Defrosting Embryo Adoption

by

Daniel I. Wallance

December 17, 2003

Submitted to:

Project Advisor: Professor Thomas A. Shannon, Worcester Polytechnic Institute

Project Sponsor: Ann N. Reese, Center for Adoption Policy Studies, Rye New York
Diane B. Kunz, Center for Adoption Policy Studies, Rye New York

Defrosting Embryo Adoption

by

Daniel I. Wallance

December 17, 2003

Sufficiency Course Sequence:

Course Number	Course Title	Term
HI 2316	American Foreign Policy	C 2001
PY 2713	Bioethics	B 2001
EN 2211	Elements of Writing	C 2002
HI 2333	History of Science	B 2000
HI 1332	History of Technology	A 2000

Presented to:

Professor Thomas A. Shannon

Department of Humanities & Arts
Term B 2003
Project Number TAS-RE13

Ann N. Reese, Center for Adoption Policy Studies, Rye New York
Diane B. Kunz, Center for Adoption Policy Studies, Rye New York

Submitted in Partial Fulfillment
of the Requirements of
The Humanities & Arts Sufficiency Program
Worcester Polytechnic Institute
Worcester, Massachusetts

Abstract

This research project examines current practices of embryo adoption. Infertile couples often use in-vitro fertilization (IVF) to bear children. Through IVF, physicians typically produce more embryos than needed and freeze the remaining, adding to the quantities already cryogenically stored. Couples with unsuccessful IVF trials, who desire the pregnancy experience, use embryo adoption organizations to acquire frozen embryos for implantation through a process based on traditional adoption. To support this industry, these organizations and the government must form a legislative framework.

Authorship

Daniel Wallance completed all of the research, analysis and writing contained herein at Worcester Polytechnic Institute (WPI) during the months of November and December 2003. Mr. Wallance created the report as a partial fulfillment of the requirements for his Bachelors of Science degree. Professor Thomas A. Shannon of WPI held the role of the project advisor. Ann N. Reese, Co-Founder and Co-Executive Director of the Center for Adoption Policy Studies (CAPS) located in Rye, New York, originally suggested the topic of embryo adoption. CAPS is an independent entity whose mission is to research, analyze, advise and educate practitioners and the public about current legislation and practices governing domestic and inter-country adoption in the United States, Europe, Asia, Latin America and Africa. Worcester Polytechnic Institute, located in Worcester Massachusetts is a technical university whose mission is to educate talented men and women in engineering, science, management, and humanities through a project based learning environment.

Table of Contents

Introduction

The ability for organisms to produce offspring founds the basis of evolution. Reproduction, whether through the process of laying eggs or the development of a mammalian fetus, is critical to the survival of species. Each species has its own ritual – a tree sheds its seeds, a sea turtle buries her eggs and a bear gives birth to her young. Equally as important is the development of the newly born. In some species, the young are left to fend for themselves while others join a social structure inclusive of their parents. Fish are left to hatch on their own while wolf cubs are raised in a social structure until adolescence (Wolf Haven International, 2003). One of the most developed is the family structure found among human beings.

The natural desire for humans to raise children in a family setting of their own is strong enough to throw couples and individuals into disarray when they are medically unable to reproduce. According to the World Health Organization (2002), there are more than 80 million people worldwide suffering from a form of infertility. The emotional strain stemming from such a large group has led to a profound impact on humanity through the development of new services, industries, and techniques designed to provide couples with the opportunity to raise children. Whether through traditional adoption or through medical breakthroughs, infertile couples are encountering a wealth of possibilities to create a family.

The more customary, non-medically assisted method for infertile couples to acquire children is through traditional adoption. According to the Evan B. Donaldson Adoption Institute (2002b), there are 1.5 million adopted children living in the United States. Even more significant is that within the past eleven years, the number of

international adoptions doubled (Evan B. Donaldson Adoption Institute [EDAI], 2002a). Additionally, as of mid 2001, there were 126,000 children waiting to be adopted in foster care in the United States. At the same time, 46,668 children in foster care were adopted during the year 2001 (U.S. Department of Health and Human Services, 2003). These staggering numbers demonstrate that demand for traditional adoption is present and continues to grow.

Many hurdles exist in the adoption process. Whether a couple is looking at international adoption or restricting their search to the United States, the costs are tremendous. Legal fees, travel expenses, home studies and even medical expenses can result in impassable obstacles. According to the National Adoption Information Clearing House (2003), the cost of a single adoption can reach amounts in excess of 30,000 dollars including such costs as counseling, home studies, travel expenses, agency fees, etc. Attorney fees can be as high as 14,000 dollars for domestic adoption with international adoption agencies charging double the amount. With the median 2002 household income in the United States at 42,409 dollars, the number of families who can afford adoption is significantly limited (U.S. Census Bureau, 2003, p. 1).

When the limitations of traditional adoption cannot be overcome, couples need to look for alternative options that are rooted in adoption but take a divergent path. Traditionally, adoption begins after pregnancy whereby the parental rights of a born child are transferred to an adopting couple. However, does adoption have to begin after birth or can couples adopt earlier in the life cycle? A form of adoption exists in which an infertile couple receives the opportunity to experience raising a family starting with pregnancy. Unlike traditional adoption, embryo adoption provides an approximation to

the full experience. Camilla Warrick from The Cincinnati Post (1998) writes, "It's kind of like adoption - only the new mother gets morning sickness, swollen ankles, labor pains and all the wonder of birth." Embryo adoption is the process by which an infertile couple acquires frozen embryos leftover from another couple's IVF procedure. Physicians defrost a select few for implantation in the adoptive mother's uterus. The potential then exists for the implanted embryos to take hold and develop into full born children nine months later.

An infertile couple might argue that they can acquire the same experience through an individual donating some of his or her gametes combined with in-vitro fertilization. A benefit, in some perspectives, is this procedure permits genetic relation of the born child to one parent, a biological relation that a child born from an adopted embryo does not have. However, pregnancy through IVF while using a donated gamete and a gamete from the fertile partner leads to expenses and complications not found with embryo adoption. A typical IVF procedure, according to Gina Kolata from The New York Times (1997a), can cost as much as 16,000 dollars per cycle while implanting a frozen embryo costs around 3,000 dollars. Dr. Mitchell Tucker from the Reproductive Biology Associates in Atlanta mentions that medical risks on the part of the egg donor must be recognized. On rare occasions, over stimulating the donor's ovaries results in significantly abnormal estrogen levels causing harm to the patient (Kolata, 1997a). In some IVF procedures, couples use their own extracted eggs fertilized with donated sperm for insertion into the uterus. In this case, the medical risks described above are applicable to the birth mother and not a separate donor. Although IVF procedures hold these specific risks and not embryo adoption, embryo adoption would not be common without

IVF. The popularity of in-vitro fertilization has led to the current state of 400,000 frozen embryos stored in liquid nitrogen, according to Arthur Caplan (2003), citing experts, in an MSNBC.com article. For the most part these embryos remained after IVF procedures because couples were satisfied with their new family size and were unsure of how to handle the remaining embryos (Cedars, 2003).

IVF procedures will only become more common. Herman, M.D. and Perry, M.D. (1997), explain that gynecologists are seeing more patients with infertility problems than in years past. Consequently, an unavoidable byproduct will be excess frozen embryos, continually adding to the number currently in storage. Undoubtedly, the need for embryo adoption will become more important as infertile couples face easier access to an economically viable solution. Therefore, reproductive clinics and adoption institutions must recognize the need for embryo adoption and the benefits to the birth and adoptive parents.

Origin of Adoptable Embryos

The origins of embryo adoption and the estimated 400,000 frozen embryos in storage trace back to previous couples trying to cope with infertility. Since 1978, couples in which the male or female partner could not reproduce have had the option of bearing children through a procedure called in-vitro fertilization (IVF). In this procedure, physicians extract gametes from the fertile partner and mix them in a container with donated gametes from another individual. The result is fertilized eggs that form human embryos. Typically, doctors select three to four embryos and insert them into the uterus with the hope that at least one will take hold and develop into a child (Grayson, 2003). According to the Genetics and IVF Institute in Virginia (2003b), the maximum chance that a single IVF procedure is successful is between 20 and 30 percent per egg. Consequently, multiple attempts might be necessary to ensure pregnancy. Each trial can cost upwards of 12,400 dollars says the American Society of Reproductive Medicine (Grayson, 2003). Even if monetary needs were not an issue, eggs still need to be extracted resulting in an additional invasive procedure on the donor with possible complications.

To avoid these pitfalls, a popular practice has been to extract as many as 25 to 30 eggs and produce embryos for multiple IVF cycles (Kolata, 1997b). The unneeded embryos during the first cycle are frozen and stored. If pregnancy does not occur, then physicians defrost some of the frozen embryos for subsequent attempts. Embryos remaining after a successful pregnancy are stored in liquid nitrogen for later use. Couples can choose to bear more children by using the embryos in the future; however, if they are satisfied with their current family size, the embryos remain frozen and become a

statistic. The number of embryos in storage increases as more couples face IVF and the question of what to do with their embryos. Consequently, this provided an opportunity for adoption.

Another form of embryo adoption does not use frozen embryos leftover from IVF procedures but instead doctors create embryos explicitly for adoption. In this type of embryo adoption, more appropriately called donation, doctors use a donated egg and sperm to create a new embryo designed for a specific patient. This is a unique procedure as physicians breed new embryos instead of finding adoptive couples for existing embryos. One advantage is that the embryos can be tailored to the wishes of patients as physicians often select egg and sperm from donors who fit a desired profile. For example, a couple might want a mix of Italian and American in their embryo.

The Columbia-Presbyterian Medical Center in Manhattan is one of a few centers that offer such services. Here doctors make a variety of embryos with different characteristics based on the male and female donors. The embryos are frozen and stored until a suitable couple visits the center. At this point physicians select one of their pre-made embryos that best matches the desires of the recipient parents (Kolata, 1997a). Such a procedure is highly unique and raises more questions as to why doctors should make new embryos when there are already hundreds of thousands in cold storage. However, Dr. Mark Sauer from the Columbia Presbyterian Center claims, “If you talk to smaller centers, they'll say they never heard of such a thing,” showing that this procedure is rare (Kolata, 1997a).

Embryo Classification

Regardless of whether prospective couples adopt frozen embryos leftover from IVF procedures or embryos from a fertility clinic that physicians bred specifically for adoption, there is a tendency to consider the classification of the embryo. At one end of the scale, an embryo can be classified as fully human and have all the rights of a living person. At the other end of the scale, an embryo is simply a cell that is in no way human. There is a classification that falls in line with the success rates of embryo adoption and that is by adopting an embryo couples receive "the potential for a child" in that there is no guarantee the embryo will result in a live birth. In effect, couples engaged in embryo adoption are not adopting a child as they would in traditional adoption, but they are instead adopting the opportunity to raise a child.

The success rates, whether the chance that an implanted embryo will develop or the ability to defrost a frozen embryo are so low that couples are only given a potential and not a guarantee. Embryos selected for defrosting have a 65 to 70 percent chance of surviving the process according to the Genetics and IVF Institute in Virginia (2003a). While this may seem like a high number, their definition of survival indicates that 50 percent or more of the cells in the embryo had to remain viable after the procedure. If 100 percent of the embryo's cells are required in defining survival, then the success rates drop to 30 to 35 percent. From the embryos that are successfully defrosted only 36 percent result in pregnancy and that is only the case if four high quality defrosted embryos are inserted in the recipient's uterus (2003a). A similar study published in 1997 by the U.S. Centers for Disease Control claims 18.6 percent of successfully defrosted embryos result in live births. However, these statistics are not even per embryo but are

instead per transfer and according to The National Infertility Association, a maximum of three to four embryos are contained in a single transfer (Cedars, 2003). Therefore, the chance that an individual embryo results in a born child is much lower, further supporting the view that a couple engaged in embryo adoption is only adopting the potential for a child. Even in the case where doctors use a donated egg and sperm to prepare fresh embryos tailored to a couples' request, the chance for a live birth is only at 29.7 percent according to the CDC (Cedars, 2003). Dr. James Grifo from the New York University Medical Center provides a complementary analysis of the embryos that are cryogenically stored. He says, "It's [embryos] like a tree that throws off seeds. How many trees grow from them?" (Dobnik, 1998)

Simply examining the source of frozen embryos, other infertile couple's IVF procedures, shows that the ones available for adoption have an even lower chance of survival than the embryos previously used. When a couple undergoes in-vitro fertilization, doctors carefully select embryos for the first cycle. Only the ones that are most healthy and have the best chance for a successful pregnancy are used. The Institute for Reproductive Medicine and Science of Saint Barnabas in New Jersey (2003) selects the most health embryos for implantation based on a number of factors including the quantity of cells, cell size and symmetry, and the thickness of the shell surrounding the embryo. Therefore, any leftover embryos are not of top quality and are the ones that could become available for adoption if the biological parents choose. Nevertheless, even with low quality frozen embryos and very low survival rates, couples are still interested in adopting the embryos.

Defining Embryo Adoption

The question of why acquiring embryos can be considered a form of adoption needs to be answered. A key view lies with the attachment found on the part of the biological parents causing a need for recipient screening. Regardless of the embryo's classification, biological parents are still highly attached emotionally to their embryos. One couple from Australia having undergone an IVF procedure describes their feelings towards their excess frozen embryos, as "Now we could not donate our own embryos. I could not give away my daughter's siblings." When considering disposing of the embryos, the same couple felt as if they were "Denying them their potential and squandering their souls" (Hogben, 1998, p. 89) Unlike the strong emotions of the Australian couple, an individual under the name of Elaine found satisfaction in donating her embryos for adoption:

> We went through so much to have William, we understand how people are desperate for help. We thought it would be nice to donate them [her embryos] so that someone else could have the same amount of pleasure that we had out of our son. It wasn't a hard decision (Cooper, 1996, p. 38).

Regardless of whether strong emotions or feelings of generosity are involved, couples have shown that a desire for embryo adoption exists. Organizations providing embryo adoption services address the need for screening perspective parents, such as Snowflakes, formed in 1997 (Manier, 2002). The screening provided by these organizations turns receiving embryos into a form of adoption.

Snowflakes, located in California, base their program on the same lines as traditional adoption. Couples seeking to adopt embryos or put their frozen embryos up for adoption approach a program offered by organizations such as Snowflakes. Both

types of couples provide information about themselves and the type of family to or from which they wish to donate or acquire embryos. The biological parents supply information including preference of the recipient couple's age, work plans, religion, race and desired level of contact. The couple seeking to adopt an embryo also supplies similar information. If Snowflakes finds a match then they send the adoptive couple's biography and photos to the biological couple. Upon approval from the biological couple, the adoptive couple receives similar information. Snowflakes also requires a homestudy including criminal background checks of the recipient couple to provide safeguards for the biological couple's embryo. Snowflakes leaves the final decision to the biological parents as to whether they wish to relinquish their embryos to a specific couple for adoption (Snowflakes Embryo Adoption Program [Snowflakes], 2003).

One couple who undertook IVF and as a result successfully gave birth to three children describes Snowflakes as "this was the answer to our prayers" in regards to their nine leftover frozen embryos. In reference to the adopting couple, after sharing photo books and family history essays, the biological father said, "If I couldn't raise those kids, they were the perfect family to do it" (Jerome, 2002, p. 45).

Although Snowflakes appears to be a predominant embryo adoption organization, cited in numerous articles, a new non-profit organization called the National Embryo Donation Center (NEDC) opened in November of 2003 at the Baptist Hospital for Women in Tennessee (Christian Medical & Dental Associations, 2003). The NEDC operates on a similar basis as the Snowflakes programs. Both programs provide a matching service between the embryo's biological parents and perspective adoptive couple, giving the biological parents the final choice. Additionally the perspective

couples are thoroughly screened with the resulting information provided to the biological parents (National Embryo Donation Center [NEDC], 2003a). Unlike the Snowflakes program, the NEDC does perform the actual implantation in the recipient's uterus. Snowflakes on the other hand leaves the task to the adoptive couple to locate a suitable clinic for the transfer. Another interesting difference is that the NEDC will only consider married couples while Snowflakes permits single women to enter their program (Snowflakes, 2003). Although NEDC does maintain this limitation, they claim, "Once more embryos are available they will be able to offer their services to a larger variety of couples" (NEDC, 2003a). Their statement seems to be referring to non-married couples, but it is unclear as to whether they will open their services to include single women as has Snowflakes. Regardless of specifics, as stated by NEDC, they are a "centralized "clearinghouse" for both the donating and receiving couples" (NEDC, 2003b) (Southeastern Fertility Center, 2003). In general, this is an accurate definition for programs such as Snowflakes, the National Embryo Donation Center, and other, similar organizations that provide screening for prospective and adoptive couples seeking embryo adoption.

Even with similarity between the two programs, the Snowflakes organization likes to think of itself as providing, "the same steps and similar forms to those used in traditional adoption" (Snowflakes, 2003). While, Dr. Jeffrey Keenan, leading the NEDC team, was quoted in May of 2003 by Stuart Shepard from Family News (2003) as describing his program as "It will not be run as a traditional adoption. It will really be run as just another aspect of infertility care." However, this does not mean that his program should not be thought of as following traditional adoption protocols. In fact, the

similarities between embryo adoption programs such as the NEDC and the Snowflakes organization and between traditional adoption programs are undeniable.

If embryo adoption is the process in which prospective couples are screened along the lines of traditional adoption for their suitability for adopting an embryo, then embryo donation better classifies programs where there is no screening aside from medical exams (Snowflakes, 2003). In these programs, such as the previously described Columbia-Presbyterian Medical Center, physicians select separately donated egg and sperm from which they make embryos specifically for adoption. Since the individuals providing the gametes did so in the form of standard donation, there is no screening involved with the exception of medical tests. The Snowflakes program (2003) best describes the difference, "The genetic family is responsible for selecting a family to raise their genetic child [adoption], as opposed to the doctor in a clinic making the selection of a family [donation]." Many doctors and infertility clinics use the two terms interchangeably or cite a legal discrepancy but the programs with screening typically follow the path of traditional adoption while those without do not.

After all, regardless of the definition used to classify the transfer of embryos from the biological parents to the adoptive parents, the adoptive parents still receive the opportunity to bear a non-biologically related fetus (Cedars, 2003). The raising of a biological stranger provides a characteristic that is commonplace to traditional adoption. In traditional adoption, the adopted child is biologically unrelated to the adoptive parents and therefore another couple could possibly raise full biological sisters and/or brothers from the child. With embryo adoption, this is almost a guarantee. A couple who underwent in-vitro fertilization most likely has leftover frozen embryos because they

stopped treatment upon a successful birth. Therefore, if a couple adopts the leftover embryos and raises them to term, the newly born child has full biological sister(s) and or brother(s) raised by different parents, a similar circumstance to traditional adoption. As stated by Camilla Warrick of The Cincinnati Post (1998), "they might be sending their children's siblings into other peoples' homes." However, Warrick's comment must be considered in reference to the low success rates of embryo adoption. The statement only holds true if an adopted embryo indeed becomes a full born child.

The similarities between embryo adoption and traditional adoption are not necessarily strong enough to make them one in the same. In embryo adoption, the adoptive mother undertakes pregnancy in the hopes of giving birth to a child, while in traditional adoption, adoption occurs after pregnancy. In part, the lack of pregnancy in traditional adoption forms the requirement for home studies. Unlike traditional adoption, anytime a couple wishes to undertake traditional sexual reproduction (TSR), in the effort to deliver a child, a home study is not required. Jeremy Manier from the Chicago Tribune cites a legal expert claiming embryo adoption can be placed closer to TSR than traditional adoption:

> Legal expert Andrews said one reason the adoption model would be wrong for embryo donation is that the adoption process is supposed to screen would-be parents to confirm they are committed to raising a child. Embryo donation is different because most state laws presume that a woman who carries a child to birth has earned the right to be a parent. "The idea is that biologically tied parents are already committed to the child," Andrews said (Manier, 2002).

Irrelevant to the current legal stature given to frozen embryos, Andrews makes a strong argument that an adopted embryo carried to term already has a physical attachment to the adoptive mother that supercedes traditional adoption.

Whether embryo adoption should then be placed at the level of TSR, traditional adoption or a level of its own, the fact that the safeguards of home studies are available and are being used solidifies embryo adoption as a form of adoption (Snowflakes, 2003). A line can therefore be drawn between embryo donation programs in which a doctor donates an embryo to a couple without a background check and embryo adoption programs that provide full service embryo adoption such as Snowflakes and the National Embryo Donation Center. To place all the tangents and theories into a clean package, Dr. Stanley Korenman, associate dean for Ethics and Medical Scientist Training at UCLA, sums it up best, "It isn't all that different from a traditional adoption. It's just that they adopt the child nine months earlier" (Jerome, 2002, p. 44). Conceiving Concepts, Inc. (Boss, 2001), a premiere fertility products and services company, builds on the similarity, "Embryo adoptions provide the same safeguards that the traditional adoption process offers."

Nevertheless, a couple engaged in embryo adoption, seeking to adopt, must face the statistical reality that what they are receiving is only the potential for a child. Even with the small chance of successfully defrosting an embryo and the smaller chance of brining the embryo to term, both the biological parents and the adoptive parents still desire participation in embryo adoption. International adoption, domestic adoption, in-vitro fertilization, and even surrogacy are all alternative options for infertile couples to form a family; however, couples still gravitate towards embryo adoption and find it a desirable solution. For adoptive parents to have realized the benefits, biological parents had to relinquish their embryos for adoption. Consequently, to do so, benefits must also exist for the biological parents.

Benefits to Biological Parents

Couples possessing excess frozen embryos after the birth of their child faced a wealth of emotionally and physically straining decisions, activities, and procedures that led them to the path of in-vitro fertilization. Just when consumed with the joy of a newborn child and all the surrounding excitement, the question of how to handle the frozen embryos remains in the back of their heads. Susanne and Bob Gray of Atlanta encountered this lingering question. Jeremy Manier (2002) from the Chicago Tribune describes their situation:

> After delivering twins the couple were left with nearly two dozen frozen embryos, and a moral crisis. "It never occurred to us that this issue would come up," Gray said. "You become so obsessed with having a child, you forget the actual process you're involved in" (Manier, 2002).

The ethical dilemma faced by the Grays is one that almost every couple engaged in in-vitro fertilization must consider or face at one point. Although not a solution that resolves all issues, embryo adoption is a possible solution that removes the moral consequences of destroying one's embryos. Additionally, it provides a solution to the biological parents from which they can take comfort by placing their embryos up for adoption.

Ron and Sandra Elliott from Louisiana went through the same thought process as the Grays. When they were in the course of in-vitro fertilization, the concern of what to do with potential excess embryos had not crossed their minds. "The fate of any surplus embryos was far from their minds. "We thought we might have to use them," says Sandra, 40, a homemaker. "At the time, you just want that baby."" The Elliott's solution to use embryo adoption provided, as they describe, "The answer to our prayers" (Jerome, 2002, p. 45). The Grays and the Elliotts are only two examples of the numerous couples

who went through in-vitro fertilization and were left to decide the fate of their excess embryos.

With most decisions in life, a wide variety of options usually provides a better selection of choices. Nevertheless, even with a better selection, choosing a single solution from a large quantity of options often causes a tougher decision. Embryo adoption provides an alternative to destroying one's embryos. Additionally, couples opposed to donating their embryos for stem cell research, resulting in embryonic destruction, have an alternative option. Regardless of what definition is used to label the embryos, they are still part of the biological husband's and wife's bodies. Destroying the embryos would destroy something the couple helped create through a difficult process. Stephane Zavidow, said in reference to her seven frozen embryos, "I would at least like to try and use the other embryos -- after all, they're made from our eggs and sperm" (Dobnik, 1998).

The creation of embryos through the combined effort on the part of the biological male parent and the biological female parent leads, in part, to strong emotional attachment. Couples might view their emotions as the result of the embryo providing them with the potential for a child. However, couples are attached to their biological embryos and not embryos from another couple; therefore, placing emphasis on the effort of the embryo's creation and not on status.

Marilyn Hogben from Australia gave birth to a baby girl through a successful in-vitro fertilization trial. As a result, she and her husband found themselves with five frozen embryos that were leftover. Years later when making a decision about the fate of her embryos, Hogben faced strong emotional attachment to the embryos she helped

create. In a conversation with her IVF clinic, she learned that many couples struggle with the same feelings:

> I talked about the strong emotional attachment I had for our embryos and she told me that many of the women she had spoken to also had these feelings, feelings stronger than had been anticipated by some health professionals (Hogben, 1998, p. 88).

The emotions expressed by Marilyn Hogben occurred while her embryos were stored in a cryogenic state. Attachment to the embryos on the part of the biological parents not only lies while the embryos remain frozen but also extends even after the couple decided their embryos' fate. Couples who decided against or did not consider embryo adoption and chose to destroy their embryos are still emotionally attached to their destroyed embryos. Lori Andrews, director of the Institute for Science, Law and Technology at the Illinois Institute of Technology knows couples who requested the return of their embryos after destruction. Andrews said:

> She has spoken with couples who asked for their unused embryos back so they could be buried. Others have the extra embryos implanted, but at a time in their fertility cycle when it's extremely unlikely they will become pregnant (Manier, 2002).

The emotional attachment encountered by couples when facing the fate of their embryos is strong enough to add to the need for providing a respectable process through which couples can give away their embryos. "The vast majority of people are just holding on to them" says Dr. David L. Keefe, director of reproductive medicine and infertility (Holland, 2003). Inevitably, couples must make a decision, as their embryos cannot remain in storage indefinitely. Couples with excess embryos need to be given the option of pursuing all possibilities so they can find comfort knowing they made the best decision for themselves. Therefore, the biological parents benefit from wide variety of

possibilities and as such, embryo adoption should be included. However, a wide variety of choices can cause a tougher decision.

Couples who choose to place their embryos up for adoption, instead of destroying them, also encounter strong emotions. Many couples are almost, if not, equally as reluctant to give away their embryos as they are to destruction. Ron and Sandra Elliott from Louisiana relinquished their embryos to a couple for adoption. Even after making their decision, they remained in agony as to whether they made the right choice. ""I bawled," says Ron, "thinking that maybe we made a mistake"" (Jerome, 2002, p. 45). Constantly questioning one's decision regarding the fate of leftover embryos extends to almost every couple who went through in-vitro fertilization. Susan Klock, a psychologist for Northwestern's IVF program describes the mental tug of war couples play in deciding whether to give their embryos up for adoption or to destroy them. Klock says:

> It's gut-wrenching for many couples, because they feel like there's no good choice… Most Northwestern couples who donated their embryos said they did it because their own experience taught them sympathy for others trying to have a baby (Manier, 2002).

If there is no fix-all decision and neither the solution of adoption or destruction can provide complete satisfaction for a couple, then why should multiple antagonizing options be offered instead of presenting only one option, that of destruction? The reason is that infertile couples and couples who experienced in-vitro fertilization know of the emotions and struggle that other couples recently facing infertility are going through. Infertile couples with excess embryos have the ability to help by participating in embryo adoption.

Elaine Oliver is one of these couples. She had a successful in-vitro fertilization procedure and decided to place her leftover frozen embryos up for adoption to help

another couple. "We went through so much to have William, we understand how people are desperate for help," she says. "We thought it would be nice to donate them so that someone else could have the same amount of pleasure that we have had out of our son" (Cooper, 1996, p. 38).

Although fertile couples do not have the experience and understanding of what it means to encounter infertility, they still recognize the anguish it provides others and the comfort that embryo adoption can offer. Christine Denos from California recognizes the pains of infertility as "she watched two friends wrenched because they were unable to bear children." "If I were struggling with infertility, I would hope there would be someone out there to go to bat for me" (Marcus, 1999, p. 43). Angie Boss from Conceiving Concepts (2001), a company that provides fertility products and services, says:

> They [couples who completed IVF and have leftover embryos] may understand better than anyone the painful struggles of infertility and would like to help other couples who may not be able to afford a traditional IVF cycle or who cannot produce their own embryos (Boss, 2001).

These situations only present a sample of the couples who find fulfillment in providing their embryos to others in similar infertility situations. Comforting infertile couples by sending them an offer of hope through embryo adoption has given many biological parents the satisfaction of knowing they made the right decision. In the mental tug and pull experienced by the biological parents in deciding between embryo adoption and destruction, the benefit of helping others places adoption on top.

Benefits to Adoptive Parents

The strong emotion felt by the biological parents in deciding whether to put their embryos up for adoption, destroy them, or donate them for research is only appropriately viewed when contrasted with the satisfaction gained by the adoptive parents. The desire from, and the advantages provided to the adoptive parents is the favorable catalyst in a controversial system.

Embryo adoption most likely has the strongest impact through the benefits supplied to the adoptive parents. Couples experiencing infertility constantly struggle with the notion that they might never bear biological children of their own. Many feel completely helpless and emotionally lost. Laura and Raymond Paterniti spent six years trying to conceive a child, trying methods from artificial insemination to in-vitro fertilization. Laura Paterniti provides a description of her blackened emotion trying desperately to conceive a child:

> She fell into a state of depression, neglecting meals and housework at the couple's split-level home in the Chicago suburbs, caring little about her appearance. Unable to sleep, Paterniti said she sometimes left her husband in bed and walked to their darkened living room to sit and cry. "You basically think your life is over," said Paterniti, 34 (Manier, 2002).

A couple in Canada faced similar wrenching emotions as the Paternitis. Their struggle with infertility highlights the strong emotional and physical suffering that couples and individuals submit to in an effort to conceive a child. Louisa Taylor from the Toronto Star describes:

> Never in a million years did Selina think she'd need medical help getting pregnant. Never did she imagine she would be injecting herself with powerful hormones, submitting to dozens of blood tests, spreading her legs for vaginal ultrasounds every second day and writing countless cheques to clinics. But she did it, because that's what it takes when you try fertility treatments (Taylor, 2003, p. A23).

The Paternitis and Selina provide only a few examples of the many individuals seeking a cure for their infertility. The struggle in coping with infertility leads couples to seek options. Many of the procedures are invasive and can cause trauma on the part of the patient; nevertheless, couples still undertake them. Embryo adoption provides hope and a solution to those couples who unsuccessfully tried IVF, other technologies and methods. Unlike in-vitro fertilization, embryo adoption provides the benefit of a less invasive procedure on the part of the recipient. There is no need to take hormonal drugs designed to over stimulate the ovaries into producing an excessive quantity of eggs in a single cycle for extraction by a physician. The procedure is simpler and safer.

Couples usually choose embryo adoption at a point when other options including in-vitro fertilization fail and when traditional adoption is undesirable. "Embryo adoption is an option for couples who want to share a pregnancy experience and have neither eggs nor sperm to contribute to that process." says Susan Cooper and Ellen Glazer (1998) in their book, Choosing Assisted Reproduction (p. 319). They want to experience pregnancy. The mother wants to know what it is like to give birth, to feel the baby kicking inside her. Embryo adoption provides a form of therapy to couples who continually struggle with their infertility while watching others become pregnant and give birth to beautiful babies.

After five years of engaging in hormonal injections and artificial insemination, Karen and Tom Sperling of Illinois tried all of their possibilities. Karen wanted to experience pregnancy and to do so she stayed away from traditional adoption and instead settled on embryo adoption. "Ever since I was a little girl, I'd wanted to experience pregnancy," she says. "It was like a big part of me was being taken away" (Jerome, 2002,

p. 44). Through embryo adoption, Karen successfully gave birth to two twin sons. The Sperlings' case is only one of many where embryo adoption provided a successful solution when all other attempted methods failed.

Like the Sperlings, Laura and Raymond Paterniti, the couple who spent six years exhausting almost every infertility treatment before arriving at the doorsteps of embryo adoption also wanted the pregnancy experience. Laura needed the sensation of pregnancy, brought to her by embryo adoption, in order to heal her infertility emotionally.

> "Paterniti said although some women might balk at going through pregnancy with someone else's genetic child, for her it was the fulfillment of a long-thwarted hope." Embryo adoption provided comfort. "See, I wanted that experience," Paterniti said. "I wanted to be pregnant, buy maternity clothes, have someone say to me, `When are you due?'" (Manier, 2002)

The Paternitis and Sperlings are two examples demonstrating the physiological benefits resulting from a successful attempt at embryo adoption. In these cases, the couples tried embryo adoption because all of the other attempted infertility methods failed. However, it is important to recognize that had they not failed, using IVF or artificial insemination would have provided the same experience of pregnancy as the couples gained with embryo adoption. Nevertheless, other benefits also exist that when coupled with the pregnancy experience pushes embryo adoption as a prominent solution.

Not only does embryo adoption provide physical benefits to the recipient mother such as a less invasive procedure than methods including in-vitro fertilization, but the resulting child also receives advantages. The large amount of medical information available as the result of engaging in embryo adoption is unique. When adopting an embryo through programs such as those offered by Snowflakes and the National Embryo

Donation Center, the adopting parents receive extensive medical information. Part of the medical screening includes not only information about the biological parents but also a detailed family history (NEDC, 2003a). Unlike embryo adoption, in traditional adoption this information might not be as easily available when one or both of the birth parents are unknown or unavailable.

In embryo adoption, even if the adopting couple receives comforting information of a clean medical history, the nature of the adoption provides for an additional level of forewarning. In most cases, the biological parents had leftover embryos from in-vitro fertilization because they stopped treatment once the mother gave birth. Since the frozen embryos received by the adopting couple are genetic siblings of the biological parents' child, any genetic disorders or medical problems discovered from the child can be relayed to the adopting couple to let them know what could progress. An additional benefit beyond medical information is access to a source of bone marrow, blood donors and possibly even organ donors. Since the biological family is known, one or more of the family members could possibly act as a suitable donor (Boss, 2001).

Even with access to medical information, blood and bone marrow, the biological parents might not desire any direct contact with the adopting couple. Although the focus of embryo adoption groups such as Snowflakes is to provide a matching and screening service, they can also serve as an intermediate party (Boss, 2001). If the biological parents discover a genetic disorder in their child, they can use the agency to warn the adoptive couple. Additionally, if the recipient couple is seeking medical information, the embryo adoption organization could contact the biological parents. Even though these forms of contact are possibilities, either couple may not want any contact, not even

indirect contact, after the initial transfer. In the situation where the recipient couple is in desperate need of medical information or bone marrow for their child, the embryo adoption organization might have to respect the wishes of the biological parents and not release any information.

A couple interested in embryo adoption might be reluctant if they feel that access to the biological parents is difficult. A situation such as where the adoptive parents need immediate medical information and the biological parents refuse any contact could be a reason to discourage an interested party. However, prospective couples should realize they have the option to indicate a desired level of contact when seeking embryo adoption and many couples maintain close relationships with the biological parents. In one case, the Grays from Atlanta donated their 23 excess frozen embryos to the Vests and chose to maintain an open relationship. The two couples even spent a vacation together after the Vests gave birth to a son from the Gray's embryo (Manier, 2002). Even if this situation appears to be extreme, it is important to remember that programs such as Snowflakes encourage an open approach to embryo adoption (Jerome, 2002, p. 45).

Although embryo adoption can provide easier access to medical information from the biological parents, types of non-genetic complications are still possible for which prior medical records would have no benefit. One such issue is a direct function of embryo adoption using a portion of the birth process. As with traditional adoption and in-vitro fertilization, birth defects are possible with embryo adoption. A consequence of couples seeking the pregnancy experience through embryo adoption is they acquire the possibility of potential complications associated with traditional sexual reproduction (TSR). Birth defects are a main complication as are miscarriages, a troubled delivery and

other problems (Boss, 2001). In these situations, the term embryo adoption can be misleading. In traditional adoption, couples seek the after product. The couple can examine the child they are interested in adopting and have the option of deciding whether to adopt. With embryo adoption there is no turning back. At the same time in traditional adoption, medical aliments could be hidden.

Adoptive parents should also consider the benefits of being able to control the birth cycle. In traditional adoption there is no guarantee the biological mother did not consume drugs and or alcohol during the pregnancy (Boss, 2001). The female adoptive parent, pregnant from another couple's previously frozen embryo, takes on the responsibility of ensuring a pregnancy environment in which the fetus receives enough nutrients and no harmful substances.

Even with possible medical complications associated to pregnancy, infertile couples still discover the benefits of embryo adoption as a therapy for infertility. Although couples generally seek embryo adoption when they exhausted all other assisted reproduction methods, embryo adoption could be selected immediately after unsuccessful attempts at TSR. Even though a prominent reason to choose embryo adoption above in-vitro fertilization is to avoid an invasive and potentially harmful procedure, financial benefits exist that provide for a suitable solution across a wide variety of income levels.

In-vitro fertilization can cost anywhere from 10,000 to 20,000 dollars according to David Marcus (1999, p. 42) from U.S. News & World Report. The American Society of Reproductive Medicine confirms this estimate. They claim the average cost of an IVF cycle in the United States is 12,400 dollars (Grayson, 2003). If a couple's own gametes are not suitable then the costs only continue to increase when donor eggs and or sperm

are used. An anonymous individual, cited by Dr. Michael Tucker, an embryologist at Reproductive Biology Associates in Atlanta, suffered from premature menopause and was not able to produce eggs. Consequently having to pay 16,000 dollars for in-vitro fertilization destroyed her financially (Kolata, 1997b). Another couple, the Butlers, with fertility problems also required in-vitro fertilization with donor eggs. Similar to the situation presented by Dr. Tucker, the Butlers paid 16,500 dollars for donor eggs that did not survive. "It wiped us out financially," Ms. Butler said (Kolata, 1997a).

Unlike in-vitro fertilization, the costs of embryo adoption are significantly less. Snowflakes provides an estimate to the costs of embryo adoption with a high end estimate of 9,000 dollars and a low end estimate of 5,800 dollars. These estimates include Snowflake's fees, the cost of a home study and even include the cost of the actual embryo implantation (Snowflakes, 2003). Although these prices might seem high to couples with modest income, many sources claim that insurance almost entirely covers embryo adoption whereas in-vitro fertilization is not covered. Camilla Warrick from the Cincinnati Post (1998) says, "Since most insurance companies won't underwrite IVF, it tends to be off-limits to couples of modest means." Jeremy Manier from the Chicago Tribune (2002) says, "Many insurance plans cover virtually the whole cost of implanting and carrying a donated embryo." The Paternitis can attest, "Insurance amply covered implantation of the Paternitis' donated embryos - Laura Paterniti said their total out-of-pocket expense was $156. She said they still owe another clinic about $3,000 for a failed fertility treatment."

The Future

The Paternitis and their baby girl, the Sperlings and their twin sons, the Vests and their son, and the Stewarts, a couple in Britain (Cooper, 1996, p. 38), and their son, all are successful cases of couples forming a family through embryo adoption. These couples demonstrate that embryo adoption works and is beneficial. At the other end of the process are the Elliotts from Louisiana who had nine frozen embryos, the Grays from Atlanta who had 23 frozen embryos, and Elaine Oliver who also had frozen embryos are examples of couples and individuals who went through in-vitro fertilization and gave away their remaining frozen embryos through embryo adoption.

The benefits of these and similar couples' experiences, the approximately 400,000 frozen embryos in storage, and the continuing popularity of in-vitro fertilization shows that a definite need exists for embryo adoption. As long as infertility remains an unpleasant fact of life, couples will continue to seek in-vitro fertilization. Traditional adoption is an easier and possibly less complicated solution, but couples desire biological children of their own and one method is through in-vitro fertilization. For in-vitro fertilization to be a cost effective solution, doctors will continue to produce excessive amounts of embryos for a couple and cryogenically store the unused. Consequently, the quantity of frozen embryos in storage will only grow higher. The larger number of frozen embryos translates to a greater availability for infertile couples seeking to adopt embryos. Even with the astonishing number of frozen embryos stored today, the hesitancy of couples to give away their embryos results in a shortage of those available for adoption (Cooper & Glazer, 1998, p. 320). If the number in storage increases, then the percentage available to adoptive couples will also increase.

A greater availability translates to easier access for infertile couples by not having to wait as long to adopt a frozen embryo. A larger quantity of frozen embryos in storage also reveals a larger quantity of biological parents willing to relinquish their embryos. Easier access combined with an almost free solution, because of possible insurance coverage, results in greater participation on the part of infertile couples. The larger interest causes a need for more organizations to assist in the embryo adoption process. Snowflakes and the National Embryo Donation Center are two prominent organizations providing embryo adoption services along with other, smaller, groups; however, the number of organizations will continue to increase.

The unquestionable growth of this controversial industry will uproot legal and ethical consequences. The government working in cooperation with embryo adoption organizations should form and implement a legislative framework to minimize the legal ramifications associated with embryo adoption including the rights of the biological and adoptive parents. One major point is whether infertility clinics can release embryos for adoption when the biological parents are unreachable. Already the government is showing interest in embryo adoption. President Bush in 2002 developed plans to distribute approximately one million dollars to organizations such as Snowflakes in an effort to promote embryo adoption (Meckler, 2002, p. 1). Although monetary support is beneficial, long-term sustainability will hold if embryo adoption organizations receive the support of a legislative framework based upon the current practices of traditional adoption including home studies.

A significant issue that IVF clinics and embryo adoption programs will continue to encounter relates to the wishes of the biological parents and the adopting parents. If

the biological parents are unreachable or deceased, the question arises as to whether the clinic preserving the frozen embryos should destroy them, donate them to research institutions or place the embryos for adoption. The same issue holds true on the side of the adoptive parents if they do not use all of the embryos received. There are also additional options such as whether the unused embryos from the adoptive parents should become the responsibility of the biological parents and whether responsibility can transfer back in cases where the adoptive parents are deceased or unreachable. The National Embryo Donation Center (2003a) provides a small insight into the momentous legal complexity by indicating that a child resulting from embryo adoption will have the adoptive parents listed on the birth certificate and not the biological parents. This small detail of whose name the birth certificate lists as the child's parents highlight the significant legal intricacy of embryo adoption.

Issues that are more peculiar will develop and test the strength of the agreements between the biological parents, the adoptive parents, and the embryo adoption organization. One complication is the intentions of the adoptive parents in agreeing to acquire the biological parents' embryos. How long from acquisition is the adopting couple required to implant the embryos and how many? What happens if the adopting couple wishes to destroy any remaining embryos? Does a responsibility lie on the part of the adopting parents to ensure that their unused embryos will remain frozen even beyond the parents' death? What happens if the adopting couple acquires embryos, from unsuspecting biological parents, solely for the purpose of stem cell research? Although the ramifications of these questions seep into whether society should consider an embryo

a human being, the immediate implications hit the center of the agreements developed by the embryo adoption organizations.

These issues only provide a glimpse of the different quandaries that will arise, and as such, embryo adoption organizations ultimately need the support of a legislative framework. Embryo adoption will not fade. The industry will only become bolder and stronger as infertile couples discover the hidden opportunities. Society will find increasing involvement with the ethical and legal perplexities. From what was once an almost frozen industry, embryo adoption will defrost itself and evolve into the heart and sole of infertility treatments and adoption.

Author's Words

Infertility clinics will continue to produce excess frozen embryos as long as in-vitro fertilization remains a popular treatment for infertile couples. Infertile couples possessing excess embryos must make an immediate and definitive decision regarding their embryos' fate at the point when further children are undesirable and an initial IVF treatment was successful. I believe it is unfair and unhealthy for the biological parents to postpone their decision. The high number of frozen embryos currently in storage is partly a result of indecision. Embryo adoption therefore provides an excellent solution.

Organizations such as Snowflakes, who base embryo adoption on the model of traditional adoption, use an appropriate approach. I feel this procedure is desirable for satisfying the emotional needs of the biological parents and therefore encourages their participation. Additionally, embryo adoption organizations need to understand that a significant aspect of their program is to ensure following the biological parents' wishes. In traditional adoption, the adopting family is legally responsible for the welfare of the adopted child. If the child is mistreated, the adopting parents break the adoption agreement and the child can be removed from the household. In embryo adoption, part of the transfer agreement between the biological parents and the adoptive parents must detail the consequences if the adoptive parents do not use the embryos for their intended purpose. I believe that embryo adoption organizations have to place strict legal clauses in the adoption agreements detailing the consequences if the adoptive couple uses the embryos for purposes other than implantation. Some uses include adopting the embryos for the purpose of stem cell research, adopting the embryos and never using them or even adopting them for destruction.

Including these clauses could potentially shift the embryo into a classification worthy of legal protection. I feel this would misrepresent the intention, as the legal transfer agreement would be protecting the rights of the biological parents and not those of the embryo. I believe the frozen embryos should be classified as providing an infertile adoptive couple the potential for a child based on the low probability for success in embryo adoption. I do not even support the definition that a frozen embryo provides a couple with a potential child. Embryo adoption should not provide any ammunition to support pro-life groups nor should it provide any ammunition to support pro-choice. Society should view embryo adoption simply as an appropriate mechanism by which to distribute existing frozen embryos to infertile couples.

Although I support embryo adoption, I do not feel embryo donation is appropriate so long as frozen embryos remain in storage. In embryo donation physicians use separately donated gametes to form new embryos. The purpose of embryo adoption is to appropriately use and distribute existing frozen embryos. Embryo donation works against embryo adoption since physicians create new embryos instead of using those already in existence. As long as frozen embryos remain in storage, physicians should avoid embryo donation and couples with frozen embryos, unsure of their decision, should be encouraged to decide.

Biological parents must also work to reduce the amount of newly frozen embryos by minimizing the number produced during their in-vitro fertilization trials. I am not saying that physicians should produce and implant only one embryo at a time, but the quantity needs to decrease. At the same time, physicians should not place the health of the biological mother at an elevated risk. Decreasing the quantity of embryos produced

must be weighted against the success rates of a live birth and therefore minimizing the need for extracting subsequent eggs and further stimulatory drugs. Although this might be the present goal of in-vitro fertilization clinics, economic benefits and the couple's possible interest in raising more children at a later date should not play a part. With approximately 400,000 frozen embryos currently in storage, practices need to change.

I believe embryo adoption is a worthwhile solution requiring the full support of embryo adoption clinics, infertile couples with frozen embryos, infertile couples seeking frozen embryos, the government, fertility clinics, reproductive specialists, adoption policy groups, and traditional adoption agencies to provide guidance. Embryo adoption is in a vulnerable fledgling state. Each of these groups and individuals must play a part to plant embryo adoption in a concrete footing supported by the weight and approval of a legislative framework.

References

Boss, A. (2001). The Basics of Embryo Adoption and Donation. Conceiving Concepts, Inc. Retrieved November 20, 2003, from the World Wide Web: http://www.conceivingconcepts.com/learning/articles/embryo.html

Caplan, A. (2003, June). The problem with 'embryo adoption'. The Center for Bioethics. Retrieved November 4, 2003, from the World Wide Web: http://www.msnbc.com/news/928846.asp

Cedars, M. (2003). Medical Aspects of Embryo Donation. The National Infertility Association. Retrieved November 2, 2003, from the World Wide Web: http://www.resolve.org/main/national/treatment/options/donor/embryo.jsp

Christian Medical & Dental Associations. (2003, November, 17). Christian Doctor: Embryo Center Offers Ethical Alternative To Life-Honoring Couples. Retrieved November 28, 2003, from the World Wide Web: http://www.cmdahome.org/index.cgi?BISKIT=3266681072&CONTEXT=art&art=2498

Cooper, G. (1996, July 27). Are Embryos People? The Independent, London: p. 38.

Cooper, S., & Glazer, E. (1998). Choosing Assisted Reproduction. Indianapolis, IN: Perspectives Press.

DeNavas-Walt, C., Cleveland, R., & Webster, Jr., B. U.S. Census Bureau. (2003). Current Population Reports, Income in the United States: 2002. Washington, DC: U.S. Government Printing Office.

Dobnik, V. (1998). Frozen embryos 'in limbo'. The Standard-Times. Retrieved November 2, 2003, from the World Wide Web: http://www.s-t.com/daily/02-98/02-18-98/b01li054.htm

The Evan B. Donaldson Adoption Institute. (2002a). International Adoption Facts. Retrieved October 30, 2003, from the World Wide Web: http://www.adoptioninstitute.org/FactOverview/international.html

The Evan B. Donaldson Adoption Institute. (2002b, January). Overview of Adoption in the United States. Retrieved October 30, 2003, from the World Wide Web: http://www.adoptioninstitute.org/FactOverview.html

Genetics & IVF Institute. (2003a). Human Embryo Cryopreservation (Embryo Freezing) and Frozen Embryo Transfer Cycles. Retrieved November 1, 2003, from the World Wide Web: http://www.givf.com/embryov.cfm

Genetics & IVF Institute. (2003b). In Vitro Fertilization (IVF) Program. Retrieved November 1, 2003, from the World Wide Web: http://www.givf.com/ivf.cfm

Grayson, C. (2003, September). In Vitro Fertilization. WebMD Medical Reference. Retrieved November 9, 2003, from the World Wide Web: http://my.webmd.com/content/article/73/87998.htm

Herman, B., & Perry, S. Infertility. (1997). WebMD Medical Reference from "The Twelve-Month Pregnancy". Retrieved November 8, 2003, from the World Wide Web: http://my.webmd.com/content/article/4/1680_51205.htm

Hogben, M. (1998, summer). What size is an embryo's soul?. The Human Life Review, 24(3), 88-90.

Holland, J. (2003, August, 3). Leftover embryos pose dilemma. Providence Journal-Bulletin, p. A-01.

The Institute for Reproductive Medicine and Science of Saint Barnabas. (2003). Embryo Culture Systems. Retrieved November 6, 2003, from the World Wide Web: http://www.sbivf.com/ivf_culture.htm

Jerome, R. (2002, January, 21). Last Chance Family: Couples plagued with infertility find a new path to parenthood: adopting frozen embryos. People Weekly, 57(2), 44-46.

Kolata, G. (1997a, November 23). Clinics Selling Embryos Made For 'Adoption'. The New York Times, pp. 1, 1.

Kolata, G. (1997b, October 17). Successful Births Reported With Frozen Human Eggs. The New York Times, pp. A, 1.

Manier, J. (2002, September 24). Embryo donations fuel stem cell debate. Chicago Tribune. Retrieved November 24, 2003, from the World Wide Web: http://www.macon.com/mld/macon/news/nation/4140272.htm

Marcus, David. (1999, April, 12). Mothers with another's eggs: booming and controversial egg donation business for donors to infertile couples. U.S. News & World Report, 126(14), 42-44.

Meckler, L. (2002, August, 21). Government pushes embryo adoption; Public awareness program encourages couples to donate. San Mateo County Times. p. 1.

The National Adoption Information Clearing House. (2003, January). Cost of Adoption. Retrieved October 30, 2003, from the World Wide Web: http://naic.acf.hhs.gov/pubs/s_cost.cfm

National Embryo Donation Center. (2003a). Embryo Adoption Information. Retrieved November 18, 2003, from the World Wide Web: http://www.embryodonation.org/adoptions.html

National Embryo Donation Center. (2003b). Information For Fertility Clinics. Retrieved November 18, 2003, from the World Wide Web: http://www.embryodonation.org/clinics.html

Shepard, S. (2003, May, 13). Embryo Adoption Center Nears. Family News In Focus. Retrieved November 8, 2003, from the World Wide Web: http://family.org/cforum/fnif/news/a0025926.cfm

Snowflakes Embryo Adoption Program. (2003). Snowflakes Frequently Asked Questions. Retrieved November 12, 2003, from the World Wide Web: http://www.snowflakes.org/FAQs.htm

Southeastern Fertility Center. (2003, summer). The Southeastern Center for Fertility and Reproductive Surgery. Retrieved November, 22, 2003, from the World Wide Web: http://www.baby4you.com/

Taylor, L. (2003, February, 22). On a quest to fulfil a dream. Toronto Star. p. A23.

U.S. Department of Health and Human Services. (2003, March). Factsheet/Publications: Adoption and Foster Care Analysis and Reporting System (AFCARS). Retrieved October 30, 2003, from the World Wide Web: http://www.acf.hhs.gov/programs/cb/publications/afcars/report8.htm

Warrick, C. (1998, July). Miracle Babies. The World Wide Web Edition of The Cincinnati Post. Retrieved November 8, 2003, from the World Wide Web: http://www.cincypost.com/living/1998/embryo072098.html

Wolf Haven International. (2003). Wolf families and social structure. Retrieved October 30, 2003, from the World Wide Web: http://www.wolfhaven.org/newwolffamilies.htm

World Health Organization. (2002, October). Infertility. Retrieved October 30, 2003, from the World Wide Web: http://www.who.int/reproductive-health/infertility/index.htm