

The Medical Model of Reproduction

A Path to Artificial Wombs

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Women's reproductive powers have been a source of fear, envy and reverence throughout history.¹ Subsequently the treatment of women during the reproductive process has depended heavily upon cultural interpretations of these capabilities and the female body. The following article is concerned with medicine's relationship to the female body and reproduction. During the latter half of the twentieth century many feminists argued that the field of reproductive medicine is a modern day expression of an historic fascination with female procreative power and a desire to control women's bodies.² In the twenty-first century the controlling hand of medicine stretches further than ever before. As a result the entire reproductive process, including natural conception, pregnancy and childbirth are increasingly conceptualised as medical problems rather than personal or social experiences. This is referred to as the medicalisation of reproduction, and can be attributed to the application of the *medical model of health* to pregnancy and childbirth.

Technological interventions employed during reproduction offer useful examples of this medicalisation. A feminist analysis of the ultrasound examination and caesarean section, two such interventions, will be provided. The latter part of this article will focus upon a developing technology known as ectogenesis; or artificial wombs. Like its technological predecessors, it will be argued, the artificial womb is a new expression of an historic desire to control human reproduction.

The Medicalisation of Reproduction

The medicalisation of reproduction refers to a process whereby pregnancy and childbirth are perceived as medical problems rather than natural elements of the human life cycle.³ In this process technological interventions are employed to "treat" pregnant patients. Contemporary attitudes towards pain in childbirth provide one example of this medicalisation. The medical pro-

feSSION is primarily concerned with alleviating pain. Pain, to medicine, is pathological. However, in childbirth pain is natural. During childbirth pain stimulates the brain, causing the release of hormones that then stimulate the uterus.⁴ This helps birthing women to contract at appropriate levels of intensity and at normal intervals, which

As a surgeon, it often amazes me how any human being manages to be alive at all Murphy Magnus MD

means placental blood flow will be maintained.⁵ Despite this, the medical approach to childbirth remains the same as it would for a typical illness; eradicate pain. This is not to suggest that medical professionals violate birthing women by attempting to reduce the pain they experience, rather it is to draw attention to the fact that pregnancy and childbirth are unique bodily experiences and it is therefore problematic to interpret or treat these experiences in the same manner one would an illness.

For perinatologist and perinatal epidemiologist Marsden Wagner M.D. M.S.P.H. the medicalisation of reproduction is the product of one of two contrasting approaches to health; the medical and the social. The medical model perceives the human body as a flawed machine; it focuses on the problems and pitfalls of the body such as its susceptibility to disease.⁶ This model relies upon man-made science to create technologies with which to intervene and prevent the body from breaking down.⁷ In contrast the social model of health understands the body to be a naturally healthy organism and perceives disease as an unusual and temporary condition.⁸ As with health, these two models have different approaches to reproduction. In the social model reproduction is seen as a "biosocial" process; birth is both biological and social, but most importantly it is a personal experience.⁹ Within the medical model, pregnancy and childbirth are perceived as unsafe conditions of the imperfect human body, and are therefore medical problems, to be dealt with by medical experts.¹⁰

Historically women have risked death in pregnancy and childbirth, thus the medical view

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of reproduction is understandable. However, it remains problematic. In the medical model of health, pregnancy and childbirth are seen as necessary periods of heightened control over women.¹¹ It is difficult to determine which women will develop complications throughout their pregnancies and births; therefore the medical model dictates that the only responsible course of action is to treat all pregnant and birthing women as potentially high-risk cases.¹² Foetal monitoring in the form of routine ultrasounds, amniocentesis, regular physical examinations, and procedures such as active management of labour and caesarean section are all employed for the purpose of eliminating the inherent uncertainty of reproduction.¹³

Medical control of the female body is inseparable from foetal monitoring. Pregnant women must do as instructed in order for the obstetrician to conduct tests effectively. Once the results have been collected women's behaviour may have to be manipulated in order to create the best possible chance of obtaining the desired outcome; a healthy baby. If the results show signs of an abnormality the pregnant woman can expect to endure a series of subsequent tests to determine exactly what the suspected abnormality may be.¹⁴ Rather than accepting medical control of women's bodies during reproduction, feminists including Gena Corea and Andrea Dworkin have sought to explain why this has occurred.

Feminists recognise that women have a unique relationship to reproduction compared to men. Mary O'Brein once described it thus; "women are the handmaidens of biological continuity".¹⁵ Through their ability to gestate and give birth women have a special appreciation of reproduction and a sense of their own belonging to past and future generations. This is much harder for men to obtain because to reproduce men must part with an element of their bodies.¹⁶ While reproduction takes place within women's bodies, men are separated from much of the process. Moreover this separation makes maternity incontestable but paternity tenuous. Continuity is therefore a particularly significant issue for men.¹⁷ Medical reporter Gena Corea states:

envying woman her genetic continuity and her connection to the human species, men of different times and cultures have

tried to make her reproductive experience their own through a variety of means, the latest of these being the development of obstetrics and gynaecology and the new reproductive technologies.¹⁸

According to Corea the medicalisation of reproduction, can be attributed to man's historic desire to experience a stronger sense of biological continuity. Through the expansion and application of technology to reproduction man seeks to make the creation of life his own. As Andrea Dworkin argues the womb no longer belongs to the pregnant woman but has become "the province of the doctor".¹⁹ The obstetrician becomes the agent who examines, diagnoses and administers while the pregnant woman becomes the passive receiver.²⁰

Fundamental to the medicalisation of reproduction is the issue of control.²¹ Feminist sociologist Ann Oakley provides a comprehensive critique of antenatal care in her text *The Captured Womb*, arguing that; "Antenatal care is something that is done to women. It represents an attempt to control the behaviour of women's bodies".²² As the medicalisation of reproduction intensifies the same can be said of the entire reproductive process. In the medical model controlling women's bodies is not regarded as a sinister or patriarchal exercise, rather it is thought to be necessary for maintaining the health and well-being of pregnant women and their unborn children.²³ The underlying assumption is that women cannot know what is in their best interests because they are not highly trained medical practitioners. According to the medical model pregnant and birthing women's behaviour must be controlled by obstetricians, otherwise they risk death of both mother and child, a risk no responsible doctor wishes to take. In an attempt to eliminate these risks proponents of the medical model turn to technological solutions. However the evidence suggests that rather than removing risk from reproduction, technologies introduce a host of new risks. Caesarean sections provide one example of this.

A caesarean section is major abdominal surgery, and when necessary has the potential to save the lives of birthing women and their unborn children.²⁴ However, caesareans are not without their risks and in no way guarantee

mother and child a healthy outcome over vaginal births. Women face a twenty percent chance of infection when having a caesarean.²⁵ Due to the nature of the caesarean procedure there is a risk that pelvic organs such as the bladder or kidneys can become infected.²⁶ The woman may also contract intrauterine infections.²⁷ Other risks include internal organs may accidentally be cut during surgery²⁸, bowel function can decrease for days after the procedure, which can lead to distention, bloating and discomfort.²⁹ Blood clotting can occur³⁰, reactions to anaesthesia³¹, mispositioning of the placenta in later births³², increased chance of experiencing future infertility³³, and the risk of requiring additional surgeries such as hysterectomy or bladder repair.³⁴ Furthermore twice as much blood is lost during a caesarean than a vaginal birth³⁵ and the likelihood that the birthing woman will die from a caesarean is four to eight times greater than a vaginal birth.³⁶ There are further psychological risks to be considered; for example the chance that a woman will suffer post-partum depression following a caesarean is much higher compared to vaginal birth.³⁷

There are also significant risks to the foetus. There is the possibility of a premature birth if the due date was calculated incorrectly.³⁸ With an increased risk of premature birth comes an increased risk of respiratory problems, which are the biggest cause of death for newborn infants.³⁹ Foetal injury is another risk. It is not uncommon for foetal laceration to occur during a caesarean.⁴⁰ Finally evidence suggests that caesarean deliveries could increase the chance of stillbirth in future pregnancies.⁴¹

Despite the plethora of risks associated with this surgical procedure caesarean section rates have been climbing over the past thirty years.⁴² In Australia nearly 30% of all births are caesareans.⁴³ This figure is double what the World Health Organisation deems justifiable for one region.⁴⁴ This figure is not an indication that Australian women are losing their ability to give birth. In fact it has been found that caesareans are sometimes conducted for reasons unrelated to the patient. These non-medical motivations include; convenience, economics, and fear of litigation.⁴⁵ Caesareans are a convenient option for obstetricians, as they can be scheduled in

advance and the time it takes to perform the procedure is more predictable than natural birth. Studies have shown that as the number of births involving technological intervention increases so does the percentage of births that occur between the hours of nine to five.⁴⁶

Possible financial gain⁴⁷ is another driving force behind the rising number of caesareans, as one obstetrician states:

I believe that the trend in obstetrics will continue toward managed labor because traditional care for the normal woman in labor is no longer cost-effective. It is no longer feasible for individual physicians who have invested 12 years in training at a cost of hundreds of thousands of dollars to dedicate extended periods to observing one normal woman in labor.⁴⁸

This statement contains a fusion of non-medical reasons for caesareans. The obstetrician recognises that it is inconvenient for doctors to take "traditional care" of birthing women because of the amount of time these women may take. This time could be better spent by the obstetrician making financial gains elsewhere. After all, the obstetrician didn't spend all those years of training to watch women give birth.

A common misconception within obstetrics is that caesareans are safer than vaginal births.⁴⁹ Taking into account the aforementioned risks this assumption seems ludicrous, yet many physicians have claimed to use caesareans to protect themselves from litigation.⁵⁰ Caesareans are assumed to be safer because the obstetrician has far more control over the delivery than s/he would in a natural birth. The president of a US county society of obstetrician-gynaecologists told a newspaper; "When we do a cesarean section, we're sure we're going to get a good result".⁵¹ At the core of this statement lies the medicalisation of reproduction; the obstetrician can never be certain natural birth will produce a healthy outcome, but believes the use of technological intervention can. Pregnancy and childbirth are perceived as ailments of the imperfect body, and technology and obstetric control the cure.

Another intervention, that is so widely used it's become synonymous with pregnancy, is the ultrasound examination.⁵² The ultrasound works by emitting sound waves through the pregnant

woman's skin. As the waves pass through the body, echoes bounce off each tissue layer.⁵³ The machine then takes the information provided by these echoes and transforms it into a two-dimensional picture on a television screen.⁵⁴ This technology was first introduced to reproduction in 1955 when Ian Donald, a Scottish obstetrician, took an industrial machine that was used to flaws in metal and tested it on tumours he had previously removed.⁵⁵ Using a beefsteak as the control Donald discovered that different tumours produced different echoes.⁵⁶ From tumours and steak Donald moved to foetuses and pregnant women:

So I lost no time in applying it to my patients. They'd come along with a big lump inside and I used their metal flaw detector which I borrowed from their factory. We even used the same kind of disgusting gear oil on their tummies to act as an acoustic coupling medium. We used transformer oil.⁵⁷

Since the late 1970s the ultrasound has been considered central to the practice of obstetrics.⁵⁸ Ultrasounds are used include to check for foetal abnormalities or potential problems with pregnancy, and to confirm multiple pregnancies.⁵⁹ In Australia today it is estimated that ninety-nine percent of pregnant women have at least one scan per pregnancy.⁶⁰ Despite its considerable use in western medicine the ultrasound provides no benefits to the health of pregnant women or their unborn children.⁶¹ Furthermore it has never been established that ultrasounds are safe.⁶² Studies have shown that ultrasounds increase the risks of newborns having low birth-weights⁶³, increased risk of retarded foetal growth⁶⁴, preterm labour or miscarriage⁶⁵, and postnatal mortality.⁶⁶ When exposed to ultrasound adult mice experienced impaired brain function.⁶⁷ And another study showed that children who had been exposed to ultrasound in utero were twice as likely to have speech problems as those who had not.⁶⁸

Like caesarean sections the ultrasound examination has additional psychological costs for pregnant women. Sociology professor Barbara Katz Rothman conducted interviews with women who had experienced prenatal tests such as ultrasound scans and found that these tests cast a shadow over a woman's experience

of pregnancy.⁶⁹ Rothman discovered that the possibility of a negative diagnosis affected the mother's relationship with her foetus, causing her to feel her pregnancy is "tentative" until she receives the test results.⁷⁰ Other studies have shown that women can feel pressured to have a termination, and often distance themselves emotionally from a potentially abnormal baby.⁷¹

Considering the extensive risks ultrasounds pose to the unborn child, the trauma it can cause expectant mothers, the unreliable results it produces and the fact that it has no proven clinical value one would be justified in questioning its routine use. The ultrasound does, however, give the obstetrician a special place in the reproductive process. Without the obstetrician pregnant women cannot have an ultrasound, she is dependent upon the obstetrician to provide the equipment, carry out the test, and to interpret the findings. Once she has the results there is little she can do with them until her child is born but have more tests.

Technological interventions used during pregnancy and childbirth provide obvious examples of how reproduction is medicalised. Through the routine use of ultrasound and the increasing caesarean rates the pregnant woman is encouraged to be passive throughout her pregnancy and childbirth. In contrast the doctor takes active control of the reproductive process. The ultimate of all reproductive technologies is the artificial womb. The artificial womb completes the medicalisation of reproduction; the pregnant woman pacified, but is replaced by the doctor entirely.

Artificial Wombs

Artificial wombs, or ectogenesis, entertained the imaginations of science-fiction authors and some medical scientists throughout the twentieth century⁷², and in February 2002 Dr. Hung-Ching Liu, head of the Endocrinology laboratory at Cornell University's Weill Medical college, announced that she and her colleagues had created an artificial uterus. While the artificial uterus has yet to be perfected, Liu expects it will be fully developed within five years.⁷³

The research team attempted to create an artificial womb by removing endometrial cells from

the lining of a woman's⁷⁴ uterus, and placing these cells in a biodegradable scaffold moulded into the shape of a uterus.⁷⁵ The uterus model is composed of two substances; chondroitin and collagen.⁷⁶ The artificial uterus is administered with hormones and nutrients, which cause layers of endometrial cells to grow on the model.⁷⁷ The model eventually dissolves leaving the remaining cells to function. Human embryos attached themselves to the walls of the artificial womb as they would have in an actual womb.⁷⁸ The embryos were terminated after six days despite showing little sign of deteriorating.⁷⁹ Liu has stated that she intends to extend the experiment to fourteen days, which is the current endpoint for embryo experimentation under U.S. law.⁸⁰

Liu has encountered problems with her artificial womb, notably a lack of blood vessels.⁸¹ Within the uterus blood vessels supply nutrients to the embryo and rid the womb of waste products. Liu has yet to specify how her team intends to deal with issues of waste and has only alluded to the use of computers to monitor nutrient administration.⁸²

During the course of pregnancy a woman's hormonal balance becomes far more complex, and many doctors including perinatologist Dr. Per Sandberg and Dr. David Adamson, director of Fertility Physicians of Northern California, doubt scientists have the ability to adequately recreate the uterus without causing harm to the foetus.⁸³ Questions as to how Liu intends to administer, modify and monitor hormone levels require further consideration at this point.

Liu has said that she hopes her research will shed light on the causes of miscarriage and help infertile couples to have children.⁸⁴ Liu foresees her method of reproduction being employed by women who are unable to carry their foetuses to term due to damaged or abnormally shaped uterine walls.⁸⁵

While the creation of an artificial womb could benefit a small number of infertile couples there are grave implications for human reproduction. One potential consequence worth considering is that the successful development of ectogenesis may put all women in a position where they are forced to decide whether or not it is in their own or in their foetus' best interests to gestate naturally or artificially. This decision presents a new

burden within the reproductive decision making process for potential parents.

The development of the artificial womb was not inspired by a desire to serve the needs of women or infertile couples. While reproductive medicine has been promoted by doctors⁸⁶ and media commentators as an altruistic science that seeks to bestow children upon hopeful women, underlying much of the research is a lack of confidence in the female body and a desire to control human reproduction. Ectogenesis was advocated because it was believed by many that artificial reproduction would be safer for the foetus than her mother's womb.⁸⁷ As writer Edward Grossman argued:

An efficient artificial womb, far from increasing the incidence of birth defects, would reduce them by keeping the fetus in an *absolutely safe and regular environment*; safe, for example from infection by German measles or drugs taken by the mother.⁸⁸ (Emphasis added)

Implicit to Grossman's assertion is a lack of confidence in the female body. While he is sceptical of a woman's ability to effectively gestate her foetus naturally, he places complete faith in the doctor's ability to do so artificially, thus failing to consider the possibility of human error or technological malfunction. Rather than appreciating that women have successfully birthed the human species for millennia, Grossman draws the reader's attention to the fact that women cannot protect foetuses from biological and environmental risks. Conversely, using man's artificial technology, foetuses can be protected from women's irresponsible decisions and their unpredictable bodies. Once again the desire to eliminate uncertainty from reproduction is paramount. Grossman later argues that parents cannot love an imperfect child and it is only a sense of nobility that pressures them into raising their child.⁸⁹

Echoing Grossman, William A. W. Walters a professor of reproductive medicine, argues that an artificial womb could prevent possible malformations of the foetus caused by the irregular, and therefore inept, environment women's bodies provide.⁹⁰ However, Walters reveals foetal safety is not his only concern. Walters states ectogenesis could be used to mature

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embryos launched into space should we desire to transport our species to another planet.⁹¹ This suggestion demonstrates that the artificial womb provides an opportunity for scientists to expand their control over reproduction and human life. The alleged benefits to foetal development are merely an offset of a larger hunger to boldly go where no man has gone before.

Many pro-ectogenesis commentators throughout the twentieth century anticipated that replacing women's bodies with technological means of foetal gestation will lead to a physically healthier and genetically superior human race.⁹² J.B.S. Haldane, the biologist who coined the term ectogenesis, predicted that complete artificial reproduction would help create a utopian future by ensuring only "desirable" members of society can procreate:

The small proportion of men and women who are selected as ancestors for the next generation are so undoubtedly superior to the average that the advance in each generation in any single respect, from the increased output of first-class music to the decreased convictions for theft, is very startling.⁹³

For Haldane artificial wombs provide not only a method of improving human reproduction, but of improving society. According to Haldane the fate of the world depends upon the medicalisation of reproduction. He believed civilisation would crumble if the intellectual elite, such as doctors and scientists, allowed individuals to continue to reproduce naturally.

As well as providing a method of foetal gestation for a small percentage of infertile couples and a "safer" environment for foetuses, medical justifications for artificial wombs include the opportunity to improve foetal medicine and one day treat the foetus in utero⁹⁴; the ability to sustain an embryo for the purpose of taking tissue samples for organ donation⁹⁵ and (coupled with female sterilisation) artificial wombs could act as an effective method of contraception without preventing women from producing genetically related offspring.⁹⁶ But like the ultrasound and caesareans artificial wombs are not always advocated for medical reasons. Australian bioethicists Peter Singer and Deane Wells approve of artificial wombs because they believe there is no justifi-

able reason not to in such a medicalised society: "Why should the replication of the condition of the womb be an insoluble mystery, when the problem of replicating the conditions necessary for conception have been solved?"⁹⁷ This statement reveals the link between existing technologies such as the ultrasound and ectogenesis. The two technologies are situated on a continuum. Singer and Wells may well ask; if we can peek at the foetus during an ultrasound scan, why not ogle her for the entire gestational period?

The artificial womb, like the ultrasound and caesarean section, gives greater control over reproduction to the obstetrician. With the pregnant woman removed, the obstetrician can finally take the most central and important place in the reproductive process. S/He can create life apparently single-handed. The artificial womb is the pinnacle of the medical model of reproduction. The imperfect human body has been removed from the equation, potentially making reproduction completely predictable and all malfunctions eradicable.

Conclusion

Once a far-fetched dream of sci-fi fantasy, artificial wombs are now closer to scientific reality than ever before. When considering medicine's history of technological intervention in reproduction, the creation of an artificial womb appears inevitable. Like the ultrasound before it ectogenesis tantalises medical researchers' senses as they draw nearer to gaining total control over the reproductive process. The artificial womb is, as one advocate claimed, "the ultimate medical victory".⁹⁸

While the medical model of health provides doctors with a useful approach to disease and illness its application to reproduction is problematic, and could lead the human race down a dangerous path. Reproduction is not an "illness" one should want to eradicate. It is important to be prepared for complications during pregnancy and childbirth, however it is equally important not to assume that because something could go wrong it will. In the vast majority of cases pregnancy and childbirth can have healthy results without technological intervention.⁹⁹ Therefore an approach to reproduction that doesn't focus

on the negative aspects of the human body would be more practical.

The medicalisation of reproduction was born out of a professional desire to avoid the potentially hazardous elements of the reproductive process. Ironically it has introduced a series of new dangers. Perhaps the most chilling of these is should the artificial womb become a reality the bodily element of reproduction will finally be removed. Reproduction will no longer be a personal experience, but a medical procedure; the technological production of the species.

In the quest to eliminate uncertainty from reproduction the medical model's initial motivations have been lost to the seductive idea that man may one day be able to artificially create life. The numerous technological feats of reproductive medicine were supposedly developed to decrease the risks women face in pregnancy and childbirth. While travelling down this path of medicalised, technological reproduction we have somehow forgotten the wonder that is natural reproduction and the fact that women's bodies have been able to create life all along.

The Author

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Notes

1 See Eva Feder Kittay, "Womb Envy: An Explanatory Concept," in *Mothering: Essays in Feminist Theory*, ed. Joyce Trebilcot (New Jersey: Rowman and Allanheld, 1984), pp. 94-128. See also Gena Corea, *The Mother Machine: Reproductive Technologies from Artificial Insemination to Artificial Wombs*, 1st ed. (New York: Harper & Row, 1985).

2 Corea, *The Mother Machine: Reproductive Technologies from Artificial Insemination to Artificial Wombs*, Kittay, "Womb Envy: An Explanatory Concept.", Robyn Rowland, *Living Laboratories: Women and Reproductive Technologies* (Sydney: Sun Books, 1992), Robyn Rowland, "Reproductive Technologies: The Final Solution to the Woman Question?," in

Test-Tube Women: What Future for Motherhood?, ed. Rita Arditti, Renate Duelli Klein, and Shelley Minden (London, Boston, Melbourne, Henley: Pandora Press, 1984), pp.356-69. Ann Oakley, *The Captured Womb: A History of the Medical Care of Pregnant Women* (Oxford [Oxfordshire] ; New York, N.Y.: B. Blackwell, 1984).

3 Marsden Wagner, M.D., M.S.P.H., *The Active Management of Labour* (28 July 2002 [cited 13 July 2005]; available from <http://www.acegraphics.com.au/articles/wagner01.html>, Marsden Wagner, M.D., M.S.P.H., *Pursuing the Birth Machine: The Search for Appropriate Birth Technology* (Camperdown: ACE Graphics, 1994). pp. 30-35.

4 Marsden Wagner, M.D., M.S.P.H., *Fish Can't See Water: The Need to Humanize Birth in Australia* (28 July 2002 [cited 13 July 2005]; available from <http://www.acegraphics.com.au/articles/wagner03.html>.

5 Ibid.([cited]).

6 Wagner, *Pursuing the Birth Machine: The Search for Appropriate Birth Technology.*, p. 27-29, & p. 35.

7 Ibid., p. 28.

8 Ibid., p. 29.

9 Ibid., p. 32.

10 Ibid., p. 30.

11 Ibid., p. 31.

12 Ibid., p. 30.

13 Ibid., pp. 33-34.

14 An important question raised by many researchers has been: what is the clinical benefit of foetal monitoring? If the foetus is found to have an abnormality there may be very little the obstetrician can do, and the only real choice the pregnant woman is given is; give birth to an imperfect baby or terminate the pregnancy. In most cases the doctor is powerless to treat the foetus in utero, therefore most foetal monitoring merely shows conditions that would have been discovered once s/he is born, and that cannot be dealt with until s/he is born.

15 Mary O'Brien, *The Politics of Reproduction* (Boston: Routledge & Kegan Paul, 1981), p. 19.

16 Ibid., p. 33.

17 Ibid., p. 33.

18 Corea, *The Mother Machine: Reproductive Technologies from Artificial Insemination to Artificial Wombs.*, p. 9.

19 Andrea Dworkin, *Right-Wing Women* (New York: Perigee Books, 1983), p. 187.

20 Ibid., p. 181.

21 Wagner, *The Active Management of Labour* ([cited]).

22 Oakley, *The Captured Womb: A History of the Medical Care of Pregnant Women.*, p. 252.

23 Wagner, *Pursuing the Birth Machine: The Search for Appropriate Birth Technology.*, p. 40.

24 Childbirth.org., *Cesarean Fact Sheet* ([cited 30 April 2005]; available from <http://www.childbirth.org/section/CSFact.html>.

25 Marsden Wagner, M.D. M.S.P.H., *Technology in Birth: First Do No Harm* (2000 [cited 13 July 2005]; available from <http://www.midwifery-today.com/articles/technologyinbirth.asp>.

26 Childbirth.org., *Risks of Cesarean Section* ([cited 30 April 2005]; available from <http://www.childbirth.org/section/risks.html>, Magnus Murphy, M.D., "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?"

27 Childbirth.org., *Risks of Cesarean Section* ([cited]). See also Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?."

28 Wagner, *Technology in Birth: First Do No Harm* ([cited]).

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- 31 Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?."
- 32 Andrew Darby, "Caesareans Could Soon Outstrip Normal Births," *The Age*, 12 April 2005 2005.
- 33 Henci Goer, *Obstetric Myths Versus Research Realities: A Guide to the Medical Literature* (Westport Connecticut London: Bergin and Gravey, 1995), p. 23.
- 34 Childbirth.org., *Risks of Cesarean Section* ([cited]).
- 35 Ibid.([cited]). See also Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?."
- 36 Wagner, *Technology in Birth: First Do No Harm* ([cited]). For more on the risks of caesarean sections see Henci Goer, *Cesareans: Are They Really a Safe Option?* ([cited 16 July 2005]; available from <http://parenting.ivillage.com/pregnancy/plabor/0,,48f2,00,html>. Goer, *Obstetric Myths Versus Research Realities: A Guide to the Medical Literature*. Marsden Wagner, M.D. M.S.P.H., "Choosing Cesarean Section," *Lancet* 356 (2000). *Frequently Asked Questions* (International Cesarean Awareness Network, [cited 30 April 2005]; available from <http://www.ican-online.org/resources/faqs.php>).
- 37 Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?." Sheryl Ruzek, "Women's Reproductive Rights: The Impact of Technology," in *Women and New Reproductive Technologies: Medical, Psychosocial, Legal, and Ethical Dilemmas*, ed. Judith Rodin and Aila Collins (New Jersey, Hove and London: Lawrence Erlbaum Associates, 1991), p. 73.
- 38 Childbirth.org., *Risks of Cesarean Section* ([cited]). Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?."
- 39 Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?."
- 40 James F. Smith, M.D., Cesar Hernandez, M.D., and Joseph R. Wax, M.D., "Fetal Laceration Injury at Cesarean Delivery," *Obstetrics and Gynecology* 90 (1997).
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- 42 Goer, *Obstetric Myths Versus Research Realities: A Guide to the Medical Literature*. Wagner, *Fish Can't See Water: The Need to Humanize Birth in Australia* ([cited]).
- 43 "Australia's Mothers and Babies 2002," *Birth Matters*, March 2005., p. 7. Darby, "Caesareans Could Soon Outstrip Normal Births".
- 44 "Birth Is Not an Illness: The Forteleza Declaration, Who 1985," *Birth Matters*, September 2003., p. 16
- 45 Goer, *Obstetric Myths Versus Research Realities: A Guide to the Medical Literature*., p. 25. Ruzek, "Women's Reproductive Rights: The Impact of Technology". See also Wagner, *Technology in Birth: First Do No Harm* ([cited]).
- 46 Wagner, *Technology in Birth: First Do No Harm* ([cited]). See also Murphy, "Choosing Cesarean Birth: An Alternative to Today's Crisis in Natural Childbirth?."
- 47 In Ruzek, "Women's Reproductive Rights: The Impact of Technology." p. 74.
- 48 In Goer, *Obstetric Myths Versus Research Realities: A Guide to the Medical Literature*., p. 24.
- 49 Wagner, *Technology in Birth: First Do No Harm* ([cited]).
- 50 In Ruzek, "Women's Reproductive Rights: The Impact of Technology." p. 76.
- 51 Goer, *Obstetric Myths Versus Research Realities: A Guide to the Medical Literature*., p. 21.
- 52 For the purpose of this article I focused only on ultrasound as it is used within the reproductive process. I recognise that this technology has other practical applications within medicine.
- 53 De Crespigny L and Dredge R., *Which Tests for My Unborn Baby*, Revised Edition ed. (Melbourne: Oxford University Press, 1996), p. 43.
- 54 Ibid., p. 45.
- 55 Oakley, *The Captured Womb: A History of the Medical Care of Pregnant Women*., pp. 155-59.
- 56 Marsden Wagner, M.D. M.S.P.H., "Ultrasound: More Harm Than Good?," *Midwifery Today* 50, no. Summer (1999).
- 57 In Oakley, *The Captured Womb: A History of the Medical Care of Pregnant Women*., p.158.
- 58 Ibid., p. 165.
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