

Maternal-Fetal Conflict and the Impact of Ectogenesis

by

Roxana Nouri-Nikbakht

B.S. Biological Sciences, Chapman University, 2016

Submitted to the Graduate Faculty of the
Dietrich School of Arts & Sciences in partial fulfillment
of the requirements for the degree of
Master of Arts

University of Pittsburgh

2019

UNIVERSITY OF PITTSBURGH
DIETRICH SCHOOL OF ARTS AND SCIENCES

This thesis was presented

by

Roxana Nouri-Nikbakht

It was defended on

May 28, 2019

and approved by

Martha A. Terry, PhD, Associate Professor of Behavioral and Community Health Sciences

Valerie B. Satkoske, PhD, Associate Professor of Bioethics

Thesis Advisor: Lisa S. Parker, PhD, Director of the Center for Bioethics and Health Law

Copyright © by Roxana Nouri-Nikbakht

2019

Maternal-Fetal Conflict and the Impact of Ectogenesis

Roxana Nouri-Nikbakht, M.A.

University of Pittsburgh, 2019

This paper explores how ectogenesis (EG), or artificial womb technology, impacts maternal-fetal conflict (MFC), which refers to instances when there are conflicts between the interests of the pregnant woman and the interests of her fetus. After a discussion about the interests of women, pregnant women, and fetuses, five approaches to analyzing the ethics of MFC are presented and then used to analyze the case of a pregnant diagnosed with cervical cancer, before and after the availability of EG. The analysis concludes that, based on appeals to justice, the principle of respect for autonomy, and the rights to bodily integrity and privacy, physicians must respect a woman's autonomous choice regarding her health and pregnancy.

The presence of EG provides an option for pregnant women to pursue the treatment that is in their interests while also promoting the fetus's interests. However, in the presence of EG, the pregnant woman's decision-making may be constrained by her fetus's interests and healthcare needs. Specifically, once the fetus is separate from her body, there may be an obligation on the part of the medical professionals to use the technology and this obligation may override the woman's preference that it not be used. Medical professionals may have a beneficence-based obligation to the *ex utero* fetus once it is a distinct patient separate from the previously pregnant woman. Failure to employ EG could constitute medical neglect and violate the Baby Doe Amendments.

This paper argues that women are not obligated to undergo a procedure that violates their bodily integrity and inflicts medical harm on them in order to have the fetus removed in order to

employ EG, and they should not be pressured to do so for the sake of their fetus's health even if removal and EG utilization would be in the fetus's best interest. Others, such as physicians or the State, may be obligated to use EG if it is available to serve the *ex utero* fetus's interests, but women should not be required to compromise their interests for the sake of the fetus.

Table of Contents

Preface.....	VIII
1.0 Introduction.....	1
2.0 Background Regarding Maternal-Fetal Conflict.....	3
2.1 Interests, Preferences, Values, and Rights	3
2.2 Interests of Women, Pregnant Women, and Fetuses	5
2.3 Approaches to Framing and Analyzing Maternal-Fetal Conflict	7
3.0 Case Presentation and Analysis.....	16
3.1 Case Presentation: Ms. A.....	16
3.2 Case Analysis	19
3.2.1 Autonomy.....	19
3.2.2 Justice	21
3.2.3 Informed Consent	23
3.2.4 Status as a Patient and Intraprofessional Conflict.....	24
3.2.5 Weighing Risks and Benefits.....	26
4.0 The Effect of Ectogenesis on Maternal-Fetal Conflict.....	29
4.1 Ectogenesis Description.....	30
4.2 A Reexamination of the Previous Case of Maternal-Fetal Conflict in the Presence of Ectogenesis	31
4.3 Informed Consent to Ectogenesis and Ms. B as the Decision-maker for Her Fetus	33
4.3.1 The Availability of Ectogenesis	37

4.4 The Relevance of Ectogenesis for Cases in Which Fetal Health is Imperiled.....	39
4.5 The Relevance of Ectogenesis for Abortion	42
5.0 Conclusion	46
Bibliography	48

Preface

I am most indebted to Dr. Lisa Parker for the countless hours she spent editing my drafts, meeting or talking with me on the phone, and pushing me to think more deeply and critically about my argument, which truly made this paper a success. I also owe a special thanks to my committee members, Dr. Valerie Satkoske and Dr. Martha Terry, for their time, advice, and support in helping me complete this paper and this program, as well as to Zachary Mace for his guidance and advice throughout the writing process.

1.0 Introduction

The relationship between a pregnant woman and her fetus is multifaceted and complex. Within one body, there is one person, the woman who is pregnant, and one potential person, the fetus (Post 1997). With regard to the fetus, the attribution of rights and moral status is the subject of substantial controversy in contemporary American society. It may be said, largely without controversy, that both the woman and fetus have interests, at least in the following sense: something is or is not in the interest of the woman or the fetus, and that there are actions that can be taken that will promote the objectively defined well-being of the woman or the fetus. Indeed, their interests may conflict, culminating in a maternal-fetal conflict (MFC), the focus of this paper.

This paper will specifically explore implications of a recently developed technology, ectogenesis (EG), for the possibility of protecting or serving fetal interests, and thus the implications for the possible obligation to do so. In 2017, researchers succeeded in using EG, or artificial womb technology, to support extremely premature lamb fetuses' survival and growth *ex utero*. Subsequently, there has been discussion of the possibility of using EG to benefit human fetuses, which raises ethical questions (Partridge, et al. 2017). Although foundational ethical rights and values may remain unchanged by advances in technology, their material implications may change in light of technological advances. Furthermore, EG may cause decision-making in cases of MFC to become more complex by increasing the number of decisions that must be made by adding an option that is worthy of consideration.

This paper will examine a case of MFC, first without the availability of EG, and then with the assumption that EG is available (i.e., that it has met standards of safety and

effectiveness). The goal of these two case analyses is to articulate the relevance of the availability of EG for cases of MFC and to illuminate how the availability of EG affects obligations of healthcare professionals and pregnant women with regard to protection or promotion of fetal interests. Chapter Two will present relevant background information regarding MFC. Chapter Three will present and discuss a case of MFC, concluding that a woman's rights to bodily integrity and autonomy should be upheld and her interests promoted even at the expense of the interests of the fetus. Chapter Four will discuss the same case in the presence of EG to explore the effects of EG on the resolution of MFC. This paper will conclude that while EG may provide women with an option to serve their interests or the interests they have regarding their fetus, and may even obligate others to serve what may be in the *ex utero* fetus's best interest, a woman cannot be required to place her fetus's interests before her own. Such a requirement would be a violation of her rights. Overall, when balancing the competing interests of a pregnant woman and her fetus, interventions cannot be imposed on the pregnant woman contrary to her interests, although constraints may be placed on the pregnant woman's decision-making to protect the fetus's interests once it is *ex utero*.

2.0 Background Regarding Maternal-Fetal Conflict

2.1 Interests, Preferences, Values, and Rights

Maternal-fetal conflict (MFC) refers to instances in which there are conflicts between the interests of the pregnant woman and the interests of her fetus. Whereas preferences are subjective, and refer to a person's actual wants, interests can be ascribed objectively to a person, without knowing what that person's preferences, values, or beliefs are. Interests are objective needs for flourishing as a person. A person's interests benefit him or her in some way and are conducive to his or her well-being. A person need not actually want or prefer what is his or her interest (Beauchamp & Childress 2009). People may prefer to use herbal remedies even though it would be in their best interest to take antibiotics if they have strep throat, or smokers may want another cigarette although not smoking would be in their best interest.

The objective nature of interests is what allows surrogate decision makers to use the Best Interest Standard when making decisions for a patient (Beauchamp & Childress 2009). According to this standard, because an incompetent patient's specific values and preferences regarding treatment are not known, a surrogate decision maker makes a decision on behalf of the patient based on a general view of interests. If a person's values and preferences are known, the interests that may be justifiably ascribed to that person may be constrained. If it is known, for example, that a person's deeply held religious beliefs require that she refuse medical interventions and thus, that person prefers herbal remedies because of these deeply rooted religious beliefs, then it may not be in that person's best interest to prescribe him or her antibiotics. It may be said that his or her overall well-being (which encompasses the state of his

or her self-identity and/or soul) is more important than his or her physical, health-related well-being.

Rights are narrower in scope than preferences or interests. Interests that are sufficiently important ground rights, or a moral, ethical, or legal claim against others that oblige other members of a society or community to take, or refrain from engaging in, certain actions. Moral rights protect important interests, and define or restrict what one is entitled to do or be, how one is entitled to act, or how others have a duty to act with regard to oneself. Rights can be positive (i.e., a right that permits a good or action of some sort; for example, the right to vote) or negative (i.e., a right that obliges noninterference; for example, the right to be left alone). Rights can serve to advance an individual's interests, but having an interest in something does not equate to having a right to that thing (Wenar 2015). Agents do not have a moral right to have all of their preferences satisfied or interests protected.

While all people have an interest in having the right to vote (i.e., it is in their interest to have that right), some have a preference to participate in elections, while others do not. We might say that those who have a preference to participate are *interested in* participation. However, even though something is in a person's interest, it does not mean that the person is automatically interested in it as an end. While all people have an interest in health (i.e., an interest in health that can be ascribed to all people), because health is conducive to their well-being no matter what their life plans (Daniels 2008), not all people are interested in health. Some may be proverbial couch potatoes or may enjoy risky behaviors; they may *prefer* to pursue an unhealthy lifestyle. Health may be less important to them than pleasure, for instance. While all people have an interest in having a right to reproductive freedom, some have the preference to exercise that right by having children, while others prefer to exercise that right by not having

children. The right to reproductive freedom protects people's interest in being able to control their bodies, their interest in bodily integrity, their interest in privacy, and their interest in being able to craft their own life plans based on their values and preferences.

2.2 Interests of Women, Pregnant Women, and Fetuses

A woman has a variety of interests, such as health, equality (e.g., being an equal citizen of society), and reproductive freedom. By virtue of being pregnant, it can be said that the interests of a pregnant woman are compromised because being pregnant places a woman at risk of harm since being pregnant is more physically dangerous than not being pregnant. It is in any person's interest to be healthy and not be at risk, but being pregnant itself is a conflict as it makes a woman more vulnerable, including to illness or infection. Likewise, a woman can be even more vulnerable if she faces additional risks, such as cancer, while she is pregnant. As a result, while a woman is pregnant, even if she wants to be pregnant and to have her child based on her own preferences, her most basic interests in health conflict with the fetus's interests.

There are things that can be objectively viewed as in the fetus's interests. We can ascribe to a fetus, as a potential person, an interest in the conditions that enable it to have "normal" healthy development, to be born, and to become a person capable of pursuing life plans. A pregnant woman's interests can coincide with those of her fetus if having a child is part of her life plan and if she comes to believe that what is in the interest of her fetus-*cum*-child is what she wants or prefers, because of the importance she places on the well-being of her fetus-*cum*-child and the importance she places on its role in her life. We might say that the well-being of her fetus-*cum*-child is conducive to (or contributes to) her well-being as she defines it; the thriving of

the fetus-*cum*-child is something she deeply values. When she is pregnant, we might say that her interests encompass or include those of her fetus, because she wants the child. So long as the fetus does not present any additional threat to her well-being beyond those associated with simply being pregnant, the interests that may be objectively ascribed to the fetus and to the pregnant woman may coexist and may coincide.

However, those interests can diverge, such as in instances when the health of the pregnant woman adversely affects the health of the fetus, or vice versa. Because of their relationship, the pregnant woman and fetus can present an existential threat to each other, either because of the risk one may present to the other's health and life, or because the pregnant woman may make a decision to terminate her pregnancy or otherwise act in a way that is contrary to the interests of the fetus. When the fetus or continued pregnancy presents a risk to the pregnant woman, she may want to seek or promote her own interests instead of promoting the fetus's interests, or the well-being of the fetus may be so important to the woman that she still wants to protect the fetus even at some increased risk to her own health. For example, if the woman is interested in maintaining her pregnancy and having a healthy baby, she may sacrifice freedom of movement and pursuit of her usual daily activities and agree to stay on bed rest until the fetus is born. This sacrifice of some of her preferences for what she prefers more – a healthy baby – not only serves the fetus's interest in gestating in a healthy environment and being born without complication, but also aligns with her higher preferences and values.

The situation is more difficult when what is needed to adequately serve the fetus's interests (e.g., to save its life or provide for its health development) requires a greater degree of sacrifice of the woman's well-being, even if serving the fetus's interests in this way aligns with her higher preferences, values, and life plan. The woman may, based on her preferences and

values, choose to consent to interventions that serve the fetus's interests at the expense of her interest in her own health, or she may not, and may instead seek instead to protect her health. Questions arising in such cases of MFC include: are there any constraints, grounded in the interests of the fetus, that may be justifiably placed on the pregnant woman's decision-making when she seeks to protect her interests, particularly her interests in her life and health? What are the conditions that justify these constraints, or under which may they be imposed? Who has the authority and/or obligation to constrain the pregnant woman's ability to protect her health when she is acting in service of her interest in her own life and health for the sake of serving the fetus's interests?

2.3 Approaches to Framing and Analyzing Maternal-Fetal Conflict

Commentators differ on how to conceptualize MFC and how to analyze cases involving MFC. These accounts of MFC vary with regard to such dimensions as how the parties to the conflict are conceptualized, the moral status attributed to the parties, who is considered to have standing with regard to weighing in on the conflict, and the relevance of various material conditions (such as the time during the pregnancy at which the conflict arises and whether the fetus is viable at that time).

While developed for maternal-fetal surgery and clinical research, Frank Chervenak and Laurence McCullough (2011) have put forward an often-cited theory that conceptualizes the fetus as a patient. This idea can be applied to cases of MFC to help determine how healthcare professionals or the pregnant woman may be obligated to act towards the fetus. They posit that some humans are not people, such as those who are infants, have dementia, or are irreversibly

neurologically damaged, but that these humans can still be patients despite their level (or lack) of competency. According to them, the concept of being a patient is beneficence-based as opposed to autonomy-based, rights-based, or person-based. Therefore, a patient is defined as a (human) being whose health-related interests could be met or promoted by a physician.

Chervenak and McCullough (2011) discuss two different types of moral status: independent moral status or dependent moral status. They define independent moral status as based on the intrinsic properties that produce a moral status for that being independent of all other human beings; this would be the pregnant woman's moral status. They define dependent moral status as a moral status that is related to the context of a relationship or is constructed as a result of the social interactions between human beings and the being in question; this would be the fetus's moral status. They argue that once a viable fetus is presented as a patient to the physician, it will have dependent moral status as a patient, regardless of its status as a person. Since the physician has now entered into a relationship with the fetus, given its dependent moral status, the physician has, at the very least, beneficence-based obligations to protect the health-related interests of the fetus and the person it can become, if the physician is to treat all patients justly as patients.

Notably, Chervenack and McCoullough (2011) state that neither the previable nor viable fetus can be considered a patient separate from the pregnant woman. They assert:

On our account of the ethical concept of the fetus as a patient, beneficence-based obligations to the fetal patient are only one component of the physician's or investigator's clinical ethical judgment. As such, beneficence-based obligations to the fetal patient must in all cases be balanced against both beneficence-based and autonomy-based obligations to the pregnant patient. The fiduciary relationship of the physician to a fetal patient does not make beneficence-based obligations to the fetal patient the physician's sole ethical consideration: To repeat, beneficence-based and autonomy-based obligations to the pregnant patient must *in all cases* be balanced against beneficence-based

obligations to the fetal patient (McCullough and Chervenak 1994, as cited in Chervenack and McCoullough 2011, p. 43, their emphasis).

Consequently, the obligations of the physician towards the fetus as a patient rest on viability and the woman's choice to present her fetus (when either previable or viable) to the physician, but the difference between obligations to the woman and fetus do not rest on these two factors alone. The pregnant woman has no moral obligation to present her fetus to a physician, which makes the fetus a patient only through the woman's autonomous choice to present the fetus as such (Chervenack & McCoullough 2011).

However, Chervenack and McCoullough do not discuss what should be done when the woman's autonomous choice to present the fetus to the physician conflicts with the beneficence-based obligation she may have toward the fetus. The fetus's interest in health may be better served or advanced by being cared for by a physician, who can serve the fetus's interests at no cost to his or her own physical interests, so the woman should present her fetus to the physician to act with beneficence towards the fetus and to protect or advance its interests; yet she can make the choice not to, which may not be in the fetus's best interests. Chervenack and McCoullough's framework also does little to help physicians determine how to balance their obligations toward the pregnant woman and fetus as patients, nor does it acknowledge that a physician must trespass the woman's body to provide any aid to the fetus-patient. Although this paper will not be discussing the moral status of the fetus in depth, Chervenack and McCoullough's conceptualization can be useful in analyzing cases of MFC in that it provides a theory that depicts the fetus as a patient, which may make it more easily justifiable to recommend interventions considering the fetus's interests.

Chervenack and McCoullough's approach frames the fetus and woman as one unit, whereas Susan Mattingly (1992) presents a framework that criticizes approaches that view the

woman and fetus as separate patients. Mattingly disagrees with the medical model of the maternal-fetal relationship that has emerged as a result of the medical diagnostic advances; she contends that this shift has led physicians to regard fetuses as patients, changing the physician-patient relationship by viewing the pregnant woman and her fetus as two separate entities. Mattingly does not provide any other basis for why the fetus can be regarded as a patient other than a shift in a relationship with the physician.

This “two-patient model” presents a new problem for physicians, she says, in that what may benefit one patient may not be of benefit to (and may even be of harm) the other, yet their “biological unity” cannot be ignored ethically or materially. Therefore, beneficence cannot be used to justify treatment for one patient alone when a conflict of interests arises, since the two patients are linked. Mattingly (1992) asserts that when employing this two-patient model, physicians must apply the principle of justice when attempting to resolve a conflict between the interests of two patients. Physicians may not benefit one patient at the expense of the other. It would be unjust to recommend to the pregnant woman treatment for the sake of the fetus that is against her medical interests (except under “stringently qualified conditions”) as it would be a conflict of duties between multiple patients. The woman may identify with the fetus’s interests and choose to pursue treatment that promotes fetal health that may be burdensome to her; however, only if the woman waived her interest in not being harmed would a physician be justified in proceeding with an intervention that benefitted the fetus at the expense of harming the woman (Mattingly 1992).

Mattingly (1992) does advocate for a proxy to give consent on behalf of the fetus if it is viewed as a separate patient (as it is incompetent), but states that when a recommended intervention is therapeutic for the fetus and nontherapeutic for the woman, the woman has no

obligation to provide consent for the therapy as it is harmful to her, and her refusal cannot be overridden if she is a competent, informed patient and refuses voluntarily. Therefore, according to Mattingly, the challenge to fetal benefit is not the woman's autonomy, but rather the physician's duty of nonmaleficence with regard to the woman, as a physician should not force nontherapeutic intervention on a patient. Mattingly (1992) goes on to say that to truly view the woman and fetus as two separate patients may actually have no effect on the physician's duty to intervene or provide ethical care to the patient, especially given that in order to provide care for the fetus, the physician must go through the woman's body to do so. Therefore, Mattingly argues that it is more accurate to view the pregnant woman and her fetus as a two-patient ecosystem, as the two are integrated (Mattingly 1992). Nevertheless, despite her criticism of the two-patient model of the maternal-fetal dyad, Mattingly suggests how it can be used to analyze cases of MFC using the standards of justice and maternal nonmaleficence (i.e., not causing harm or acting with beneficence towards the pregnant woman such that treatment recommendations made to her on behalf of the fetus are not contraindicated with what is in her best health interest).

Interestingly, the accounts presented so far have not focused on the conflict of interests between the woman and her fetus, but rather between the conflict that arises from clashes between what the woman believes is conducive to her well-being and that of her fetus and what the physicians acting on the fetus's behalf believe is conducive to the woman and her fetus's well-being, thereby affecting what the physician has a duty or obligation to do in order to act ethically. Baylis, Rodgers, and Young (2008, as cited by Kukla & Wayne 2015), hold this view, that the conflict is maternal-professional instead of maternal-fetal, as do Sozos Fasouliotis and Joseph Schenker (2000). Fasouliotis and Schenker assert that a conflict arises when the pregnant woman does not want to comply with the recommendations a physician makes on her fetus's

behalf, leading to a “serious moral and professional dilemma” (p. 102), though they acknowledge a conflict of interests between the woman and fetus as well. Kukla and Wayne (2015) seem to endorse that the conflict may be maternal-professional insofar as they suggest that the best way to mediate such conflicts may be to first try to discern where differences in views about what would best promote maternal and fetal well-being arise.

It seems that MFC is most commonly analyzed by using the principles set forth by Beauchamp and Childress: beneficence, nonmaleficence, autonomy, and justice. As evident in the approaches already presented, there is a specific focus on beneficence and autonomy when analyzing MFC, although Mattingly appeals to justice. Mary Mahowald (1992) identifies three principle-based positions that highlight this focus: 1) giving priority to the pregnant woman’s autonomy, 2) giving priority to beneficence towards the fetus, and 3) giving priority to beneficence for both patients in a manner that trumps the woman’s autonomy. The first position supporting the woman’s autonomy is grounded in a right to bodily integrity and the debatable moral status of the fetus. Like Judith Jarvis Thomson (1971), Mahowald recognizes that even if the fetus were considered a person, it would be inconsistent to require a pregnant woman to undergo a risky or invasive procedure when no other competent adult could be similarly coerced into doing so. Mahowald notes that the right to control one’s body is “limited by the extent to which that body is capable of harming others” (p. 733), suggesting that, if the woman and fetus have equivalent moral status, a woman may be obligated to protect the fetus from harm if the harm will be greater for the fetus than for herself. Correspondingly, in her well-known article defending a woman’s right to have an abortion, Thomson (1971) argues that the woman’s right to self-defense must be limited by an obligation not to inflict more harm on the fetus than is necessary to be free of the fetus’s unwanted intrusion on her bodily integrity; otherwise, her right

to self-defense would permit her to inflict more harm on the fetus than the fetus would present to her.

In the second position, Mahowald discusses overriding both beneficence toward the woman and the woman's autonomy to give greater weight to the obligation of beneficence towards the fetus primarily on the grounds that the fetus is vulnerable and thus deserves more care, especially because the fetus may have more to lose (e.g., the potential for a life filled with a variety of experiences, whereas the woman has already lived and had a variety of experiences) if the priorities were reversed (Mahowald 1992). However, it seems wrong to argue that a pregnant woman has already "lived life" by this time in her life, given that most women are pregnant under the age of forty-five or that a fetus is guaranteed a long life.

In the third position Mahowald considers, she cites Chervenack and McCullough, and considers whether duties of beneficence toward both patients – the fetus and pregnant woman – override respect for the woman's autonomy. Chervenak and McCullough argue that a woman's right to refuse medically indicated treatment that would benefit both her and her fetus can be overridden in cases when refusal of the treatment "dooms the beneficence-based interests of the fetus and virtually dooms the beneficence-based interests of the pregnant woman" (Chervenak and McCullough 1991, as cited in Mahowald 1992, p. 734). Mahowald rejects Chervenak and McCullough's reliance on the idea that the woman's assertion of a negative right (to refuse an intervention) amounts to an assertion of a positive right (to an inappropriate intervention or professional care), which would in turn set up a conflict between the woman's autonomy and professional autonomy. Mahowald argues that the woman's negative right to refuse an intervention must be honored. Even when there is a high probability that her refusal will result in "tragic consequences," the woman who "has identified her own ends with nonintervention" must

not be treated as a means to another's ends (the fetus's) by overriding her choice of nonintervention (Mahowald 1992, p. 735).

Fasouliotis and Schenker (2000) also use the same principles to analyze MFC, although their framework assumes the fetus is a patient on the grounds that it has a potential to become a person, not that it has independent moral status. Contrary to Mattingly, they claim that if the fetus is a person and past the point of viability, the woman's right to bodily integrity and privacy may be overridden based on the beneficence-based obligation the physician has to the fetus, so long as the benefits for the fetus of the proposed action or treatment outweigh the risks to the pregnant woman. Fasouliotis and Schenker (2000) state that if the woman and fetus are considered separate patients, physicians must decide what is best for each patient separately, and cannot make treatment recommendations based on the principle of beneficence alone because it would be unjust to weigh the burdens of one patient against the benefits of the other.

Oduncu and colleagues (2003) use the principles of maternal autonomy, maternal beneficence, and fetal beneficence to construct a framework to approach MFC without determining whether a fetus is a person. These authors explain that the pregnant woman's autonomy should be respected as she is free to choose her course of treatment based on "her perspective of her best interests and personal well-being that are based on her individual and beliefs" (Oduncu, et al. 2003, p. 136). There is no autonomy-based obligation to the fetus, as it lacks personal beliefs and values, which form the basis of assertions of autonomy. Yet, they argue that the physician does have beneficence-based obligations to both the pregnant woman and the fetus: the physician must try to achieve a greater balance of benefit over harm to each. Furthermore, the authors claim that justice demands that the physician "distribute benefits and

harms equally to the patient [the pregnant woman] and the fetus where it is possible” (Oduncu, et al. 2003, p. 137).

Oduncu and colleagues then state that when these principles are applied, four types of obligation-based conflicts can arise between the pregnant woman, fetus, and healthcare professional: 1) maternal beneficence-based obligations of the physician clash with fetal beneficence-based obligations of the physician, 2) fetal beneficence-based obligations of the woman clash with fetal beneficence-based obligations of the physician, 3) maternal autonomy-based obligations of the physician clash with fetal beneficence-based obligations of the physician, and 4) maternal autonomy-based obligations of the physician clash with maternal beneficence-based obligations of the physician. They contend that balancing principles when conflicts of these types arise can help with the decision-making process when trying to determine the best course of action. The first type of conflict — between beneficence-based obligations of the physician with regard to both pregnant patient and fetus — will be the focus of this paper’s analysis in Chapter Three, which considers what Oduncu et al. term “the classic conflict in the tragic constellation of cancer occurring in pregnancy. The conflict is whether to terminate the pregnancy to enable an immediate start to maternal therapy or to delay maternal therapy to allow fetal maturation” (2003, p. 135). Chapter Four will then consider how the availability of EG affects analysis of this classic conflict.

3.0 Case Presentation and Analysis

While all of the aforementioned frameworks emphasize balancing bioethical principles, especially respect for autonomy and obligations of beneficence, the differences between these accounts highlight the difficulties of actually balancing competing interests of pregnant women and their fetuses, as well as the challenges of articulating what obligations are owed to whom and by whom. This chapter will use approaches and considerations outlined above to analyze a case in order to examine these competing interests and the obligations owed to the pregnant woman and her fetus.

3.1 Case Presentation: Ms. A

At ten weeks of her pregnancy, Ms. A receives a confirmed diagnosis of cervical cancer. At the time of diagnosis, the cancer is classified as Stage IIA2, meaning cancer has spread beyond the cervix with a tumor that is greater than 4 cm, but is still confined to the pelvic area and no lymph nodes have been affected (Cancer.Net 2017). She is referred to an oncologist to discuss treatment options. Her obstetrician and oncologist worry that the cancer will spread rapidly or metastasize given the rapid rate of cell division they observed. At this time, Mrs. A is warned of the aggressive nature of her cancer and the possibility for it to spread rapidly. The cancer is still in a relatively early stage and the tumor is fairly small, so it is possible for Ms. A to benefit from receiving chemoradiation. Chemoradiation, however, may harm the fetus given that the high-energy radiation beams will be directly targeting the uterus to treat the cancer.

Chemoradiation between two to eighteen weeks of pregnancy can cause serious birth defects and/or brain damage to the fetus, but treating the cancer while it is localized would allow for a 92% five-year survival rate (ACS 2019; CDC 2011).

Ms. A's oncologist recommends that she terminate her pregnancy to begin cancer treatment including chemoradiation. The oncologist believes that beginning treatment immediately would be in her best physical health interest due to the concern for potential rapid spread of the cancer. Ms. A's obstetrician agrees that termination would be in Ms. A's best interest so that she can begin treatment. Contrary to her obstetrician and oncologist's advice, Ms. A decides to postpone initiating cancer treatment (i.e., receiving chemoradiation) because she wants to have her baby. She states that she wants to carry the fetus to term in order to give her child the best chance of good health outcomes.

Yet as times passes, Ms. A becomes increasingly anxious about her diagnosis, and grows more worried about her own health and well-being. Although her cancer is still Stage IIA2, she wants to minimize the chances of its progression, and yet she still wants to have the baby. At 19 weeks of her pregnancy, she states that she wants to deliver the fetus as soon as it is viable (at 23 weeks) in order to begin treatment. Ms. A's oncologist is as much in favor of treating her cancer as before, and supports her decision (and indeed would support her terminating her pregnancy and beginning treatment immediately). However, the neonatal pulmonologists (NPs) in her healthcare institution advise that she wait longer than 23 weeks to deliver, because the fetus's lungs would not be sufficiently developed at 23 weeks to best support life and avoid a poor prognosis. The NPs advise that Ms. A remain pregnant until at least 27 weeks to give the fetus a better chance of survival and healthy development based on the more advanced development of its lungs.

If the fetus were to be delivered at 23 weeks, it would be considered extremely premature, and would require a lengthy stay in the neonatal intensive care unit (NICU) (Simmons, et al. 2010). If born so prematurely, the baby could suffer from neurodevelopmental issues, such as bleeding in the brain or brain injury, that can later lead to poor cognitive function if the child survives to school age (Hoekstra, et al. 2004). In addition to poor neurodevelopmental outcomes, these infants experience higher rates of cardiovascular, pulmonary, and vision and hearing impairments. Prematurity places the baby at risk for sepsis and asphyxia, as well as higher risk for respiratory distress, infections, seizures, feeding difficulties, digestive problems, temperature instability, disability (especially cerebral palsy), and other illnesses that can lead to long term difficulties or developmental delays. Premature babies are also more likely to have lower long-term survival rates and increased mortality (Simmons, et al. 2010).

On the other hand, waiting another month (to 27 weeks of pregnancy) before beginning cancer treatment in order for the fetus's respiratory system to develop as the NPs suggest, could allow the cancer to spread and advance in stage. Delaying treatment conflicts with what both Ms. A's obstetrician and oncologist initially suggested, namely starting treatment as soon as possible. While some chemotherapies may be less harmful to the fetus than others during pregnancy, these drugs still have potential to cause at least minor damage to the fetus since not much research has been done to determine the optimal dose and treatment interval for pregnant women (Han et al. 2013).

Ms. A remains adamant about delivering her fetus at 23 weeks to start chemoradiation.

3.2 Case Analysis

This case presents a MFC: the woman's interest, her well-being, conflicts with the fetus's interest in developing more fully *in utero*. In addition to this conflict, there is also a maternal-professional conflict and conflict between Ms. A's physicians regarding what they recommend. Using the bioethical principles of respect for autonomy and justice, the doctrine of informed consent, and respect for rights to bodily integrity and privacy, this paper argues that Ms. A has the right to deliver as she desires at 23 weeks to preserve her health and start cancer treatment.

3.2.1 Autonomy

An autonomous agent has the ability to self-govern and has the right to be free from others' controlling interference so that he or she can act on his or her own beliefs, reasons, or values in order to make choices that are in accordance with his or her values (Beauchamp & Childress 2009). In order to make an autonomous decision, a person must be competent and have adequate information to understand and appreciate the decisions to be made. In healthcare, the principle of respect for autonomy grounds the rights to bodily integrity and privacy, and the doctrine of informed consent. According to the doctrine of informed consent, autonomous agents have the right to refuse or authorize treatment, and thus have a right to be informed of material information pertaining to that treatment, so that they may give informed consent or refuse to do so. In law, the doctrine of informed consent is based on the right to bodily integrity, which includes being free from unwanted bodily harm or trespass, and came to include the right to make one's own choices about medical treatments as well as reproductive decisions (Allen 2015; Faden & Beauchamp 1986; Neff 1990; Overall 2015).

The right to privacy is intertwined with the rights of autonomy and bodily integrity. This right entails not being interfered with or regulated by the government or others in certain aspects of private life (Allen 2015; Beauchamp & Childress 2009; Faden & Beauchamp 1986). This right encompasses decisional privacy and confidentiality, which protects one's right of self-determination and freedom to make personal decisions. In this case, the rights of self-determination and privacy shield Ms. A from outside interference when making a decision about her health, even a potentially controversial one. As a competent adult and autonomous agent, she has the right to exercise her decisional freedom to make choices in accordance with her values and preferences regarding the course of her pregnancy and matters related to her health.

Many of the accounts of MFC previously presented discuss autonomy, as it is a crucial principle used to analyzing this type of conflict. Chervenack and McCoullough's (2011) framework asserts that the fetus's status as a patient is dependent on the autonomous choice to present the fetus to a physician. Without doing so, the physician has no obligations toward the fetus. Therefore, the woman's autonomy must be respected as the fetus is first dependent on her and her choice to do so. The first position Mahowald (1992) discusses prioritizes the woman's autonomy so long as doing so does not subject the fetus to greater harm than it does the woman. Fasouliotis and Schenker (2000) make a similar claim.

Approaching this case from the first position Mahowald presents, Ms. A can be considered as vulnerable as the fetus since Ms. A is not only pregnant (which places her health at risk), but also has cancer, while the fetus faces the side effects of chemoradiation or effects of prematurity. Ms. A's health depends on receiving cancer treatment that she cannot receive unless she chooses to terminate her pregnancy, which is not what Ms. A wants nor is it in the fetus's interests. Ms. A is fulfilling her beneficence-based duty to the fetus by considering the interests

of her fetus, for she is trying to protect the fetus's interest in life and health by making an informed decision about which intervention would allow the fetus to be born and have a chance at life, although neither option optimizes the fetus's health given the short and long-term effects of being subject to chemotherapy *in utero* or being born prematurely. Additionally, Ms. A is choosing which course of action would cause the fetus less harm, as she has already chosen not to terminate her pregnancy. According to this position, given that Ms. A is vulnerable as well, Ms. A's autonomy and rights to self-defense and bodily integrity should be given priority over the fetus's interests.

Oduncu and colleagues (2003) specifically consider a comparable case of a pregnant woman with cancer. In the case they describe, maternal autonomy-based obligations of the physician clash with fetal beneficence-based obligations of the physician. The physicians must decide if their obligation to respect Ms. A's autonomous decision to deliver early should be prioritized or if their beneficence-based obligation to promote fetal health should lead them to override the woman's autonomy. As Oduncu and colleagues (2003) believe that physicians should try to achieve a greater balance of benefit over harm to the fetus and to Ms. A, it can be again concluded that the physician's obligation to uphold Ms. A's autonomy should have greater weight in the outcome of this case. Respecting Ms. A's autonomy allows for a more just distribution of harms since both Ms. A and the fetus can get treatment once the fetus is delivered at 23 weeks, whereas only the fetus benefits from continued *in utero* gestation.

3.2.2 Justice

The principle of justice demands that equals be treated equally, or that similar cases be treated similarly (Beauchamp & Childress 2009). In determining that two cases are indeed

similar, it is necessary to determine what is relevant to that determination. In determining whether a patient should be offered a medical intervention, for example, it is necessary to ask what about the patient is relevant to making this determination. Medical need is the least controversial consideration on the basis of which to judge that a person should be offered a medical intervention, though some contend that other factors are also relevant, like ability to pay. Most would agree that, for example, race, ethnicity, religious beliefs, and marital status are not relevant to being offered an intervention for which one has a medical need. Justice requires that all those with similar medical need for and similar probability of benefitting from a medical intervention have equal right to be offered it. In this case, it would be unjust not to offer cancer treatment to Ms. A based on her pregnancy status. Ms. A should have the same right of access to standard of care intervention as someone who is not pregnant.

As a person, Ms. A has the same rights to privacy and bodily integrity as any other person, and can exercise those rights when making a decision regarding her health care. Her rights should be respected regardless of her pregnant state. Being pregnant does not interfere in any way with the conditions that are relevant to having her decisions respected as a competent decision-maker. The following analysis of the MFC in this case argues that forcing Ms. A to sacrifice her own well-being for her fetus's well-being would be unjust, because requiring her to do so would create a double standard that would allow intervention in the decisions and self-determination of pregnant women (as they direct the care of their bodies, their bodily integrity) for the benefit of the fetus, while no nonpregnant competent rights-bearing person would be forced to undergo medical intervention, or be prevented from seeking medical intervention, for the sake of another's interests (Kukla & Wayne 2015). Furthermore, even when the other party whose interests would thereby be served is a fully competent rights-bearing person (as in the

case of a competent adult organ transplant recipient), no autonomous agent can be required or forced to undergo medical intervention contrary to his or her wishes (nor to forbear from undergoing an intervention) for the sake of that other party.

The NPs' treatment recommendation of continuing the pregnancy to 27 weeks for the sake of the fetus would be unjust to Ms. A, as it is contrary to her health interests. Ms. A has a right to receive the standard treatment for her cancer, like any other person with cancer, in order to be treated as equally fairly as any other person with cancer. Patients do not typically have the right to demand treatment, but given that chemoradiation is standard of care for her condition, was previously offered and recommended to Ms. A, and would still be appropriate care for her cancer, the physicians have a duty to provide that standard of care. As a byproduct of upholding this standard, the physicians would also have to deliver the fetus to prevent cancer treatment related harm from coming to the fetus.

3.2.3 Informed Consent

Ms. A's physicians have provided her with their professional opinions as well as the information she needs to make an informed decision based on what is important to her. Ms. A refused to terminate the pregnancy at the time of her diagnosis because she wanted to promote the health of her future child and may have even considered seeking a healthy child to be an important part of her life plan and thus, in her interests. At the time, her values and preferences, and perhaps her life plan and vision of her overall well-being, encompassed or included the interests of her fetus and future child, but later, what she wanted changed. She chose to give greater weight to her own health. Whatever her reasons, she took delivering her fetus as soon as it was viable and beginning treatment to be within her values and preferences. She made an

informed decision to begin treatment, knowing what it would mean to delay treatment longer than she already has and what it would mean for her fetus's health to deliver at 23 weeks. Ms. A has a right to change her mind as an autonomous person, and she has the right to change her mind in order to make decisions that reflect her current values and preferences, particularly given that different life circumstances have seemingly altered what is meaningful to her. Indeed, she has a right to change her mind (i.e., her preferences) even if there were no change in her circumstances. Doing so is a personal decision, and her right to privacy protects her decision from being overly scrutinized by others.

3.2.4 Status as a Patient and Intraprofessional Conflict

In keeping with the approach of Fasouliotis and Schenker (2000), this conflict could be viewed as a maternal-professional conflict because Ms. A does consider her fetus's interests to be important and has protected them thus far, yet she disagrees with what the NPs recommend (i.e., allowing the fetus to continue gestating at the cost of her own health deteriorating). At the same time, this conflict can be viewed as an intraprofessional conflict like that described by Oduncu et al., whereby maternal beneficence-based obligations of the physician clash with fetal beneficence-based obligations of the physician. The oncologist and obstetrician were acting with beneficence towards Ms. A when thinking of their patient's (Ms. A) best health-related interest when they recommended that she terminate her pregnancy at the time of cancer diagnosis to begin treatment to promote her own health. The oncologist may not view the fetus as a patient nor as a person, but can understand Ms. A's interest in the fetus's well-being. Similarly, the obstetrician's patient is the woman, although the obstetrician may feel a greater duty than the oncologist to promote the fetus's well-being given her profession. As noted in the accounts of

MFC, the obstetrician may or may not view the fetus as a patient or a person, but the obstetrician in this case is more concerned with promoting Ms. A's interests and well-being.

In contrast, intraprofessional conflict arises when the NPs act out of a fetal beneficence-based obligation towards and on behalf of the best interests of their future patient (i.e., the fetus, once it is born prematurely and admitted to the NICU) when they recommend the pregnancy be continued for another month. Whether or not they view the fetus as a person, the NPs do view the fetus as a patient, for the intervention they are recommending is for the fetus's benefit. That each physician views either the fetus or Ms. A as his or her patient creates a conflict regarding to whom their beneficence-based obligation is owed, creating intraprofessional and interprofessional conflicts in addition to an MFC.

The NPs recommendation makes it seem as if the fetus's viability does not matter for it to be considered a patient, for Ms. A's fetus is currently previable and the NPs are still acting with beneficence on its behalf. As Chervenak and McCullough (2011) argue, the fact that Ms. A presented the fetus to the care of the healthcare system makes the fetus a patient despite its previability. On this view, the oncologist and obstetrician should act with beneficence towards the fetus, as the NPs do. Although the NPs already consider the previable fetus a patient, the obstetrician and oncologist may give greater weight to the fetus's interests at the point of viability, as it can survive independently of the mother. Nevertheless, the fact that the oncologist, and perhaps the obstetrician, do not similarly seek to protect the previable fetus's interests does not mean that they do not view the fetus as a patient. They may view the fetus as a patient, but choose instead to promote Ms. A's interests as they feel they have a duty to protect her interests as she is *their* patient. The different views of the fetus as a patient may be a reason why each

physician recommends what he or she does: each physician seeks to serve his or her own patient's interests.

3.2.5 Weighing Risks and Benefits

Ms. A wants this baby, and considers its interests or well-being important to her own, as evidenced by the fact that she does not want to terminate her pregnancy or deliver the fetus before it is viable. It can be assumed that she wants her baby to survive and thrive, and would consent to treatment that would help her baby survive. Yet at 19 weeks, she is not consenting to postponing the start of her cancer treatment to 27 weeks of pregnancy. It is important to note that if the fetus is delivered once it is viable and capable of surviving outside the woman's womb, the fetus can be treated and cared for separately from the pregnant woman so that the woman can seek her own well-being. Premature delivery would adversely affect the fetus's well-being, as the fetus would benefit from as much growth *in utero* as possible given that the survival rate for a fetus born at 23 weeks is about 47% (Hoekstra, et al. 2004). Although premature birth does not confer the best chance of survival for the fetus and may not be in the fetus's interest, physicians can balance their duty of beneficence toward the fetus with respecting the woman's autonomy only by acting in the fetus's best interest once it has been born by providing it with the care and treatment it needs to improve its odds of surviving and by addressing morbidities associated with prematurity. They are not justified in interfering with Ms. A's competent decision-making, her exercise of her autonomy.

If Ms. A has been counseled on the possible outcomes and what a preterm birth would mean for her fetus and the baby's long-term development, and if she understands and appreciates these outcomes, she has the right to make the informed decision to advance her own well-being.

Although the fetus does not directly benefit from an early delivery, Ms. A would immediately benefit because she would have the chance to pursue cancer treatment. Doing so promotes her own health and, she presumably hopes, allows her to take care of her newborn baby, for whom she consented to an early delivery. If her treatment were successful, the baby would receive the benefit of having a mother who is alive and well and who wants to take care of her baby, whom she always wanted.

To equally serve the interests of the woman and the fetus is not possible, for as long as the fetus is gestating *in utero*, whatever is done to protect the fetus must be done to the woman or through the woman, and whatever is done to treat the woman's cancer risks a detrimental impact on the fetus. Therefore, to balance the demands of the principle of beneficence with regard to both the woman and fetus is not possible, and the woman's autonomous choice should be respected; she should be the one to make the tragic trade-off between her interests and those of her fetus (Oduncu, et al. 2003). When an individual puts his or her life at risk for the good of another, the action is deemed supererogatory. It is permissible for people not to risk their own life for the sake of others unless there is a particular obligation.

Ms. A has already acted in supererogatory fashion by carrying the child close to a gestational age that permits delivery, when she could have terminated the pregnancy early on. She also did not want to subject her fetus to the harms of chemoradiation while it was previsible, which she could have started from the moment of diagnosis. She has acted beneficially toward the fetus so far, but is not required to let the fetus continue gestation *in utero* at continued increased risk to herself. The choice to deliver in order to serve Ms. A's health should still be deemed ethically justifiable for reasons already stated, and the NPs' recommendations to delay delivery and postpone the start of cancer treatment should not be imposed upon Ms. A contrary

to her interests, preferences, and competent decision to seek standard of care cancer treatment.

As a result, Ms. A's rights and assertion of her interests should be decisive when considering this

MFC.

4.0 The Effect of Ectogenesis on Maternal-Fetal Conflict

This chapter will focus on ectogenesis (EG), or development of a fetus *ex utero*. The term “*ex utero* fetus” will be used to refer to a fetus that has been removed from the uterus and that has been or will be placed in the ectogenetic system, whereas the use of “baby” or “child” will more generally refer to a fetus that has been born (either prematurely or at term). EG is currently in development in nonhuman animal trials, but researchers expect the system they have created to be used to support premature infants in the near future, first in clinical trials and eventually, perhaps, in clinical care (Partridge, et al. 2017). EG could eventually provide an option for women who want to have children to have that child without having to continue a pregnancy that poses health risks to them. If EG were deemed to be sufficiently safe and effective to be used to sustain human fetuses *ex utero*, EG may have the potential to minimize MFC.

This chapter addresses the question of how the availability of EG would affect physician recommendations and pregnant women’s decision-making in cases of MFC such as that of Ms. A. It considers how the availability of EG affects any constraints, grounded in the interests of the fetus, that may be justifiably placed on the pregnant woman’s decision-making when she seeks to protect her important interests, particularly her interests in her life and health. Furthermore, this chapter articulates the EG-related conditions that justify these constraints, and considers who has the authority and/or obligation to constrain the pregnant woman’s decisions (and actions with regard to her) for the sake of the fetus’s interests. It discusses the implications of EG for application of the Baby Doe Amendment of the Child Abuse Amendment of 1984. This chapter will also consider whether an institution or which type of institution has an obligation to make EG available (i.e., to have the technology and professional expertise available to employ EG).

4.1 Ectogenesis Description

EG refers to development of a fetus outside of the womb, either from conception or after being delivered and transferred to the artificial environment *ex utero*. In a recent nonhuman animal study, researchers at the Children’s Hospital of Philadelphia were able to design a system that supported extremely premature lambs in an environment that closely resembles the womb. They attributed the success of the system they designed to the use of a pumpless oxygenator circuit in lieu of a pump-supported circuit, creation of a closed “amniotic” fluid environment that provides continuous fluid exchange, and innovative new umbilical vascular access (Partridge, et al. 2017). Their system supported extremely premature lambs for up to four weeks with no apparent damage to the organism (Partridge, et al. 2017). The researchers refer to their ectogenetic device as a “system,” which is the term used here. The system is what facilitates EG by providing nutrients and oxygen, removing waste, and generally sustaining the fetus’s life until it can be safely removed from the system.

Supporting fetal life on this system would differ from current NICU technologies because the EG system would more closely and comprehensively approximate a womb-like environment than existing technologies including incubators for premature infants. The researchers expect that this system will also be superior by allowing parents to stay closely bonded to their fetus via ultrasound, the ability to play maternal heart sounds and abdominal sounds for the fetus, and a darkfield camera that would allow real-time visualization of the fetus in the system’s environment. They posit that this technology would be used in a variety of pregnancy-related complications, such as in cases of threatened premature delivery after fetal surgery or for fetuses with fetal growth retardation. Additionally, the EG system would afford health professionals sterile access points to suction meconium, to examine the fetus via ultrasound (which would be

superior to the physical examinations currently done in the NICU), and to open the device quickly should the fetus need resuscitation (Partridge, et al. 2017). Given that NICUs currently rely on ventilators and incubators to support premature infants, this system is expected to afford improved health and developmental outcomes over those of current clinical technologies.

4.2 A Reexamination of the Previous Case of Maternal-Fetal Conflict in the Presence of Ectogenesis

Reimagining and analyzing the previous case study in light of this technology will demonstrate the impact of EG on MFC. The implications of EG for MFC will be more generally examined following the case analysis. To differentiate between the two cases, the pregnant woman in this new version of the case involving EG will be referred to as Ms. B, although all of the other facts of the case remain the same at the beginning of the case.

Like Ms. A, at the time of her cancer diagnosis, Ms. B wants to delay recommended cancer treatment in order for her fetus to develop to term. Based on her values and preferences at that time, like Ms. A, Ms. B is willing to incur some increased risk to her own health for the sake of the health of her fetus and future child. However, like Ms. A, by 19 weeks, Ms. B has become anxious about her health; she no longer wants to delay cancer treatment. She is willing to deliver via c-section despite the risks of the procedure in order to seek her own health. Like Ms. A, she wants to have her baby, which is why she initially rejected termination, and hoped to carry the baby as long as possible *in utero* in order to bond with her child. But Ms. B also wants a healthy baby, and wants to avoid the long-term developmental delays associated with prematurity.

Given her desire, transferring Ms. B's fetus to the EG system at 19 weeks would grant the fetus an improved chance of development (as compared to the fetus of Ms. A), while enabling Ms. B to serve her own health interest and begin cancer treatment. There would be little reason to wait until 23 weeks, unless the actual outcomes of using the EG system demonstrate a benefit to transferring a fetus to the system later rather than earlier in fetal development. In this case, using the EG system would respect Ms. B's autonomy by honoring her choice to begin treatment as soon as possible. Additionally, so long as she gives informed consent to the surgery removing her fetus, her bodily integrity is preserved, as she is not asked to remain pregnant until 27 weeks as the NPs suggested to Ms. A, contrary to her stated preference. EG provides Ms. B a way to pursue the cancer treatment plan that is in accordance with her interests and values while also providing a means to pursue her desire to have a healthy baby. EG enables her to act to safeguard her own health as well as her fetus's health.

The availability of EG also helps resolve the maternal-professional conflict in this case, as those acting on behalf of the fetus also have an option to recommend that enables them to serve the fetus's interest while not acting in a way contrary to the pregnant woman's interest. Given both the time of pregnancy at which Ms. B seeks to begin cancer treatment and her desire to have her baby, and to have it be as healthy and developmentally "normal" as possible, Ms. B may find it quite acceptable to incur the surgical risk of a c-section as opposed to the risk of delaying cancer treatment. One can imagine a different case, for example, if Ms. B had wanted to begin treatment at the time of diagnosis (10 weeks of pregnancy), when the risks associated with extracting the fetus so that it could be placed on the EG system would be greater than performing a standard pregnancy termination (abortion). The issue of the implications of the availability of

EG for the acceptability of terminating a pregnancy (without making provisions for placing the fetus on the EG system) is discussed later.

It might seem that the availability of the EG system eliminates the MFC present in the specific case of Ms. A or the reimagined case of Ms. B. The fetus's health interest can be served by placement on the EG system: it will have more robust health outcomes by being placed on the system as opposed to suffering from the outcomes of extreme prematurity as presently known. The NP's concern about underdeveloped lungs would be addressed as the system is designed to support the growth and maturation of extremely premature infant organs. Similarly, Ms. B's own health interest would be served as she would be able to start chemoradiation not merely upon delivery or at 23 weeks of fetal development, but as soon as practicable after she decides that she wants to. Further, the use of the EG system serves Ms. B's interest in pursuing her particular life-plan that includes having and raising a healthy baby. Whether the availability actually eliminates the MFC will be addressed a bit later.

4.3 Informed Consent to Ectogenesis and Ms. B as the Decision-maker for Her Fetus

In the presence of EG, it is possible for clinicians — in this case, perhaps the team of Ms. B's obstetrician, her oncologist, and the NPs — to recommend that Ms. B's fetus be removed and placed in the EG system. Indeed, given the availability of EG, that recommendation might have been made at the time of her cancer diagnosis; however, for purposes of discussion, it will be assumed that *in utero* gestation is normally superior to use of the EG system for the fetus. Therefore, given Ms. B's values and preferences at the time of diagnosis, she might have refused the option of surgical removal of her fetus for placement on the EG system.

So that she can make an informed decision about having her fetus removed and placed on the system, Ms. B's team of clinicians should provide information material to her decision: the risks associated with using the system and potential benefits of the system for the *ex utero* fetus, and future child, as well as the risks of the surgical removal (to both Ms. B and her fetus), and the risks and potential benefits to the fetus associated with alternatives, including gestating *in utero* to term or, for example, waiting to 23 weeks when the fetus would be viable, as Ms. A had wanted to do as her concern for her health increased. Why focus on the alternative of waiting to 23 weeks? There may not be a particular reason. Ms. A wanted to deliver at 23 weeks, because that was considered the point of viability, the point at which the fetus could survive *ex utero*, despite the increased risks to its current and longer-term health risks. With the availability of the EG system, however, depending on the details of its success, the time of viability (the point at which an *ex utero* fetus can survive) could be pushed earlier, perhaps to the point of conception (Overall 1985). The relevance of the concept and time of viability will be discussed later in the context of considering third-party rights and obligations regarding the fetus.

If she gives her informed consent to delivery at 19 weeks and use of the EG system, it must be imagined that Ms. B's considers the risks of surgery to herself and to her fetus, and the risks associated with EG, to be outweighed by the benefits she anticipates from beginning cancer treatment at that point in time and the outcome (benefit) she anticipates for her future child from the EG system. In effect, in deciding to consent to the removal and subsequent treatment of her fetus, she evaluates these risks and potential benefits in two roles, "wearing two hats." She is a patient who must consider the risks of surgical removal of the fetus (and perhaps the risks associated with her subsequent cancer treatment) as a patient. But she must also consider the risks of surgical removal and the risks and potential benefits associated with use of the EG

system as the decision-maker who grants permission for interventions affecting her future child. Moreover, according to current laws and ethical analysis, other parties (the State and the clinicians involved) have the authority and even the obligation to consider the risks and potential benefits to (i.e., the interests of) the *ex utero* fetus.

In fact, the availability of EG raises the question of whether the woman's consent would have to be given in order to utilize the system. The right to give informed consent implies the right to refuse. Would Ms. B have the right to refuse to have her *ex utero* fetus placed on the system? Should Ms. B want to use EG, she would most definitely have to give informed consent to the surgery required to remove the fetus from her body; this is required in order to respect her right to bodily integrity. But she would then also have to choose either to place the fetus on the system or to have the fetus placed inside an isolette once it is delivered, or refuse continued treatment for the fetus altogether. Ethically, does she have the right to refuse permission for both courses of treatment, or would doing so be medical neglect? Medical neglect is defined as a parent's failure to provide adequate medical care to a child by failing to recognize obvious signs of serious illness or to comply with a physician's directions once medical advice has been solicited (Jenny & The Committee 2007). Medical neglect can lead to a child being at risk of harm or being harmed, especially if the treatment would confer benefits to the child such that a reasonable caregiver would choose treatment over nontreatment (Jenny & The Committee 2007).

This paper contends that Ms. B should be considered her fetus's guardian and that she should be considered the appropriate surrogate decision maker with the right and responsibility to give permission for medical interventions for her fetus. Her decision-making would be constrained, however, by her fetus's interests and healthcare needs. This paper assumes that *ex utero* fetuses extracted in the presence of (and for the purpose of using) the EG system have the

same ethical status, and likely the same legal status, that viable premature infants currently do. It also assumes that if the EG system is sufficiently safe and effective, that Ms. B's refusal to use either technology would not serve the fetus's interests in life and health. Her refusal would thus violate the right to standard of care afforded by the current Baby Doe Amendments of the Child Abuse Amendment of 1984 (Child Abuse Amendment of 1984).

This amendment was enacted to protect the interests of children born with disabilities by making it illegal to withhold standard medical procedures from them based on assessments of their future quality of life or their parents' wishes, rather than the likelihood of the success of a medical treatment as predicted by competent medical opinion (Child Abuse Amendment of 1984). Although the Baby Doe rules were enacted to apply to children born with disabilities or birth defects, the ethical reason motivating these rules suggests that they should be applied to *ex utero* fetuses as well. Justice is the requirement that cases be treated differently only on the basis of ethically relevant features. Thus, justice would suggest that neither the timing of their emergence from the uterus, nor the method by which they emerge (e.g., vaginal birth or surgery) is relevant to the claim of the *ex utero* fetus or infant for protection of its interests. If a premature infant has such an ethical and legal claim once it is born, then the same claim would seem to be available to the *ex utero* fetus. If failure to respond to that claim would constitute medical neglect of an infant, then failure to provide standard medical intervention to the *ex utero* fetus would also constitute medical neglect. Therefore, if Ms. B refuses to consent to either technology (the isolette or the EG system), the state may step in to mandate that the fetus be placed on the system and receive whatever medically indicated treatment is necessary to protect its interests.

Ms. B may have a choice as to which technology she believes would be best for her fetus once born, but refusing to use either technology would be impermissible as it does not promote

the fetus's interests and denies the fetus its right to a standard of care. She may not be obligated to choose EG over the isolette, but she must make a choice that promotes the fetus's interests. If Ms. B takes on the role of the fetus's decision-maker, she has beneficence-based obligation to the fetus. Therefore, she must consent to using either technology to promote the fetus's interest in health. Additionally, the only justifiable reason she may have to choose the inferior medical intervention (i.e., the isolette in the presence of the EG system) would be if the hospital does not employ the EG system or if the fetus is born at a later gestational age such that its development will not be negatively affected if placed in an isolette, as will be discussed below.

4.3.1 The Availability of Ectogenesis

It can be imagined that EG will not be universally available at all institutions that care for pregnant women and their babies. EG can be resource-intensive; one system may not be only expensive, but may also require professionals with certain expertise to monitor the system, which could be cost prohibitive for average obstetric units and healthcare institutions. This paper assumes that institutions that lack the resources to implement this technology cannot be obligated to do so, and therefore that it may still be ethical to implement current NICU therapies as standard of care for *ex utero* fetuses when EG cannot be employed. Ideally, most institutions that care specifically for women or children, such as women's hospitals or children's hospitals or institutions with long-term neonatal supports, should make EG available. Some institutions may choose to keep both EG and isolettes, as it may be discovered in the development of this technology that at a certain point in prematurity, the fetus could similarly benefit from either EG or an isolette (e.g., if the infant were born late preterm at 35 weeks, and only needs to be

monitored briefly to make sure all vital signs are normal or to grow a little more, it may be more logical and resource-conscious to place the premature infant in an isolette).

If both therapies are available, the institution must create a policy based on predictive outcome measures of when it is safe to move the *ex utero* fetus from the system to an isolette, as well as criteria for placing a premature infant or *ex utero* fetus in one technology or the other to ensure the infant receives quality care. Evidence-based policies must be created to help guide physicians' decision-making when both therapies are available both to promote the interests of the *ex utero* fetus or premature infant, and to avoid a conflict of interest between the physician's judgment about what is in his or her patient's best interest and the institution's interests, assuming for example that use of the EG system is more expensive than the isolette (Prabhu, Parker & DeVita 2017). The policy the institution adopts when deciding how to proceed in the event that both therapies can be used must be made public not just to uphold a fiduciary duty to patients, but also to maintain trust and encourage positive relationships with the community (Prabhu, Parker & DeVita 2017).

It can be ethical for institutions that cannot afford such high-tech, expensive life-saving therapies or the expertise of personnel who can monitor the *ex utero* fetus on the system to use current standard NICU therapies for treatment. Implementing current NICU therapies and not offering EG must be cautiously and transparently deliberated based on the available resources and needs of the community (Prabhu, Parker & DeVita 2017). If the more expensive EG system is not covered by public or private health insurance, cost may be a barrier not only to making EG available within an institution, but also to recommending this treatment option in particular cases. Therefore, it will be important to assess both community needs and financial resources available to patients (e.g., charity care, Medicaid, or health insurance reimbursement) prior to

establishing stringent guidelines in order to prevent coercing women into using a technology that may be therapeutic for their fetus, but not in their financial interests.

Institutions should partner with local or regional hospitals that can afford the technology to establish a referral network for patients that can benefit from the technology. If no institutions in the region can afford the technology or personnel to employ EG such that no referral network can be established, then current NICU standard of care procedures must be used. If EG is available but scarce in certain regions, a protocol must be created that clearly identifies who will benefit the most from using EG, perhaps similar to how people are deemed eligible for organ transplants, so that EG will be justly allocated to those most in need. Even once this protocol and referral system are established, there must be careful consideration of what would constitute medical neglect toward the fetus as well as what would be in the woman's best interests when recommending this option. If it is not in the woman's best health interests to have the surgery necessary to remove the fetus for the purpose of employing the EG system, she should not be transferred to an institution in order for her fetus to be placed on the system simply because EG is an option available there. Similarly, a woman should not be transferred to another institution that has an EG system in anticipation of her premature delivery, unless she consents to such transfer. While the fetus remains *in utero* a woman may justifiably give priority to her interests over those of her fetus.

4.4 The Relevance of Ectogenesis for Cases in Which Fetal Health is Imperiled

This paper argues that women are not obligated, and should not be required, to undergo a procedure to extract the fetus in order to employ EG to promote their fetus's health when it is at

risk or because doing so would be in the fetus's best interest. Requiring this would be an infringement on the woman's rights, because forcing her to have the fetus removed would be a physical trespass and a violation of her right to give informed consent (or to refuse intervention). The woman cannot be obligated to undergo a procedure that violates her bodily integrity and inflicts medical harms on her, even if she is also interested in the health of her fetus. Physicians, on the other hand, may be obligated to use EG to promote the fetus's interests to help it survive and thrive once it is *ex utero* in order to act in accordance with their duties to promote the interests of those with emergency medical needs. That some may want to impose this obligation on the pregnant woman based on fetal interests necessitates an examination of just what interests and rights a fetus may have, and whether the availability of EG affects them.

It is well understood that upon birth, a baby is now separate from the woman who was gestating it, and that this separation authorizes others to step in on the newborn's behalf to serve its well-being and interests, despite the right parents have to rear their children according to their beliefs (Overall 2015; Post 1997). Because others can now act in support of the newborn's interests without violating the woman's bodily integrity, the newborn can be assigned certain rights. But while the fetus is still gestating *in utero*, serving its interests is constrained by its being dependent on the woman's body.

Protecting the fetus's interests by assigning it rights equivalent to that of a person while it is *in utero* would create a situation in which the pregnant woman may be treated as a mere means to another's end and in which the woman is seen merely as a vessel for the fetus to gestate in, thereby diminishing the woman as a person herself (Overall 2015; Thomson 1971). As Judith Jarvis Thomson (1971) writes, a woman and her fetus "are not like two tenants in a small house which has, by an unfortunate mistake, been rented to both: the mother *owns* the house" (p. 53).

The fetus does not have a right to use the woman's body, and so long as the fetus remains dependent on the woman's body for gestation, it cannot be considered morally independent of the woman, and one cannot violate the woman's bodily autonomy for the benefit of the fetus. Even when the fetus's survival is dependent on the pregnant woman's actions, she cannot be compelled to give consent to an intervention that violates her rights, just as no other person can be compelled to undergo any medical intervention to save another person's life. Therefore, forcing the woman to have a c-section or to deliver in order to place the fetus on the EG system, for the fetus's well-being as fetal rights advocates may desire, is unethical because it makes the woman a means to another person's end. This is especially true if she does not consider the fetus's interests to coincide with her own, as is likely the case if she does not seek to utilize EG of her own accord.

Yet, the fetus has the potential to become a person who has the rights. This potentiality leads some to act on behalf of the fetus's interests, or to claim that the fetus has certain rights prior to being born. Because some people value the sanctity of human life, they act from a sense of duty to protect fetal interests. Moreover, some believe that those who are more vulnerable deserve more care than those who are not (Nelson 1988, as cited in Mahowald 1992). This line of reasoning has been used to assert that a fetus can be considered more vulnerable and in need of greater outside protections than the woman, obligating others to act on behalf of the fetus's best interests (Nelson 1988, as cited in Mahowald 1992). Society has also recognized an interest in the fetus's potentiality by acting in the fetus's best interest, as in court cases acknowledging significant risk to the fetus or regarding fetuses as neglected children (Post 1997). However, protecting the "more vulnerable" fetus by overriding the woman's rights cannot be justified for reasons already stated. So while society may recognize fetal interests and have an interest in

protecting fetal interests, it cannot be obligated to promote those interests when doing so infringes on the woman's rights, and indeed is not justified in doing so. Rather, it may be permissible for society to uphold fetal interests, so long as doing so does not contravene the woman's rights or interests.

4.5 The Relevance of Ectogenesis for Abortion

The availability of EG may have implications for women who want to end their pregnancies, and for the exercise of the state's interest in fetal protection. Some may believe EG provides a "solution" to MFC regarding abortion, because women would have an option that permits them to terminate their pregnancy, permitting them to achieve their interest of reproductive freedom by no longer being pregnant, without terminating the fetus's life and perhaps even promoting the fetus's interest of being born and having a life (Overall 1987, as cited in Overall 2015). However, this "solution" could violate the woman's rights to determine or control what happens to her body and to provide consent (or refuse) interventions affecting her body.

This "solution" does not consider that in order for EG to serve as a "solution," women may be constrained regarding the method of fetal extraction available to them because there is now a means to sustain fetal life independent of the woman. Rather than a woman being able to choose what method of termination she prefers, based on her physician's recommendation of what method affords her the best health outcome given her stage of pregnancy, a woman might be required to undergo a method of fetal extraction that preserves the possibility of placing the fetus on the EG system. Theoretically, this requirement could be imposed from the point of

conception. It is reasonable to assume that at some point in pregnancy, the method of fetal extraction that preserves the fetus to be placed on the system would impose more risks and burdens on the pregnant woman than alternative methods previously available (e.g., medical/medication abortion, suction curettage, or dilation and evacuation).

It should be obvious that forcing women to terminate their pregnancies either by inducing labor or performing the c-section is a violation of their rights to bodily integrity and autonomy, as it requires them to undergo a procedure without their consent. Forcing women to deliver fetuses would involve not just a surgical procedure, but also removing something (in this case, the fetus) from within the woman. No procedure in which something is removed from one's body can be done without consent, as it would be an unjust violation of one's right to bodily autonomy. But women who want to terminate their pregnancies — for their health or other reasons — might give their informed consent. They may not want to undergo those procedures, but they may be willing to; they may give their informed consent in the sense of giving their autonomous authorization in the presence of limited alternatives (Faden & Beauchamp 1986).

It may be less obvious that constraining their choice of abortion method violates the rights of pregnant women, even though the abortion methods offered to them once EG is available pose more risks to their health than methods that were previously available. This paper argues, however, that it is ethically inappropriate to constrain women's medical options in a way that is contrary to their health interest for the sake of serving the fetus's health interest. While women may choose to make this sacrifice of their interest for the sake of the fetus, they should not be required to do so. As Thomson (1971) states, “no person is morally required to make large sacrifices to sustain the life of another who has no right to demand them... we are not morally required to be Good Samaritans” (p. 64). Potential mothers are not required to maximize the

well-being of their fetus. They may have an obligation to take some steps to ensure some minimal level of well-being of their fetus, but not to the detriment of their own health or important interests. Others intervening on the fetus's behalf may act as Good Samaritans towards the fetus, but as the fetus does not have a right to use or be allowed to continue to use the woman's body, it cannot be morally justifiable for these Good Samaritans to intervene in a manner that infringes on the woman's rights.

Once the fetus is *ex utero*, however, its interests can be served without infringing on the woman's right of bodily integrity (or related right to give informed consent). The question then becomes whether Good Samaritans or the State would be violating the woman's right of decisional privacy or her right as the decision-maker who is charged to give permission on behalf of the fetus, if they intervened to serve the fetus's interests in ways that the woman does not prefer. While a newborn infant has a right to life, and is protected by Baby Doe rules with regard to its medical needs, is the product of a sought pregnancy termination, a desired abortion, similarly protected?

Above it was argued that the *ex utero* fetus has a right to receive medically necessary interventions. It was argued that the right to receive these interventions did not depend on the timing or method of its becoming separate from the pregnant woman. It would seem that whether its existence is desired by the woman who was gestating it is equally irrelevant to its entitlement to medically necessary treatment. Therefore, it would seem that any *ex utero* fetus (including one whose status as an abortus is desired by the previously pregnant woman) would have a right to treatment. Once it is separated from the woman, others — including the State and medical professionals — are obligated to further the *ex utero* fetus's interests. To fulfill this obligation, these people may be required to use EG as it provides an enhanced chance of development and

health, because the fetus has an interest in growing up with good health outcomes and being a healthy person. EG makes it materially possible for those acting on behalf of the fetus to protect its interests in a more optimal way. Given this possibility, it may be said that the *ex utero* fetus has a right to have people serve its interest in this way.

Overall, so long as the fetus is in the woman's womb, it remains unethical to obligate the woman to put fetal interests ahead of her own if she does not want to, as it would be a violation of her bodily integrity and would make the woman a means to another's ends. Likewise, it would be unethical to coerce her into any procedure without her consent because doing so would be a violation of her autonomy. Furthermore, it is unethical to limit her choice of interventions that affect her health interests for the sake of her fetus. Doing so would unjustly treat her, as a pregnant woman, differently from nonpregnant people who are able to choose interventions that best serve their health interest and their preferences and values. While the fetus does not have any rights *in utero*, it will have rights *ex utero* by virtue of the ability of others to intervene to protect its interests without violating anyone else's rights (particularly those of the previously pregnant woman) at that time.

5.0 Conclusion

MFC refers to instances in which the pregnant woman's interests conflict with the interests of her fetus. The very nature of pregnancy compromises the woman's health and interests, as being pregnant places a woman at greater risk of harm. This paper has argued that when faced with an MFC, the pregnant woman's autonomy, grounded in her rights to privacy and bodily integrity, should be respected, as demonstrated in the two case studies and their analyses. If the woman has made an informed decision about the treatment that is in her best interest and in accordance with her values, it would be unjust not to abide by the decision she has made, even if that decision conflicts with what is in the fetus's interests. Although the woman's interests may align with the fetus's such that she makes decisions that consider the fetus's interests, she cannot be obligated to undergo medical interventions that pose risks or harms to her for the fetus's benefit.

The existence of ectogenesis does not eliminate MFC, change the pregnant woman's or fetus's interests, nor their rights, nor does it serve as a solution to abortion. Rather, EG provides an option that enables the woman and fetus (or others acting in the fetus's best interests) to serve their interests of health and life, and can resolve or eliminate specific conflicts, such as the conflict of Ms. A. Once the fetus is separated from the woman, refusing to consent to the use of EG for the *ex utero* fetus may constitute medical neglect and may be a violation of the Baby Doe Amendments and the fetus's right to a standard of care. If so, physicians would be obligated to place the *ex utero* fetus on the EG system to promote its interests if the system is available, and the State may step in to similarly protect the *ex utero* fetus's interests. In conclusion, the

pregnant woman cannot be obligated to promote her fetus's interests over her own; however, once the fetus is *ex utero*, she or others may be obligated to serve the fetus's interests.

Bibliography

- ACS. (2019). Survival rates for cervical cancer. *American Cancer Society*. Retrieved from: <https://www.cancer.org/cancer/cervical-cancer/detection-diagnosis-staging/survival.html>
- Allen, A. (2015). Privacy and medicine. *Stanford Encyclopedia of Medicine*. Retrieved from: <https://plato.stanford.edu/entries/privacy-medicine/>
- Beauchamp, T.L. & Childress, J.F. (2009). *Principles of Biomedical Ethics, 6th Edition*. New York: Oxford University Press.
- Cancer.Net. (2017). Cervical cancer: Stages. *American Society of Clinical Oncology*. Retrieved from: <https://www.cancer.net/cancer-types/cervical-cancer/stages>
- CDC. (2011). Radiation and pregnancy: A fact sheet for the public. *U.S. Department of Health and Human Services*. Retrieved from: <https://emergency.cdc.gov/radiation/pdf/prenatal.pdf>
- CDC. (2019). Abortion surveillance – Findings and reports. *U.S. Department of Health and Human Services*. Retrieved from: https://www.cdc.gov/reproductivehealth/data_stats/abortion.htm
- Chervenack, F.A. & McCoullough, L.B. (2011). An ethically justified framework for clinical investigation to benefit pregnant and fetal patients. *The American Journal of Bioethics*, 11(5), 39-49.
- Child Abuse Amendment of 1984. Pub. L. No. 98-457. H. Rept 98-159; 98-1038. (1984). Available at: <https://www.congress.gov/bill/98th-congress/house-bill/1904>
- Daniels, N. (2008). *Just health: Meeting health needs fairly*. New York: Cambridge University Press.
- Faden, R.R. & Beauchamp, T. L. (1986). *A history and theory of informed consent*. New York: Oxford University Press.
- Fasouliotis, S.J. & Schenker, J.G. (2000). Maternal-fetal conflict. *European Journal of Obstetrics and Gynecology and Reproductive Biology*, 89(2000), 101-107.
- Han, S.N., Gziri, M.M., Van Calsteren, K., Amant, F. (2013). Cervical cancer in pregnant women: Treat, wait, or interrupt? Assessment of current clinical guidelines, innovations, and controversies. *Therapeutic Advances in Medical Oncology*, 5(4), 211-19.

- Hoekstra, R.E., Ferra, T. B., Couser, R.J., Payne, N.R. & Connett, J.E. (2004). Survival and long-term neurodevelopmental outcome of extremely premature infants born at 23–26 weeks' gestational age at a tertiary center. *Pediatrics*, *113*(1), e1-6.
- Jenny, C. & The Committee on Child Abuse and Neglect. (2007). Recognizing and responding to medical neglect. *Pediatrics*, *120*, 1385-1389.
- Kukla, R. & Wayne, K. (2015). Pregnancy, birth, and medicine. *Stanford Encyclopedia of Philosophy*. Retrieved from: <https://plato.stanford.edu/entries/ethics-pregnancy/#CompPregWomeAuto>
- Mahowald, M. (1992). Maternal-fetal conflict: Positions and principles. *Clinical Obstetrics and Gynecology*, *35*(4), 729-737.
- Mattingly, S. (1992). The maternal-fetal dyad: Exploring the two-patient obstetric model. *Hastings Center Report*, *22*(1), 13-18.
- Neff, C.L. (1990). Woman, womb, and bodily integrity. *Yale Journal of Law and Feminism*, *3*(6), 327-353.
- Oduncu, F.S., Kimmig, R., Hepp, H. & Emmerich, B. (2003). Cancer in pregnancy: Maternal-fetal conflict. *Journal of Cancer Research and Clinical Oncology*, *129*, 133-146.
- Overall, C. (1985). New reproductive technology: Some implications for the abortion issue. *The Journal of Value Inquiry*, *19*, 279-292.
- Overall, C. (2015). Rethinking abortion, ectogenesis, and fetal death. *Journal of Social Philosophy*, *46*(1), 126-140.
- Partridge, E.A., Davey, M.G., Hornick, M.A., McGovern, P.E., Mejaddam, A.Y., Vrecenak, J.D., Mesas-Burgos, C., Olive, A., Caskey, R.C., Weiland, T.R., Han, J., Schupper, A.J., Connelly, J.T., Dysart, K.C., Rychik, J., Hedrick, H.L., Peranteau, W.L., & Flake, A.W. (2017). An extra-uterine system to physiologically support the extreme premature lamb. *Nature Communications*, *8*(15112), 1-15.
- Prabhu, A., Parker, L.S. & DeVita, M.A. (2017). Caring for patients or organs: New therapies raise new dilemmas in the emergency department. *The American Journal of Bioethics*, *17*(5), 6-16.
- Post, L.F. (1997). Bioethical consideration of maternal-fetal issues. *Fordham Urban Law Journal*, *24*(4), 757-775.
- Simmons, L.E., Rubens, C.E., Darmstadt, G.L. & Gravett, M.G. (2010). Preventing preterm birth and neonatal mortality: Exploring the epidemiology, causes, and interventions. *Seminars in Perinatology*, *34*, 408-415.

Thomson, J.J. (1971). A defense of abortion. *Philosophy and Public Affairs*, 1(1), 47-66.

Wenar, L. (2015). Rights. *Stanford Encyclopedia of Philosophy*. Retrieved from:
<https://plato.stanford.edu/entries/rights/#5.5>