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Stem Cell Research and Conditional Federal Funding: Do State Laws Allowing More Extensive Research Pose a Problem for Federalism?

Charity Schiller

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"The chemical or physical inventor is always a Prometheus. There is no great invention, from fire to flying, which has not been held as an insult to some God. But if every physical or chemical invention is a blasphemy, every biological invention is a perversion."

-J.B.S. Haldane, geneticist, 1923[1]

Early in 1998, scientists in Worcester, Massachusetts, took a single skin cell from a cow and removed its nucleus.[2] These scientists then took the nucleus from another cow cell and placed it in the empty cell.[3] The cloned cell was implanted into a cow's uterus where it grew into a fetus, but it was never allowed to be born.[4] The fetus was prematurely removed from the surrogate mother and "strip-mined for its parts,"[5] its tissues and organs harvested in the name of stem cell research.[6] The "brave new world of fetal farming" had begun.[7]

I. INTRODUCTION

Since human stem cells were first isolated in 1998,[8] stem cell research and its possible applications have been the source of much debate, comment, and scholarship.[9] The controversy surrounding stem cells has largely arisen from ethical issues involved in the collection and use of stem cells.[10] Stem cell research offers the possibility that stem cells might be used to grow

1. Lee Silver, *Public Policy Crafted in Response to Public Ignorance is Bad Public Policy*, 53 HASTINGS L.J. 1037, 1047 (2002).

2. Charles Krauthammer, *The Fatal Promise of Cloning: Advocates Say They Will Never Create Human Fetuses. Can We Believe Them?*, TIME, June 24, 2002, at 54.

3. *Id.*

4. *Id.*

5. Charles Krauthammer, *Mounting the Slippery Slope*, TIME, July 23, 2001, at 80.

6. Krauthammer, *supra* note 2.

7. *Id.*

8. Michael J. Shamblott et al., *Derivation of Pluripotent Stem Cells from Cultured Human Primordial Germ Cells*, 95 PROC. NAT'L ACAD. SCI. U.S. 13,726, 13,726 (1998); James A. Thomson et al., *Embryonic Stem Cell Lines Derived from Human Blastocysts*, 282 SCI. 1145 (1998).

9. *See* Gretchen Vogel, *Can Old Cells Learn New Tricks?*, 287 SCI. 1418, 1418 (2000).

10. Margaret R. McLean, *What's in a Name? "Nuclear Transplantation" and the Ethics of Stem Cell Research*, 53 HASTINGS L.J. 1017, 1018 (2002); Elaine Fuchs & Julia A. Segre, *Stem Cells: A New Lease on Life*, 100 CELL 143, 153 (2000).

replacement organs, regenerate damaged tissue,[11] and provide a cure for diseases such as diabetes,[12] leukemia,[13] and even AIDS.[14] These potential medical miracles have garnered great support for stem cell research from those who hope to see such miracles realized.[15]

Yet with great power comes great responsibility. Those who give deference to this responsibility point to the parallels between the procedures used for stem cell research and those used in attempts to clone humans.[16] Although there has not yet been a single, verifiable instance in which a cloned human has been brought to term,[17] some have no doubt that "a live-born human clone is either already among us or soon will be."[18]

Distinct from the concerns about cloning humans, many have commented on the questionable practices involved in the process of stem cell collection itself,[19] which is most easily achieved through the dissection of developing human embryos.[20] Indeed the march towards embryo destruction appears to be quickening, as Korean scientists announced in February 2004 that they successfully used a cloning procedure to create a

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11. Thomson et al., *supra* note 8, at 1146-47; COMM. ON THE BIOLOGICAL AND BIOMEDICAL APPLICATIONS OF STEM CELL RESEARCH, NAT'L RESEARCH COUNCIL, STEM CELLS AND THE FUTURE OF REGENERATIVE MED. 34 (2002) [hereinafter NAT'L RESEARCH COUNCIL REPORT].

12. Bernat Soria et al., *Insulin-Secreting Cells Derived From Embryonic Stem Cells Normalize Glycemia in Streptozotocin-Induced Diabetic Mice*, 49 DIABETES 157, 161 (2000).

13. Èva Mezey et al., *Turning Blood into Brain: Cells Bearing Neuronal Antigens Generated in Vivo from Bone Marrow*, 290 SCI. 1779, 1781 (2000).

14. *Id.*

15. *See California Law Permits Stem Cell Research*, N.Y. TIMES, September 23, 2002, at A22; *see also* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 8.

16. California Advisory Committee on Human Cloning, *Cloning Californians?*, 53 HASTINGS L.J. 1143, 1158 (2002) [hereinafter California Report]; Alexander Morgan Capron, *Placing a Moratorium on Research Cloning to Ensure Effective Control Over Reproductive Cloning*, 53 HASTINGS L.J. 1057, 1061 (2002).

17. *See* Associated Press, *House Passes Ban on All Human Cloning*, AP ONLINE, Feb. 28, 2003, *available at* 2003 WL 14958175. It is worth noting that in December of 2002, a religious group calling themselves the Raelians announced that they had successfully brought a cloned human to live birth. *Raelian Leader Says Cloning First Step to Immortality*, CNN.COM/HEALTH (Dec. 28, 2002), *at* http://cnn.com/2002/HEALTH/12/27/human.cloning/. The Raelians' leader is a man who claims that he is the half-brother of Jesus and that he was visited by aliens in green suits who announced that they had created all life on earth through genetic engineering. Clifford Krauss, *Earthlings, the Prophet of Clone is Alive in Quebec*, N.Y. TIMES, Feb. 24, 2003, at A4. The Raelians believe that they must clone humans in order to achieve eternal immortality. *See id.* These beliefs, coupled with the Raelians' refusal to allow genetic testing of the alleged "clones," has allowed their claim to be considered nothing more than a hoax. *See id.*; *Raelian Leader Says Cloning First Step to Immortality*, *supra*.

18. Senator Sam Brownback, *A True, Complete Ban*, NAT'L REVIEW ONLINE (Feb. 26, 2003), *at* http://www.nationalreview.com/comment/comment-brownback022603.asp (Senator Brownback is a major sponsor of the Human Cloning Prohibition Act of 2003).

19. *See, e.g.*, McLean, *supra* note 10, at 1017-18, 1021 (supporting a ban on the use of human pre-embryos for stem cell research after development of the primitive streak); John A. Robertson, *Liberty, Identity, and Human Cloning*, 76 TEX. L. REV. 1371, 1393 n.100 (1998) (admitting that parents might seek to create viable human embryos only as a source "from which tissue stem cells can be obtained for an existing child").

20. NAT'L INSTS. OF HEALTH, STEM CELLS: A PRIMER 3, 8, 12 (May 2000) [hereinafter NIH PRIMER] (explaining that embryonic stem cells are more numerous, more easily maintained in laboratory conditions, and more easily isolated than other sources of stem cells) (on file with author); NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 4.

human embryo which was then dissected for its stem cells.[21] The ethical and moral issues raised by stem cell research are ones that cannot be easily dismissed; however, a full discussion of such issues lies beyond the scope of this Comment.[22]

Aside from this moral debate, an issue central to stem cell research is the source of the funding that fuels it.[23] Stem cell research is an expensive process requiring advanced facilities,[24] precise laboratory conditions,[25] and well-educated researchers.[26] "Without public funding of basic research on stem cells, progress toward medical therapies is likely to be hindered."[27] The likelihood that researchers will look to the federal government for support is not one that has escaped notice.[28] President Clinton issued an executive order that forbade the use of federal funds in research projects that created human embryos with the intent of destroying them.[29] Later, on August 9, 2001, President Bush issued an executive order limiting the use of federal funds to research on the sixty stem cell lines that already existed at the time of his announcement.[30] These initial acts raise the questions of whether the government will take additional action to regulate stem cell research through funding limitations and whether such action will pass constitutional muster if challenged.

This Comment will attempt to address the aforementioned issues. Part II contains an overview of what stem cells are, how stem cells are useful for research purposes, and which ethical issues are raised in a discussion about stem cell research. Part III presents the pertinent federal and state regulations that directly curtail or encourage stem cell research. Part IV examines whether the Constitution or the interests of federalism prohibit Congress from using its taxing and spending powers to effectively limit stem cell research. After concluding that Congress does indeed have the

21. Gina Kolata, *Scientists Claim Cloning Success*, N.Y. TIMES, Feb. 12, 2004, at A1.

22. For a discussion of ethical issues arising from stem cell research see Courtney S. Campbell, *Source or Resource? Human Embryo Research as an Ethical Issue*, *in* CLONING AND THE FUTURE OF HUMAN EMBRYO RESEARCH 34 (Paul Lauritzen ed., 2001); McLean, *supra* note 10; Carol A. Tauer, *Responsibility and Regulation: Reproductive Technologies, Cloning, and Embryo Research*, *in* CLONING AND THE FUTURE OF HUMAN EMBRYO RESEARCH 145 (Paul Lauritzen ed., 2001).

23. *See* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 49-50; Deborah Ortiz, *Cloning, Science, and Public Policy*, 53 HASTINGS L.J. 1117, 1119-20 (2002).

24. *See* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 2-3, 49-50.

25. *See id.*

26. *See id.*

27. NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 3. *See also* Ortiz, *supra* note 23, at 1120-22.

28. President George W. Bush, *Remarks by the President on Stem Cell Research* (Aug. 9, 2001), *at* http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html [hereinafter *Remarks by the President*] (admitting that "[f]ederal dollars help attract the best and brightest scientists").

29. *See* California Report, *supra* note 16, at 1159; Robertson, *supra* note 19, at 1434.

30. *Remarks by the President*, *supra* note 28.

constitutional power to regulate stem cell research, Part V will outline the likely social ramifications of exercising such a power.

II. STEM CELL RESEARCH: CONSEQUENCE AND CONTROVERSY

A. What Is Stem Cell Research Generally?

As an organism grows from an embryo into an adult, the cells of that organism take on specific characteristics that allow each cell to function in a specific way.[31] This process is called differentiation, and it may be triggered by many different intracellular and extracellular factors.[32] Differentiated cells are identifiable by their appearance, function, and location, meaning that the cells of one tissue or organ look or function much differently than the cells of other tissues or organs.[33] Each differentiated cell type is uniquely suited to its function in the body and retains its specific characteristics throughout its life.[34]

In contrast, stem cells are those cells that have not yet become differentiated.[35] Because stem cells are not differentiated, they lack the characteristics that would otherwise classify them as a liver cell, skin cell, or other distinct cell type.[36] This absence of differentiation gives stem cells the potential to become nearly any type of tissue in the body, provided that they are given the correct intracellular and extracellular factors.[37] Due to their potential to differentiate into a multiplicity of cell types, stem cells are said to be multipotent or pluripotent.[38] Researchers hope to discover how to direct stem cell differentiation in order to control the type of tissue that stem cells eventually become.[39] Investigations into the procedures by which stem cells may be identified and isolated, the methods by which these cells are maintained and controlled in the body or the lab, and the possible uses and applications of these cells are collectively referred to as stem cell research.[40]

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31. Fuchs & Segre, *supra* note 10, at 143.

32. NIH PRIMER, *supra* note 20, at 3. Extracellular factors may include chemicals secreted by neighboring cells, physical touching between two cells, or molecules in the cell's vicinity, whereas intracellular factors typically involve changes in cellular shape, alternation of intracellular structures, and transcription regulation. *Id.*

33. *See* Fuchs & Segre, *supra* note 10, at 143.

34. *See* Benjamin E. Reubinoff et al., *Embryonic Stem Cell Lines from Human Blastocysts: Somatic Differentiation in Vitro*, 18 NATURE BIOTECHNOLOGY 399, 399 (2000).

35. NIH PRIMER, *supra* note 20, at 3; *see* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 12.

36. NIH PRIMER, *supra* note 20, at 3.

37. *Id.*; Lori P. Knowles, *Science Policy and the Law: Reproductive and Therapeutic Cloning*, 4 N.Y.U. J. LEGIS. & PUB. POL'Y 13, 14 (2000) ("[Stem cells can] become any type of tissue except placental tissue.").

38. Reubinoff et al., *supra* note 34, at 399; NIH PRIMER, *supra* note 20, at 3.

39. *See* Thomson et. al., *supra* note 8, at 1146-47; *accord* Hitoshi Niwa et al., *Quantitative Expression of Oct-3/4 Defines Differentiation, Dedifferentiation or Self-renewal of ES Cells*, 24 NATURE GENETICS 372, 375 (2000); Shamblott et al., *supra* note 8, at 13,730.

40. NIH PRIMER, *supra* note 20, at 2; *see* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 9.

B. Why Are Stem Cells Thought to Be Useful in the Treatment of Disease and Injury?

1. Stem Cells Might Be Used to Heal Damaged Tissue.

The potential of stem cells to differentiate into any of the body's specific cell types has given scientists and others the hope that stem cells can be used to replace or repair degenerate or damaged organs, heal ailing tissues, and offer new means of fighting disease.[41]

One possible use for stem cells is to reduce or even reverse the nerve damage associated with traumatic injury.[42] Once nerve tissue develops, it cannot regenerate and thus loses the ability to repair itself once damaged.[43] This means that people who suffer spinal cord injury or other nerve damage have little chance of ever recovering.[44]

Stem cell research, however, has recently provided a glimmer of hope to these patients.[45] Experiments with stem cell-derived neuronal cells have shown that mice afflicted with nerve damage showed a markedly increased chance of recovery over mice that did not receive the stem cell therapy.[46] These studies encourage those suffering from nerve damage to hope that an analogous procedure might be implemented in humans to restore the movement or sensation lost due to trauma.[47] Similarly, researchers hope to alleviate the effects of Parkinson's and Alzheimer's diseases by replacing damaged nervous tissue with healthy tissue derived from stem cells.[48]

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41. Thomson et. al., *supra* note 8, at 1146-47; *accord* Donald Orlic et al., *Bone Marrow Cells Regenerate Infarcted Myocardium*, 410 NATURE 701, 701 (2001); Shamblott et al., *supra* note 8, at 13,730.

42. NIH PRIMER, *supra* note 20, at 7; *see* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 8.

43. N. Seppa, *Stem Cells Repair Rat Spinal Cord Damage*, SCI. NEWS ONLINE (Jan. 1, 2001), *at* http://www.findarticles.com/m1200/1_157/59021043/p1/article.jhtml.

44. *See id.*

45. *See* Associated Press, *California Law Permits Stem Cell Research*, N.Y. TIMES, September 23, 2002, at A22.

46. Oliver Brüstle et al., *Embryonic Stem Cell-Derived Glial Precursors: A Source of Myelinating Transplants*, 285 SCI. 754, 755 (1999); Mezey et al., *supra* note 13, at 1779-80.

47. *See* Associated Press, *supra* note 45. Actor Christopher Reeve was paralyzed from the neck down after a tragic horseback riding accident in 1995; he currently is an avid supporter of stem cell research for therapeutic purposes. *Id.*

48. Fuchs & Segre, *supra* note 10, at 152 (listing Alzheimer's disease as potentially curable through advances in stem cell research); NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 8 (tabulating the number of persons in the United States with Alzheimer's and Parkinson's diseases that might be cured through stem cell research); NIH PRIMER, *supra* note 20, at 2 (explaining that the effects of Parkinson's disease might be alleviated through advances in stem cell research).

2. Stem Cells Might Be Used to Replace Damaged Organs.

Another possibility is that stem cells may be used to heal damaged organs.[49] A standard transplant procedure involves taking an organ or tissue from a donor individual and using it to replace the damaged organ or tissue in the recipient.[50] Unfortunately, the recipient often has to wait a long time before a compatible donor can be found.[51] Even if a donor organ or tissue is available, many recipients experience only limited success with the transplant before their body rejects the foreign tissue.[52]

Stem cell research offers the possibility that a patient's own DNA could be placed inside an empty stem cell before triggering differentiation into the type of tissue needed to repair the failing organ.[53] Successful differentiation and division of this cell would then give rise to a population of healthy cells, each of which would contain an exact copy of the patient's own DNA.[54] Implantation of these cells into the patient's failing organ presumably would not trigger rejection by the patient's body because the implanted cells would be genetically indistinguishable from the patient's own.[55]

The possible applications of stem cell research seem to be boundless. Additional skin cells might be grown to heal the damage suffered by burn victims.[56] Insulin-secreting pancreatic cells could replace those malfunctioning in people with diabetes, effectively curing them of the disease.[57] Persons suffering from blindness or hearing impediments due to nerve damage might be relieved of their condition through replacement of the damaged nerve tissue with healthy stem cell-derived tissue.[58] Further, a recent study has shown that the introduction of stem cells into heart tissue damaged by a heart attack could heal the damage and reduce the risk of further heart attacks associated with coronary artery disease.[59]

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49. *See, e.g.*, Reubinoff et al., *supra* note 34, at 403.

50. *See* Tom Harris, *How Organ Transplants Work*, HOW STUFF WORKS (2002), *at* http://www.howstuffworks.com/organ-transplant2.htm; NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 21.

51. *See* Harris, *supra* note 50; NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 21.

52. NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 21-22 (explaining that a "potentially lethal condition" known as graft versus host disease can result when the transplanted tissues and the recipient's tissues attack one another); DONALD VOET & JUDITH G. VOET, BIOCHEMISTRY 1208 (2d ed. 1995) (explaining that the use of immunosuppressant drugs is required after a transplant operation to prevent the patient's immune system from attacking the new organ as a foreign tissue).

53. Robertson, *supra* note 19, at 1380-81 (describing the procedure in the cloning context). This procedure, called somatic cell nuclear transplantation (SCNT), creates a clone of the patient's own cells and is currently viewed with great skepticism because it is the same procedure which would presumably be used to clone humans. Capron, *supra* note 16, at 1061-62.

54. Gordon Keller & H. Ralph Snodgrass, *Human Embryonic Stem Cells: The Future is Now*, 5 NATURE MED. 151, 152 (1999).

55. *Id.*; NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 39 ("Cells created with this technique would overcome the problem of immune rejection.").

56. *See* Fuchs & Segre, *supra* note 10, at 152; NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 8.

57. NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 8; Soria et al., *supra* note 12, at 161.

58. *See* Brüstle et al., *supra* note 46, at 756; Mezey et al., *supra* note 13, at 1779.

59. Orlic et al., *supra* note 41, at 701.

Given the numerous and potentially life-changing applications of stem cell therapy, many whole-heartedly support research in this area.[60] However, those who oppose unfettered stem cell research do not argue without reason and compassion.[61] Many of the concerns surrounding stem cell research arise from the methods used to gather the stem cells and the sources from which they are obtained.[62]

C. What Are the Sources from Which Stem Cells Can Be Obtained?

1. Stem Cells Can Be Obtained from Adults.

Although the vast majority of cellular differentiation occurs long before birth,[63] stem cells may be obtained in limited number from adults.[64] Adults do carry low levels of the stem cells that are needed to regenerate certain kinds of tissue during the adult's life.[65] These "adult" stem cells may be found in bone marrow, skin, muscle, blood, and the brain.[66] Recent studies involving adult stem cells have offered the hope that they, like their embryonic counterparts, may be pluripotent and capable of differentiating into a variety of the body's cell types.[67] If these initial impressions prove accurate, adult tissues could become the next major source of stem cells used in research while "skirting the ethical dilemmas surrounding research on embryonic and fetal stem cells."[68]

2. Stem Cells Can Be Obtained from Fetus-Associated Tissues.

Stem cells may be obtained in limited number from fetal tissue, the umbilical cord, and the placenta.[69] Although stem cells are primarily

60. Ortiz, *supra* note 23, at 1118-19; *see* NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 8.

61. *See* McLean, *supra* note 10, at 1018 (explaining that "reasoned and reasonable" regulations on stem cell research are appropriate); Krauthammer, *supra* note 5 (claiming that "you don't have to believe [life begins at conception] to be apprehensive that stem-cell research may legitimize the . . . making of the human fetus into the ultimate guinea pig").

62. *See* McLean, *supra* note 10, at 1018; Vogel, *supra* note 9, at 1418.

63. Fuchs & Segre, *supra* note 10, at 144.

64. *See* Malcolm R. Alison et al., *Hepatocytes from Non-Hepatic Adult Stem Cells*, 406 NATURE 257, 257 (2000); NAT'L RESEARCH COUNCIL REPORT, *supra* note 11, at 7.

65. Fuchs & Segre, *supra* note 10, at 144.

66. *Id.* at 145-149.

67. *See* Alison et al., *supra* note 64; Diana L. Clarke et al., *Generalized Potential of Adult Neural Stem Cells*, 288 SCI. 1660 (2000); Orlic et al., *supra* note 41.

68. Vogel, *supra* note 9, at 1419.

69. *See* Shamblott et al., *supra* note 8, at 13,726; *Remarks by the President*, *supra* note 28 (listing the umbilical cord and placental tissues as possible sources of stem cells); *cf.* NIH PRIMER, *supra* note 20, at 3-4 (recognizing that the cells obtained from fetal tissue are pluripotent, but classifying them as embryonic germ cells).

concentrated in the early stages of embryonic development,[70] low numbers of pluripotent cells do reside in the blood and tissues of a fetus before birth.[71] Fetal tissues are gathered post-mortem, frequently as the result of an abortion, and subjected to extraction procedures that isolate the stem cells they contain.[72] It appears that the controversy surrounding abortion as a source of fetal tissue,[73] the relative ease of isolating stem cells from other sources,[74] and the possibility that federal funding will be withheld from fetal tissue research have made stem cell collection from fetal tissue too impractical and improvident for widespread research purposes.[75] Indeed, recent scholarship seems relatively devoid of an emphasis on fetal tissue as a source of stem cells for research.[76]

3. Stem Cells Can Be Obtained from Embryos.

Stem cells may be obtained from embryos remaining after in vitro fertilization.[77] In vitro fertilization is the process by which an egg and sperm are combined outside of the body to create a fertilized egg.[78] Following fertilization, the egg is allowed to divide for three to five days until it grows into a blastocyst,[79] a hollow ball of cells about the size of "the period at the end of this sentence."[80] The cells in the blastocyst's outer layer are partially differentiated; however, the inner layer is composed of two to three dozen undifferentiated stem cells.[81] Once the embryo reaches the blastocyst stage, it may be prepared for gestation in the uterus or frozen for later use.[82] Excess embryos that cannot be used are typically destroyed.[83] Stem cell research offers an alternative to the mere destruction of these embryos: by dissecting the embryo, the undifferentiated cells from the inner layers of the blastocyst can be gathered and used for research purposes.[84] The virgin

70. *See* Fuchs & Segre, *supra* note 10, at 144.

71. Shamblott et al., *supra* note 8, at 13,726.

72. *See id.*

73. *See* Charles Krauthammer, *Why Pro-Lifers Are Missing the Point*, TIME, Feb. 12, 2001, at 60 (explaining the controversy over abortion that is associated with stem cell research).

74. NIH PRIMER, *supra* note 20, at 12 (explaining that "[l]arge numbers of embryonic stem cells can be relatively easily grown in culture").

75. Krauthammer, *supra* note 73 (explaining that stem cell research will likely be curtailed by the withholding of federal funds).

76. Fuchs & Segre, *supra* note 10 (explaining the benefits and drawbacks of various stem cell sources but failing to include fetal tissue as a source); NIH PRIMER, *supra* note 20, at 3 (classifying the pluripotent fetal tissue cells as "embryonic *germ* cells" and dismissing them as a source for stem cell research); *Remarks by the President*, *supra* note 28.

77. Thomson et al., *supra* note 8, at 1145.

78. THE SIGNET MOSBY MEDICAL ENCYCLOPEDIA 437 (Walter D. Glanze et al. eds., Penguin Books 1996) (1985).

79. NIH PRIMER, *supra* note 20, at 1.

80. Krauthammer, *supra* note 2.

81. McLean, *supra* note 10, at 1023-24.

82. *See* Capron, *supra* note 16, at 1061.

83. *Id.* at 1058.

84. Thomson et al., *supra* note 8, at 1147.

condition of these stem cells suggests that they have the greatest potential for medical advancement.[85]

Stem cells may also be obtained from embryos created through somatic cell nuclear transplantation ("SCNT").[86] SCNT is the process through which the nucleus of an egg is removed and replaced with the nucleus of a somatic cell.[87] By transplanting the nucleus of a somatic cell into the emptied egg, the egg receives a full complement of genetic material and can begin to grow without being fertilized by sperm.[88] This process generates a clone of the somatic cell from which the nucleus was taken.[89] Once stimulated, the egg theoretically goes through several cycles of cell division and grows into a blastocyst.[90] The blastocyst can then be dissected for its stem cells through the same process used on embryos remaining after in vitro fertilization.[91]

Although the SCNT method has been used successfully to generate sheep, cow, goat, pig, cat, and mouse embryos,[92] the procedures used to create human embryos are only now being ascertained.[93] Still, with several laboratories working full time to refine these procedures, the widespread ability to grow human embryos in culture appears to lie in the near future.[94]

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85. Vogel, *supra* note 9, at 1419 (explaining that embryonic stem cells are nearly totipotent but some adult stem cells "seem to lose their ability to divide and differentiate after a time").

86. McLean, *supra* note 10, at 1019-20.

87. GINA KOLATA, CLONE: THE ROAD TO DOLLY, AND THE PATH AHEAD 124-25 (1998). A somatic cell is a cell from the body that is not a germ cell (i.e., somatic cells are non-sperm and non-egg cells); VOET & VOET, *supra* note 52, at 830-31.

88. Keller & Snodgrass, *supra* note 54, at 152.

89. *Id. Contra* McLean, *supra* note 10, at 1019-20 (arguing that SCNT is not the creation of an *additional* organism and therefore is not cloning).

90. *See* McLean, *supra* note 10, at 1023; Thomson et al., *supra* note 8, at 1145. This assertion may soon become more than mere theory, as scientists in Korea have published results showing that they have cultured a human embryo to the blastocyst stage using the SCNT method. Kolata, *supra* note 21.

91. *See* Thomson et al., supra note 8, at 1147.

92. Associated Press, *Scientist Claims Birth of First Human Clone*, Dec. 27, 2002.

93. Jim Waley, *The Race to Clone a Human*, NINEMSN, Dec. 31, 2002, available as a feature story, *at* http://Sunday.ninemsn.com.au/Sunday/ (explaining that it was only in October of 2001 that a cloned human embryo was created through a verifiable study).

94. *Id.* (quoting one fertility scientist who declared that "[t]he race is on" to see which lab will be the first to successfully create a live-born human clone); *see* Kolata, *supra* note 21 (explaining that it was only this month that scientists succeeded at extracting stem cells from a cultured human embryo that was cultured to the blastocyst stage using SCNT method).

D. *Why Is the Blastocyst Preferred Over Other Possible Sources of Stem Cells?*

1. The Blastocyst Is Not Immersed in Differentiated Tissues.

Stem cells are more readily isolated from blastocysts than from other possible stem cell sources because the stem cells in a blastocyst are not immersed in differentiated tissues.[95] When researchers attempt to gather stem cells from the tissues of an adult, they face the daunting challenge of fishing those cells out of a sea of differentiated cells and tissues that would otherwise contaminate the stem cell sample.[96] By relying on the blastocyst as a source of stem cells, researchers eliminate much of this purification process byseparating the stem cells within the blastocyst through the simpler process of trypsin treatment.[97] These facts make the undifferentiated embryo a pleasing target for the collection of stem cells for research.[98]

Additionally, blastocysts are maintained in controlled laboratory conditions and are isolated, as far as is practicable, from any exogenous cells that might influence differentiation or contaminate the stem cell sample.[99] The ability to nurture a nearly pure sample of stem cells that requires little processing before use makes the blastocyst a preferred source of stem cells for research.[100]

2. The Blastocyst Contains Large Numbers of Stem Cells.

The blastocyst is also preferred as a source of stem cells because it can generate the large numbers of cells that are required for effective research.[101] "[A]lmost all of the wide-ranging potential applications of [stem] cell technology in human medicine . . . are based on the assumption that it will be possible to grow [stem] cells on a large scale . . . ."[102] The stem cells collected from adult tissues are less numerous than those collected from blastocysts,[103] in part due to their relatively latent activity in the body[104] and

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95. Fuchs & Segre, *supra* note 10, at 145 (explaining that stem cells from adults are usually embedded in tissue due to "nature's desire to tuck stem cells away from harm's way"); M.J. Evans & M.H. Kaufman, *Establishment in Culture of Pluripotent Cells from Mouse Embryos*, 292 NATURE 154, 155 (1981) (explaining that simple treatment with the enzyme trypsin can disperse the blastocyst into individual cells).

96. *See* Vogel, *supra* note 9, at 1419 (explaining that adult stem cells from bone marrow are difficult to isolate because there is no "molecular marker that distinguishes the unusually powerful cells from other bone marrow cells").

97. Evans & Kaufman, *supra* note 95, at 155 (explaining that the enzyme trypsin acts to disperse the blastocyst into individual cells which can then be cultured independently).

98. NIH PRIMER, *supra* note 20, at 12.

99. *See* Thomson et al., *supra* note 8, at 1146.

100. NIH PRIMER, *supra* note 20, at 12 (stating that "embryonic stem cells can be relatively easily grown in culture, while adult stem cells are rare iin mature tissues").

101. *Id.*

102. Reubinoff et al., *supra* note 34, at 403.

103. NIH PRIMER, *supra* note 20, at 12 ("adult stem cells are rare in mature tissues").

104. Vogel, *supra* note 9, at 1419 (explaining that "perhaps 1 in 10 billion marrow cells" has the versatility of a stem cell).

in part due to their short lifespan in culture.[105] Because the blastocyst provides an effective and reliable means of gathering large quantities of stem cells, it is likely to be preferred over the less proven method of adult tissue extraction.[106]

3. The Procedures Used When Working With Blastocysts Are Relatively Well Defined.

Another reason the blastocyst is preferred as a source of stem cells for research is that the procedures for its use and isolation are better defined than the procedures required for utilization of other stem cell sources.[107] Since mouse stem cells were first isolated in the early 1980s, the blastocyst has proven to be a reliable and stable source of stem cells.[108] The procedures used to grow and dissect the blastocyst have been widely duplicated with success.[109] The possible ways in which to use human adult stem cells and the methods in which to isolate them have only recently become a major focus of research, thus making the procedures much less certain.[110] Because the outcome of the procedures used to handle blastocysts are more predictable, the blastocyst is likely to be preferred as a source for stem cells.[111]

4. Blastocyst-Derived Stem Cells Are Not Exposed to Differentiation Factors.

Additionally, the blastocyst is preferred as a stem cell source because the nature of embryonic stem cells imposes no limitations on their ability to differentiate.[112] Although in theory adult stem cells may be a suitable replacement for those obtained from a developing embryo,[113] adult stem

105. *Id.*

106. *See* NIH PRIMER, *supra* note 20, at 12.

107. *Id.* (explaining that the procedures used to handle embryonic stem cells are better defined that those used to manipulate adult stem cells).

108. *See* Evans & Kaufman, *supra* note 95, at 154-55 (explaining that the enzyme trypsin acts to disperse the blastocyst into individual cells which can then be cultured independently); Gail R. Martin, *Isolation of a Pluripotent Cell Line from Early Mouse Embryos Cultured in Medium Conditioned by Teratocarcinoma Stem Cells*, 78 PROC. NAT'L ACAD. SCI. U.S. 7634, 7634 (1981).

109. Fuchs & Segre, *supra* note 10, at 143 (explaining that Martin Evan's research established the procedure for isolating stem cells that has been used by subsequent researchers).

110. *See* NIH PRIMER, *supra* note 20, at 12; Vogel, *supra* note 9, at 1419 (explaining that it has only been since 1999 that adult stem cells have revealed their possible pluripotency).

111. NIH PRIMER, *supra* note 20, at 12 (listing the well-developed procedures used to handle embryonic stem cells as an advantage over adult stem cells).

112. *See* Fuchs & Segre, *supra* note 10, at 143 (stating that "[t]he fabulous ability of an embryo to diversify . . . is a direct result of stem cells").

113. *See* Vogel, *supra* note 9, at 1418-19 (citing examples of adult stem cells showing malleability in their ability to differentiate).

cells are generally less pliable than their embryonic counterparts.[114] Indeed, it has been suggested that adult stem cells are not truly pluripotent at all, but are instead partially differentiated due to the numerous intra- and extra-cellular signals they receive during their years of dormancy in the adult body.[115]

If this concern is proven conclusively, adult stem cells will likely have fewer medical applications due to the limited number of cell types they can become.[116] That the blastocyst is a reliable source of truly pluripotent stem cells is a compelling reason to rely on this stem cell source for experimental studies.[117]

5. Blastocyst-Derived Stem Cells Have the Potential to Prevent Immuno-Rejection.

Finally, the blastocyst is preferred over other sources of stem cells because it offers the possibility of culturing tissues that are genetically indistinguishable from those of the recipient.[118] Recall that somatic cell nuclear transplantation ("SCNT") involves taking the nucleus from a somatic cell and placing it into an enucleated egg cell for subsequent division.[119] Through the use of SCNT, a person needing an organ or tissue transplant could use their own DNA to create a viable embryo which would then grow into a blastocyst.[120] The stem cells collected from such a blastocyst would be genetically indistinguishable from the recipient's own cells,[121] and presumably this would prevent immuno-rejection of the tissue or organ transplant.[122]

This result is not possible with any other method of stem cell collection because the stem cells obtained from adults and those collected from the embryos remaining after in vitro fertilization still contain the genetic

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114. *Id.* at 1419 (quoting stem cell biologist Margaret Goodell, who explained that "'[t]here are adult cell types that may have the potential to repopulate a number of different types of tissues'" but that this does not indicate that adult stem cells are as versatile as their embryonic counterparts).

115. *Id.* ("[M]any researchers say[] adult-derived stem cells are not going to be an exact substitute for embryonic or fetal cells.").

116. *Id.* ("Adult stem cells have a drawback, however, in that some seem to lose their ability to divide and differentiate after a time in culture. This short life-span might make them unsuitable for some medical applications.").

117. Maya Schuldiner et al., *Effects of Eight Growth Factors on the Differentiation of Cells Derived from Human Embryonic Stem Cells*, 97 PROC. NAT'L ASS'N SCI. 11,307, 11,307 (2000) (explaining that stem cells from the human blastocyst "are unique in their ability to grow indefinitely in culture while retaining normal [chromosome structure]").

118. Keller & Snodgrass, *supra* note 54, at 152.

119. *See* KOLATA, *supra* note 87, at 234; *see supra* text accompanying notes 86-87.

120. KOLATA, *supra* note 87, at 9.

121. Keller & Snodgrass, *supra* note 54, at 152. For clarification, the cloning of a whole, functional human has NOT yet been accomplished. Fuchs & Segre, *supra* note 10, at 153 ("The efficiency of reproductive cloning is presently too low to be feasible for regenerating a lost child or loved one.").

122. *See* KOLATA, *supra* note 87, at 234 ("[I]t might be possible to use the cloning breakthrough to enable patients to grow their own bone marrow that would be a perfect match and ready when the patient needed it.").

material of the donor.[123] The transplantation of stem cells containing foreign DNA subject the recipient to the same risk of immuno-rejection that current organ and tissue transplants have.[124] Thus, the use of SCNT to produce stem cells is likely to be preferred over other sources because the risk of immuno-rejection involved in organ and tissue transplants would be substantially reduced.[125]

E. What Are the Central Ethical Issues Involved in Stem Cell Research?

1. The SCNT Method Raises the Specter of Human Cloning.

The SCNT protocol used to create embryos for stem cell research is the same as that used to produce clones.[126] Through transfer of a donor nucleus into a recipient cell, SCNT creates a new cell that is genetically indistinguishable from the donor cell.[127] Since the donor cell and the recipient cell are genetically identical, the new cell is said to be a clone of the donor cell.[128] Indeed, "the cloning procedure is identical up to the point where a blastocyst created through human SCNT is either implanted into a woman's uterus (reproductive cloning) or used as a source of stem cells (research cloning)."[129]

The topic of human cloning for stem cell research purposes is rife with ethical issues and academic debate.[130] Some argue that creating human clones is unequivocally immoral and unethical,[131] while others see cloning as a new means of producing children that are genetically related to their parents[132] and as an extension of the fundamental right to privacy.[133] Still others see stem cell research and cloning as precursors to a brave new world

123. *Id.* at 236 (stating that "no marrow—unless it comes from an identical twin—is a perfect match, and so even in the best of circumstances, graft versus host disease is still a threat").

124. *See id.* at 235-36 (explaining that the use of a donor's tissue, such as bone marrow, can cause a fatal response from the recipient's own immune system).

125. *Id.* (stating "[h]ow fantastic it would be to jettison the risky transplants of other people's marrows and simply grow your own").

126. Capron, *supra* note 16, at 1061.

127. Keller & Snodgrass, *supra* note 54, at 152.

128. *See* KOLATA, *supra* note 87, at 234. *Contra* McLean, *supra* note 10, at 1020 (arguing that because the donor cell inevitably dies without its nucleus, the recipient cell isn't really a clone at all).

129. Capron, *supra* note 16, at 1061.

130. *Remarks by the President*, *supra* note 28 (admitting that "stem cells derived from human embryos is increasingly the subject of a national debate and dinner table discussions").

131. *Id.*

132. *Id.*

133. *See* Capron, *supra* note 16, at 1060 (although some claim the use of SCNT for cloning is part of their "reproductive rights," the Supreme Court has never decided whether the right to make decisions about family life included the right to engage in "artificial reproductive technologies"); Robertson, *supra* note 19, at 1393 (arguing that reproductive cloning should be included within the fundamental right to reproduce and protected accordingly).

where babies will be decanted from bottles and a new class of humans, composed of hundreds of indistinguishable clones, will be created.[134]

These fears may be unrealistic in some situations, but they are not entirely without foundation.[135] Researchers have begun experimenting with other, more questionable applications of SCNT, including transferring a human cell's nucleus into the emptied egg of a cow[136] and creating stem cells by mixing human skin with rabbit eggs.[137] The fear that these indiscriminate experiments are but a foreshadowing of other unscrupulous cloning applications only serves to keep the SCNT method used in stem cell research shrouded in controversy.[138]

2. Stem Cell Research Legitimizes the Use of Human Embryos as Research Subjects.

A second ethical issue arises when the possible benefits of stem cell research are weighed against the risks.[139] Some argue that the potential applications of stem cell research would alleviate the suffering of millions and that to stand in the way of this panacea is insensitive and detached.[140] Others claim that an unheeded scramble towards the stem cell cure-all is imprudent and may result in overlooking more important social policies that cannot, once lost, be restored.[141]

This weighing of the benefits and risks associated with stem cell research strikes to the heart of the issue because the creation of cloned human embryos through SCNT is the means most likely to create effective and compatible organs and tissues for transplants.[142] The use of SCNT would likely lead to breathtaking breakthroughs in transplantation therapy, but at the cost of legitimizing research on cloned human embryos.[143] Whether the ends of stem cell research will justify the means used to accomplish it remains an issue that is hotly contested.[144]

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134. Robertson, *supra* note 19, at 1384; ALDOUS HUXLEY, BRAVE NEW WORLD 3-7 (Harper & Bros. Publishers 1946) (1932) (describing the process by which children are created in the laboratory). The cloning of a human worker race is simply "[t]he principle of mass production at last applied to biology." *Id.* at 6-7.

135. *See* Krauthammer, *supra* note 2.

136. *Id.*

137. Antonio Regalado, *Chinese Scientists Report Advance in Stem-Cell Work*, WALL ST. J., August 14, 2003, at D5.

138. Capron, *supra* note 16, at 1059 (explaining that, of the 31,007 mammal eggs used in cloning research worldwide, only 267 live offspring have resulted, "many of whom have had crippling and even lethal abnormalities").

139. Krauthammer, *supra* note 2 (claiming that "Millions are suffering. This is precisely the argument that research-cloning advocates are deploying today to allow them to break the moral barrier of creating . . . human embryos solely for their exploitation.").

140. *Id.*

141. *See Remarks by the President*, *supra* note 28.

142. Recall that since embryos created through SCNT are genetically identical to the donor, the organs and tissues that they can presumably give rise to would be the most effective transplants and would curtail the risk of immuno-rejection by the recipient. *See* KOLATA, *supra* note 87, at 236.

143. *See Remarks by the President*, *supra* note 28.

144. *Id.* (admitting that the issue of whether human embryos should be used for stem cell research is one about which there is "widespread disagreement").

3. Stem Cell Research Challenges the Views of When Human Life Begins.

A third ethical conundrum that arises in the context of stem cell research involves the debate over the point at which human life begins.[145] The specter of abortion is raised when a researcher takes a human embryo and "dismember[s] it for its mother lode of stem cells."[146] Those who claim that human life begins at conception argue that both using embryos left over from in vitro fertilization and creating embryos solely for their subsequent destruction are the wanton taking of human life.[147] An extension of these beliefs blurs the line between the creation of embryos for research (i.e., therapeutic cloning) and their creation for implantation in the uterus (i.e., reproductive cloning).[148] Indeed, some argue that "[a]ll cloning is reproductive" because both therapeutic and reproductive cloning "produces another human life."[149]

Others oppose these contentions, claiming that an undifferentiated cell mass that is barely perceivable by the human eye, the blastocyst, is "not yet an individual . . . because it cannot develop on its own."[150] Still others argue that, independent of the abortion debate, the creation of human embryos solely for the purpose of their destruction carries with it a callous disrespect for life and is an affront to humanity that should not be tolerated.[151] The conflicting views on when human life begins and how these concerns should be reflected in law and public policy will continue to be an issue as stem cell research progresses.[152]

III. GOVERNMENTAL REACTIONS TO STEM CELL RESEARCH

A. How Has the Federal Government Responded to Stem Cell Research?

Because human stem cell research is largely focused on the use of embryos as research subjects,[153] regulations that restrict the uses of human

145. *Id.* (stating that "this issue forces us to confront fundamental questions about the beginnings of life and the ends of science").

146. Krauthammer, *supra* note 5.

147. *Remarks by the President*, *supra* note 28 (explaining that many feel that "the fact that a living being is going to die does not justify experimenting on it").

148. Brownback, *supra* note 18.

149. *Id.*

150. *Remarks by the President*, *supra* note 28.

151. Krauthammer, *supra* note 5 (arguing that you do not have to believe that life begins at conception to believe that "stem-cell research may legitimize the mechanization of life, the making of the human fetus into the ultimate guinea pig.").

152. *See Remarks by the President*, *supra* note 28.

153. *Id.* (admitting that "most scientists, at least today, believe that research on embryonic stem cells offer [sic] the most promise"); Capron, *supra* note 16, at 1061.

embryos also limit the applications of stem cell research.[154] In 1994, the National Institutes of Health Human Embryo Research Panel reviewed the ethical issues involved in embryo research and issued a report summarizing its findings.[155] Included in the Panel's report were suggestions that federal funding be provided to create human embryos for research that *could not be conducted in any other ways*, but that federal funding should be withheld from research that unnecessarily relied on nuclear transfer technology.[156] Taking these suggestions into consideration,[157] President Clinton issued an executive order that denied federal funding for human cloning research.[158]

Congress rapidly followed these initial steps with a 1996 ban on the use of federal funds for the "creation of a human embryo or embryos for research purposes" and "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 . . . ."[159] Congress has renewed this ban every year since its passing, and it currently remains in effect.[160]

The Congressional ban on the use of federal funds to create or destroy human embryos for research purposes served only as a temporary damper on stem cell research, however.[161] In January 1999, the Department of Health and Human Services ("DHHS") examined the Congressional restriction and concluded that the ban did not apply to stem cell research.[162]

The National Institutes of Health ("NIH") followed the DHHS's decision with one of their own just eighteen months later.[163] The NIH issued a rule that federal dollars could continue to fund research projects that used human embryos as long as the federal dollars were not actually used in the purchase or destruction of the embryos.[164] This decision apparently rested on the assumption that stem cells are not true embryos and thus did not fall within the Congressional regulation.[165] Some have criticized the NIH's rule as one that requires researchers to try and trace the final destination of every federal dollar received, thus skirting Congress's ban through technical compliance.[166]

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154. *See Remarks by the President*, *supra* note 28.

155. California Report, *supra* note 16, at 1160 (citing the NAT'L INSTS.OF HEALTH, REPORT OF THE HUMAN EMBRYO RESEARCH PANEL (1994)).

156. *See* California Report, *supra* note 16, at 1160.

157. Robertson, *supra* note 19, at 1434.

158. *See id.*; California Report, *supra* note 16, at 1159.

159. Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, Pub. L. No. 107-116, § 510(a), 115 Stat. 2177, 2219 (2002).

160. *See* Tara L. Branum, *President or King? The Use and Abuse of Executive Orders in Modern-Day America*, 28 J. LEGIS. 1, 45 n.217 (2002).

161. *Id.*

162. *Id.*

163. *Id.*

164. *Id.*

165. *Id.*

166. *See id.*

During President Bush's time in office, discussion of stem cell research and its ethical implications continued to escalate.[167] A combined total of ten pieces of potential cloning legislation were introduced in the 107th Congress during the first session alone.[168] Although three separate bills were presented to the Senate, not a single one passed.[169] Of the seven bills brought before the House of Representatives,[170] only one bill gained approval.[171]

The single bill that the House of Representatives supported sought a broad ban of cloning-related research and would have made it illegal to perform the SCNT procedure for either reproductive or stem cell research purposes.[172] Further, the bill would have outlawed the SCNT procedure regardless of whether the research was funded with private or public dollars.[173] Despite the House's endorsement of this bill and President Bush's prompting for the Senate to pass the bill,[174] the Senate refused to approve or reject the controversial piece of legislation, choosing instead to postpone its decision until a later unspecified date.[175]

Perhaps frustrated with the Senate's inaction, President Bush gave closure to the federal funding issue just nine days later when he issued an executive order limiting federal funding for research to the sixty embryonic stem cell lines[176] already in existence at the time of his announcement.[177]

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167. *Remarks by the President*, *supra* note 28 (explaining that stem cell research is "a complex and difficult issue, an issue that is one of the most profound of our time").

168. Maria S. Quintero, Comment, *Cloning Californians? Report of the California Advisory Committee on Human Cloning and Recent Cloning-Related Legislation*, 18 SANTA CLARA COMPUTER & HIGH TECH. L.J. 417, 425 (2002).

169. *Id.* The three bills that were introduced were Human Cloning Prohibition Act, S. 704, 107th Cong. (2001); Human Cloning Prohibition Act of 2001, S. 790, 107th Cong. (2001); and Human Cloning Prohibition Act of 2001, S. 1758, 107th Cong. (2001).

170. Ban on Human Cloning Act, H.R. 1260, 107th Cong. (2001); Human Cloning Research Prohibition Act, H.R. 1372, 107th Cong. (2001); Human Cloning Prohibition Act of 2001, H.R. 1608, 107th Cong. (2001); Human Cloning Prohibition Act of 2001, H.R. 1644, 107th Cong. (2001); Cloning Prohibition Act of 2001, H.R. 2172, 107th Cong. (2001); Human Cloning Prohibition Act of 2001, H.R. 2505, 107th Cong. (2001); Cloning Prohibition Act of 2001, H.R. 2608, 107th Cong. (2001).

171. *See* Human Cloning Prohibition Act of 2001, H.R. 2505, 107th Cong. (2001). On July 31, 2001, the House of Representatives passed this proposal by a vote of 265 to 162. Quintero, *supra* note 168, at 430.

172. *See* H.R. 2505 § 302. *See also* Jonathan S. Swartz, Comment, *The Human Cloning Prohibition Act of 2001: Vagueness and Federalism*, 43 JURIMETRICS J. 79, 80-82 (2002).

173. *See* H.R. 2505 § 302. *See also* Swartz, *supra* note 173, at 80-82.

174. Quintero, *supra* note 168, at 430.

175. *Id.* (explaining that the Senate refused to vote on the bill and instead set it aside until cloture lapsed).

176. A stem cell line is established when stem cells are grown and maintained in culture for a period of at least six months without differentiating into any specific cell type. NIH PRIMER, *supra* note 20, at 5.

Since the announcement of this executive order nearly a year and a half ago, Congress has remained relatively silent on stem cell issues.[178]

Recently, however, Congress appears to have awoken from its dormancy.[179] On February 27, 2003, the House of Representatives passed yet another anti-cloning bill, the Human Cloning Prohibition Act of 2003.[180] This bill earned bipartisan support, passing by a wide margin of 241 to 155.[181] The stated goals of this bill are to prohibit all forms of human cloning, both therapeutic and reproductive, upon pain of criminal and civil penalties.[182] Although the Senate has not yet voted on this bill, many commentators are suggesting that it will fail just as the Human Cloning Prohibition Act of 2001 did.[183] The Senate's lackluster attitude towards such legislation seems to be due to the bill's utter prohibition of nuclear transfer technology, even for therapeutic applications such as stem cell research.[184]

In sum, both the House of Representatives and the Senate have considered numerous pieces of legislation aimed at directly regulating the SCNT procedure used in stem cell research.[185] Yet, as of today, there is not a single cloning-specific piece of federal legislation in effect in the United States.[186]

B. How Have the States Responded to Stem Cell Research?

Following the 1996 cloning and birth of Dolly, the sheep of worldwide fame created through the same SCNT method used in stem cell research,[187] bills to prohibit human cloning were introduced in a majority of states.[188] Although the topic was widely discussed, only eight states actually followed through with legislation that banned human cloning:[189] California in 1997,[190]

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177. *Remarks by the President*, *supra* note 28; *cf. Nuclear Transfer: Stanford to Develop Human Stem Cells*, STEM CELL WEEK, Jan. 6, 2003, at 11 [hereinafter *Nuclear Transfer*] (claiming that it is now known that seventy-eight stem cell lines were created before August 9, 2001).

178. Congress did consider two additional bills in its second term, but neither one passed. *See* Human Cloning Prohibition Act of 2001, S. 1899, 107th Cong. (2002); Human Cloning Prohibition Act of 2002, S. 2439, 107th Cong. (2002).

179. *See* Sheryl Gay Stolberg, *House Votes to Ban All Human Cloning*, N.Y. TIMES, Feb. 28, 2003, at A22 .

180. Human Cloning Prohibition Act of 2003, H.R. 234, 108th Cong. (2003).

181. Stolberg, *supra* note 179. The bill was sponsored in the House of Representatives by Dave Weldon (R). *Id.*

182. Human Cloning Prohibition Act of 2003, H.R. 234, 108th Cong. (2003); *see* Stolberg, *supra* note 179.

183. *See, e.g.*, Stolberg, *supra* note 179.

184. *See, e.g.*, *id.*

185. *See supra* text accompanying notes 159, 168-75, 180-82.

186. *See, e.g.*, Quintero, *supra* note 168, at 430.

187. KOLATA, *supra* note 87, at 1.

188. California Report, *supra* note 16, at 1161.

189. It also bears mentioning that Missouri has enacted a statute that, although not prohibiting human cloning itself, has outlawed the use of state funds for such research. 2002 MO. LAWS 1.217.

190. CAL. BUS. & PROF. CODE § 2260.5 (West 2003); CAL. BUS. & PROF. CODE §§ 16004, 16105 (West Supp. 2004); CAL. HEALTH & SAFETY CODE §§ 24185, 24187 (West Supp. 2004).

Michigan[191] and Rhode Island in 1998,[192] Louisiana in 1999,[193] Virginia in 2001,[194] Iowa in 2002,[195] and North Dakota[196] and Arkansas in 2003.[197]

California's anti-cloning law placed a moratorium on human cloning for five years, until January 1, 2003.[198] The law did not limit non-reproductive cloning, thus allowing the SCNT method to be utilized for stem cell research, but restricted only the actual implantation of a cloned human embryo into a woman's uterus.[199]

In 2002, the California legislature extended the ban on human cloning indefinitely and created the Advisory Committee on Human Cloning to advise the legislature on issues relating to human cloning technology.[200] This Committee has the authority to assess issues related to the use of human cloning.[201] The Committee's first report was recently delivered to the California legislature and the Governor, with legislative action based on the Committee's findings to presumably follow.[202]

Rhode Island's and Louisiana's statutes seem to be modeled after California's in that they prohibit the implantation of cloned human embryos but little else.[203] Michigan's statute is broader, prohibiting reproductive and non-reproductive (SCNT) cloning without any sunset date.[204] Virginia's statute is also quite broad and appears to be aimed at the SCNT method in particular by prohibiting the transfer of a human cell nucleus into an oocyte.[205] Iowa's human cloning prohibition criminalizes the transfer of somatic cell genetic material into an emptied egg, and explicitly outlaws the use of the SCNT procedure for either reproductive or therapeutic

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191. MICH. STAT. ANN. §§ 333.16274 to 333.16275, 333.20197, 333.26401 to 333.26406 (Michie 1998).

192. R.I. GEN. LAWS §§ 23-16.4-1 to 23-16.4-4 (1998).

193. LA. REV. STAT. ANN. §§ 1285(A)(31), 1299.36 to 1299.36.6 (West 1999) (operative until July 1, 2003).

194. VA. CODE ANN. §§ 32.1-162.21 to 32.1-162.22 (Michie 2001).

195. IOWA CODE ANN. §§ 707B.2 to 707B.3 (West 2003).

196. 2003 N.D. LAWS 12.1-39-02.

197. ARK. CODE ANN. §§ 20-16-1002 to 20-16-1003 (Michie 2003).

198. CAL. BUS. & PROF. CODE §§ 16004-16105, 2260.5 (2001) (operative until Jan. 1, 2003); CAL. HEALTH & SAFETY CODE §§ 24185, 24187 (West 2001) (operative until Jan. 1, 2003).

199. CAL. HEALTH & SAFETY CODE § 24185-86 (West 2003).

200. *See* CAL. HEALTH & SAFETY CODE § 24186 (West 2003).

201. *See id.*

202. *See* California Report, *supra* note 16, at 1159.

203. *See* R.I. GEN. LAWS §§ 23-16.4-1 to 23-16.4-4 (2002); LA. REV. STAT. ANN. §§ 1285(A)(31), 1299.36 to 1299.36.6 (2002); *see also* California Report, *supra* note 16, at 1161 (comparing California's law with those of Rhode Island and Louisiana).

204. *See* MICH. STAT. ANN. §§ 333.16274 to 333.16275, 333.20197, 333.26401 to 333.26406 (Michie 1998); *see also* California Report, *supra* note 16, at 1161 (comparing California's law with Michigan's).

205. *See* VA. CODE ANN. §§ 32.1-162.21 to 32.1-162.22 (Michie 2001); *see also* California Report, *supra* note 16, at 1161 (comparing California's law with Virginia's).

purposes.[206] North Dakota's law makes it a criminal act to clone humans through SCNT procedures and prohibits the receipt or transfer of cloned human embryos and fetuses.[207] Finally, Arkansas's statute forbids human cloning and the transfer or receipt of human clones upon penalty of criminal prosecution and substantial monetary fines.[208]

The emphasis these state anti-cloning laws place on the SCNT method is crucial to the issue of stem cell research because so many of the procedures used in the cloning process are also utilized to further stem cell research.[209] Prohibiting the use of certain procedures, as opposed to enacting a moratorium on the reproductive cloning of whole organisms, could effectively curtail progress in stem cell therapies even if that was not the legislature's intent.[210]

Even in states without laws aimed specifically at the procedures used in cloning, there is often legislation that curtails forward movement in stem cell research.[211] The laws that most often threaten to limit stem cell research are those that were drafted with a different purpose in mind—namely, the discouragement of abortion related research.[212] Statutes forbidding research on human embryos have been passed in more than twenty states,[213] and the majority of such laws were enacted many years before stem cell research became widely discussed.[214] Such laws could be applied to prohibit certain types of research that rely on the use of human embryos as a source of stem cells.[215] Awareness of this indirect effect has led many states to make an exception for research on embryos that were created with the intent of being carried to a live birth.[216] Such a window of opportunity would allow researchers to continue their progress with stem cells through the use of embryos from in vitro fertilization, for example, because these embryos are created with the intent of being carried to term.[217]

More recently, California Governor Gray Davis signed into law a bill protecting stem cell research that uses any stem cell line, regardless of whether the line existed at the time of President Bush's federal funding moratorium.[218] This law, enacted on September 22, 2002, protects the use of human embryos for stem cell research when the embryo is one remaining

206. *See* IOWA CODE ANN. §§ 707B.2 to 707B.3 (West 2002).

207. *See* 2003 N.D. LAWS 12.1-39-02.

208. *See* ARK. CODE ANN. §§ 20-16-1002 to 20-16-1003 (Michie 2003) (requiring that the monetary fines imposed be either $250,000 or two times the pecuniary gain of the offender, whichever is greater).

209. *See* Capron, *supra* note 16, at 1061.

210. *Contra id.* at 1066-67 (arguing that the outlawing of the SCNT procedure will not necessarily inhibit the development of alternative stem cell therapies).

211. California Report, *supra* note 16, at 1161-62; *see also* 2003 S.D. Laws 34-14-17.

212. *See* California Report, *supra* note 16, at 1161-62.

213. *Id.* at 1161.

214. *Id.* at 1161-62.

215. *Id.*

216. *Id.* at 1162; *see also* Henry T. Greely, *Banning "Human Cloning": A Study in the Difficulties of Defining Science*, 8 S. CAL. INTERDISC. L.J. 131 (1998).

217. California Report, *supra* note 16, at 1162; *see Remarks by the President*, *supra* note 28.

218. Health Care Providers—Human Embryos—Research Act, ch. 789, S.B. No. 253 (West 2002) (to be codified at CAL. HEALTH & SAFETY CODE §§ 125115-17).

from in vitro fertilization.[219] Further, this legislation explicitly permits use of the SCNT procedure for the creation of embryos as a source of stem cells for research.[220] The law also advocates using State funds to encourage stem cell research, thus expanding the sphere of publicly funded research to include stem cell lines that were created after President Bush's executive order.[221]

The stated motivations behind this new piece of legislation are the "immense promise for developing new medical therapies" through stem cell research and the wish to "maintain California's worldwide leadership in biomedicine and biotechnology."[222] It is likely that the State of California is not alone in its quest for such benefits, and that other states will soon follow its legislative lead.

IV. CONGRESSIONAL USE OF THE TAXING AND SPENDING POWERS TO REGULATE STEM CELL RESEARCH

A. What Is Conditional Funding, and How Is It Founded in the Taxing and Spending Powers?

The first paragraph of Article I, Section 8 of the Constitution gives Congress the power to "lay and collect Taxes, Duties, Imposts and Excises, to pay the Debts and provide for the common Defence and general Welfare of the United States . . . ."[223] Embodied within this clause are the taxing and spending powers that grant Congress the right to determine the federal budget's distribution and to raise revenue to support its enterprises.[224] Inherent within the distribution of federal funds is the power to place some level of limitation on what those funds are used for.[225] For example, funds earmarked for highway construction should clearly not be used to redesign the governor's mansion.[226]

Conversely, there must be some constitutional limitations on the conditions that Congress can attach to the receipt of federal funds, lest Congress be able to upset federalism by destroying the balance of power

219. *Id.* (requiring that informed consent be given by the owner of the embryos prior to their use for research purposes).

220. *Id.*

221. *Id.*

222. *Id.*

223. U.S. CONST. art. I, § 8, cl. 1.

224. *See* South Dakota v. Dole, 483 U.S. 203, 206-07 (1987).

225. *See id.*; Donald L. Beschle, *Conditional Spending and the First Amendment: Maintaining the Commitment to Rational Liberal Dialogue*, 57 MO. L. REV. 1117, 1119-20 (1992).

226. Beschle, *supra* note 225, at 1120.

between the states and the federal government.[227] Lying between these two extremes is the application of conditional taxing and funding schemes.[228] In such schemes, Congress conditions a state's receipt of federal funds or avoidance of federal taxes upon the state's conformation with a Congressionally advocated policy or rule.[229] Following the suggestions of Congress will earn the state federal funding or fewer taxes, while failure to follow Congressional prompting will result in the loss of the federal benefit but the gain of a state policy that is more akin to the interests of the state's residents.[230]

Through a conditional taxing or funding scheme, Congress can influence the states to conform to federal suggestions without directly ordering them to do so through coercive legislation.[231] Some have hailed the conditional funding scheme as one that furthers federalism by allowing each state to make an independent decision that reflects the interests of its residents.[232] Others have condemned the conditional funding scheme as a way for Congress to end-run its enumerated powers and effectively regulate areas of state interest that would otherwise lie beyond its direct constitutional control through the taxing and spending power.[233]

B. What Limits Exist on the Congressional Use of the Conditional Taxing and Funding Powers?

1. *United States v. Butler* (1936)

One of the earliest cases involving the use of conditional taxing and spending schemes came before the Supreme Court in 1936.[234] *United States v. Butler*[235] involved a federal tax imposed on farm products under the Agricultural Adjustment Act,[236] the proceeds of which were paid to farmers who agreed to reduce the size of their crop production.[237] This taxing plan

227. *Dole*, 483 U.S. at 207; Albert J. Rosenthal, *Conditional Federal Spending and the Constitution*, 39 STAN. L. REV. 1103, 1105-06 (1987); *see also* Beschle, *supra* note 225, at 1120.

228. Rosenthal, *supra* note 227, at 1106.

229. *See* Ronald D. Rotunda, *The New States' Rights, the New Federalism, the New Commerce Clause, and the Proposed New Abdication*, 25 OKLA. CITY U. L. REV. 869, 877 (2000).

230. New York v. United States, 505 U.S. 144, 168 (1992) ("If a State's citizens view federal policy as sufficiently contrary to local interests, they may elect to decline a federal grant."); *see* Rosenthal, *supra* note 227, at 1162.

231. South Dakota v. Dole, 483 U.S. 203, 206 (1987); *see* Rotunda, *supra* note 229, at 877.

232. *New York*, 505 U.S. at 168 (claiming that "the residents of the State retain the ultimate decision as to whether or not the State will comply" with the condition); *see* Rosenthal, *supra* note 227, at 1104 (explaining that "[t]here may once have been an easy answer: If you don't like the conditions, don't take the money.").

233. Beschle, *supra* note 225, at 1119; Rosenthal, *supra* note 227, at 1104.

234. United States v. Butler, 297 U.S. 1 (1936).

235. *Id.*

236. *Id.* at 53.

237. *Id.* at 55.

was intended to stabilize the cost of agricultural products during the Great Depression by reducing the supply available for sale.[238]

The *Butler* Court defined a tax as "an exaction for the support of the Government."[239] The Court explained that merely labeling a piece of legislation as a tax is not sufficient to bring it under the taxing and spending power; rather, the true intention of Congress must be to generate revenue.[240] Because the Act at issue admitted that its goal was to subsidize farmers rather than raise revenue, the Court found insufficient evidence to merit protection of the Act under the taxing and spending powers.[241]

The Court then analyzed whether the true intention of the tax—to regulate agriculture[242]—was within Congress's other enumerated powers.[243] The Court took pains to expressly point out that although Congress cannot regulate things that are exclusively the business of the state,[244] neither is Congress "limited by the direct grants of legislative power found in the Constitution."[245] Concluding that the regulation of agriculture lay outside of Congress's enumerated powers, the Court struck down this conditional taxing scheme as one that exceeded Congress's constitutional powers.[246]

2. *Steward Machine Co. v. Davis* (1937)

In 1937, just one year after the decision in *Butler*, the Court decided *Steward Machine Company v. Davis*,[247] a case that would set the standard for conditional taxing and spending review for nearly half a century.[248] *Steward* involved a federal tax on employers which was imposed by Congress under the Social Security Act.[249] Employers could avoid up to ninety percent of this federally imposed tax if the state enacted its own unemployment fund, the fund met federally mandated criteria, and the state's employers were required to contribute to this fund.[250] The funds deposited into the state unemployment fund were then turned over to the United States Treasury and dispersed in accordance with the Social Security

238. *Id.* at 54.
239. *Id.* at 61.
240. *See id.*
241. *Id.* at 59-61. The Court went on to analyze whether the Act could be protected under Congress' other powers. *See id.* at 61.
242. *Id.* at 63-64.
243. *Id.* at 64-65.
244. *Id.* at 69.
245. *Id.* at 66.
246. *Id.* at 78.
247. Steward Mach. Co. v. Davis, 301 U.S. 548 (1937).
248. The law in this area remained nearly static until *South Dakota v. Dole*. South Dakota v. Dole, 483 U.S. 203, 207-08 (1987).
249. *Steward*, 301 U.S. at 574.
250. *Id.*

Act.[251] This conditional taxation scheme was challenged as being in violation of the principles of federalism because it allegedly coerced the State into creating an unemployment fund that it would not have created but for the conditional tax.[252]

The *Steward* Court distinguished these facts from those in *Butler*[253] by pointing out that *Butler*'s tax was earmarked for a selected few, a small group of farmers, whereas the tax in the present case entered the general fund of the United States Treasury without being set aside for a special group.[254] Further, the Court pointed out that *Butler* involved the conditional taxation of individuals through contractual arrangements, whereas the facts of the instant case involved a state law, which the state could repeal at its leisure.[255] Thirdly, the Court explained that the state legislature had passed its own unemployment compensation law, and that the approval of this law by the state discredited the claim that state powers were being usurped.[256] The Court relied on these distinctions when it promulgated a new test for the constitutionality of conditional federal taxation and funding schemes.[257]

The *Steward* test for the constitutionality of a conditional funding scheme sought to determine whether the imposed condition coerced the state into adopting laws of its own.[258] In formulating this test, the Court was careful to explain that coercion due to a conditional tax should not be confused with mere encouragement or regulation[259] because every tax is inherently regulatory to some extent.[260] Upon applying the coercion test to the facts, the Court stated that it could not say that the state "was acting, not of her unfettered will, but under the strain of a persuasion equivalent to undue influence, when she chose to have relief administered under laws of her own making."[261] The *Steward* court upheld the conditional tax, explaining that it was not one that contravened the interests of federalism.[262]

3. *South Dakota v. Dole* (1987)

In 1987, a major change in conditional taxing and spending precedent occurred with the Court's decision in *South Dakota v. Dole*.[263] In *Dole*, Congress passed a law that gave each state its full allotment of federal funding for state highway projects, but only if the state's law limited the

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251. *Id.* at 576.
252. *Id.* at 578.
253. United States v. Butler, 297 U.S. 1 (1936).
254. *Steward*, 301 U.S. at 592.
255. *Id.*
256. *Id.*
257. *Id.*
258. *Id.* at 589-90.
259. *Id.*
260. *Id.* ("Every tax is in some measure regulatory.") (citing Sonzinsky v. United States, 300 U.S. 506, 513 (1937).
261. *Steward*, 301 U.S. at 590.
262. *Id.* at 585.
263. South Dakota v. Dole, 483 U.S. 203 (1987).

drinking age to those twenty-one years old or older.[264] If the state law allowed drinking at a younger age, the Act dictated that five percent of the federal funds for state highways would be withheld.[265] South Dakota law permitted nineteen-year-olds to purchase beer,[266] and thus the State lost five percent of its federal funding for highways.[267] South Dakota challenged the conditional funding scheme as one that lay outside of Congress's powers and one that upset the interests of federalism by usurping state power.[268]

The *Dole* court held that goals outside of Congress's enumerated powers "may nevertheless be attained through the use of the spending power and the conditional grant of federal funds."[269] The Court also developed a four-part test for determining if the congressional use of the spending power was constitutional: (i) the use must be judged to be in pursuit of "the general welfare" after giving substantial deference to the judgment of Congress;[270] (ii) the condition that the state must meet to get full funding must be "unambiguous" so that the state can "exercise [its] choice knowingly, cognizant of the consequences of [its] participation;"[271] (iii) the condition must be related to a federal or national interest as judged from the condition's overall objectives;[272] and (iv) the condition must not be barred by any other constitutional provision, meaning that the spending "power may not be used to induce the States to engage in activities that would themselves be unconstitutional."[273]

Applying these four factors, the Court found that the condition in *Dole* was constitutional. The Act sought to limit the drinking age to twenty-one years, and the Court found that this condition was in the interest of the general welfare based on the deference accorded congressional findings.[274] The Court held that the Act's statement of the condition imposed was sufficiently unambiguous to give the states adequate notice of their rights, thus allowing the states to knowingly exercise their choice of participation or non-participation in the federal incentive scheme.[275] The Court judged the condition's objective to be the prevention of interstate drunk driving, which the Court found was within the national interest.[276] Finally, the Court found that the condition did not require the State to complete any act that would

264. *Id.* at 205.
265. *Id.* at 211.
266. *Id.* at 205.
267. *Id.* at 205-06.
268. *See id.*
269. *Id.* at 207.
270. *Id.*; *see* U.S. CONST. art. I, § 8, cl. 1.
271. South Dakota v. Dole, 483 U.S. 203, 207 (1987).
272. *Id* at 207-08.
273. *Id* at 208, 210.
274. *Id.* at 208.
275. *Id.*
276. *Id.* at 208-09.

itself be unconstitutional.[277] Having satisfied all four factors of the *Dole* test, the Court upheld the conditional funding scheme implemented by Congress.[278]

4. *New York v. United States* (1992)

The *Dole* factors have been further clarified through their application in the 1992 case of *New York v. United States*.[279] In *New York*, Congress attempted to alleviate the problem of low-level radioactive waste disposal by encouraging states to develop their own waste-disposal sites.[280] To encourage action on the part of the states, the Act prescribed three separate types of incentives: (i) monetary incentives that would be paid to states that took prompt action in developing a disposal site, (ii) access incentives which allowed states with disposal sites to slowly restrict access and increase costs to other states that wished to use the site, and (iii) take-title provisions which would force the states to take title to and full responsibility for any radioactive waste in their state that could not be disposed of due to state inaction.[281]

The Court applied the four-factor *Dole* test to the Act's conditional monetary incentives[282] and settled the other incentives on different grounds.[283] The conditional monetary incentives established by the Act were held to pass the first requirement of the *Dole* test because the incentive pursued the general welfare by seeking the safe disposal of low-level radioactive waste.[284] The second *Dole* requirement was likewise met, because the Congressional Act "inform[ed] the States exactly what they must do and by when they must do it in order to obtain a share" of the federal funds.[285] The Court held that the monetary incentives related to the national interest of addressing the radioactive waste disposal problem, such that *Dole*'s third requirement was also satisfied.[286] Finally, the Court held that the conditions imposed for receipt of the federal funds did not appear to violate any independent constitutional provision.[287] Because all four factors of the *Dole* test were met, the Court concluded that the Act's conditional funding scheme was "well within the authority of Congress under the . . .

277. *Id.* at 209-210. Justice O'Connor argued that the regulation of alcohol is the exclusive jurisdiction of the state under the twenty-first amendment, and therefore it is unconstitutional for Congress to condition funding on the State's surrender of this right. *Id.* at 212 (O'Connor, J., dissenting).

278. *Dole*, 483 U.S. at 212.

279. 505 U.S. 144 (1992).

280. *Id.* at 150-51.

281. *Id.* at 152-54.

282. *Id.* at 171-72.

283. *Id.* at 174 (holding that the access incentives are a permissible exercise of the Congress' commerce power); *id.* at 176 (holding that the take-title incentive is an unconstitutional commandeering of the States' legislative processes).

284. *Id.* at 172.

285. *Id.* at 172.

286. *Id.*

287. *Id.*

Spending Clause[]" and permissibly encouraged the states to develop their own radioactive waste disposal sites.[288]

C. *Are the* Dole *Factors for Conditional Federal Funding Met in the Stem Cell Research Context?*

The inextricable nature of stem cell research and human cloning means that legislation banning or limiting human cloning will likely have a great impact on stem cell research.[289] Current limitations on federal dollars are already putting pressure on researchers to find alternative sources of funding.[290] Still, the fact remains that a majority of stem cell research facilities are at least partially funded with federal dollars.[291] Whether or not Congress can impose additional limitations on these crucial funds is a constitutional question to which *South Dakota v. Dole* provides some answer.[292]

1. Stem Cell Research Legislation Would Be in Pursuit of the General Welfare.

The first requirement under *Dole* that Congress must meet before conditionally distributing federal funds is a showing that the imposed regulation is in pursuit of the general welfare.[293] Although regulating stem cell research does not appear on its face to fall within one of Congress's enumerated powers, the Court has ruled that Congress is permitted to use the taxing and spending powers to regulate non-enumerated areas.[294] Further, the *Dole* test requires that the Court give substantial deference to the judgment of Congress.[295] Thus, because Congress has found stem cell research to be a topic rife with ethical, moral, and social concerns, the general welfare requirement would almost certainly be met.[296]

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288. *Id.* at 173; *id.* at 189 (White, J., concurring in part and dissenting in part).

289. *See supra* text accompanying notes 126-30, 209-210.

290. Sheryl Gay Stolberg, *Stem Cell Research is Slowed by Restrictions, Scientists Say*, N.Y. TIMES, Sept. 26, 2002, at A27 ("research on human embryonic stem cells [is] moving exceedingly slowly because of the severe restrictions that President Bush has imposed on federal financing for the work").

291. *See id.*; Ortiz, *supra* note 23, at 1119-22.

292. South Dakota v. Dole, 483 U.S. 203, 207-08 (1987).

293. *Id.* at 207; *see, e.g.*, United States v. Am. Library Ass'n, Inc., 123 S.Ct. 2297, 2303 (2003) (finding that "[p]ublic libraries pursue the worthy missions of facilitating learning and cultural enrichment."); Pennhurst State Sch. & Hosp. v. Halderman, 451 U.S. 1, 17 n.13 (1981) (stating that "[t]here are limits on the power of Congress to impose conditions on the States pursuant to its spending power").

294. *Dole*, 483 U.S. at 207.

295. *Id.*

296. *See id.*; 148 Cong. Rec. H3760 (daily ed. Jun 20, 2002) (statement of Mr. Pence).

2. Stem Cell Research Legislation May Be Unambiguous If the Congress States Clearly What Is and What Is Not Prohibited.

The second requirement imposed by *Dole* is that the condition upon which federal funds are dispersed be unambiguous, thus "enabl[ing] the States to exercise their choice knowingly, cognizant of the consequences of their participation."[297] This portion of the test is determined on a case-by-case reading of the legislation that is enacted by Congress.[298] If the legislation clearly states under what circumstances the States will or will not receive federal funding (e.g., placing an absolute prohibition on the use of SCNT or prohibiting the creation of embryos with the intent to destroy them) then this element of the *Dole* test will be met.[299]

3. Stem Cell Research Legislation Would Be Related to the Federal Interest.

Thirdly, *Dole* requires that the imposed condition must be related to some federal interest.[300] The federal interest cited in *Dole* was the prevention of interstate drunk driving by teenagers through a national solution, conditional funding for state highways.[301] In *New York v. United States*,[302] the Court was satisfied that solving the nationwide radioactive material disposal problem was a federal interest meeting this third *Dole* requirement.[303] Stem cell research, and its accompanying issue of human cloning, is a problem that has permeated the United States[304] and has extended beyond our national borders to become a worldwide issue.[305] Further, the Supreme Court has held that "[t]he Government can, without violating the Constitution, selectively fund a program to encourage certain activities it believes to be in the public interest."[306] In the case of stem cell research, there can be little doubt that it is considered by the government to lie within the national interest.[307] Based on the federal nature of the stem

297. *Dole*, 483 U.S. at 207; *see, e.g., Am. Library Ass'n, Inc.*, 123 S.Ct. at 2301; *Halderman*, 451 U.S. at 17 (stating that "if Congress intends to impose a condition on the grant of federal moneys, it must do so unambiguously").

298. *See Dole*, 483 U.S. at 207.

299. *See id.*; *accord* New York v. United States, 505 U.S. 144, 172 (1992).

300. *Dole*, 483 U.S. at 207; *see, e.g., Am. Library Ass'n, Inc.*, 123 S.Ct. at 2308 (asserting that Internet assistance programs were intended to help public libraries fulfill their traditional informative and educational roles); *Halderman*, 451 U.S. at 20 (giving deference to the Congressional opinion that providing care and financial assistance to the developmentally disabled was a federal concern).

301. *Dole*, 483 U.S. at 208.

302. 505 U.S. 144 (1992).

303. *Id.* at 172.

304. 148 Cong. Rec. H3760 (daily ed. Jun 20, 2002) (statement of Mr. Pence).

305. Krauthammer, *supra* note 73 (explaining that Great Britain legalized embryonic stem cell research and also therapeutic human cloning).

306. Rust v. Sullivan, 500 U.S. 173, 193 (1991) (holding that the decision to withhold federal dollars from funding abortion procedures was a constitutional exercise of the conditional funding power).

307. Associated Press, *supra* note 17 (quoting President Bush as saying that the House of Representative's vote in favor of banning human cloning "demonstrates concern for the profound

cell research debate and the Court's deference in favor of this governmental determination, the third factor of *Dole* is likely to be met.[308]

4. Stem Cell Legislation Would Not Conflict With Other Constitutional Provisions.

The final *Dole* factor dictates that even if the other three requirements are met, the conditional funding scheme will be struck down if an independent Constitutional provision forbids the required incentive at issue.[309] The Court has interpreted this fourth factor to mean that Congress cannot require the states to engage in an action that is in itself unconstitutional in order to secure federal funds.[310] Some have argued that the human cloning procedures used in stem cell research are an extension of the right to procreate, a fundamental right that the Court has protected.[311] Despite this argument, it remains for the Court to decide if there is a constitutional right to conduct stem cell research or reproduce through human cloning.[312]

Even if the Court eventually decides that the right to conduct stem cell research, or some facet of it, is a fundamental right, that does not *per se* prevent Congress from conditionally funding stem cell research. The Court has held that "the Government has no obligation to subsidize even the exercise of fundamental rights,"[313] and "[a] refusal to fund protected activity . . . cannot be equated with the imposition of a 'penalty' on that activity."[314] Thus, should conducting stem cell research be declared a fundamental right, the Senate is neither required to provide funding for its progress nor constitutionally prohibited from withholding federal funds from such research.[315] Because there does not appear to be an independent constitutional provision that would prohibit Congress from conditioning the receipt of federal funding on state-imposed research limitations, the fourth *Dole* factor appears to be met.[316]

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moral and social issues posed"). "Congress must act now . . . We can no longer wait for another biotech company to claim they have cloned children." *Id.* (statement of Rep. Sue Myrick (R)).

308. *See id.*; *see also Rust*, 500 U.S. at 193.

309. South Dakota v. Dole, 483 U.S. 203, 208 (1987); *see, e.g.*, United States v. Am. Library Ass'n, Inc., 123 S.Ct. 2297, 2303 (2003) (explaining that "Congress may not 'induce' the recipient 'to engage in activities that would themselves be unconstitutional'") (citing *Dole*, 483 U.S. at 210).

310. *Dole*, 483 U.S. at 210.

311. Robertson, *supra* note 19, at 1393 (arguing that reproductive cloning should be included within the fundamental right to reproduce and protected accordingly).

312. *See* Capron, *supra* note 16, at 1060 (although some claim the use of SCNT for cloning is part of their "reproductive rights," the Supreme Court has never decided whether the right to make decisions about family life included the right to engage in "artificial reproductive technologies").

313. Rust v. Sullivan, 500 U.S. 173, 182 (1991).

314. *Id.* at 193 (citation omitted).

315. *See id.*

316. *See id.*; *Dole*, 483 U.S. at 207.

Therefore, because all four of the *Dole* factors would probably be met in the stem cell research context, it appears that Congress has sufficient constitutional power to implement legislation that indirectly regulates stem cell research through the use of conditioned federal funding. This power could carry grave consequences for stem cell research and its potentially beneficial applications if Congress improvidently applies it in a harshly restrictive fashion.[317] Conversely, a thoughtful and considerate piece of legislation that prohibits certain applications of stem cell research while allowing others to continue unabated could succeed in allaying the public's fears while giving researchers and potential recipients the chance to design and enjoy the remedies from future discoveries.[318]

V. LIKELY SOCIAL IMPACTS IF CONGRESS REGULATES STEM CELL RESEARCH THROUGH A CONDITIONAL FUNDING SCHEME

A. *What Is the National Scene Into Which Research Limiting Legislation Would Be Introduced?*

The ethical issues involved in stem cell research have been the primary focus of the ongoing debate, often to the exclusion of the funding issue.[319] "Indeed, most research is on hold as policy-makers grapple with the ethics of human embryo research."[320] Whatever the eventual outcome of these ethical debates, the receipt of funds, regardless of their source, will remain crucial to the success of stem cell research.[321] In 2001 alone the federal government put $250 million towards stem cell research on adult tissues and in animals.[322] President Bush admitted that "[f]ederal dollars help attract the best and brightest scientists"[323] while "ensur[ing that] new discoveries are widely shared at the largest number of research facilities and that [stem cell] research is directed toward the greatest public good."[324]

States, too, are aware that the biomedical sciences, including stem cell research, have the potential to generate vast revenues for any state that successfully cultivates the industry.[325] The expansion of stem cell research, however, will remain predicated upon having sufficient funds to support

317. *See supra* text accompanying notes 210-218.

318. *See supra* text accompanying notes 210-218.

319. Michael H. Shapiro, *I Want a Girl (Boy) Just Like the Girl (Boy) That Married Dear Old Dad (Mom): Cloning Lives*, 9 S. CAL. INTERDISC. L.J. 1, 242 (2000) (expressly omitting any discussion of the constitutional limits imposed on the Federal Government under the taxing and spending powers).

320. Vogel, *supra* note 9, at 1418.

321. *See Remarks by the President*, *supra* note 28.

322. *Id.*

323. *Id.*

324. *Id.*

325. *See* Health Care Providers—Human Embryos—Research Act, ch. 789, S.B. No. 253 (West 2002) (to be codified at CAL. HEALTH & SAFETY CODE §§ 125115-17) (stating that "the biomedical industry . . . reports nearly $7.8 billion in worldwide revenue, and would be significantly diminished by limitations imposed on stem cell research").

extended research and the availability of a suitable source of stem cells.[326] The combination of a state's desire to generate revenue,[327] the potential lobbying for "the best and brightest scientists,"[328] and the race to secure proprietary rights to the coveted stem cell lines has created a situation in which the states may wind up competing with each other to become the preeminent forum for stem cell research.[329] Such a situation seems ripe for the leveling of the playing field through uniform federal legislation.[330]

Although President Clinton and President Bush have both used the executive order to implement national policy,[331] the Constitution dictates that the duty of federal lawmaking rests squarely on the shoulders of Congress.[332] Additionally, the numerous bills dealing with cloning and stem cell research procedures that have been considered by Congress provide evidence that Congress is moving towards a federal law, albeit slowly.[333] If Congress does impose direct federal regulations on stem cell research, similar regulations by the states may be unnecessary due to preemption[334] or invalid through operation of the Supremacy Clause.[335]

As an alternative to such coercive legislation, Congress may prefer to steer the states in a certain direction while still allowing each state to make its own policy decisions regarding stem cell research.[336] Conditional funding may serve as the means to accomplish this end and has been overwhelmingly used to regulate other bioethical issues.[337] Indeed, the historical approach to controlling research on human subjects appears to be indirect regulation by Congress through the use of conditioned federal funding.[338] By limiting the use of federal funds to those states which follow

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326. *See Remarks by the President*, *supra* note 28. "[H]uman ES cells are unavailable to most researchers because of proprietary concerns." Vogel, *supra* note 9, at 1418.

327. *See* Health Care Providers—Human Embryos—Research Act, ch. 789, S.B. No. 253.

328. *Remarks by the President*, *supra* note 28; *Nuclear Transfer*, *supra* note 177 (reporting that even universities are lobbying for stem cell researchers as some are leaving the U.S. for foreign shores where there are fewer restrictions on stem cell research).

329. Vogel, *supra* note 9, at 1418 (explaining the difficulty of acquiring human embryonic stem cells for research due to proprietary rights in the stem cell lines); *Nuclear Transfer*, *supra* note 177 (stating that the research community may only be sharing as few as four stem cell lines out of seventy-eight lines worldwide).

330. *See supra* notes 325-29.

331. Branum, *supra* note 160, at 4.

332. *See* U.S. CONST. art. I, § 1. Although a discussion of the constitutionality of President Clinton's and President Bush's executive orders regulating stem cell research is beyond the scope of this article, a useful analysis of this issue can be found in Branum, *supra* note 160, at 45-50.

333. *See supra* text accompanying notes 159, 169-73, 180-82.

334. *See* California Report, *supra* note 16, at 1199.

335. *See* U.S. CONST. art. VI, § 2.

336. Robertson, *supra* note 19, at 1437.

337. *Id.*; *see supra* text accompanying notes 156–160.

338. *See* John A. Robertson, *The Law of Institutional Review Boards*, 26 UCLA L. REV. 484, 498-502 (1979) (explaining how Congress uses the conditional spending power to monitor state projects by conditioning the receipt of federal money upon the state's compliance with federal standards).

the national consensus towards stem cell research—such as by forbidding the use of SCNT to produce human embryos—Congress could effectively influence the states' stem cell related decisions.[339] Conditional federal funding of this nature may prevent "the potential moral and ethical dangers of opening the pandora's [sic] box of human reproductive cloning."[340]

Although conditional funding may preserve the states' ability to make their own stem cell policies in the technical sense, the practical effect of such a funding regime is to force state compliance with the federal policy.[341] Indeed, some have argued that "with the budgets of state and local governments now so greatly dependent on federal money, the premise that the funds can readily be rejected if the condition is deemed oppressive seems no longer realistic."[342] The end result is that Congress can very effectively unify the states under a federal law that indirectly regulates stem cell research through the use of conditional funding, provided only that the *Dole* factors are met.[343]

B. If Legislation Limiting Stem Cell Research Is Passed, What Are Its Likely Effects?

1. The Potential for Life-Changing Medical Treatments Will Be Greatly Reduced.

The most devastating effect of limiting stem cell research—whether in whole or in part—would be the extinguishing of the potential for vast medical applications.[344] The possibilities of replacing failing organs, healing damaged tissues, and reversing other mental and physical diseases are not easily brushed aside.[345] For those persons who struggle daily with paralysis, blindness, or dementia, the prayer for relief could be answered through the application of stem cell research.[346] Limiting the progress of stem cell research or, more likely, of SCNT, sweeps away these victims' greatest hope of obtaining help.[347] "To ban such research would, to many of us, be itself unethical."[348]

339. *See* Beschle, *supra* note 225, at 1119; *cf.* Capron, *supra* note 16, at 1063 (claiming that the true reason that Congress avoids passing definitive laws to govern stem cell research is to avoid "hand[ing] their political opponents an apparent victory.").

340. Fuchs & Segre, *supra* note 10, at 153.

341. Rosenthal, *supra* note 228, at 1162.

342. *Id.* at 1162.

343. *See supra* text accompanying notes 293-316.

344. *See supra* text accompanying notes 41-48.

345. *See supra* text accompanying notes 49-58.

346. *See supra* notes 46, 58 and accompanying text.

347. *See* Ortiz, *supra* note 23, at 1118-19.

348. Quintero, *supra* note 168, at 421.

2. The Legislation May Generate a Greater General Respect for Life.

Although the costs of limiting stem cell research are grave, there do remain benefits from such a decision. Limiting human cloning, even for stem cell research purposes, avoids the creation of human embryos for mere destruction.[349] This may generate a greater respect for life, regardless of whether one labels the blastocyst as "human."[350] Such legislative limitations would avoid allowing a human embryo "to be made, unmade and used as a mere instrument for others."[351] Further, banning the use of cloning for all purposes helps to alleviate the temptation for scientists to go just a little bit further and perhaps create a viable cloned human being.[352]

3. The States May Be Forced to Choose Between Receiving Federal Funds and Conducting Stem Cell Research.

If Congress implements a conditional funding scheme to restrict stem cell research, the states will be faced with the difficult decision of whether to accept federal funds or give up the funds in order to take a gamble on stem cell research as a new source of state revenue.[353] States are well aware that if the medical benefits of stem cell research are realized, the state stands to benefit financially.[354]

However, given that state budgets are often strained to begin with, the decision of whether or not to accept federal funding is more difficult than it appears.[355] If a state accepts federal funds and rejects stem cell research, it may be criticized by residents for turning away from one of the world's greatest medical marvels.[356] Conversely, if the state rejects the federal incentive and pursues stem cell research without the benefit of federal funds, residents may chastise the state for cutting budgets on state programs that must be sacrificed in order for a stem cell research program to find its footing.[357] Left with these two displeasing alternatives, states may end up

349. Krauthammer, *supra* note 5.

350. *Id.*

351. *Id.*

352. *See* Eliot Marshall, *Varmus Grilled Over Breach of Embryo Research Ban*, 276 SCI. 1963, 1963 (2997) (explaining that a NIH scientist had violated a Congressional ban on human embryo research by "search[ing] for disease-causing mutations in DNA from embryos created by in vitro fertilization"); Ortiz, *supra* note 23, at 1118-19.

353. *See* South Dakota v. Dole, 483 U.S. 203, 211 (1987) (explaining that conditional funding schemes allow the states to take independent action only on pain of losing federal funds).

354. *See supra* note 325 and accompanying text.

355. *See* Rosenthal, *supra* note 227, at 1104 (explaining that rejecting an offer of federal assistance is no longer an "easy answer" to the conditional funding issue).

356. *See id.*

357. *See id.*

struggling against each other to serve as the primary U.S. forum for the stem cell-related sciences.[358]

4. The United States Would Risk Losing Some of Its Best Research Scientists.

As stem cell research programs dissolve under the pressure of budget cuts, the United States stands to lose more than the promise of new medical remedies. The researchers who study stem cells include some of the most brilliant scientific minds in the country, and the U.S. risks losing these scientists as their work either evaporates or is wrenched away from them.[359] Even President Bush has acknowledged that federally funded programs draw the "best and brightest scientists."[360] Indeed, the current limitations on stem cell research have already caused some researchers to leave the U.S. in search of countries with less restrictive laws governing stem cell research.[361]

5. Such Legislation Would Deprive All People of the Opportunity to Reproduce Through Cloning, Regardless of Their Circumstances.

Finally, a ban on all forms of human cloning, which necessarily includes the procedures used in stem cell research, would deprive people of the ability to procreate through cloning.[362] Although this is precisely the result that opponents of human cloning would like to see, it ignores "more sympathetic" reasons for wanting to create a human clone.[363] For those couples who suffer the misfortune of sterility, cloning offers a way to have children that are genetically related.[364] Such clones might be carried in the mother's uterus just as a naturally conceived child is, and surely such children would be equally as adored as their naturally conceived counterparts.[365]

Further, cloning might allow a couple to have a child in order to save the life of an existing child.[366] If an existing child was in desperate need of an organ transplant, which could be given without costing the donor his or her life, what more suitable donor could a doctor find than a genetically identical twin?[367] By cloning the first child, the parents could have two healthy children, identical twins of each other but of different ages.[368]

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358. *See supra* text accompanying notes 222, 231-33.

359. *See Nuclear Transfer*, *supra* note 177.

360. *Remarks by the President*, *supra* note 28.

361. *Nuclear Transfer*, *supra* note 177 (stating that U.C. San Francisco's stem cell research program closed down after their lead researcher moved to "England, where stem cell research is more accepted").

362. *See* California Report, *supra* note 16, at 1166-68.

363. *See id.* at 1168.

364. *Id.* at 1168, 1169.

365. *See id.*

366. *Id.* at 1168, 69-70.

367. *Id.*

368. *Id.*

The issues described above are only a few of those that are likely to arise when federal stem cell research legislation is enacted. Although it may not be possible to satisfy all of the opinions on this subject, it would be naïve to ignore them out of a sense of futility. In the words of one wise observer, "it is not sufficient to think once about hard issues, you have to think twice."[369]

VI. CONCLUSION

Since its explosion onto the U.S. scene,[370] stem cell research has proven to be a mixed blessing. Its benefits are the stuff of lore: organ replacements, a cure for cancer, a remedy for paralysis, and many other possibilities all unfold as options to explore.[371] The drawbacks include images of mythological creatures from science-fiction movies as cow-human hybrids,[372] fetal farms,[373] and the mysteries of human cloning[374] rise up like a dark shadow following closely on the heels of its bright benefits.

In view of the scientific community's inability to control its own impulse to push ever forward,[375] several states have taken it upon themselves to limit the technology used in stem cell research through legislation.[376] Executive orders from President Clinton[377] and President Bush[378] as well as nearly a dozen congressional bills[379] have suggested that federal legislation is not far behind. Given the relative ease with which the *Dole* factors[380] can be satisfied in the stem cell research context and the historical use of the conditional funding scheme to regulate areas of public interest, it seems likely that Congress will use its taxing or spending powers[381] when

369. 148 Cong. Rec. H3761 (daily ed. June 20, 2002) (statement of Mr. Pence).

370. Shamblott et al., *supra* note 8; Thomson et al., *supra* note 8.

371. Reubinoff et al., *supra* note 34, at 403; *see supra* notes 42-48 and accompanying text.

372. Krauthammer, *supra* note 73.

373. Krauthammer, *supra* note 2.

374. Krauthammer, *supra* note 5 (stating that the procedures used to create human clones could be used to create an "(even more ghastly) partial human clone. What other monstrosities are going on that we don't know about?").

375. *See* Marshall, *supra* note 352, at 1963 (explaining that even with the limited federal ban on using federal funds for the destruction of embryos, one N.I.H. scientist still violated the ban by using federal funds to destroy human embryos in the course of his research). *Cf. Scientific Discoveries in Cloning: Challenges for Public Policy: Hearing Before the Subcomm. on Public Health and Safety of the Senate Comm. on Labor and Human Resources*, 105th Cong. (1997) (statement of Dr. Ian Wilmut, Embryologist, Roslin Institute). Although Dr. Wilmut is the scientist who cloned the sheep Dolly, he declares that similar experiments on humans would be "unethical" and "totally unacceptable." *Id.*

376. *See supra* notes 189-197 and accompanying text.

377. *See* Robertson, *supra* note 19, at 1434; California Report, *supra* note 16, at 1159.

378. *Remarks by the President*, *supra* note 28.

379. Quintero, *supra* note 168, at 425.

380. South Dakota v. Dole, 483 U.S. 203, 207-08 (1987).

381. U.S. CONST. art. I, § 8, cl. 1.

comprehensive stem cell legislation is ready to be enacted. The extent and duration of such legislation, like the promised medical miracles of stem cell research, have yet to be realized.

Charity Schiller[382]

382. J.D. Candidate (2004), Pepperdine University School of Law; M.S. Biochemistry & Molecular Biology (2001), University of California, Riverside.