

New Ethical Horizons in Gestational Surrogacy

John D Loike^{1,*} and Ruth L Fischbach²

¹Department of Physiology and Cellular Biophysics and Center for Bioethics, Columbia University College of Physicians and Surgeons, New York, NY 10032, USA

²Center for Bioethics, Columbia University College of Physicians and Surgeons, 630 W. 168th Street, New York, NY 10032, USA

Abstract

Gestational surrogacy occurs when a woman allows a 4-7 day embryo that was not generated from her own egg to develop in her uterus. In this paper, we review emerging scientific evidence to show how maternal-fetal cell exchange (microchimerism) may affect the future health of both surrogate and fetus/child. In light of these findings, we propose that four aspects of gestational surrogacy be examined: (1) the medical health and psychological outcomes of maternal-fetal cell exchange in surrogacy, (2) surrogacy laws and contractual agreements between the various parties, (3) provisions of a more comprehensive genetic family history and genetic screening from all parties involved, and (4) appreciation of the ethical and social complexities of surrogacy. We support gestational surrogacy provided that there is comprehensive informed consent. To be comprehensive, consent should include our current understanding of microchimerism with respect to the medical, legal, genetic, and ethical elements of surrogacy.

Keywords: Gestational surrogacy; Maternal-fetal cell exchange; Informed consent; Ethics

Introduction

Gestational surrogacy has become an increasingly popular, viable, and global option for couples including those unable to conceive or carry a fetus to term [1,2], gay/lesbian couples, and couples/women who want a genetically-related child without undergoing pregnancy [1]. A woman engaged in gestational surrogacy¹ has historically been viewed as providing a great benefit to the infertile couple as merely “renting” out her body and reproductive capacities for nine months [3,4]. Many surrogates see themselves as someone who carries a genetically unrelated fetus without establishing any biological connections between herself and that fetus [5,6]. But the newest scientific advances related to maternal-fetal cell exchange (microchimerism) [7] document that intimate biological connections are established between the surrogate and fetus, transforming how we should perceive gestational surrogacy. In this commentary, we support gestational surrogacy and propose how the evidence of maternal-fetal cell exchange will need to be incorporated into the medical, psychological, financial, legal, social, and bioethical issues (e.g., informed consent) associated with gestational surrogacy.

New medical advances in pregnancy

The actual case that follows highlights one of several medical risks that is associated with in pregnancy: Susan (not her real name) was born with a leukemic tumor (B-cell pre-cursor lymphoblastic lymphoma stage III) in her cheek. Genetic fingerprinting of the leukemic cells revealed the origin of these cells to be maternal, a finding consistent with advanced understanding that maternal cells can migrate from the pregnant woman across the placenta into the fetus where they can embed and transform into a tumor [8,9].

This cellular exchange across the placenta is not unusual. In a typical pregnancy, bi-directional maternal-fetal cell exchange is a normal process. Research has shown that a variety of cells² including stem cells [7,10] from the fetus cross the placenta into the pregnant woman, populate, and then remain within various tissues for her entire life [11,12]. Conversely, a variety of cell types including stem cells from the pregnant woman cross the placenta and implant into fetal tissues

[7,13]. In clinical reports on typical pregnancies [11,14,15], there have been almost 20 case reports showing that a tumor found in the fetus originated from maternal cells that migrated into the fetus during pregnancy [8,9]. So, while maternal-fetal cell exchange has been well documented in women who conceive and carry their own child, there are now studies in animals [16] and humans [12] that document that this process occurs in surrogacy as well. In the human study [12], allogeneic long-lived male fetal cells were found in the circulation of healthy post-partum women who conceived and delivered male infants using donor eggs.

There is a growing need to address the implications of maternal-fetal cell exchange related to the health of both the surrogate and fetus she is carrying. Reports are limited describing the potential benefits and risks of maternal cells migrating into the fetus during typical pregnancies. One 2012 study showed that maternal microchimerism in muscle biopsies from children born of typical pregnancies is associated with an increased risk in these children of developing juvenile dermatomyositis [17]. Furthermore, there is clinical evidence that shows that fetal cells migrating into the pregnant woman can actually have either a protective or harmful effect on the woman. Detection of male microchimerism in women, for example, has been shown to be strongly associated with both reduced risk of developing breast cancer and increased risk of developing colon cancer [18]. There are also several reports presenting data suggesting that fetal cells within a woman may increase her risk for autoimmune disease [19]. At the same time research has also revealed protective effects for the mother that include reducing the risks of infections and cardiac disease [11,14]. Finally, the pregnant woman does not reject the fetus as foreign tissue in part due to the fetal cells within her tissues that tolerize her immune system [20].

***Corresponding author:** John D Loike, Department of Physiology and Cellular Biophysics and Center for Bioethics, Columbia University College of Physicians and Surgeons, New York, NY 10032, USA, Tel: 212 305 1510; Fax: 212 305 5775; E-mail: Jdl5@columbia.edu

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1 This view will not apply in traditional surrogacy where the woman carrying the fetus has provided her own egg for fertilization accomplished either via artificial insemination or via IVF.

2 Other cells include T and B lymphocytes, Natural Killer (NK) cells, granulocytes, myocytes, and hepatocytes; see Nelson, 2012 [7].

Given these findings, we propose that both the couple and their surrogate candidate be informed about the medical risks associated with maternal-fetal cell exchange. In the ideal situation, before they engage in surrogacy, all three parties should provide a detailed medical and family history and a genetic analysis that will assess their genetic predispositions for cancer and late onset diseases such as Alzheimer's disease. Medical history and genetic screening would be useful in predicting whether maternal or fetal cells that migrate between the surrogate and the fetus have the potential to transform into cancer cells. These new health concerns are in addition to our understanding of how the life-style of the surrogate during pregnancy influences the health of the fetus [3].

Currently, there is no evidence that the cells transferred from the surrogate to the fetus will change essential physical characteristics of the child. What is, however, emerging is that maternal-fetal exchange creates a lifelong intimate biological connection between the pregnant woman and the fetus she is carrying [7]. Therefore, we propose that potential medical concerns arising from microchimerism need to be presented to the potential surrogate and the biological donors in an informed consent document before any legal agreements are formalized.

Psychological effects of maternal-fetal exchange on the surrogate

Significant psychological conundrums are raised by bi-directional maternal-fetal cell transfer and should be presented in an informed consent document to all parties involved in surrogacy. It may come as a surprise when the surrogate realizes that she is not merely a host mother but that despite carrying a genetically unrelated fetus, her genetic fingerprint may eventually contribute to future medical risks or benefits of the child. This biological connection is the very outcome that many gestational carriers report they are trying to avoid [6] and this may influence women to be more reluctant to engage in surrogacy. On the other hand, realization of these biological connections may increase the likelihood that the surrogate will want to keep the child, or want to play a greater "parental" role in the life of the child. Future studies are needed to explore the psychological effects on the surrogate resulting from the intimate and long-standing biological connections established between the surrogate and fetus.

Legal and financial issues related to surrogacy

The laws regarding surrogacy in the US vary from state to state and are at best inconsistent and unclear [21,22]. Surrogacy even remains illegal in some states such as Arizona and Delaware. The District of Columbia forbids surrogacy and may fine violators up to \$10,000 or a prison sentence of up to one year, or both.³

If surrogacy is to be considered, certain legal issues remain to be addressed by the state courts. Should the court, for example, decide whether the surrogate or biological parents or all parties have the right to abort a fetus that will be born with Down's syndrome, cystic fibrosis, or other severe genetic disorders [23]? In March, 2013, the public's attention was riveted on the following case: Mrs. Kelley, a single mother-surrogate was offered \$10,000 by the biological contracting parents to terminate a 21 week-old fetus who was found on ultrasound to have severe heart, brain, and physical abnormalities [24]. The surrogate refused to abort and fled to a state that considered the surrogate the legal mother that allowed her to place the child up for adoption.

This case brings up a difficult situation that can arise when none of the parties wants legal and financial responsibility for the care of the child. If a baby is born, for example, who is unexpectedly disabled, [3 http://www.thesurrogacyexperience.com/surrogates.cfm?sc=23&p=99](http://www.thesurrogacyexperience.com/surrogates.cfm?sc=23&p=99)

which party would be legally responsible for its care if both the genetic parents and surrogate refuse to accept this responsibility [6,14]. The law cannot force any adult to assume parental responsibility and this child may ultimately end up as a ward of the court.

The courts also have to decide if there is financial recourse resulting from the development of medical conditions that can be shown to arise from maternal-fetal cell exchange. If Susan were born from a surrogate mother, the court would need to determine whether the biological parents would have a legal right to receive compensation from the surrogate who passed on the lethal cancer-causing cells to the child. Similarly, the court needs to decide whether the surrogate is entitled to demand financial compensation from the biological parents if she develops an autoimmune disorder that can be traced to the parents' generated embryo.

Responses to these problematic and emerging questions need to be addressed in a legal and financial document or contract prepared prior to implantation of the embryo into the surrogate [25-27]. Given that some medical conditions may not develop in the surrogate or the fetus until decades after the surrogate gives birth, a contract should be agreed upon by all parties outlining who will cover current and future medical costs. As it is difficult to predict future medical issues that may arise from microchimerism, some individuals considering surrogacy may prefer that a separate disclaimer be agreed upon that absolves the surrogate or biological parents from any future liability arising from maternal-fetal cell exchange. These types of legal documents would assist the courts in deliberating future disputes.

Bioethical issues

The bioethical dilemma of whose rights take precedence in a potential contentious surrogate – biological parent conflict is one of the most difficult knots to untangle. Since we know the surrogate is no longer seen as a rented nine-month incubator, society must prepare for the ethical conundrums that will certainly arise in the future. Should protecting the life of a fetus with severe medical problems trump the autonomy of the surrogate who wishes to terminate the pregnancy? While gender selection is a contentious issue, can the surrogate ethically demand that the fetus that she will carry be a male because male fetal cells implanted into the surrogate will be protective against her future risk of developing Alzheimer's disease [28]? But what if the couple wants a female child? These hard questions also need to take into account the religious and cultural moral compasses of the parties involved [29].

An effective way to diffuse some of these difficult issues is to first ensure that all parties are aware of the emergent research that is observed in typical pregnancies. One should encourage the parties involved in surrogacy that they receive genetic screening and counseling to assess the risks of potential medical problems that might develop in the future. An informed consent document should be prepared that addresses potential medical issues arising from surrogacy. While not every potential scenario can be delineated in the informed consent document, the language of an appropriate document should contain general information concerning the potential medical consequences of maternal-fetal cell exchange. This document should be written at a level that accounts for intellectual, cultural, and literacy differences between the surrogate and the genetic parents [30].

Conclusions

As we learn more about genetics and maternal-fetal cellular exchange, the family medical history becomes increasingly relevant to all parties. We advocate that professional healthcare providers ask for

a medical and genetic family history, as complete as possible, from the biological contributors of the gametes, as well as from the surrogate. We also advocate that genetic screening and counseling be completed and that the information be provided to the surrogate and contracting parents so they can decide how, or even whether, to proceed with the surrogacy procedure. In many countries however, including the US, it is still possible to provide gametes anonymously [31,32]. To reverse this trend, we strongly urge that registries be established to collect necessary health, family, and genetic information that would become available to all relevant parties. Great Britain [33] and Israel [34] have, for example, begun to implement such registries.

Twenty-five years ago, when gestational carriers first became a practical solution for female infertility, the surrogate was seen merely as the human vessel who rented out her uterus for nine months [3,4]. Moreover, the surrogate was considered to be genetically unrelated to any child born as a result of arrangements she agreed to, which made psychological distancing more easily accomplished when she had to relinquish her newborn infant.

Susan's story is a cautionary tale involving an apparently typical pregnancy resulting in a lethal outcome that provides an important lesson for gestational surrogacy. Currently, more studies are needed to explore the medical and psychological consequences of maternal-fetal cell exchange in surrogacy. The cellular exchange that occurs between the pregnant surrogate and the fetus reflects a biological connection that appears to last for decades.

Given the decreased associated stigma and increased use of surrogacy worldwide [35], the socio-cultural landscape of surrogacy is evolving. It is unclear whether our understanding of microchimerism would make it more difficult to recruit a surrogate or whether it may require greater compensation to obtain one. Will these new scientific discoveries discourage "contracting" a surrogate from a developing country where the genetic history of the surrogate may not be easily obtained? As we become more sophisticated about the biological ties that bind surrogates and fetuses, the complexity of the diverse medical, psychological, financial, legal, and ethical issues remain to be imagined and resolved. Whether a woman engages in surrogacy for financial gain or for a humanistic goal of helping a fellow human being, a suitable and pragmatic legal framework should be established to protect all parties involved without extinguishing the generosity of the surrogate and the dreams of the expectant couple.

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