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Annotated Bibliography

Munson, Ronald. Raising the Dead: Organ Transplants, Ethics, and Society. Oxford University

Press, 2002.

Munson discusses ethical questions surrounding organ transplantations and possible revolutions of regenerative medicine including stem-cell engineering. He begins each chapter by detailing accounts of specific controversial organ transplants followed by an analysis of ethical questions. In the last chapter, Grow Your Own Organs: Stem-Cell Engineering and Regenerative Medicine, Munson references issues such as organ banking, selling, harvesting or the allocation of organs in relationship to stem cell research. Munson also explores adult stem cell technology, which would allow researchers to grow new organs from one's own cells.

The entire chapter on stem cells was relevant to my research because Munson presented both sides of each argument. The logical pattern of question/answer helped develop my understanding of the controversies surrounding stem cell research. He effectively argues that embryonic stem cell research needs to be continued. Although the book was written in 2002, the complex and emotional issues are still relevant today. Munson appeals to a general audience by explaining technical terminology, educating his readers and using simple explanations for complex procedures.

Ronald Munson is Professor of Philosophy of Science and Medicine at the University of Missouri-St. Louis. He has written articles published in scientific and scholarly journals. His expertise is in medical ethics and the philosophy of science and medicine; he has authored many books on these subjects. His thorough research and use of credible sources are reflected in this thought provoking book.

This source was very beneficial in my research, because it presented three exclusive views of the status of the human embryo and the corresponding opinions toward stem cell research. Munson clearly states his opinion and that of his opposition while providing facts so that the reader is able to make an informative opinion of their own. Because different viewpoints are acknowledged, this was a useful resource for stem cell research controversy.

Picoult, Jodi. My Sister's Keeper. Washington Square Press, 2005.

As Picoult introduces the Fitzgerald family thru first person voice, I began to understand this is not the average American family. They conceive their third child, Anna, a genetically matched "designer baby", to save the second, Kate, diagnosed with leukemia. At first is was thought that they would only need cord blood to save Kate, but over the next thirteen years, Anna becomes her sister's donor, providing stem cells, blood and bone marrow. When the requested "donation" is a kidney, Anna seeks legal council and begins the process to medically emancipate herself from her parents.

The turmoil created from Anna's unexpected action is a catalyst for in-depth soul searching regarding family relationships and medical ethics. As this family struggles with challenging issues, Picoult raises moral and philosophical questions through her characters. Because the story is told from each character's perspective, it reflects honest, raw emotion. Picoult skillfully covered a difficult topic.

Prior to reading this book, I did not realize that cord blood or bone marrow were stem cells. This book was relevant to my research because it shows human emotion and medical ethics, which are part of the controversy surrounding stem cell research. Although this was a fictional family, the issues that challenge them are real.

Picoult plainly states that she is pro stem cell research, but well aware of the slippery slope. The author reveals in the acknowledgments that her own child had ten surgeries in three years. In the readers club guide, she divulges that the idea for this book came while researching eugenics for a previous novel. The author adds credibility drawing from personal experience and the research required to write multiple books on genetic issues.

This source was useful in my reflection because it provided a springboard for multiple issues encompassing the controversy of embryonic stem cell research. Not only did it spark ideas about medical and legal ethics, it provided an account of conflicting opinions by the members of this fictional family. This book was the catalyst for my reflection question.

Sandel, Michael J. The Case against Perfection: Ethics in the Age of Genetic

Engineering. Cambridge, Mass.: Belknap Press of Harvard University Press, 2007.

The Case against Perfection explores enhancement through genetic engineering and the possible repercussions. Sandel argues that the same technologies, which promise to prevent or treat debilitating diseases, can enable us to manipulate unwanted human genetic traits. He further states that the pursuit of perfection will coerce a revolution of ethical debates in political discourse. This five-chapter book is engaging and provides well-articulated arguments from the author's view and that of his opponents. The epilogue, Embryo Ethics: The Stem Cell Debate, in my opinion, is the climax of the

book. In the epilogue, Sandel compares the cases against genetic enhancement in the previous chapters to the arguments supporting stem cell research. Although against genetic engineering for the sole purpose of enhancement, Sandel presents his case in favor of embryonic stem cell research.

The entire epilogue was relative to my reflection because it addressed objections and viewpoints from various factions. Political, religious and intellectual perspectives were stated. Sandel simplifies and outlines the distinctions between opposing claims, then analyzes each using a step-by-step process. Sandel's case against the fundamental argument for equal-moral-status for embryos was the most significant passage cited in my reflection. Sandel does not overpower the reader with technical jargon. The brief chapters and common language make this book accessible to the general public. It was informative, concise, captivating and easy to read.

Michael Sandel is a Professor of Government at Harvard University, where he has taught political philosophy since 1980. Copyrighted in 2007, this is his most recently published book. Prior published works encompass political philosophy perspectives. In 2001 Sandel received an invitation to serve on the President's Council on Bioethics. The unique experience on the Council combined with his philosophical and political background prompted an interest in ethics and biotechnology, which he shares in this book. Sandel's credible sources include published works from universities, political and medical professionals and published works in New York Times.

The scenarios of genetic augmentation intended to stimulate moral discomfort throughout this book, created the most intriguing resource that I read. Given that the epilogue on stem cell research contains compelling arguments, this source was beneficial in my research. Because the different viewpoints were thoroughly scrutinized, this was an extremely useful resource for stem cell research controversy.

Waldby, Cathy and Robert Mitchell. Tissue Economies: Blood, Organs, and Cell Lines in Late

Capitalism. Durham, NC: Duke University Press, 2006.

This book questions the global economies of tissues including blood, umbilical cord blood, cell lines and organs. As rapidly developing medical technologies emerge, additional human tissues will be stored and distributed for therapeutic and research purposes. Complex issues associated with collecting, storing and distributing tissues are explored in-depth. Ethical and moral concerns related to donors, recipients, intellectual property rights and commercial wealth are meticulously debated.

This source was relevant to my research because it discusses the controversy of embryonic stem cells as a commodity in a global market. Published in 2006, the information and sources are relatively current. I now have a limited understanding of tissue gift/commodity relationships; private stem cell banks and their market strategies; the operation of public stem cell banks; and the impact of different models of biotechnology patents on tissue economies. Based on the content and academic language, the intended audience is probably the research community.

Cathy Waldby is a senior lecturer in medical sociology at the University of New South Wales. Robert Mitchell is an assistant professor of English at Duke University. The authors' bibliography encompasses an impressive array of sources including scientific papers, political policy reports, legal decisions, interviews, journalism and Congressional testimony.

Repeated case studies and numerous in-text citations overshadow the intended message. The long passages with relatively useless information held little of my attention. Although the text was not easy to follow, the information the authors conveyed was useful to my research because it uncovered consequences of stem cell research that will be as controversial as the research itself.

Walker, Sharon. Biotechnology Demystified. McGraw-Hill, 2007.

Biotechnology Demystified is a study guide that presents examination quizzes at the end of each chapter. The self-teaching guide provides fundamentals of cellular biology. Contrary to the title, this book does not demystify biotechnology, but it gives basic insight into this rapidly changing field of science. Chapter nine presents basic facts about stem cell research, different cell types, development of embryonic stem cell lines and therapeutic uses of embryonic stem cells. The current state of embryonic stem cell research is described in uncomplicated terms and a brief section is dedicated to the controversies and legal constraints of embryonic stem cell research.

Published in 2007, the text and referenced research are up to date. The content is presented in a logical order, using basic explanations and visuals to educate the reader. The intended audience is definitely students interested in biotechnology. The entire chapter on stem cells provided basic and relevant information related to my research topic, providing a solid foundation to embark on my reflection.

Sharon Walker, Ph.D, is a Diplomat of the American Board of Toxicology and has done extensive research in various areas of biomedicine. Dr. Walker has taught graduate courses in immunology, epidemiology, cell biology, and statistics.

In my opinion, this was the most informative source that I found. The complex issues of embryonic stem cell research were untangled in simple terms. This source was useful in my research because it provided unbiased information vital to developing a fundamental knowledge of stem cells and the controversies surrounding embryonic stem cell research.

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Stem Cell Reflection

Stem cell research: Why is it controversial?

I began this journey by reading <u>My Sister's Keeper</u>. I had no idea that cord blood was considered useful, much less life saving. After finishing the book, I still had no concept of what **a** stem cell was or why the research was controversial. I understood the initial piece of the assignment was to derive a single question, but it was not an easy task. I thought I could select a particular aspect of the research and develop my reflection. Nonetheless, I found that I lacked a basic understanding of stem cells, their functions and the complex arguments surrounding the research.

I started gathering information via internet searches, then the campus library, later a bookstore at the mall and finally, the local library. I wanted to find information that was current because there have been recent developments and controversy. I needed to acquire additional knowledge about this topic before I could formulate an educated response. Conversations in the classroom about federal funding for stem cell research, different cell types, genetic engineering, elimination of genetic disorders and cures for multiple diseases left me with more questions. My reflection question is intentionally basic; why is stem cell research so controversial?

Before addressing the controversial research, I needed to understand what stem cells were and what biological functions they perform. I decided that reading <u>Genetics for Dummies</u>, which I could not find, would provide a good foundation. As an alternative, one of the Cabarrus County librarians suggested <u>Biotechnology Demystified</u>, which provides general information about cell categories and functions, embryonic stem cell lines, controversy and legal constraints surrounding the research (Walker). This basic self-teaching guide was the most informative source that I was able to find; it was invaluable.

On the other hand, <u>Tissue Economics</u> was informative, but difficult to follow because of the numerous in-text citations. Although they may add credibility, it seemed as if a hodgepodge of citations were strung together. The authors supplied the guidelines set up by the UK Stem Cell Bank to manage the collection and distribution of embryonic stem cells. These principles were created to ensure the respect of the "embryonic gift", create fair pricing to public sector researchers and establish shared access to innovations derived from the UK stem cell lines (Waldby and Mitchell 80). Waldby and Mitchell characterize the in vitro embryo as an economy source tissue signifying "potential vitality, self-renewing productivity, an infinite tissue resource, and a locale for investment and profit" (80). Thinking about embryonic stem cells as a commodity in a global market adds another dimension to this complex debate.

Two recent sources that I thought would be helpful were government documents, one a Congressional hearing, the other a report to the NC House of Representatives. The report was mostly a compilation of previous committee proceedings briefly describing the topic and speaker's credentials. The Congressional document was over 200 pages of committee formalities by various speakers. The first document lacked details and the second was so full of procedure that I lost interest before reading opinions expressed by the expert panel. The flow of information and my attention were broken each time the floor was surrendered. Although both of these documents provide evidence of stem cell research controversy within our government, neither of these sources was useful in my quest.

The most interesting source I found was <u>The Case Against Perfection</u>. I planned to read only the epilogue on stem cell research, but read the entire book. Arguments of embryo ethics and moral status are presented, dismantled and thoroughly scrutinized (Sandel). This logical and systematic process increased my awareness and captivated my attention. Although the author asserts his views, he respectfully acknowledges those with different opinions. Another book that dissected different perspectives was <u>Raising the Dead</u>. This source untangles three different "views of the status of the human embryo" (Munson 255). The author connects embryo status position and stance on stem cell research for each of these viewpoints. Arguments in both of these books provided conflicting opinions as well as factual data. I began to understand why stem cell research is such a big deal.

I never thought about issues surrounding stem cell research, no reason to, it does not affect me. Right? Wrong. My mother is a diabetic. Diabetes is one of the degenerative diseases that may be cured by stem cell research. Clinical trials using cells from fetal tissue have reported mixed success treating Parkinson's disease and diabetes (Walker 154). Alternative therapies to promote insulin-producing tissue may also be achieved through stem cell research (Waldby and Mitchell 61). The possibilities are astounding when you expand the scope of stem cell research to include tissue repair, organ growth and the elimination of genetic disorders (Munson). When I started this reflection, medical advancements through stem cell research seemed like science fiction. In 2002 Munson's prediction, "Regenerative medicine, prospectively, has the power to manage effectively, or cure, virtually every non-infectious disease and disability" (264), perhaps seemed improbable. After reading Munson and other sources, I believe this statement has the full potential to be realized.

Before these medical miracles can become reality, biomedical technology must advance. As Munson asserts, "Regenerative medicine requires harnessing and regulating the body's inherent powers to rebuild itself. Before we can realize this dream, however, we must first acquire much more information about controlling the fundamental biological processes involved in human development and repair" (243). Understanding stem cells and their intricate functions is challenging, harnessing that understanding has gargantuan potential.

When I began this assignment, my opinion was that if degenerative diseases could be cured using embryonic stem cells, our government should back the research without hesitation. In August of 2001, US federal funding was approved to support established human embryonic stem cell lines. Currently only twenty-two viable lines meet the federal criterion for funding (Walker 161). I was not aware of the position against embryonic stem cell research taken by many conservatives, the Catholic Church and the US President, nor the basis for their reasoning. These groups ardently state that embryos should not be destroyed for stem cell research presenting their core argument, responsibility to protect this vulnerable early life form (Munson 257). Those holding this belief "claim that the embryo is morally equivalent to a person. The moral and political controversy arises from the fact that extracting stem cells destroys the blastocyst", thus destroying the embryo (Sandel 113). Most groups that embrace the opinion that life begins at conception oppose embryonic stem cell research. There is a split opinion, even on the conservative side over the use of in vitro fertilization embryos for human embryonic stem cell research (Sandel). Sandel argues that "embryonic origin and developmental continuity do not compel the conclusion that the blastocyst is inviolable, the moral equivalent of a person"

(119). These conflicting opinions will thrive as long as differing belief systems exist. Although I respect the views expressed by these groups, I do not agree with their opposition regarding human embryonic stem cell research.

Excess "in vitro embryos are the major source of embryonic tissue for stem cell research around the world" (Waldby and Mitchell 61-62). There are currently 400,000 "spare" in vitro fertilization embryos in the United States, of which 2.8 percent have been donated to research (Walker 156). Embryos at this early stage of development are composed exclusively of pluripotent, or undifferentiated stem cells. Pluripotent stem cells are used to create cell lines that can, in theory, divide and multiply indefinitely (Waldby and Mitchell 62). Because each cell line is created from a single embryo, the entire cell line's genetic characteristics are derived from the original donors (Waldby and Mitchell 77). Researchers advocate federal funding to develop new cell lines for several reasons, one of which is the inadequate representation of the human genetic diversity in the genomes contained in the 22 approved lines. Secondly, although the cell lines are "immortal", they can be contaminated in the laboratory, loose vitality and play out, thus needing to be replenished (Walker 161).

Research using adult stem cells is less controversial than ESC research because these cells are not derived from embryos. The most promising therapeutic application of adult stem cells is to repair damaged or defective organs (Munson 246).

Adult stem cells have been successfully used in clinical trials to treat heart disease, in bone marrow transplants and aiding in the formation of skin grafts. Although less likely to be rejected by the immune system, adult stem cells may not be useful if they exhibit the same genetic defects as the recipient. Adult stem cells from older individuals may also contain toxins and unfortunately their viability declines as the donor ages. (Walker) Although adult stem cells offer various therapeutic possibilities, they are not as diverse as embryonic stem cells. Restricting research to adult stem cells would pacify those that oppose ESC research; nonetheless, it would lengthen the delay in developing treatments, require additional funding and limit the amount of research (Munson).

When I began reading about federal funding for stem cell research, I learned about privatized research. Private funding or government funding beneath the federal level exists because many believe in the importance of this research (Walker 161). Human "embryonic stem cell lines are patentable" in many countries. "To date more than 500 patent applications have been filed worldwide" (Waldby and Mitchell 65). Because this research is relatively new, economic markets may explode when theoretical cures become reality. Intense capital investments have the ability to drive economies. Substantial investments in private stem cell lines have the potential to create a market that can prejudice research and exclude those that do not have access to commercial wealth. "Cloned pluripotent cell lines promise to be the ultimate self-renewal technology, but the high cost of establishing viable lines is likely to exclude the practice from national health budgets and render it the prerogative of the wealthy" (Waldby and Mitchell 130). Researchers also have concerns that private sector proprietary privileges will restrict the flow of information, thus limiting research that relies on the exchange of ideas to move forward (Walker 162).

As in <u>My Sister's Keeper</u>, what avenues would you pursue to help someone you love? I think we should love enough to let go, death is a natural ending to life. Picoult's character, Brian is speaking to his wife about their daughter Kate, "She will die, either tonight or tomorrow or maybe a year from now if we're really lucky...It just postpones what's coming" (265).

Biomedical science can delay the inevitable by employing stem cells. My thought return again to my mother. How much is another day worth?

Prior to this assignment, I lacked sufficient knowledge on the subject of stem cells to have an informed opinion about the controversies encompassing the research. The varied and numerous human embryonic stem cell arguments are astounding. The more I read about stem cell research the more important I feel it is to understand impacts, goals and related casualties. The central controversy surrounding embryonic stem cell research is the debated moral status of the human embryo, which will not be resolved. Additional arguments have developed due to ethical questions regarding research practices, the viability of the federally funded cell lines and the economics created from research developments. Continued human embryonic stem cell research with proper oversight and strict regulations can ensure appropriate cell differentiation and decrease risks, both of which need to be achieved before we will be able to realize the magic of regenerative medicine. After completing this assignment, I believe that donated IVF embryos are a gift of life to humanity. They are a valued gift that should be treasured and respectively utilized in embryonic stem cell research.