat'l Inst. of Health, *Stem Cells: A Primer* (May 2000) <http://www.nih.gov/news/stemcell/primer.htm>.

[10] *See id.*; *Umbilical Cord Stem Cells May Repair Brain Injury*, MED. INDUSTRY TODAY, Feb. 21, 2001, at Drugs and Biotech. "[M]ultipote nt stem cells can be found in some types of adult tissue." *Stem Cells: A Primer*, *supra* note 9. For a discussion of why scientists cannot simply harvest stem cells from children and adults instead of fetal tissue, refer to Section II(A)(2) of this note.

[11] *See Stem Cells: A Primer*, *supra* note 9.

[12] *See* Audrey R. Chapman et al., American Association for the Advancement of Science and Institute for Civil Society, *Stem Cell Research and Applications Monitoring the Fron-*

gan within the human body, as well as a "fu lly functional organism."[13] The pluripotent stem cell, the focus of this paper, also has the potential to develop into any cell, tissue, or organ within the human body.[14] Unlike its totipotent counterpart, however, the pluripotent stem cell lacks the capacity to develop into a "fu lly functioning organism."[15] The multipotent stem cell is already somewhat specialized and so its potential for further development is limited; it cannot develop into *any* cell.[16] Instead, the multipotent stem cell can only develop into certain types of tissues such as "b one, cartilage, muscle, [and] fat."[17]

Aside from developing into any type of human cell, organ, or tissue, stem cells possess another equally significant trait: once placed in a petri dish, a pluripotent stem cell will divide indefinitely, given the right conditions and satisfactory nourishment.[18] From just one stem cell scientists can culture hundreds or even thousands of stem cells.[19]

Stem cells "o ffer the possibility of a renewable source of replacement cells and tissue."[20] Scientists currently experiment extensively with stem cells, in an effort to prove that with the proper stimulus, one can "gu ide" a stem cell to develop into a certain cell type.[21] In the near future, scientists envision cultivating stem cells into new, healthy cells, organs, or tissues, to replace their diseased counterparts.[22] Experts believe that studying how stem cells evolve into specialized cells will enable them to make revolutionary advances in the medical field and find cures to many diseases and conditions, including Parkinson's and Alzheimer's diseases, spinal cord injury, stroke, burns, heart disease, diabetes, osteoarthritis, and rheumatoid arthritis.[23] With the potential to alleviate or even cure diseases, stem cells are a miracle in the works.

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*tiers of Biomedical Research* (Nov. 1999) <http://www.aaas.org/spp/dspp/sfrl/projects/stem/report.pdf>.

[13] *Id.*

[14] *See id.*

[15] *Id.*

[16] *See id.*

[17] *See* Chapman et al., *supra* note 12.

[18] *See Talk of the Nation*, *supra* note 7.

[19] *See id.*

[20] *Stem Cells: A Primer*, *supra* note 9.

[21] *See* Christine Gorman, *Brave New Cells Despite a Federal Ban, Research on "Cure- all" Embryo Tissue Widens*, TIME, May 1, 2000, at 58; Todd Ackerman, *Test-Tube Tissue Seen as Parkinson's Cure; Embryonic Stem Cells Used in Research*, HOUS. CHRONICLE, Feb 17, 2001, at 10; Kurt Samson, *Stem Cell Issue Looms for Thompson Speech*, UNITED PRESS INT'L , Feb. 28, 2001, at Gen. News; *Stem Cells: A Primer, supra* note 9.

[22] *See* Nat'l Inst. of H ealth, *NIH Publishes Final Guidelines for Stem Cell Research*, (Aug. 23, 2000) <http://www.nih.gov/news/pr/aug2000/od-23.htm>; *Stem Cells: A Primer*, *supra* note 9; John L. Allen, Jr., *Stem Cell Rift Among Vatican Experts, Use of Embryo Cells*, NAT'L CATH. REP., Jan. 26, 2001, at 6; Thrive Online, *Should Embryos be used for Medical Research?* (Aug. 25, 2000) <http://thriveonline.oxygen.com/health/polls/news/news.poll111.html>.

[23] *See Stem Cells: A Primer*, *supra* note 9.

1. Embryonic Stem Cells

The unification of a sperm and an egg yields a totipotent fertilized egg capable of becoming a fetus.[24] Soon after the fertilized egg is formed, natural cell divisions commence, resulting in a two-layered "h ollow sphere of cells" called a blastocyst.[25] These layers are composed of stem cells.

The superficial layer eventually develops into the support system, including the placenta, for the developing fetus.[26] Latent in the underlying layer of stem cells is the faculty to become one of over 200 different specialized cells that exist within the human body.[27] Ultimately, these cells will form eyes, fingers, arms, skin, brain cells, blood, or any other body part or cell.[28] Despite this enormous potential, these underlayer stem cells are not totipotent.[29] According to the National Institutes of Health (" NIH"), they do not even qualify as an embryo because "th ey are unable to give rise to the placenta and supporting tissues necessary for development in the human uterus."[30] The inability to give rise to supporting tissues renders this underlayer of stem cells pluripotent.[31] Notwithstanding the NIH's characterization, however, many people oppose the extraction of the pluripotent underlayer of stem cells from the blastocyst.[32] The removal of stem cells from the blastocyst, they believe, equals destruction of human life.[33]

Pluripotent stem cells can be derived from two sources. Scientists can take them from the tissue of aborted fetuses.[34] Such tissue comes from an expired fe-

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[24] *See id.*

[25] *See id.*

[26] *See id.*

[27] *See* Emma Ross, *Brit Doctors Defend Embryo Research* YAHOO DAILY NEWS (visited Nov. 11, 2000) <http://dailynews.yahoo.com/h/ap/20001107/sc/britain_embryo_research.1.html>.

[28] *See* Joyce Howard Price, *British Measure Would Allow Human Cloning Focuses on Embryos for Medical Research*, WASH. TIMES, Aug. 17, 2000, at A1.

[29] *See Stem Cells: A Primer*, *supra* note 9. Recall that the only type of stem cell able to develop into a human being is totipotent stem cells. Thus, this underlayer of stem cells cannot develop into a human being. Accordingly, one cannot call the destruction of this underlayer the destruction of human life.

[30] *Id.*

[31] *See id.*

[32] *See* Richard Doerflinger, *Destructive Stem-Cell Research on Human Embryos*, CATHOLIC NEWS SERVICE (Apr. 29, 1999) (Doerflinger's testimony before the Senate subcommittee in January 1999 on behalf of the National Conference of Catholic Bishops) <http://www.petersnet.net/research/retrieve.cfm?recnum=1062>; PR NEWSWIRE, *American Bioethics Advisory Commission: Anyone with a Discerning Eye Can See Bush's Plan for Microscopic Persons*, Feb. 12, 2001, at Wash. Dateline.

[33] Part IV will discuss this in greater detail.

[34] *See Talk of the Nation*, *supra* note 7. "An abortion may occur spontaneously, in which case it is also called a miscarriage. . ., or it may be brought on purposely, in which case it is often called an induced abortion." 1 NEW ENCYCLOPEDIA BRITANNICA (15th ed. 1993). A miscarriage is a "s pontaneous abortion [which can] occur for many reasons including

tus and is therefore called cadaveric tissue.[35] Scientists can also expel stem cells from surplus embryos created at fertility clinics for in vitro fertilization.[36] Women often fertilize more eggs than can be implanted in their wombs through fertility treatments.[37] Doctors destroy the excess embryos or store them in liquid nitrogen tanks for later use.[38] Over 100,000 embryos are currently in cold storage.[39]

2. Adult Stem Cells

Not surprisingly, research involving adult stem cells causes the least controversy because of the lack of moral concerns. Adult stem cells are multipotent and can be found in the "b one marrow, blood stream, cornea and retina of the eye, the dental pulp of the tooth, liver, skin, gastrointestinal tract, and pancreas."[40] Unlike embryonic stem cells, which give rise to any cell type, adult stem cells are more limited in their potential.[41] Usually, an adult stem cell can give rise only to the cell species of its origin.[42] For example, "[s]tem cells in the bone marrow usually give rise to different types of blood cells; stem cells in the muscles generally give rise to muscle."[43] Although recent research shows that certain adult stem cells may be able convert into different cell types,[44] the flexibility of adult stem cells remains unknown. Consequently, the unyielding adult stem cell fails as an adequate substitute for the acquiescent embryonic stem cell.[45]

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disease, trauma, or genetic or biochemical incompatibility of mother and fetus." *Id.* According to researcher John Gearhart of John Hopkins University School of Medicine, "there's a reason for a spontaneous abortion and over 90 percent of the time. . .these embryos are genetically defective." *Talk of the Nation*, *supra* note 7. Tissue from miscarriages, therefore, cannot be used for embryonic stem cell research.

[35] *See Talk of the Nation*, *supra* note 7.

[36] *See id.*

[37] *See* Mona Charen, *Another kind of adoption*, WASH. TIMES, Mar. 1, 2001, at A17 ("[w]hen attempting in vitro fertilization, clinics typically give women a drug that causes multiple ovulations in each cycle.").

[38] *See* Vida Foubister, *Extra Embryos: What is Their Future?*, AMERICAN MEDICAL NEWS (Nov. 13, 2000) <http://www.ama-assn.org/sci-pubs/amnews/pick_00/prsa1113.htm>.

[39] *See* Michael J. Fox, *A Crucial Election for Medical Research*, N.Y. TIMES, Nov. 1, 2000, at A35.

[40] Nat'l Inst. of Health, *The Stem Cell* (visited Sept. 23, 2001) <http://www.nih.gov/news/stemcell/chapter1.pdf>. Last year, scientists reported a *possibility* that stem cells found in human fat could be transformed into muscle cells. *See Human Fat May Provide Useful Cells*, WASH. POST Apr. 10, 2001, at A1.

[41] *See* Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells, 65 Fed. Reg. 51,976 (2000); Gorman, *supra* note 21.

[42] *See* Gorman, *supra* note 21.

[43] *Id.*

[44] *See Bush mum on embryo research status for stem cells*, BIOTECHNOLOGY NEWSWATCH Jan. 15, 2001, at 4.

[45] There have been successful clinical trials on stem cells derived from umbilical cords. For example, at the University of South Florida researchers discovered that " cells derived

*B. Possible Medical Uses for Stem Cells Cell Replacement*

One possible stem cell use involves transforming an unspecialized stem cell into a specialized cell in order to replace sick or diseased cells.[46] In this case, "th e transplanted stem cells may be able to regenerate dead or dying human tissue, reversing the progress of disease."[47] A stem cell would be placed within a group of specialized cells,[48] and through physical contact with the other cells, the stem cell would be "p rogrammed" into that particular type of specialized cell.[49] In other words, the specialized cells send the unspecialized stem cell "b iological signals" that instruct it on how to specialize.[50]

To demonstrate this concept, consider a person suffering from multiple sclerosis ("MS" ), a debilitating and devastating central nervous system disease.[51] What occurs in the body of a person with MS parallels a civil war. For reasons that remain unknown, the immune system declares war on the myelin sheath of its nerve cells.[52] Myelin is the protective sheath of a nerve cell that helps insulate the cell, thereby enabling it to transmit electronic impulses.[53] Myelin cells lack the ability to regenerate like other cells in the body.[54] After time the myelin sheath loses its battle against the immune system. The myelin sheath is destroyed, and nerve scarring results.[55] The scarring retards and, in some cases, completely blocks the passage of electrical impulses.[56] The electrical impulse delay, in turn, causes limb numbness and motor skill loss.[57] With cell replacement unspecialized stem cells could be "p rogrammed" into new nerve cells with protective myelin, thus restoring functionality in the person with MS.[58]

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from human umbilical cord blood can be reprogrammed to act as brain cells and can greatly speed recovery in rats following stroke. . . .Study results from about [sixty] rats showed that after one month, the animals that received the cells recovered about [eighty] percent from their strokes, compared with about 20 percent of the untreated rats. . . ." *Umbilical Cord Stem Cells May Repair Brain Injury*, MEDICAL INDUSTRY TODAY Feb. 21, 2001, at Drugs and Biotech.

[46] *See* Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells, 65 Fed. Reg. 51,976 (2000).

[47] Fox, *supra* note 39.

[48] Gorman, *supra* note 21.

[49] *Id.*

[50] *See id.*

[51] *See* Nat'l Multiple Sclerosis Soc'y., *What is Multiple Sclerosis?* (visited Mar. 8, 2001) <http://www.nmss.org/What%20is20MS.asp>.

[52] *See* Charbonneau, *supra* note 8.

[53] *See* Nat'l Multiple Sclerosis Soc'y, *Sourcebook: Etiology* (visited Mar. 8, 2001) <http://www.nmss.org/Sourcebook-Etiology.asp>.

[54] *See* 2 MAGILL'S ME DICAL GUIDE 144, *Health and Illness* (1995).

[55] *See id.*

[56] *See Multiple Sclerosis,* MEDLINEPLUS HEALTH INFORMATION MEDICAL ENCYCLOPEDIA (visited Sept. 15, 2001) <http://medlineplus.nlm.nih.gov/medlineplus/ency/article/000737.htm>.

[57] *See* Nat'l Multiple Sclerosis So c'y, *su pra* note 53.

[58] *See generally* Gorman, *supra* note 21.

1. Organ Replacements

Over 70,000 people await an organ transplant.[59] Sadly, only about 11,000 of these people will receive an organ due to donor shortages.[60] The Health and Human Services approximates that 15 people die each day for want of available organs.[61] Aside from the replacement of damaged cells, stem cell research could also lead to the replacement of damaged or diseased organs.[62] Through stem cells, a new, healthy organ, one that would be a genetically perfect match, could be produced to replace a damaged organ.[63]

Likewise, stem cell research could lead to a remedy for tissue and organ rejection. "[O]rgan and tissue transplantation [almost always causes] an immune response against the foreign tissue . . . which [results] in the destruction of the transplant."[64] Foreign tissue rejection is the immune system's automatic response to foreign tissue in the body; it tries to shield the body "from potentially harmful substances ('antigens')" that may accompany the foreign tissue.[65] This response ultimately leads to tissue or organ transplantation rejection.[66] Embryonic stem cells could be manipulated in such a way that when transplanted into the body, they would effectively fool the body into thinking that they are native tissue.[67] The genius of this remedy is that it provides for the "universal" acceptance of foreign tissues and organs.[68]

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[59] *See* Laura E. Niklason, M.D., Ph.D. & Robert Langer, *Prospects for Organ and Tissue Replacement,* 285 JAMA, 573, 573 (2001).

[60] *See id.*

[61] *See* U.S. Dep't of Health and Human Serv., *Organ Donation* (visited Sept. 23, 2001) <http://www.organdonor.gov/>; *See also* David J. Mooney & Antonios G. Mikos, *Growing New Organs,* SCIENTIFIC AMERICAN (Apr. 1999) (visited Sept. 23, 2001) <http://www.sciam.com/1999/0499issue/0499mooney.html> ("Every day thousands of people of all ages are admitted to hospitals because of the malfunction of some vital organ. Because of a dearth of transplantable organs, many of these people will die. In perhaps the most dramatic example, the American Heart Association reports only 2,300 of the 40,000 Americans who needed a new heart in 1997 got one.").

[62] *See* Eric Juengst & Michael Fossel, *The Ethics of Embryonic Stem Cells—Now and Forever, Cells Without End,* 284 JAMA 3180, at 3180 (2000).

[63] *See id.* This process would take place by "transferring the nucleus from a patient's somatic cell into an enucleated human ovum, stimulating it to divide." *Id.*

[64] *Transplant Rejection,* MEDLINEPLUS HEALTH INFORMATION (visited Sept. 23, 2001) <http://www.nlm.nih.gov/medlineplus/ency/article/000815.htm>.

[65] *Id.* ("The presence of foreign blood or tissue in the body triggers an immune response. . . .").

[66] *See id.*

[67] *See* Juengst & Fossel, *supra* note 62, at 3180.

[68] *See id.* Researchers have found that patients' bodies sometimes reject embryonic stem cells. This is where the hotly contested issue of human cloning enters into the scene. Therapeutic cloning involves five steps:

> Removing the nucleus from the skin cell of a person with, for example, heart disease or diabetes. Implanting the skin-cell nucleus into a donated human egg from which the nucleus has been removed. Nurturing the altered egg as it transforms the inserted

## III. HISTORY OF STEM CELL RESEARCH

Stem cell production has not had a smooth or harmonious undertaking.[69] In the 1980s, President Ronald Reagan placed a moratorium on federal funding of human embryo research, which lasted through his administration.[70] The ban withstood another four years during George Bush's presidency.[71] The future of stem cell research, however, brightened considerably with the election of the more liberal President William Clinton.

President Clinton called for federal funding of fetal tissue research in his first

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skin-cell nucleus and evolves into a 5-day-old embryo containing stem cells. Removing the embryonic stem cells and 'persuading' them to develop into cells that will form heart muscle, for instance, or components of the pancreas. Injecting the manipulated stem cells into the patient, where they will form new heart muscle to replace damaged original tissue or into the islets of the pancreas gland that are responsible for producing the insulin essential for controlling diabetes.

August Gribben, *Senate to Debate Cloning Penalties*, WASH. TIMES, Jan. 7, 2002, at A1. Therapeutic cloning is also known as somatic cell nuclear transfer ("SCNT"). Proponents of therapeutic cloning prefer to refer to it as SCNT in order to distinguish from reproductive cloning, which is vastly different. *See Hearing on Cloning Before the Subcommittee on Labor, Health, and Human Services, Education of the Senate Committee on Appropriations*, 107th Cong. (Dec. 4, 2001) [hereinafter *Hearing*] (statement of U.S. Senator Tom Harkin). Often opponents of embryonic stem cell research feel no differently about cloning, saying "they cannot accept the idea of creating embryos just to destroy them." *See* Sheryl Gay Stolberg, *The Stem Cell Debate: Controversy Reignites Over Stem Cells and Clones*, N.Y. TIMES, Dec. 18, 2001, at F1. In fact, the Senate will soon consider a bill, supported by President Bush and passed by the House of Representatives, which prohibits both reproductive and therapeutic cloning of human stem cells. *See id.* Meanwhile, proponents of stem cell research argue for the legality of cloning. Senators Tom Harkin (D-Iowa) and Arlen Specter (R-Pa) jointly proposed a bill that would prohibit reproductive cloning, but would allow therapeutic cloning of human stem cells. *See* Wesley J. Smith, *Smoke-and-Mirrors Awards*, NATIONAL REVIEW, March 11, 2002.

[69] *See* Chapman et al., *supra* note 12, at 1-2.

> Knowledge about stem cell science and potential applications has been accumulating for more than 30 years. In the 1960s, it was recognized that certain mouse cells had the capacity to form multiple tissue types, and the discovery of bona fide stem cells from mice occurred in 1971. . . . But it has been only recently that scientists have understood stem cells well enough to consider the possibilities of growing them outside the body for long periods of time.

*Id.*

[70] *See* Nat'l Multiple Sclerosis Soc'y, *Possible Gains from Stem Cell Research* (visited Oct. 18, 2000) <http://www.nmss.org/scream/data/2000/09/23/Uwire/harvest_Uwire9697089573061243.html> [hereinafter NMSS, *Possible Gains*]; Neil D. Rosenberg, *Stem cell researcher fears loss of funds*, MILWAUKEE J. SENTINEL, Feb. 19, 2001, at 4G.

[71] *See* Lionel Van Deerlin, *Politicians give way to the researchers*, SAN DIEGO UNION-TRIB., Feb. 7, 2001, at B7.

week of office.[72] Then, in 1994, the NIH's Embryo Research Panel recommended that federal funds support the research of human embryos.[73] Congress's staunch disapproval followed this recommendation, leading to a 1996 federal law banning the use of federal funds for research requiring the destruction of embryos or research that "k nowingly" subjected embryos to possible "in jury or death."[74]

In 1999, the Department of Health and Human Services ("DH HS")[75] determined that the ban did not proscribe embryonic stem cell research.[76] Taken in isolation, embryonic stem cells "d o not have the capacity to develop into a human being;"[77] therefore, embryonic stem cells do not fall under the 1996 ban. Armed with the DHHS's interpretation of the 1996 ban, the NIH began considering guidelines for federal funding of embryonic stem cell research.[78] The NIH did not take this task lightly.[79] The NIH undertook an exhaustive study on stem cell research.[80] To facilitate the study, the NIH organized the "Wo rking Group of the Advisory Committee to the Director, composed of scientists, patients and patient advocates, ethicists, clinicians, and lawyers."[81] The NIH also heard from the National Bioethics Advisory Commission before releasing its Guidelines on

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[72] *See* Debra Rosenberg & Martha Brant, *Taking Aim at Abortion*, NEWSWEEK, Feb. 5, 2001, at 27.

[73] Juengst & Fossel, *supra* note 62, at 3182; *see also* Marjorie Shaffer, *NIH Panel Recommends Research on Human Embryos*, BIOTECH. NEWSWATCH, Oct. 3 1994, at 1.

[74] Juengst & Fossel, *supra* note 62, at 3183; *see also* Dickey Amendment of 1996, Pub. L. No. 106-113, § 113 Stat. 1501 (1999).

[75] The HHS "is the United States government's principal agency for protecting the health of all Americans and providing essential human services. . . ." U.S. Department of Health and Human Services, *HHS: What We Do* (visited March 27, 2002) <http://www.hhs.gov/news/press/2002pres/profile.html>. The NIH makes up one of the HHS' eleven operating divisions. *See id.* The HHS is "the federal agency that oversees [the] NIH." Catherine Edwards, *Research: A Life for a Life?*, WASH. TIMES, Mar. 6, 2000, *available at* 2000 WL 41500600.

[76] *See* Kathi E. Hanna, *Stem Cell Politics: Difficult Choices for the White House and Congress*, THE HASTINGS CENTER REPORT, July-Aug. 2001, at 9 (The HHS determined "that human embryonic stem cells are not a human embryo within the statutory definition. . . .the cells do not have the capacity to develop into a human being even if transferred to the uterus.").

[77] *Id.*

[78] *See id. See also* Richard Doerflinger, *Destructive Stem-Cell Research on Human Embryos* (visited Mar. 25, 2001) <http://www.petersnet.net/research/retrieve_full.cfm?RecNum=1062>; Nat'l Inst. of Health, Guidelines for Research Using Human Pluripotent Stem Cells, 65 Fed. Reg. 51,976 (2000).

[79] *See* NIH News Release, *NIH Publishes Final Guidelines for Stem Cell Research* (visited Oct. 18, 2000) <http://www.nih.gov/news/pr/aug/2000/0d-23.htm>.

[80] *See Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000).

[81] *Id.*

August 23, 2000.[82]

Bearing in mind that Congress had struck down its 1994 recommendation to use federal funds to create embryos for research purposes, the NIH made a discerning modification in the Guidelines.[83] It distinguished between embryonic stem cells *derived* for research purposes, and those *used* for research purposes.[84] That is, the Guidelines forbid publicly funded scientists from using embryonic stem cells specifically created for research purposes; however, publicly funded scientists may use these cells for research if certain conditions are met.[85]

In releasing the Guidelines, the NIH stated that, "th e potential medical benefits of human pluripotent stem cell technology are compelling and worthy of pursuit in accordance with appropriate ethical standards."[86] The Guidelines explain that although embryonic stem cells are taken from embryos or fetal tissue, the cells themselves are not embryos.[87]

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[82] *See id.* In 1995, President Clinton created the National Bioethics Advisory Commission. Among other things, the Commission was established to "g overn the ethical conduct of research". Exec. Order No. 12,975, 60 Fed. Reg. 52,063-52,065 (1995).

[83] *See* Juengst & Fossel, *supra* note 62, at 3183.

[84] *See id.*

[85] *See Nat'l Inst. of Health, Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000).

[86] Nat'l Inst. of Health, *NIH Publishes Final Guidelines for Stem Cell Research* (visited Oct. 18, 2000) <http://www.nih.gov/news/pr/aug2000/od-23.htm>.

[87] *See Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000). The Guidelines are as follows:

- Human pluripotent stem cells must be come from either human fetal tissue, or human embryos that were created from in vitro fertilization and are in excess of the clinical need, that have not yet formed mesoderm.
- In order to receive NIH funding for human pluripotent stem cell research derived from human embryos the following must be adhered to:

(i) No type of inducement is permitted for the donation of human embryos for research purposes. Fertility clinics should implement specific written policies and practices to ensure that no such inducements are made

(ii) The attending physician responsible for the fertility treatment and the researcher or investigator deriving and/or proposing to utilize human pluripotent stem cells should not have been one and the same person.

(iii) Only frozen human embryos should have been used to derive human pluripotent stem cells.

(iv) Donation of human embryos should have been made without any restriction or direction regarding the individual(s) who may be the recipients of transplantation of the cells derived from the human pluripotent stem cells.

(v) Informed consent must be obtained from the individuals who have sought fertility treatment and who elect to donate human embryos in excess of clinical need for human pluripotent stem cell research purposes.

*Id.*

To ensure rigorous adherence to these Guidelines, the NIH organized the Human Pluripotent Stem Cell Review Group ("HPSCRG"). The HPSCRG "oversee[s] . . . compliance with NIH policy, advise[s] the NIH Center for Scientific Review advisory committee on the outcomes of the review, and hold[s] public meetings when research issues arise that are not addressed in NIH stem cell policy."[88]

On August 9, 2001, President George W. Bush officially advanced a position on stem cell research that effectively rejected the NIH's guidelines.[89] In a televised address to the country, Bush ruminated on the ethics of stem cell research, the need to support science and medical discoveries, and announced his approval of the use of federal funds for embryonic stem cell research.[90] One caveat, however, accompanied Bush's a pproval: scientists may use federal funds for research on existing stem cell lines only.[91] Currently less than eighty stem cell lines exist.[92] Bush defended his position on moral grounds:

Leading scientists tell me research on these . . . lines has great promise that could lead to breakthrough therapies and cures. This allows us to explore the promise and potential of stem cell research without crossing a fundamental moral line, by providing taxpayer funding that would sanction or encourage further destruction of human embryos that have at least the potential for life.[93]

Bush's decision appears to be a political compromise. The allocation of federal funds to existing lines attempts to appease the scientific community, while prohibiting the use of federal funds on any further embryo destruction attempts to placate the pro-life lobby. Yet, the decision satisfies neither camp; both have criticized Bush's d ecision.[94]

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[88] *Final NIH Stem Cell Research Guidelines Require Derivation Protocol Review*, HEALTH NEWS DAILY, Aug. 24, 2000, *available at* 2000 WL 7409988.

[89] *See Remarks by the President on Stem Cell Research*, U.S. NEWSWIRE, Aug. 9, 2001, at National Desk.

[90] *See id.*

[91] *See id* ("[Preside nt Bush] ha[s] concluded that we should allow federal funds to be used for research on these existing stem cell lines, where the life and death decision has already been made.").

[92] As of February 12, 2002, exactly seventy-eight embryonic stem cell lines can currently receive federal funding. *See* Michelle Healy, *NIH Stem-Cell Registry Expands*, USA TODAY, Feb. 12, 2002, at 14B; *see also* National Institutes of Health, *NIH Human Embryonic Stem Cell Registry* (visited March 27, 2002) <http://escr.nih.gov/>. The United States has twenty-seven colonies, Sweden has twenty-five, India has ten, Korea has six, Australia has six, and Israel has four. *See* National Institutes of Health, *NIH Human Embryonic Stem Cell Registry* (visited March 27, 2002) <http://escr.nih.gov/>.

[93] *Remarks by the President*, *supra* note 89.

[94] *See Gephardt Statement on Stem Cell Research Decision*, U.S. NEWSWIRE Aug. 9, 2001, at National Desk (quoting House Democratic Leader Richard A. Gephardt, "[t]o allow research only on an isolated group of cells and not go beyond that group and explore new possibilities is shortsighted and a failure of leadership on the President's behalf."). *See also Catholic Bishops Criticize Bush Policy on Embryo Research*, U.S. NEWSWIRE Aug.

Many scientists fear that Bush's decision severely constrains the ability for adequate research.[95] Others fear that restrictive ownership rights of the stem cell lines will impede research.[96] Recently, Senator Arlen Specter stated that, "it has become apparent that many of those [stem cell lines] are not really viable or robust or usable."[97] In another report, Specter stated that Bush had "recei ved pre-

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10, 2001, at National Desk (quoting the President of the U.S. Conference of Catholic Bishops, Bishop Joseph A. Fiorenza: "the trade-off [President Bush] has announced is morally unacceptable: The federal government, for the first time in history, will support research that relies on the destruction of some defenseless human beings for possible benefit to others.").

[95] *See* Melissa Huang, *Stem Cells Responsible for Medical Discoveries, Ethics Controversy*, UNIVERSITY WIRE Sept. 17, 2001 (quoting Ted Kennedy stating that "[m] any in the scientific community are concerned that the president's decision will delay development of cures for dread disease for many years, at the cost of countless lives and immeasurable suffering."). *See also* Kelly Hearn, *New Stem Cell Lines Will Be Needed*, UNITED PRESS INT'L , Oct. 31, 2001 (expressing concern that "[e]xisting stem cell lines could accrue genetic abnormalities over time," thus requiring new stem cell lines); Am. Health Line, *Stem Cell Research: Thompson Says Most Lines Too Immature*, Sept. 6, 2001, at Politics & Policy ("Rep. James Langevin (D-RI) and Sens. John Warner (R-Va.), Arlen Specter (R-Pa.) and Edward Kennedy (D-Mass.) all expressed concerns that limiting federal funding to 64 lines chosen by the administration may hamper research efforts"; Am. Health Line, *Stem Cells: 'Growing Doubts' About Lines' Existence*, Aug. 20, 2001, at Politics & Policy (quoting Rep. Diana DeGette's (D-Colo.) letter to HHS Secretary Tommy Thompson: "I am concerned that limiting federal funding of research to [sixty] cell lines places arbitrary limits on innovation and is not based on sound science. . . .It also potentially creates a myriad of access, availability, quality and legal problems that may have the effect of restricting the development of useful therapies."). *See also* Nicholas Wade, *Scientists Divided on Limit of Federal Stem Cell Money*, N.Y. TIMES, Aug. 16, 2001, at A16. Furthermore, some scientists, such as Dr. Pera, who reported to the Senate HHS and Education Subcommittee, have stated that additional cell lines will be needed because some of the existing lines have been "c o-cultured" with animal cell lines, which could pose "a possible hazard." *Hearing*, *supra* note 68. Dr. Pera also believes that " cell lines representative of a greater degree of genetic diversity may well be required to circumvent problems of tissue rejection." *Id.*

[96] *See* Wade, *supra* note 95 ("[t welve] cell types are in dispute. . .over the rights to develop them"); Ron Southwick, *Senators Clash with HHS Secretary Over Bush Stem-Cell Plan*, CHRON. OF HIGHER EDUC., Sept. 14, 2001, at A26 ("[Se veral senators] found fault with the president's plan for restricting the use of federal funds to a group of stem-cell colonies controlled by 10 laboratories. . . . Researchers and patient advocates are worried about how much access scientists will actually have to the privately held stem cells."). *But see* Elizabeth Neus, *Bush Administration Defends Stem Cell Policy to Congress*, GANNETT NEWS SERVICE, Sept. 5, 2001 (detailing how one private holder of five stem cell lines agreed to permit "NIH-bac ked scientists" to use their stem cells for a mere $5,000 fee). However, nine other holders of stem cell lines have yet to do the same. *See id.* For more information on stem cell patents, see Robert C. Scheinfeld and Parker H. Bagley, *The Current State of Embryonic Stem Cell Patents*, N.Y. L. J., Sept. 26, 2001, at 3.

[97] *Stem Cells Responsible for Medical Discoveries, Ethics Controversy*, UNIVERSITY WIRE, Sept. 17, 2001.

liminary testimony that scientists may need to access at least 200 stem-cell lines" in order to pursue various medical cures.[98]

Accordingly, Bush's decision does not signal the end of the embryonic stem cell research controversy. Less than a month after Bush stated his position, the U.S. Senate Committee on Health, Education, Labor and Pensions convened to discuss the matter.[99] In response, Bush warned that "'h e will veto legislation that goes beyond his decision to fund limited' stem cell research, 'leaving little doubt that his mind is made up.'"[100] With enough resolve, however, Congress may overturn a veto. This could render the prospect of an even broader allowance of federal funds for stem cell research a workable end.[101]

## IV. OBSTRUCTION OF A MIRACLE

Embryonic stem cell research spawns bitter polemics. Opponents condemn the use of federal funds for stem cell research, claiming that it will indirectly coerce the pro-life group, and any other group against such research, into supporting something they fiercely oppose.[102] Opponents are going to great lengths to prevent the government from subsidizing such research with their tax dollars.[103]

Consequently, various members of Congress have voiced disapproval of stem

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[98] *Specter Says Bush Stem Cell Decision May Not Be Sufficient*, THE BULLETIN'S FRONTRUNNER, Aug. 16, 2001, at Wash. News.

[99] *See Congress Might Feel President Bush did not open the Door Wide Enough for Embryonic Stem Cell Research*, NAT'L PUBLIC RADIO, Sept. 5, 2001.

[100] *Stem Cell: Bush says He'll Veto Any Changes in his Proposal*, THE NAT'L J. GROUP, INC., Aug. 14, 2001, at National Briefing (quoting Bazinet, NEW YORK DAILY NEWS, Aug. 14, 2001).

[101] Congress is currently considering two bills. The first would allow more federal funding than provided by President Bush's August 9, 2001 executive order. The other bill would provide criminal penalties for human embryonic stem cell cloning. *See* Stolberg, *supra* note 68, at F1. The proposed bill prohibiting stem cell cloning arose in furor after Advanced Cell Technology, Inc., a Massachusetts biotechnology company, announced that it had created a clone of human embryo for medical purposes. *See id. See also Best Response to Stem Cell News is Calm, not Panic*, MORNING CALL, Nov. 28, 2001, at A20.

[102] *See* Juengst & Fossel, *supra* note 62, at 3182.

[103] A class-action lawsuit on behalf of eight plaintiffs has been filed against the HHS, HHS Secretary Tommy Thompson, and the NIH in an effort to ban the distribution of federal funds for pluripotent stem cell research. The plaintiffs allege that the NIH Guidelines violate the 1996 ban on the use of federal funds for research involving the destruction of embryos. *See Anti-Abortion Rights Groups sue HHS over Stem Cell Research*, NAT'L J.'S CONGRESS DAILY, Mar. 9, 2001, at Health; *Stem Cell Research: Opponents to sue Thompson, NIH*, AM. HEALTH LINE, Mar. 8, 2001, at In the Courts. Furthermore, the Catholic Leadership Conference, comprised of over 100 Catholic leaders and two million Catholics, has publicly stated its disapproval of human pluripotent stem cell research. *See Over 100 Catholic Groups Join in Opposition to Embryonic Stem Cell Research; Leaders urge non-destructive course of Research*, U.S. NEWSWIRE Mar. 13, 2001, at Nat'l D esk [hereinafter *Over 100 Catholic Groups*].

cell research, urging Congress to pass bills that further limit such research.[104] One opponent, Senator Sam Brownback (R-KS), has "comp ared embryonic stem cell research to Nazi experiments on concentration camp prisoners during World War II."[105] He advocates limiting research to adult stem cells.

Yet, while many vehemently oppose embryonic stem cell research, many passionately support it.[106] Senator Arlen Specter (R-PA), chair of the Senate Appro-

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[104] *See Republican Senators Clash at Hearing on Stem Cell Research*, ISSUES IN SCI. & TECH., July 1, 2000, *available at* 2000 WL 20687120. *See also* Ron Southwick, *Bush Approves Federal Support for Stem Cell Research, with Limits*, CHRON. OF HIGHER EDUC., Aug. 17, 2001, at 21 (Senator Bill Frist "advocate d restricting the number of cell lines used for research" at a recent Senate Hearing); *Move in G.O.P. to Block Study of Embryo Cells*, N.Y. TIMES, July 3, 2001, at A1 (Dick Armey (Republican H.R.-TX), Tom DeLay (Republican H.R.-TX), and J.C. Watts Jr. (Republican H.R.-Okla.) all oppose embryonic stem cell research). *But cf. Specter Says Bush Stem Cell Decision May Not Be Sufficient*, THE BULLETIN'S FRONTRUNNER, Aug. 16, 2001, at Wash. News, where Senate Majority Leader Tom Daschle stated "'I give the credit to the President for getting this effort' on Federal funding for stem cell research 'u nder way. He could have made an entirely different decision and he didn't."

[105] *Republican Senators Clash at Hearing on Stem Cell Research*, *supra* note 104. Senator Brownback also strongly supports a proposed bill to prohibit stem cell cloning. *See* Gribben, *supra* note 68. Some scientists believe that if this bill were ultimately adopted, "the measure would halt research in the United States that could lead to cures for some of mankind's most terrible diseases. They also predict that some of the country's top medical researchers would then move to countries where such experimentation is accepted and ongoing." *Id.*

[106] Eighty Nobel laureates recently sent President Bush a letter urging him "to support Federal funding for research using human pluripotent stem cells." The letter states:

> We the undersigned urge you to support Federal funding for research using human pluripotent stem cells. We join with other research institutions and patients groups in our belief that the current National Institutes of Health (NIH) guidelines, which enable scientists to conduct stem cell research within the rigorous constraints of federal oversight and standards, should be permitted to remain in effect. The discovery of human pluripotent stem cells is a significant milestone in medical research. Federal support for the enormous creativity of the US biomedical community is essential to translate this discovery into novel therapies for a range of serious and currently intractable diseases.
>
> The therapeutic potential of pluripotent stem-cells is remarkably broad. The cells have the unique potential to differentiate into any human cell type. Insulin-producing cells could be used to treat - or perhaps even cure - patitents with diabtetes, cardiomyocytes could be used to replace damaged heart tissue, chondrocytes could be used for arthritis, and neurons for Parkinson's, Alzheimer's, ALS and spinal cord injuries to name a few examples. There is also the possibility that these cells could be used to create more complex, vital organs, such as kidneys, liver, or even entire hearts.
>
> Some have suggested that adult stem cells may be sufficient to pursue all treatments for human diseases. It is premature to conclude that adult stem cells may have the same potential as embryonic stem cells—and that potential will certainly vary from disease to disease. Current evidence suggests that adult disorders that prove not to

priations/Labor-DHHS Subcommittee, has actively sought federal funding of stem cell research under strict federal regulation to prevent commercial exploitation of stem cells.[107] On January 31, 2000, he introduced the Stem Cell Research Act of 2000 (the "Act").[108] The Act permits funding for embryonic stem cell research under very controlled circumstances.[109] Essentially, scientists may only use embryos *left over* from in vitro fertilization for pluripotent stem cell research.[110] The

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be treatable with adult stem cells, impeding human pluripotent stem cell research risks unnecessary delay for millions of patients who may die or endure needless suffering while the effectiveness of adult stem cells is evaluated.

The therapeutic promise of pluripotent stem cells is based on more than two decades of research in mice and other animal models. This research confirms that pluripotent stem cells are capable of generating all the cell types of the body. Most importantly, the therapeutic potential of these cells has already been demonstrated. Cardiomyocytes generated in the laboratory from these cells have been transplanted into the hearts of dystrophic mice where the formed stable intracardiac grafts. Nerve cells have successfully reversed the progression of the equivalent of MS in mice and have restored function to the limbs of partially paralyzed rats; and insulin-secreting cells have normalized blood glucose in diabetic mice. These findings suggest that therapies using these cells may one day provide important new strategies for the treatment for a host of currently untreatable disorders.

While we recognize the legitimate ethical issues raised by this research, it is important to understand that the cells being used in this research were destined to be discarded in any case. Under these circumstances, it would be tragic to waste this opportunity to pursue the work that could potentially alleviate human suffering. For the past 35 years many of the common human virus vaccines—such as measles, rubella, hepatitis A, rabies and poliovirus—have been produced in cells derived from a human fetus to the benefit of tens of millions of Americans. Thus precedent has been established for the use of fetal tissue that would otherwise be discarded.

We urge you to allow research on pluripotent stem cells to continue with Federal support, so that the tremendous scientific and medical benefits of their use may one day become available to the millions of American patients who so desperately need them.

*Nobel Laureates' Letter to President Bush on Funding Stem Cell Research*, 11 TRANSPLANT NEWS 4, Feb. 28, 2001. One hundred twenty-three patient advocacy groups also wrote a letter to President Bush, insisting that embryonic stem cell research should be supported by federal funds. *Bush Urged to Back Federally-Funded Stem Cell Research by 123 Advocates*, BLUE SHEET, Jan. 24, 2001, *available at* 2001 WL 7810875. *See also Academia Backs Embryonic Research*, NEWS AND OBSERVER, Mar. 27, 2001, at B7 ("More than 100 university presidents have asked President Bush to maintain federal rules that permit funding for limited embryonic stem cell research."); *Move in G.O.P. to Block Study of Embryo Cells*, N.Y. TIMES, July 3, 2001, at A1 (Republicans such as Senators Arlen Specter (Pa.), Orrin G. Hatch (Utah), Strom Thurmond (S.C.), Susan Collins (Maine), and Representative Jennifer Dunn (Wash.) endorse embryonic stem cell research).

[107] *See* Stem Cell Research Act of 2000, S. 2015, 106th Cong., 2000.

[108] *Id.*

[109] *See id.* § 2.

[110] *See id.*

Act mandates that fertility clinics donate the cells with the embryo donor's informed consent.[111] The Act prohibits transferring or acquiring embryos through a monetary transaction.[112] To properly implement and monitor the Act, "institutional review boards would be empowered to determine whether stem cell research proposals conform to NIH guidelines."[113] Furthermore, the Act requires the DHHS secretary to submit a yearly report to Congress "describing the activities carried out . . . during the preceding fiscal year, and including a description of whether and to what extent research . . . has been conducted in accordance with this section."[114]

## V. STEM CELL RESEARCH IS CONSISTENT WITH THE LAW

### *A. Due Process Right to Life*

Collectively, pro-life groups condemn embryonic stem cell research.[115] They claim that stem cell research flies in the face of human rights.[116] Their argument centers on the belief that life begins at conception and, thus, taking stem cells from an embryo parallels the taking of human life.[117] Opponents also argue that it is against the law to destroy potential human life, no matter how beneficent the cause.[118]

The National Conference of Catholic Bishops ("NCCB") agrees. Richard Doerflinger of the NCCB stated that "[f]or the first time in federal history, U.S. History, the federal government will actually be taking a class of human be-

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[111] *See id.*

[112] *See* Stem Cell Research Act of 2000, S. 2015, 106th Cong., 2000.

[113] *Id.*

[114] *Id.*

[115] *See* Samson, *supra* note 21; *Christian Medical Association Doctors Urge Thompson to Focus on Ethical Stem Cell Research*, PR NEWSWIRE, Mar. 1, 2001, at State and Reg'l News; *Over 100 Catholic Groups*, *supra* note 104; *Talk of the Nation*, *supra* note 7; Eliot Marshall, *Antiabortion Groups Target Neuroscience Study at Nebraska*, SCIENCE, Jan. 14, 2000.

[116] *See* David Callender & Gwen Carleton, *Abortion Foes May Seek Ban on Stem Cell Studies*, CAP. TIMES, Jan. 22, 1999, *available at* 1999 WL 5289338.

[117] *See* Judy Holland, *Embryo Research Advocates Alarmed by Bush Pledge*, TIMES UNION, Jan. 14, 2001, at E15; *American Bioethics Advisory Commission: Empirical Studies Confirm Benefits of Ethical Stem Cell Research*, PR NEWSWIRE, Mar. 13, 2001, at Wash. Dateline; *Stem Cell Debate*, ONLINE NEWS HOUR (Dec. 2, 1998) (visited Mar. 25, 2001) <http://www.pbs.org/newshour/bb/health/july-dec00/genome_8-24.html>; *Testimony of Richard M. Doerflinger on behalf of the Committee for Pro-Life Activities National Conference of Catholic Bishops before the Senate Appropriations Subcommittee on Labor, Health, and Education* (visited Mar. 25, 2001) <http://www.nccbuscc.org/prolife/issues/bioethic/1202.htm>.

[118] Whether stem cells derived from an embryo for the purpose of research violates the law will be discussed in the following pages.

ings . . . and destroying that life for the benefit of others."[119] The executive director of the American Bioethics Advisory Commission,[120] Father Joseph Howard, Jr., shares similar views. Father Howard stated, "[t]h ere is never a reason to kill a person for the sake of scientific progress" and that "[w]h en the pluripotent stem cells are removed from an embryonic person, the result is the death of that person."[121]

Similarly, other pro-life groups argue that embryonic stem cells are "[m]em bers of the human species," unable to give their consent to be the subjects of experimentation.[122] According to this argument, the acceptability of experimentation involving a human subject rests on his or her consent.[123] Consequently, due to the impossibility of obtaining the "n ecessary consent" from the embryonic stem cells, embryonic stem cell experimentation cannot proceed.[124]

When considering the legality of embryonic stem cell research, one must ask a pivotal question: Does a pluripotent stem cell qualify as human life? While societal agreement does not exist, legal agreement certainly does. In 1973, the United States Supreme Court held that "th e word 'person,' as used in the Fourteenth Amendment, does not include the unborn."[125] Although the Court, when deciding *Roe v. Wade*, declined to address the question of when life begins, it made the momentous determination that a fetus is not a person before the point of viability.[126] The magnitude of this pronouncement was enormous. Had the Court qualified a fetus as a person, the fetus would be entitled to protection under the Fourteenth Amendment's Due Process right to life,[127] and abortion would be il-

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[119] *Stem Cell Debate*, *supra* note 117.

[120] The American Life League, a pro-life organization, established this Commission "to defend the human being, his innate dignity and his unique nature." American Bioethics Advisory Commission, *Mission* (visited Sept. 15, 2001) <http://www.all.org/ubac/mission/htm>.

[121] *American Bioethics Advisory Commission: Anyone with a Discerning Eye Can See Bush's Plan for Micr oscopic Persons,* PR NEWSWIRE, Feb. 12, 2001, at Wash. Dateline.

[122] Edwards, *supra* note 75.

[123] *See id.*

[124] *See id.*

[125] Roe v. Wade, 410 U.S. 113, 158 (1973).

[126] *See id.* The *Roe* Court held that the right of privacy under the Fourteenth Amendment includes a woman's decision whether to terminate her pregnancy. Yet, this right is not absolute; the state can interfere with this right if it has a "c ompelling state interest" for doing so. Justice Blackmun, speaking for the Court, set out a spectrum for the legality of prohibiting abortion, which consisted of dividing a woman' s pregnancy into trimesters. Prior to the first trimester, a state cannot prohibit abortions. During the second trimester, the state can only enact abortion regulations that "reaso nably relate" to maternal health. Finally, Blackmun stated that the state's interests become compelling only enough to prohibit abortion after the second trimester (the point at which the fetus has reached viability). At that time, the state can legally regulate abortion as long as the regulation is " narrowly drawn to express only the legitimate state interests at stake." *Id.*

[127] The Fourteenth Amendment of the United States Constitution states: "nor shall any state deprive any person of life, liberty, or property, without due process of law. . . ."

legal.[128]

It follows then, that the Due Process right to life does not apply to the pluripotent stem cell. An embryo is the unification of a sperm and an egg cell, which has yet to develop into a fetus.[129] Thus, an embryo, like a fetus, must be classified as an "un born." Because the current state of law does not qualify an embryo as a person, an embryo is not entitled to Due Process rights.[130]

Since *Roe*, other federal courts have repeatedly confirmed this notion. In *Keith v. Daley*, the Seventh Circuit stated that "[t]h e Supreme Court has unequivocally ruled on the assertability of fetal rights."[131] The court relied on *Roe* and affirmed a district court decision that a pro-life group's interest in protecting the unborn and adopting fetuses that survive abortions was "in sufficient to meet the 'direct and substantial interest' test of eligibility to intervene as of right".[132] The court quoted *Roe*, stating, "[t]h e word 'person' as used in the fourteenth amendment, does not include the unborn" and that "[t] he state may not, therefore, assert any legitimate interest in potential life until the fetus has reached 'v iability,' that is, until the fetus has the capability of sustaining meaningful life outside the

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[128] In 1992, the Supreme Court reaffirmed the essential holding of *Roe*. "[T]he concept of viability, as we noted in *Roe*, is the time at which there is a realistic possibility of maintaining and nourishing a life outside the womb. . . ." Casey v. Planned Parenthood of Southeastern Penn., 505 U.S. 833 (1992).

[129] The process is as follows:

> Once sperm is deposited in the vagina, it travels through the cervix and into the Fallopian tubes. . . A single sperm penetrates that egg and a joining of the genetic information occurs. This resulting single cell is called a zygote. . . .[which] spends the next few days traveling down the Fallopian tube and rapidly multiplying the number of cells through division. A ball of cells results from the cell division, each with a copy of the genes that will become the fetus. This ball of cells in the Fallopian tube is called a morula. With additional cell division, the morula becomes an outer shell of cells with an attached inner group of cells. This stage of embryonic development is called a blastocyte. The outer group of cells become the membranes that nourish and protect the inner group of cells which becomes that fetus. The blastocyte continues the journey down the Fallopian tube and between the 7th and 9th day after conception, implants in the uterus . . . The blastocyte burrows into the endometrium where it receives nourishment. . . . The embryonic stage begins on the 15th day after conception and continues until about the 8th week, or until the embryo is 1.2 inches in length. During this period the cells of the embryo are not only multiplying, but they are taking on specific functions. This process is called tissue differentiation and is necessary for the different cell types that make up a human being (such as blood cells, kidney cells, nerve cells, and so forth).

MEDLINEPLUS MEDICAL ENCYCLOPEDIA, *Fetal Development* (visited Sept. 25, 2001) <http://www.nlm.nih.gov/medlineplus/ency/article/002398.htm> (visited Sept. 25, 2001). It is not until the eighth week that "th e embryo is developed enough to call a fetus." *Id.*

[130] *Roe*, 410 U.S. at 158.

[131] Keith v. Daley, 764 F.2d 1265, 1271 (1985).

[132] *Id.* at 1269.

mother's wo mb."[133]

In 1996, the Ninth Circuit reinforced the notion that rights cannot be asserted on behalf of the unborn.[134] In *Santana*, a wife and husband sued the wife's employer for the wrongful death of six nonviable fetuses.[135] They alleged that the wife's place of employment had exposed her to toxic chemicals, causing her to miscarry on six separate occasions.[136] In denying the wrongful death claims on behalf of the six nonviable fetuses, the court relied on the majority view that recovery is only proper "if the fetus has reached the stage of viability."[137] The court emphasized that almost all of the thirty-seven states that allow recovery for wrongful death refuse to extend such recovery to the nonviable fetus.[138] Lastly, the court mentioned that the point of viability is used as a "co ndition precedent for recovery because until that point the fetus is not capable of sustaining an independent, separate existence from its mother."[139] By reconfirming the Supreme Court's decision that the Due Process right to life does not include an embryo in the definition of a person, these cases serve only to bolster the argument in favor of stem cell research. Accordingly, embryonic stem cell research opponents cannot successfully assert a legitimate legal interest in protecting human life. Existing law simply does not and cannot recognize the claim that embryonic stem cell research destroys human life.[140]

### *B. 1996 Federal Law - The Dickey Amendment*

Critics also contend that using stem cells derived from a fetus for research violates a 1996 federal law commonly referred to as the Dickey Amendment.[141]

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[133] *Id.* at 1271.

[134] *See* Santana v. Zilog, Inc., 95 F.3d 780 (9th Cir. 1996).

[135] *See id.*

[136] *See id.*

[137] *Id.* at 783. *See also* Farley v. Sartin, 193 W. Va. 671, 677 (1995) (listing thirty-seven jurisdictions that allow wrongful death causes of action to be brought on behalf of viable fetuses).

[138] Six states that allow a wrongful death cause of action for both viable and nonviable fetuses. *Santana*, 95 F. 3d at 783.

[139] *Id.*

[140] In a concurring/dissenting opinion to Webster v. Reprod. Health Serv., 492 U.S. 490, 569 (1989), Justice Stevens stated:

> As a secular matter, there is an obvious difference between the state interest in protecting the freshly fertilized egg and the state interest in protecting a 9-month-gestated, fully sentient fetus. . . . There can be no interest in protecting the newly fertilized egg from physical pain or mental anguish, because the capacity for such suffering does not yet exist. . . . In fact. . .a State has no greater secular interest in protecting the potential life of an embryo that is still "seed" than protecting the potential life of a sperm or an unfertilized ovum.

[141] *See* Callender & Carleton, *supra* note 116. The Dickey Amendment states that federal funds cannot be used for:

> (1) the creation of a human embryo or embryos for research purposes; or

Stem cell research violates this law, opponents argue, because embryonic stem cells are derived from an embryo.[142] They insist that the NIH Guidelines are simply a "p lay on words" designed to dodge the federal law.[143] One opponent, Senator Brownback (R-KS), is outraged that the NIH approved federal funding for embryonic stem cell research despite this federal law. He stated that "[t] he intent of Congress is clear: If a research project requires the destruction of [living] human embryos, no federal funds should be used for the project."[144] Brownback and twenty other senators wrote and signed a letter to the NIH before it announced its Guidelines for federal funding of embryonic stem cell research.[145] The letter admonished the NIH's ap proval of such research and urged the NIH to recognize that its Guidelines violated the Congressional intent of the 1996 law.[146]

Despite the criticism, the NIH Guidelines comply with the Dickey Amendment. The NIH set exacting standards through its Guidelines to prevent possible inconsistency with the law. First, federal funds will not be used to create a human embryo. Federal funds will only be used for research on pluripotent stem cells already in existence.[147] The Guidelines state that federal funds can only be used for "h uman pluripotent stem cells derived from . . . human fetal tissue or . . . from human embryos that are the result of in vitro fertilization, are in excess of clinical need, and have not reached the stage at which the mesoderm[148] is formed."[149] Thus, the Guidelines successfully abide by the 1996 law in this respect.

Second, federal funds will not be used for research that destroys, discards, or knowingly subjects embryos to risk of injury or death.[150] The Guidelines only per-

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(2) research in which a human embryo or embryos are destroyed, discarded, or knowingly subjected to risk of injury or death greater than that allowed for research on fetuses in utero. . .

(b) For purposes of this section, the term "hum an embryo or embryos" includes any organism, not protected as a human subject under 45 CFR 46 as of the date of the enactment of this Act, that is derived by fertilization, parthenogenesis, cloning or any other means from one or more human gametes or human diploid cells.

Dickey Amendment of 1996, Pub. L. No. 106-113, § 113 Stat. 1501 (1999).

[142] *See Stem-Cell Research*, WINSTON-SALEM J., Aug. 27, 2000, *available at* 2000 WL 27226151.

[143] *See Stem Cell Debate*, *supra* note 117; *Christian Medical Association Doctors Urge Thompson to Focus on Ethical Stem Cell Research*, PR NEWSWIRE, Mar. 1, 2001, at State and Reg'l News; *Bus h Mum on Embryo Research Status for Stem Cells*, *supra* note 44.

[144] Edwards, *supra* note 75.

[145] *See id.*

[146] *See id.*

[147] *See Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000).

[148] Mesoderm is "the germ layer [of the embryo] that forms many muscles, the circulatory and excretory systems, and the dermis, skeleton, and other supportive and connective tissue." Encyclopedia.com (visited Sept. 15, 2001) <http://www.encyclopedia.com/articles/30835.html>.

[149] *Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000).

[150] *See id.*

permit the use of federal funds for research on human pluripotent stem cells.[151] These stem cells, although found in and taken from embryos, are not themselves embryos.[152] The Guidelines state that "stu dies utilizing pluripotent stem cells derived from human embryos may be conducted using NIH funds only if the cells were derived (without federal funds) from human embryos . . . ."[153] Thus, the NIH will deny funds for stem cell research that involves the use of stem cells derived from human embryos. This limitation sets up a barricade that effectively thwarts the distribution of public monies for embryonic stem cell research in which the government destroyed embryos.

Lastly, the NIH Guidelines are not a semantic circumvention of the Dickey Amendment. As the law stands, it is clear that federal funds are simply not to be used in the destruction of human embryos.[154] If Congress meant to avoid any government affiliation with research that involves the destruction of human embryos, it certainly would have drafted the law to convey that intention. The law does not state that such funds cannot be used on cells taken from embryos.[155] The NIH Guidelines, therefore, comply with the Dickey Amendment.

### *C. Adult Stem Cells Are Not Good Enough*

It would be inaccurate to declare pro-life groups per se opponents of stem cell research. Although they are categorically opposed to pluripotent stem cell research, opponents do not necessarily disagree with adult stem cell research.[156] In

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[151] *See id.*

[152] *See id.*

[153] *Id.*

[154] Dickey Amendment of 1996, Pub. L. No. 106-113, § 113 Stat. 1501 (1999) (stating that no federal funds can be used for "research *in which* a human embryo or embryos are destroyed. . . .") (emphasis added). Under the NIH Guidelines, federal funds would not be used for research in which an embryo is destroyed because government-funded scientists would not be destroying the embryos. Instead, federal funds would be used for the specific purpose of researching stem cells. Thus, under the NIH Guidelines, the government has effectively separated its connection with any embryo destruction.

[155] *See id.*

[156] *See Talk of the Nation, supra* note 7. Richard Doerflinger speaking on behalf of the National Conference of Catholic Bishops, states

> And so we don't necessarily have a conflict between scientific progress and moral misgivings because these other [adult] stem cells . . . raise no moral objection—and I would include in that not only adult stem cells but placental tissue, cord blood, [and] fetal tissue that is obtained from spontaneous abortions or miscarriages. . . .

*Id. See also* Allen, *supra* note 22, at 6 ("John Paul II, in an Aug. 29 address to a congress of transplantation experts in Rome, urged use of adult cells as the proper method of stem cell research."); *Over 100 Catholic Groups, supra* note 103 (" The Catholic Leadership Conference. . .today released a collective statement condemning destructive embryonic stem cell research, encouraging instead the more ethical and equally promising path of adult stem cell research"); *American Bioethics Advisory Commission*, PR NEWSWIRE, Feb. 12, 2001 (noting that a Catholic priest who condemns embryonic stem cell research, yet touts adult umbilical cord blood and placental blood stem cell research).

fact, most opponents advocate adult stem cell research provided that it does not require the destruction of a human embryo.[157]

The pro-life lobby argues that the use of stem cells from embryos is completely unnecessary because stem cells are available from other sources like adults, umbilical cords, and placentas.[158] Furthermore, they contend that contrary to popular belief, adult stem cells are "enormously more versatile and useful than anyone imagined even a year or two ago."[159]

Adult stem cell research would neatly dispose of any ethical dilemmas involved in stem cell research; however, research has shown that adult stem cells lack the mind-blowing capabilities found in pluripotent stem cells.[160] This is evidenced in the NIH Guidelines, which do not dismiss the potential of adult stem cells, but state, "there is evidence that adult stem cells may have more limited potential than [human pluripotent stem cells]."[161] The NIH lists five impediments with adult stem cells: (1) adult stem cells have not been found for all types of cells and tissues in the human body;[162] (2) adult stem cells are often found in limited numbers, "are difficult to isolate and purify, and their numbers decrease with age;"[163] (3) a person who is inflicted with a genetic disorder is likely to have stem cells inflicted with the same disorder;[164] (4) "there is evidence that stem cells from adults may not have the same capacity to multiply as do younger cells," which may "limit the usefulness of adult stem cells;"[165] and (5) " adult stem cells may contain more DNA abnormalities, caused by exposure to daily living, including

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[157] *See American Bioethics Advisory Commission*, *supra* note 156; Allen, *supra* note 22; *Over 100 Catholic Groups*, *supra* note 103; *Talk of the Nation*, *supra* note 7.

[158] *See id.*

[159] *Talk of the Nation*, *supra* note 7. *See also* Aaron Zitner, *Diabetes Study Fuels Stem Cell Funding War*, L.A. TIMES, Apr. 27, 2001, at A4 ("In revolutionary animal studies. . .two teams reported . . . that bone marrow cells could be turned into heart muscle and heart blood vessels in rats, helping to repair the damage from heart attacks."); *See also* Stephen S. Hall, *Adult Stem Cells*, 104 TECH. REV. 47 (Nov. 2001) (describing studies showing that healthy adult stem cells injected into a pig's scarred heart tissue "literally remodeled the damaged heart" and describing a study showing that the injection of healthy adult stem cells into a goat's knee, which had had its meniscus surgically removed in order to simulate conditions of osteoarthritis, "not only restored the surgically removed meniscus but within 12 weeks have . . .recarpeted the eroded bony surface of the thigh and calf bones with new cartilage.").

[160] *See Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000); *see also Adult Stem Cells: May Not Have Same Potential As Embryonic*, AM. HEALTH LINE, March 14, 2002, at Research Notes; Justin Gillis, *Questions Raised on Stem Cells; Adult Cells Found Less Useful Than Embryonic Ones*, WASH. POST, March 14, 2002, at A3 (discussing reports that placed serious doubts on recent studies that touted the flexibility of adult stem cell research).

[161] Nat'l In st. of Health Guidelines for Research Using Human Pluripotent Stem Cells, 65 Fed. Reg. 51, 976 (2000).

[162] *See id.*

[163] *Id.*

[164] *Id.*

[165] *Id.*

sunlight, toxins, and by expected errors made in DNA replication during the course of a lifetime."[166]

As discussed above, scientists have demonstrated through clinical trials the inflexibility of adult stem cells as compared to pluripotent stem cells.[167] Despite these studies, it would be imprudent to dismiss the potential of adult stem cells.[168] There may yet come a day when scientists discover the true promise that adult stem cells hold for modern medicine. For now, however, adult stem cells are confined to seemingly rigid limitations and therefore cannot be the sole source of research. If science is to advance to the groundbreaking medical revolution that is expected within the next decade or so, the use of pluripotent stem cells is far from expendable.

### *D. The Use of Federal Funds for Embryonic Stem Cells Will Not Encourage Abortion*

Some people fervently protest pluripotent stem cell research because they believe it will provide an incentive or rationale for abortions.[169] Protesters claim that "[i]f [donating their fetal tissue for research] can put an altruistic halo around abortion, then more women will be tempted to have one."[170] They also assert that women will be encouraged to abort pregnancies due to monetary incentives.[171] As a result of these perceived incentives, opponents fear that pluripotent stem cell research would lead to an increase in the number of abortions that are performed each year.[172] Opponents also claim that "[t]h e federal funding of stem cell research effectively creates a demand to generate and destroy human lives."[173] They insist that the allowance of embryonic stem cell research will lead to the mass commercial production of embryos, or "tissu e factories."[174]

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[166] *Stem Cells: A Primer*, *supra* note 9, at 5.

[167] *See* Nat'l Inst. of Health, *NIH Fact Sheet on Human Pluripotent Stem Cell Research Guidelines* (visited Sept. 23, 2001) <http://www.nin.gov/news/stemcell/stemfactsheet.htm>.

[168] *Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000).

[169] *See id.*

[170] Carolyn Abraham, *The Big Chill*, MED. REP. (Toronto, Can.), July 8, 2000, at A10.

[171] *See Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51976 (2000); Cokie Roberts & Steven Roberts, *Stem-Cell Research Must go Forward*, DALLAS MORNING NEWS, Mar. 8, 2001, at 17A (editorial).

[172] *See id.* According to the National Center for Chronic Disease Prevention and Health Promotion, 1,186,093 legal abortions were performed in 1997. "From 1990 through 1995, the number of abortions in the United States declined each year. In 1996, the number increased slightly, but in 1997, the number of abortions in the United States declined to its lowest level since 1978." Nat'l Ctr. for Chronic Disease Prevention and Health Promotion, *Fact Sheet: Abortion Surveillance-United States 1997* (visited Sept. 16, 2001) <http://www.cdc.gov/nccdphp/drh/surv_abort97.htm>.

[173] *American Bioethics Advisory Commission*, *supra* note 156.

[174] *See* Gorman, *supra* note 21.

The fear that the NIH Guidelines will encourage abortion or result in the production of human "tissue factories" is completely unfounded. The NIH enacted strict regulations to ensure that pluripotent stem cell research would not promote abortion.[175] The Guidelines specifically state, "To ensure that the donation of human embryos in excess of the clinical need is voluntary, no inducements, monetary or otherwise, should have been offered for the donation of human embryos for research purposes."[176] This directive clearly prevents the possibility that women will be induced to seek an abortion to reap a profit. Furthermore, the introduction to the NIH Guidelines states that they "guard against encouraging abortion by requiring that the decision to have an abortion be made apart from and prior to the decision to donate tissue."[177] Thus, the NIH will not fund any research on stem cells that encouraged a woman to have an abortion.[178] The Guidelines also ward off the creation of any type of "black market" for embryos.[179] The Guidelines acknowledge and allay this fear by allowing the use of federal funds only "if the cells were derived from frozen embryos that were created for the purpose of fertility treatment and that were in excess of clinical need."[180] And as stated above, under no circumstances will federal funds be dispersed if the embryo resulted from any type of monetary enticement.[181] The NIH will not fund research, therefore, on stem cells taken from embryos that are a result of illegitimate activities.

Lastly, the Guidelines eradicate any motivation to donate embryos for designated individuals.[182] The Guidelines state that "[d]onation of human embryos should have been made without any restriction or direction regarding the individual(s) who may be the recipients of transplantation of the cells derived from the

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[175] *Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,976 (2000).

[176] *Id.* ("Fertility clinics and/or their affiliated laboratories should have implemented specific policies and practices to ensure that no such inducements are made available.").

[177] *Id.*

[178] *Id.* ("Compliance with the Guidelines will be imposed as a condition of grant award."). To prove compliance, researchers must "provide documentation. . .that the embryos were created for the purposes of fertility treatment." *Id.* at 51,971. Furthermore, the NIH Guidelines prevent the encouragement of aborting fetuses for research purposes by "requiring the decision to have an abortion be made apart from and prior to the decision to donate tissue." *Id.* at 51,978.

[179] *Id.* at 51,977.

[180] *Id.* Of course, people can still sell their unused embryos on the black market, but such embryos could only be used for private research purposes as the NIH Guidelines fiercely reject funding for such. *See* Perry Daniel, *Patients' Voices: The Powerful Sound in the Stem Cell Debate, Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,979 (2000), Feb.25, 2000, at 1423; *see also Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,979.

[181] *Nat'l Inst. of Health Guidelines for Research Using Human Pluripotent Stem Cells*, 65 Fed. Reg. 51,979 (2000).

[182] *See id.* at 51,977.

human pluripotent stem cells."[183] An embryo supplier cannot specify who will receive the pluripotent stem cell. This effectively derails any attempt to produce and then donate an embryo for exclusive use.[184]

*E. Excess Embryos Will Just Go to Waste*

Pro-life groups are equally hostile to excess embryos taken from in vitro fertilization clinics for embryonic stem cell research.[185] One opponent has stated the following: "A frozen embryo who is destined to be discarded is a tiny human being, an embryonic child, whose parents have decided he is garbage."[186] Here, the pro-life groups' dissension over pluripotent stem cell derivation from excess embryos again arises from their belief that an embryo is a human being.[187] Thus, the destruction of the embryo, regardless of whether it will ever be used, is immoral.

It is an unfortunate reality that some women are unable to conceive naturally. In an effort to become pregnant these women resort to procedures such as in vitro fertilization. As discussed above, women must undergo fertility treatments for in vitro fertilization, which beget a plethora of eggs.[188] The eggs, along with the male's sperm, are placed in a petri dish to form an embryo.[189] Only three or

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[183] *Id.*

[184] *See id.* at 51,979. The NIH will police its policies by requiring the researcher to "file progress reports" with the NIH and " NIH staff will also monitor the progress of these investigators as part of their regular duties." Furthermore, if researchers fail to comply with the regulations after NIH has granted them funds, the NIH reserves the right to withhold funds until the researcher complies with the Guidelines or it may suspend "all or part of the funding for the project . . . . Individuals and institutions may be debarred from eligibility for all Federal financial assistance and contracts under 45 CFR Part 76 and 48 CFR Subpart 9.4, respectively."

[185] *See* Gorman, supra note 21, at 58; NPR, *Politics and ethics of Embryonic Stem Cell Research*, Jan. 31, 2001; *Christian Medical Association Doctors Urge Thompson to Focus on ethical Stem Cell Research*, PR NEWSWIRE, Mar. 1, 2001, at State and Regional News; *Stem Cell Issue Looms for Thompson Speech*, UNITED PRESS INT'L , Feb. 28, 2001, at Gen. News.

[186] Elizabeth Cohen & Bill Hemmer, *Controversy Roils around stem cell research*, CNN TONIGHT, Mar. 7, 2001, at Science (quoting Judie Brown, President, Am. Life League).

[187] *See* American Bioethics Advisory Commission, *Cloning: When Word Games Kill* (visited Oct. 18, 2000) <http://www.all.org/issues/clonirv.htm>; *Stem Cell Debate*, ONLINE NEWSHOUR (visited Mar. 25, 2001) <http://www.pbs.org/newshour/bb/health/julydec00/genome_8-28.htm>; *American Bioethics Advisory Commission: Anyone With A Discerning Eye can See Bush's Plan for Micr oscopic Persons*, PR NEWSWIRE, Feb. 12, 2001, at Wash. Dateline; *Over 100 Catholic Groups*, *supra* note 103.

[188] *See* 2 MAGILL'S ME DICAL GUIDE 144, *Health & Illness*.

> When ova are collected for the in vitro fertilization procedure, doctors try to collect as many as possible. . . .The extra embryos can be frozen for later use, if the first ones implanted in the uterus do not survive. This spares the woman additional surgery to collect more ova if they are needed.

*Id.*

[189] *See* Charen, *supra* note 37.

four of the resulting embryos are then implanted into the woman's uterus.[190] The fertility clinic will usually give the woman a choice of what to do with the excess embryos.[191] She can choose to discard them or to store them for later use.[192] Those stored for later use will be frozen.[193] It is estimated that there are over 100,000 embryos in storage right now.[194] Yet, these embryos will almost never see life.[195]

Consequently, proponents clamor for the continuance of research that derives pluripotent stem cells from these jettisoned embryos. They argue that embryos, discarded from in vitro fertilization procedures, will only go to waste.[196] And because "th ese embryos are going to be destroyed [anyway]. . .it is humane and compassionate to use the stem cells to help living people who are suffering."[197]

Advocates of stem cell research also believe embryos should be taken from aborted fetuses for research purposes.[198] As long as abortion remains legal in this country, women will seek to abort unwanted pregnancies. There will continue to be a supply of aborted fetuses that are disposed of after the procedure.[199] Advocates argue that aborted fetuses, like organs, should be used for medical purposes.[200] They claim that taking stem cells from aborted fetuses is analogous to organ donation and, therefore, should be legal.[201] As one geneticist put it, "u sing an organ from someone killed by a drunk driver does not condone drinking and driving . . . . The fact that researchers use fetal tissue does not mean they con-

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[190] *See* 2 MAGILL'S MEDICAL GUIDE, *supra* note 54 (stating that only a few embryos are placed into the women's uterus because "a pregnancy with a large number of fetuses carries significant health risks.").

[191] *See* Christopher Reeve, *Use the Body's "Repair Kit" We Must Pursue Research on Embryonic Stem Cells*, TIME, May 1, 2000, at 60; Chapman et al., *supra* note 12.

[192] *See* Reeve, *supra* note 191, at 60; Chapman et al., *supra* note 12.

[193] 2 MAGILL'S ME DICAL GUIDE, *supra* note 54.

[194] *Should Embryos be used for Medical Research?*, THRIVE ONLINE, (visited Oct. 18, 2000) <http://thriveonline.com/medical/polls/news/news.poll111.html>.

[195] In other words, these embryos will not be used for another in vitro fertilization procedure. *See* Gina Kolata, *Researchers Say Embryos in Labs Aren't Available*, N.Y. TIMES, Aug. 26, 2001, at 1, Foubister, *supra* note 38. Recently, however, embryo adoption programs have been emerging in an effort to counteract the number of embryos that are abandoned by couples who have undergone fertility treatments. These embryo adoption programs have also come to the forefront due to the stem cell research controversy. These programs hope to reduce the number of available embryos in an effort to prevent scientists from pursuing pluripotent stem cell research. *See* Charen, *supra* note 37; *see also* Deroy Murdock, *Finding Places for 'Surplus' Embryos*, WASH. TIMES, Aug. 27, 2001, at A17; Richard Jerome, et al., *Last Chance Family*, PEOPLE MAGAZINE, Jan. 21, 2002, at 44.

[196] *See Hearing on Stem Cell Research before the Health, Education, Labor, and Pensions Senate Committee*, 107th Cong. 9, *available in* Federal News Service, Sept. 5, 2001.

[197] *See Stem-Cell Research*, *supra* note 142.

[198] *See* Abraham, *supra* note 170.

[199] *See* David Dubuisson, *The Politics of Medical Research*, NEWS & RECORD, Feb. 4, 2001, at H3.

[200] *See* Abraham, *supra* note 170.

[201] *See id.*

done abortion."[202]

Both in vitro fertilization and abortion are legal procedures in this country. The inevitable corollary of these procedures results in excess embryos that have no prospect of life. Allowing these embryos to go to waste would be a tragedy — especially when one considers the hundreds of millions of lives that could be improved or even saved, through stem cell research.

### *F. Embryonic Stem Cell Research Must Be Monitored*

With or without the support of the federal government, pluripotent stem cell research will continue. The private sector will continue the research.[203] With the denial of federal funds to support pluripotent stem cell research comes the inability to regulate such embryonic sem cell research.[204] Outlawing the use of federal funds for human pluripotent stem cell research would effectively curtail the ability of the federal government to keep a close eye on such research and to "trac k ethical questions."[205] The federal government would be handing over its power to ensure that embryonic stem cell research is not abused.

Surrendering federal regulatory power is not only frightening, but also potentially disastrous. It is not impossible to imagine "an unlegislated, commercially driven world" exploiting pluripotent stem cell research to its utmost profit.[206] Unregulated stem cell research could lead to unsafe, black market operations.[207] The lack of federal regulations could also lead to "an erosion of respect" for embryonic stem cells, "ex actly the erosion of values" that such regulation "wou ld be designed to protect."[208] Thus, advocates argue, it is imperative for the federal government to step in and regulate stem cell research. Regulation of stem cell research will provide monitoring to help avoid possible abuse of stem cell research.[209] It will also avoid "secrecy and destructive competition between laboratories and ensure the widest possible dissemination of scientific breakthroughs."[210]

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[202] *Id.* (quoting geneticist Dr. Steven Bamforth).

[203] *See The Bush Decision*, TIME, Aug. 20, 2001, at 18; Jeffrey Krasner, *Biotechnology; Stem Cell-Researchers See Hope for Private Funds*, BOSTON GLOBE, Oct. 3, 2001, at D1. Private companies such as Geron have " already funded various embryonic stem cell research projects and plan[ ] to continue doing so in the future." Paul Polgar, *Who is Funding Stem cell Research?*, DAILY FREE PRESS, Oct. 8, 2001.

[204] *Thompson Can Boost Stem Cell Research*, WISCONSIN STATE JOURNAL, Jan. 30, 2001, at A6; *Tommy & Stem Cells*, CAP. TIMES, Feb. 6, 2001, at 8A.

[205] *See Tommy & Stem Cells*, *supra* note 204, at 8A

[206] Muriel Gray, *Science Fiction Horrors Shouldn't St op Progress*, SUNDAY HERALD, Apr. 16, 2000, at 2, *available at* 2000 WL 4102650.

[207] *See* Juengst & Fossel, *supra* note 62, at 3182.

[208] *Id.*

[209] *See* Reeve, *supra* note 191, at 60.

[210] *Id.*

*G. Costly Ramifications for Medicine in the Future*

The denial of federal funds for stem cell research could have a devastating effect on the future of medical advances. Since the 1930s, medical scientists have taken advantage of fetal cells found in aborted fetuses in order to study, treat, and cure diseases.[211] In fact, research on fetal cells has resulted in numerous medical breakthroughs that we take for granted today.[212]

Many vaccines have been developed through clinical trials and experimentation with fetal cells. For example, in 1955, Jonas Salk developed the polio vaccine through research on cells from an aborted fetus.[213] Before Salk developed the polio vaccine, tens of thousands of American children had become infected with polio each year.[214] This vaccine eliminated polio in our country.[215] The development of other vaccines, made possible through stem cell research, include the measles, mumps, and rubella vaccine, rabies vaccine, hepatitis A vaccine, and the chickenpox vaccine.[216]

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[211] *See* Abraham, *supra* note 170; *see also* Fetal Tissue Transplantation, (visited March 31, 2001) <http://www.muhealth.org/~shrp/radsci/fetal/fetal.html>.

[212] *See* Nat'l Abortion and Reproductive Rights Action League, *Fetal Tissue Research: Moving Beyond Anti-Choice Politics* (visited Sept. 22, 2001) <http://www.naral.org/mediaresources/fact/fetal_tissue.html> (finding that fetal tissue research led to development of two vaccines—polio and rubella). *See also* Abraham, *supra* note 170; *Tommy & Stem Cells*, *supra* note 204.

[213] *See The Hall of Science*, Jonas Salk, M.D. Biography, (last visited March 31, 2001) <http://www.achievement.org/autodoc/page/salObio-1>.

[214] *See id.*

[215] *See* Centers for Disease Control, *What Would Happen If We Stopped Vaccinations?*, (last visited Sept. 22, 2001) <http://www.cdc.gov/nip/publications/fs/gen/WhatIfStop.htm>. ("Development of polio vaccines and implementation of polio immunization programs have eliminated paralytic polio caused by wild polio viruses in the U.S. and the entire Western hemisphere.").

[216] *See* Catherine Williams, *The Campaign for Ethical Vaccines* (visited Mar. 31, 2001) <http://www.dgwsoft.co.uk/homepages/vaccines/usvaccines.html>. Measles, an extremely contagious disease, causes symptoms including "fever, runny nose, cough, red eyes, and a spreading skin rash." MedicineNet.com, *Diseases and Conditions* (visited Sept. 22, 2001) <http://www.medicinenet.com/Script/Main/art.asp?li=MNI&ArticleKey=6242&page=1#1whatis>.

> Before measles immunization were available, nearly everyone in the U.S. got measles. An average of 450 measles-associated deaths were reported each year between 1953 and 1963. . . .In the U.S., widespread use of measles vaccine has led to a greater than 99 percent reduction in measles compared with the pre-vaccine era.

Centers for Disease Control and Prevention, *What Would Happen If We Stopped Vaccination* (visited Sept. 22, 2001) <http://www.cdc.gov/nip/publications/fs.gen/WhatIfStop.htm>. "Before the mumps vaccine was introduced, mumps was a major cause of deafness in children. . . .[R]are conditions such as a swelling of the brain, nerves and spinal cord can lead to serious side effects such as paralysis, seizures, and fluid in the brain." *Id.* Before the introduction of the mumps vaccine, an estimated 212,000 cases of mumps occurred in the U.S. *Id.* Last

The availability of federal funds for embryonic stem cell research is imperative to avoid adverse consequences for the future of medicine. Scientists must be able to receive federal funds for research involving fetal cells from aborted embryos to continue making such miraculous discoveries as those described above. Without federal funds to support their research, scientists will not have the necessary resources to continue pursuing a cure that alleviates the suffering of hundreds of millions of Americans afflicted by many horrific and currently untreatable diseases.

## VI. CONCLUSION

Not only is federal funding of embryonic stem cell research legal, it is also a vital component in the fight against devastating diseases such as MS, Parkinson's, and Alzheimer's diseases. Hundreds of millions of Americans will benefit from stem cell research.

Embryonic stem cell research is not a violation of human rights. The United States Supreme Court has held that the Fourteenth Amendment, which entitles people to the due process of law, only protects persons, and not the "un born." Our federal government has consistently supported the notion that a fetus is not a person before the point of viability. A pluripotent stem cell, taken from the underlayer of a blastocyst, has not even begun to develop into a fetus. Consequently, a pluripotent stem cell is neither protected nor considered a person under current law.

Embryonic stem cell research is in harmony with the 1996 federal law limiting federal funding for embryonic cell research. Under no circumstances can federal funds be used to create a human embryo for research purposes. Furthermore, federal funds will only be delegated to projects involving human pluripotent stem cells, which are not embryos. Moreover, federal funds will not be used to support research that destroys, discards, or subjects an embryo to harm.

The NIH has set thorough, prudent guidelines that prevent the possibility of abuse within embryonic stem cell research. Due to these strict guidelines, federal funding of human pluripotent stem cell research will not encourage abortion or black market activity. These guidelines correctly interpret the 1996 federal law and promote research that will one day find a cure to diseases that today affect an

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year, about 327 cases of mumps were reported. *Id.* Rubella primarily affects children born to mothers infected with rubella. Such children suffer such complications as "h eart defects, cataracts, mental retardation, and deafness." *Id.* Prior to the development of the rubella vaccination, "t here was an epidemic of rubella that resulted in an estimated 20,000 infants born with CRS [congential rubella syndrome]." *Id.* In 2000, a mere six CRS cases were reported. *Id.* Those infected with chickenpox usually suffer mild symptoms. However, "[s]om e people who get chickenpox have also suffered from complications such as secondary bacterial infections, loss of fluids. . ., pneumonia, and central nervous system involvement. In addition, only persons who have had chickenpox in the past can get shingles, a painful inflammation of the nerves." *Id.*

astounding percentage of the American population.

Without federal funding of embryonic stem cell research, the realm of possibilities for the future of modern medicine will stagnate. Without the support of the government, scientists will be forced to turn to private funding to continue their research. Private funding alone is not nearly enough to sustain the research. A lack of federal funds will unnecessarily prolong success in finding a cure to the many diseases mentioned above.

Finally, with nearly half of the American population affected by debilitating conditions, certainly each and every one of us knows a loved one who suffers from such a condition. I chose to write this article because two of the most important persons in my life suffer from such a fate. Both of these people are my parents. I will never pretend to understand the anguish my mother goes through as a result of the disease that plagues her life day in and day out. Nor will I pretend to understand the intense nausea my dad went through for a year while taking noxious medication in hopes of ridding his body of a potentially terminal illness. In doing research for this paper, I came across the following quote, also located at the beginning of this paper, of an eight-year old boy named Max Mosher:

> If I could see MS, it would look like a big monster. It takes up lots of room in my house. It has a very long tail to trip my mom and knock her down and try to hurt her. It is a very selfish monster. We try our best to ignore it and not let it push us around. Sometimes, the monster is quiet, and we forget about him. One day, we will get rid of it and say good-bye forever.[217]

For me, Max Mosher describes this terrible disease perfectly, as I have also witnessed it trying, repeatedly, to knock my own mom down. A similar monster has also tried to hammerlock my father. And I am sure one of your friends or relatives wrestles daily with his or her own monster. With the legalization of federal funding for embryonic stem cell research, the day we "say good-bye forever" to these monsters is just around the corner. [218]

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[217] *Through a Child's Eyes, s upra* note 1, at D9.