SALVE REGINA UNIVERSITY

ASSISTED REPRODUCTIVE TECHNOLOGY, BIOETHICS AND LITERATURE: PROGENITORS AND OTHERS' RELATEDNESS TO EMBRYOS, ANDROIDS AND CHILDREN

PREVIEW

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IN CANDIDACY FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

BY

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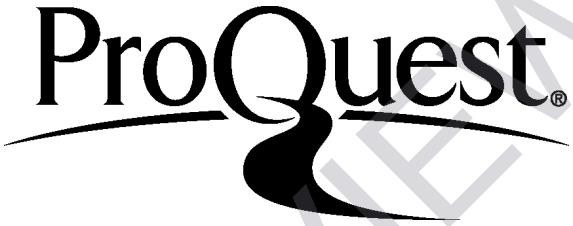

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GRADUATE STUDIES

This dissertation of **Donna J. Tocco-Greenaway, J.D.**, entitled **"Assisted Reproductive Technology, Law Bioethics and Literature: Progenitors and Others' Relatedness to Embryos, Androids, Children"** submitted to the Ph.D. Program in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Salve Regina University has been read and approved by the following individuals:

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Abstract

The dissertation explores the question, "With the use of assisted reproductive technology, what becomes of humanity?" The inquiry discusses the rise of ART, and the lack of uniform legal treatment of the human embryo. It investigates two scenarios where people use ART. One, progenitor couples using assisted reproductive technology (ART) and their relationship to their embryos, including those that are cryopreserved. The inquiry uses scholarly literature that studies relationships between progenitor couples and their embryos, including a multi-institutional study conducted on fertility patients' attitudes and opinions toward their cryopreserved embryos. It examines two Jodi Picoult novels, which portray the use of ART for begetting children as challenging the meaning of what it means to be a parent, partner, spouse, or family member. It considers narratives in both Picoult novels that use the findings from the studies to demonstrate how the characters are reacting to the possibilities ART offers. Picoult's novels, characterized as contemporary realistic fiction, are compared to novels of another type of popular fiction, alternate history, or science fiction. The second scenario involves societies using ART in futuristic novels and their relationship to their creations, including children that are cloned and androids that are manufactured. By comparing the two genres of popular fiction, it examines the relationality, or relatedness between people and the human or quasi-human beings that will be born from ART, in order to explore the impact ART has upon people. The thesis is that as assisted reproductive technology offers greater success in bringing embryos to term on our terms, such as pre-implantation diagnosis, the technology exerts pressures upon procreative couples and families that threaten to rupture the familial bond and reduce the status of their progeny to less than fully human.

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Introduction

This dissertation addresses the question, "With the use of Assisted Reproductive Technology, what becomes of humanity?" My thesis is that as assisted reproductive technology offers greater success in bringing embryos to term on our terms, such as pre-implantation diagnosis, the technology exerts pressures upon procreative couples and families that threaten to rupture the familial bond and reduce the status of their progeny to less than fully human. I intend to focus on assisted reproductive technology in two scenarios. The first involves progenitor couples using assisted reproductive technology (ART) and their relationship to their embryos, including those embryos that are cryopreserved, or frozen. I examine two Jodi Picoult novels, characterized as "realistic family drama,"[1] which portray the use of ART for begetting children as challenging the meaning of what it means to be a parent, a partner or spouse, a sister, a brother, a family. The second scenario involves societies using ART in futuristic worlds and their relationship to their creations, including children that are cloned, and androids that are manufactured. Using popular fiction, I examine contemporary literature as a commentary and an articulate illustration of how people are reacting to ART. I also use scholarly literature that studies relationships between progenitor couples and their embryos, including a multi-institutional study conducted on fertility patients' attitudes and opinions toward their cryopreserved embryos. There are narratives in both Picoult novels that use the findings from those studies to demonstrate how the characters are reacting to the possibilities ART offers. By comparing novels within two genres of popular fiction,

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[1] Martha Montello, "Novel Perspectives on Bioethics" *Chronicle of Higher Education* 51 no. 36 (2005): B6.

contemporary realistic fiction and alternate history or science fiction, I examine the relationality, or relatedness between people and the human or quasi-human beings that will be born from ART, in order to explore the impact ART has upon people.

By juxtaposing Picoult's portrayal of the use of ART in *My Sister's Keeper* to create a savior sibling and Ishiguro's portrayal of its use in *Never Let Me Go* to produce cloned children as organ donors for non-cloned people, I consider whether the savior sibling, Anna, endures a different status in her family than her siblings, Kate and Jesse, not unlike the cloned children in *Never Let Me* Go. Ishiguro's focus upon the characters in his novel and their relationships, and their distanced relationships to the outside world and political fray within which the cloning experiment have been realized provides a way to consider the real issue: how does assisted reproductive technology (ART) affect humanity? In all four novels, using human beings for the benefit of others exacts a human cost. Using Gabriele Griffin's consideration of science in the contemporary culture in *Never Let Me Go*,[2] I consider the novel and another, Philip K. Dick's *Do Androids Dream Of Electric Sheep,* as those that "are not to actualize science in quasi-mimetic fashion but to comment critically on the history of the present."[3] I examine the first novel, Katsuo Ishiguro's *Never Let Me Go*, to explore how using children for the benefit of others exacts a toll on both guardians and students. I use the second, *Blade Runner (Do Androids Dream Of Electric Sheep)*, to consider the effect ART has upon the quality of empathy, where ART is used to produce androids for human use that are organic, yet

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[2] Gabriele Griffin, "Science and the Cultural Imaginary: The Case of Kazuo Ishiguro's *Never Let Me Go*" *Textual Practice* 23 no. 4 (2009): 645-6.

[3] Griffin, 653.

synthetic beings. In this manner the novels give us a way to imagine and assess how humans might typically react to ART's possibilities. We should think carefully about the kind of future we want to have. So, I intend to use story as a vessel for interrogating ART's effects upon people, as described in the contemporary, family dramas by Picoult, and the science fiction novels by Ishiguro and Dick. Will use of ART lead us to a truly human future or one that is less than fully human?

At present, Assisted Reproductive Technology (ART) is largely unregulated in the U.S., which can be understood [at least in part] as a result of ART advancing more rapidly than the laws and regulations pertaining to the technology. As a result, the legal status of the human embryo is not uniform in the U.S. This lack of a uniform legal status of embryos and the pressures developing technologies, including ART, using human embryos exert upon the relationships between people and embryos, present increasingly urgent questions considering how we should treat human embryos. Thus, the legal and political landscape concerning embryo treatment influences the treatment of human embryos. In *Jurisprudence and Genetics*, M. Cathleen Kaveney considers the proper relation of law and morality in the face of recent developments in ART. She considers the dominant model for addressing reproduction as one that is "individualistic, voluntaristic, and dualistic."[4] In American law and policy Kaveney notes, there is a "constitutive function of the law, its ability to channel not only how we answer questions pertaining to our common life, but how we ask questions in the first place."[5] The roles embryos play in

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[4] M. Cathleen Kaveney, "Jurisprudence and Genetics" *Theological Studies* 60 (1999): 135.

[5] Kaveney, 146.

society have altered because of ART, and that has had a hand in shaping people's attitudes toward human embryos. It can be argued that how human embryos are treated for purposes of assisted reproductive technology is constitutive for purposes of the future treatment of human embryos particularly in the area of producing children by human cloning, or by other types of cell reprogramming, which I assume we will acquire the technical means to achieve in the future. In this way, I see the treatment of human embryos as a key component in considering how we treat the humans and quasi-humans who will be born from assisted reproductive technology (ART). Public policy reflects our choices about ethical matters, particularly when it involves the creation of life in the lab. Therefore, how we should proceed in human embryo treatment is a question deeply relevant to the very heart of humanity for the immediate and not so immediate, but rapidly approaching future.

By exploring the way people react to ART in Ishiguro's, Dick's, and Picoult's novels, and the effects it has upon the characters and their relationships, it is possible to reflect upon what possible effect the onrushing biotechnologies could have upon humans and society. A humanities-based approach, which draws from the contemporary literature, together with scholarly sources concerning the relatedness of people to their embryos can provide a helpful way to think and converse about questions involving the impact of assisted reproductive technology (ART) as it advances, upon human relationships, and ultimately, upon humanity. Using fiction to think about what effect ART could have on us shows that along with real benefits, such as allowing people to have children despite infertility, treating diseases like cancer, and providing companionship to people, the actual circumstances that surround use of ART could be

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harmful and perhaps irreversible. Whether ART offers us a way to make families, or something else, story offers us a way to experience its possibilities, and to decide how that benefits humanity or how it does not.

Chapter Review

This qualitative analysis is divided into 4 chapters. The analysis focuses on the matter of relatedness between progenitors and their embryos as a way to think about the ways that assisted reproductive technologies can affect human relationships, and, ultimately, humanity. The analysis follows a trajectory from the status quo of the legal treatment of human embryos in the U.S., to the use of popular fiction as a commentary and articulate illustration of how people are reacting to the assisted reproductive technology (ART), and a consideration of what their reactions to ART show us about ART's impact upon humanity for the present and in the future.

Chapter 1 is the introductory chapter, which sets the stage for my analysis by discussing the rise of assisted reproductive technology (ART) in the most commonly understood practice, in vitro fertilization (IVF), which began with the first "test tube baby," Louise Brown, and the progression of ART to include, for example, pre-implantation diagnosis for patients. Next, I discuss the status quo in the law concerning assisted reproduction technologies (ART), which is largely unregulated in the U.S. As a result, the legal status of human embryos is not uniform in the U.S. Excess embryos from ART are a source of embryos for human embryonic stem cell research (hESC), which destroys embryos. The roles embryos play in society have altered because of ART, and that has had a role in shaping people's attitudes toward human embryos. Assisted

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reproductive technology and human embryonic stem cell research are integrally related, at least for now.

I discuss the contentious political landscape surrounding human embryonic stem cell research, for which excess cryogenically frozen human embryos from assisted reproductive technology (ART) are a source. Therefore, I briefly describe the controversy over federal funding for human embryonic stem cell research, including the Dickey-Wicker Amendment, which limited federal funding of human embryonic stem cell research. Next, I discuss briefly President George W. Bush's Executive Order No. 13,435 (June 2007) and President Barack Obama's Executive Order No. 13,505 (Mar. 9, 2009) concerning the funding, and case law, such as *Sherley v. Sebelius*. The result of the *Sherley* case demonstrates that how we treat the human embryo legally and politically, ethically, and technologically is a matter of ongoing concern, and the subject of continued engagement at the political level. Peoples' reactions to the assisted reproductive technology (ART) and their opinions about the technology and embryos are relevant to the development of the law and regulations governing their uses, and their treatment.

There is a brief discussion of the research showing there is lack of uniformity between state and federal law and regulations concerning the treatment of human embryos. States have set up their own regulatory and funding mechanisms in response to the federal restrictions and regulations concerning human embryonic stem cell research. This discussion situates my examination of the way people are affected and reacting to the technology (ART) within recent political and legal developments, similar to both Picoult novels, and the science fiction novels. Thus, this paper's examination of how

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people are reacting to the use of assisted reproductive technology (ART), which is the subject of law and regulation, however strict or lax, and the discussion of how people relate to embryos, is situated in the description of these recent political and legal developments. Later, the popular fiction is used as a way to reflect upon what influence ART might have upon our humanity.

Chapter 2 is a literature review. I discuss the political ideologies that are in the background of the contentious debate surrounding human embryonic stem cell research and assisted reproductive technology (ART), as it is necessary to understand that the ways people react to assisted reproductive technology depends upon some basic ideas they hold about human embryos.

Chapter 3 considers how people are reacting to the assisted reproductive technology (ART). The popular literature includes novels by Jodi Picoult, Katsuo Ishiguro, and Philip Dick. The scholarly literature includes a multi-institutional U.S. survey conducted by Anne Drapkin Lyerly et al. (Duke study) of fertility patients' views about frozen embryo disposition, and work by Elizabeth Roberts, which considers the Duke study in relation to her own research, and compares patients' views about frozen embryonic disposition in the U.S. and Ecuador. In the Picoult novel, *My Sister's Keeper*, the patients are parents who use ART to create a savior sibling for their sick child. The care of a living, sick child is the impetus for using ART as a means of selection of an embryo for specific genetic qualities to create a future child for a very specific purpose, to harvest stem cells from her umbilical cord blood to treat her sister's leukemia. The consideration of the both the Duke and Roberts findings are used to examine the notion of parental responsibility to their embryos in the context of clan formation, in contrast to

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the notion of abandonment of a family member. In another scenario, if a couple does not want to attempt another IVF procedure to bring another frozen embryo to term because they feel their family is complete, or they have not succeeded in bringing a child to term through ART, they may object to destroying the embryos and opt to keep the embryos frozen indefinitely. Or they may abandon the embryos, which remain cryogenically frozen indefinitely. Some couples may wish to have a ritual to memorialize the destruction of the excess frozen embryos. Other couples may disagree on what to do with the excess frozen embryos, particularly in the event of a divorce. This is the situation In Picoult's novel, *Sing You Home*, which uses findings substantiated by the Duke study in the story to explore the challenges assisted reproductive technology (ART) presents for progenitor parents.

Picoult portrays art therapist and musician Zoe, the progenitor mother, by allowing Zoe to use music and artwork in telling the story. I use the term "artwork" in this paper to describe creative artistic endeavors in order to avoid confusion with Assisted Reproductive Technology, which has the acronym, "ART." I consider the role of artwork in the novels, i.e., painting, drawing, music, and how it is used in the contemporary fiction to consider people's reactions to assisted reproductive technology. *Sing You Home* includes a CD of original music meant to be the voice of Zoe, and the format of the book contains a suggested way to listen to the music as one reads a particular section of the story. The use of music in *Sing You Home* provides a way to examine the matter of relatedness of progenitor parent, Zoe, to her stillborn child, her embryos leftover from in vitro attempts during her marriage to Max, and, eventually, to her child born of one of those embryos. In Ishiguro's *Never Let Me* Go, the guardians use artwork to assess

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whether the clones have souls, leaving the reader to draw her own conclusions about the society that embraces such a project.

In contrast to Picoult's realistic settings, Ishiguro and Dick's novels provide settings that are alternate history, or science fiction. Each story examines others, student clones and androids, produced for human use, and the effect that fact has upon its characters and its respective societies. Ishiguro's cloned students are harvested for their organs, and endure lives that are literally truncated by their immutable status within society. Dick's characters are either human or android, but the lines are blurred by both nature—organic qualities shared by androids and humans—and circumstances in a post-apocalyptic Earth. Colonization of Mars spurs both creation of the androids—"andys"—for human use and companionship on Mars, and their revolt from their circumstances involves murder of humans and unauthorized escape and return to earth. Bounty hunter Rick Deckard confronts both the andys he must "retire" and his own humanity. His relationships to both the humans and quasi-humans (androids), suggests the use of ART has consequences beyond its intended uses. One of those consequences is that Deckard's relationship with Rachel Rosen, an android, seems more real than his relationship with Iran, his wife. I also consider how Deckard's actions change him. Using others can change a person even if the others are not considered fully human. Dick portrays Rachel Rosen as one who does not know what she is, organic, yet not human. Is it cruel for her human creators to keep that fact from Rachel when she is not human even if they are right to believe that she is not human? Rachel's circumstances show that using ART might result in producing people who may not know what they are. Would that be cruel? We can learn from these stories as onrushing biotechnology facilitates increasingly

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blurred lines between the human and the synthesized, yet organic being. The novels help to answer questions concerning the effect ART has upon us as we consider the question, what effect might ART have upon peoples' lives and, ultimately their humanity?

Chapter 4 is my conclusion.

Defining Technology

Assisted reproductive technologies (ART) include in vitro fertilization, pre-implantation diagnosis, cryogenically preserved excess embryos, human embryonic stem cell technology, and cloning. This is not a complete list, nor is this a dissertation in biotechnology. Although basic definitions of these technologies are helpful and will be provided, I am interested in examining both the overarching view of assisted reproductive technologies (ART) used as a means of providing infertility patients and others with a means of making a family and how people are reacting to the technology in order to consider how ART might affect our humanity. Interestingly, the two novels by Jodi Picoult I examine delve into the medical and scientific specifics of the technologies mentioned above as an integral part of telling the story. Her realistic depiction of the science will be addressed in the discussion of contemporary fiction being a helpful way to think about how people are reacting to ART. In comparison, I use two novels, Ishiguro's *Never Let Me Go,* and Dick's *Do Androids Dream of Electric Sheep,* which avoid scientific realism in their critique of ART and its treatment of the question, what effect could ART have upon humans?

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Chapter 1

The Rise of Assisted Reproductive Technology (ART)

The rise of assisted reproductive technology (ART) is most commonly understood as the practice of in vitro fertilization (IVF), developed to alleviate infertility. Simply put, the woman's egg and the man's sperm are joined together in a laboratory dish. Three to five days later, the embryos are transferred to the woman's uterus. If the embryo implants successfully and begins to grow, a successful pregnancy results.[6] The clinical research by British embryologist, Robert Edwards, who worked closely with gynecologist, Patrick Steptoe, led to the birth of the world's first "test tube baby." Louise Brown was born July 25, 1978 at Oldham General Hospital, Great Britain. Edwards was awarded the 2010 Nobel Prize for medicine and physiology for the development of clinical in vitro fertilization. An article in the *Wall Street Journal* stated "The basic techniques pioneered by Edwards form the technical foundation of in vitro fertilization, human cloning techniques, genetic screening of human embryos and embryonic-stem cell research."[7]

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The Status Quo of Assisted Reproductive Technology (ART)

According to a RAND study in association with the Society for Assisted Reproduction, "During the last 20 years, medical breakthroughs have allowed growing numbers of patients suffering from a variety of infertility-causing diseases to achieve

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[6] "In Vitro Fertilization (IVF)." *MedlinePlus*, last modified December 3, 2014, accessed December 10, 2014. http://www.nlm.nih.gov/medlineplus/ency/article/007279.htm.

[7] Robert Lee Hotz, "In Vitro Pioneer Wins Nobel: British Scientist's Work Has Enabled the Birth of Four Million Test-Tube Babies." *The Wall Street Journal*, October 5, 2010, accessed December 10, 2014. http://online.wsj.com/news/articles/SB10001424052748704631504575531452979697016.

healthy pregnancies through assisted reproductive technologies (ART)."[8] Currently, the supply of excess, cryogenically frozen human embryos created when a patient couple undergoes ART is the subject of intense interest, because these embryos are a source for human embryonic stem cell[9] research,[10] with its promise of therapeutic benefits for illness.[11] Although advances in adult stem cell research (iPSC) (which does not destroy human embryos) show promise,[12] human embryonic stem cell research will continue for

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[8] David I. Hoffman, et al., "Cryopreserved Embryos in the United States and Their Availability for Research" *Fertility and Sterility* 79 no. 5 (May 2003): 1063.

[9] "Stem Cell Information." National Institutes of Health, last modified September 13, 2010, accessed December 9, 2014. http://stemcells.nih.gov/info/basics/pages/basics3.aspx. "Stem cells—Cells with the ability to divide for indefinite periods in culture and to give rise to specialized cells."

[10] "Stem Cell Information." National Institutes of Health, last modified September 13, 2010, accessed December 9, 2014. http://stemcells.nih.gov/info/basics/pages/basics3.aspx. "Scientists discovered ways to derive embryonic stem cells from early mouse embryos nearly 30 years ago, in 1981. The detailed study of the biology of mouse stem cells led to the discovery, in 1998, of a method to derive stem cells from human embryos and grow the cells in the laboratory. These cells are called human embryonic stem cells. The embryos used in these studies were created for reproductive purposes through *in vitro* fertilization procedures. When they were no longer needed for that purpose, they were donated for research with the informed consent of the donor."

[11] "Stem Cell Information." National Institutes of Health, last modified April 28, 2009, accessed December 9, 2014. http://stemcells.nih.gov/info/basics/pages/basics6.aspx. "Given their unique regenerative abilities, stem cells offer new potentials for treating diseases such as diabetes, and heart disease."

[12] "Stem Cell Information." National Institutes of Health, last modified, January 20, 2011, accessed December 9, 2014. http://stemcells.nih.gov/info/basics/pages/basics5.aspx. "Both embryonic stem cells and adult stem cells are thought to have advantages and disadvantages in potential use of cell-based therapies—treatment in which stem cells are induced to differentiate into the specific cell type required to repair damaged or destroyed cells or tissues. Adult stem cells, and tissues derived from them, are currently believed less likely to initiate rejection after transplantation. This is because a patient's own cells could be expanded in culture,

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the foreseeable future for use as a control within the development of adult stem cell research, until therapeutic success is achieved using adult stem cells.[13] Research involving iPSCs is fraught with uncertainties about the safety, effectiveness and the cost of iPSC development and use.[14] Understandably, "ethical concerns surrounding the use of hESCs are likely to accompany much iPSC research for the time being."[15]

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coaxed into assuming a specific cell type (differentiation), and then reintroduced into the patient. The use of adult stem cells and tissues derived from the patient's own adult stem cells would mean that the cells are less likely to be rejected by the immune system. This represents a significant advantage, as immune rejection can be circumvented only by continuous administration of immunosuppressive drugs, and the drugs themselves may cause deleterious side effects."

[13] "Stem Cell Information." National Institutes of Health, last modified March 30, 2009, accessed December 9, 2014. http://stemcells.nih.gov/info/basics/pages/basics10.aspx. "Induced pluripotent stem cells—Somatic (adult) cells reprogrammed to enter an embryonic stem cell–like state by being forced to express factors important for maintaining the "stemness" of embryonic stem cells (ESCs). Mouse iPSCs were first reported in 2006 (Takahashi and Yamanaka), and human iPSCs were first reported in late 2007 (Takahashi et al. and Yu et al.). Mouse iPSCs demonstrate important characteristics of pluripotent stem cells, including the expression of stem cell markers, the formation of tumors containing cells from all three germ layers, and the ability to contribute to many different tissues when injected into mouse embryos at a very early stage in development. Human iPSCs also express stem cell markers and are capable of generating cells characteristic of all three germ layers. Scientists are actively comparing iPSCs and ESCs to identify important similarities and differences." Shinya Yamanaka, "Elite and Stochastic Models for Induced Pluripotent Stem Cell Generation" *Nature*, 460 no. 7251 (2009): 49-52.

[14] Nancy M.P. King, Christine Nero Coughlin, and Anthony Atala, "Pluripotent Stem Cells: The Search For The 'Perfect' Source" *Minnesota Journal of Law, Science & Technology* 12 (Spring 2011): 715, 722, Megan Scudellari, "The iPSC-ESC Gap," *The Scientist* February 2, 2011, http://www.the-scientist.com/news/display/57971/.

[15] King, Coughlin, and Atala, 715, 722.

Moral and Legal Status of the Embryo Not Uniform in the U.S.

Today the human embryo comprises a source of new life and a source of raw material for human embryonic stem cell research, which results in its destruction.[16] The research shows that there is no broad consensus as to the moral and legal status of these human embryos.[17] Research involving human embryos became increasingly controversial shortly after *Roe v. Wade*[18] struck down state abortion laws as unconstitutional and asserted a constitutional right for women seeking an abortion.[19] The focus of the controversy has centered on federal funding policy concerning research involving human embryos.[20] John A. Robertson discusses early-stage funding of human Embryonic Stem Cell (hESC) research as crucial for progress in that area of research, and in the sciences in general, because the research is considered "too far upstream from marketable products to draw much private investment. Thus, the burden thus falls on the government

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[16] Ryan P. O'Quinn, "*Sherley v. Sebelius*: Stem Cells And The Uneasy Interplay Between The Federal Bench And The Lab Bench" *Duke Law And Technology Review* 002 (2011): 6, citing Roseann B. Termini, "Does 'Political' Science Exist Anymore? Embryonic Stem Cell Research In This New Political Era," *Journal Of Health & Biomedical Law* 5 (2009): 249, 256.

[17] Hoffman, et al. 2003, 1063. See also Dan Brock, "Creating Embryos for Use in Stem Cell Research": *Journal of Law, Medicine & Ethics* 38 (Summer, 2010): 229, Maggie Davis, "Indefinite Freeze?: The Obligations A Cryopreservation Bank Has To Abandoned Frozen Embryos In The Wake Of The Maryland Stem Cell Research Act of 2006": *Journal Of Health Care Law & Policy* 15 (2012): 379.

[18] Roe v. Wade 410 *U.S.* 113 (1973).

[19] O'Quinn, 8.

[20] Ibid., 8-10. See also John A. Robertson, "Embryonic Stem Cell Research: Ten Years Of Controversy" Symposium Article, *Journal Of Law, Medicine & Ethics* 38 (Summer 2010): 193-196, Robert P. George and Christopher Tollefsen, *Embryo.* (New York: Doubleday, 2008): 11-12, 210-214.

to do so, as it does with other public goods, such as national defense and highways."[21] Robertson's characterization of hESC research and science in general as a public good, helps to understand why the controversy over embryo research has been so alive in the political arena.

The history of federal funding and legislative prohibition on embryo research demonstrate that embryo research continues to be controversial. Despite recent easing of restrictions under President Obama's administration, and some states' responses in support of hESC research, controversy continues to surround the use of human embryos in research that involves their destruction. The political arena, therefore, will continue to entertain important bioethical questions involving human embryos and assisted reproductive technology (ART). The political backstory is helpful when I examine the Duke study of progenitor couples and their feelings about their excess embryos, and the popular novels as a way to think about ART and what might occur as a result of its use. First, I will discuss briefly the history of federal funding and restriction on embryo research, and then I will briefly address the states' responses to the federal funding controversy—enacting a wide range of regulation and policies concerning hESC research.

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[21] Robertson 2010, 194.