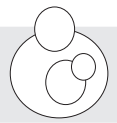




ADVANCES AND COMPLEXITIES:

In Vitro Fertilization (IVF)
and Embryo Freezing



Louise Brown was born in 1978, becoming the world's first baby born by *in vitro fertilization* (IVF). For the world of medicine, her birth in Great Britain was a revolutionary breakthrough. For couples experiencing infertility, the success of in vitro fertilization symbolized a new hope in their efforts to conceive a child.

The road to IVF for most couples is quite predictable. First, the woman's obstetrician (who is most likely the person making the diagnosis) determines the cause of the infertility (e.g., tubal irregularities for females, low sperm count/motility in males, a combination of female and male factors). Depending on the nature of the infertility, the doctor recommends first line interventions such as medications or corrective surgery, which represent 85 to 90 percent of infertility services (American Society for Reproductive Medicine, 2005).

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If these treatments are unsuccessful and the couple wants to continue their efforts, they are referred to a Reproductive Endocrinologist (RE)—a physician who specializes in the treatment of infertility. It is while working with a reproductive endocrinologist that couples have the option to receive IVF, a procedure which is perceived as common, but which actually accounts for less than three percent of infertility services (American Society for Reproductive Medicine, 2005).

The Science of IVF

IVF is the process in which a woman's eggs are fertilized with a man's sperm outside of the body in a laboratory. Prior to ovulation, a woman's ovaries are stimulated with injectable medications for increased egg production. The resulting eggs are retrieved from the ovaries and are combined with the

(American Society for Reproductive Medicine, 2005). If a couple undergoes four IVF attempts, they could spend close to \$50,000—the majority of which is out-of-pocket expense, because insurance coverage for infertility treatment is rare.

Advances in IVF: Improving Success Rates

Since 1978, several advances in IVF have been made to help improve a couple's chance to conceive. However, with each technological advance, unexpected human dilemmas are created. One of these advances is Intracytoplasmic Sperm Injection (ICSI). During ICSI, a single sperm is surgically injected into a single egg to assist with fertilization. ICSI is used when a man's sperm count is low, sperm motility is poor, and the sperm have difficulty penetrating the egg.

women who have had multiple miscarriages. Three days following egg retrieval and fertilization, an embryologist removes a single cell from the embryo (called a blastomere) and analyzes it for hereditary conditions such as cystic fibrosis and chromosomal abnormalities such as Down's Syndrome. Only the embryos that are free of problematic conditions are transferred back to the uterus.

PGD contains great promise for advanced reproductive technologies. Because only healthy embryos are used, many reproductive centers report increased IVF success rates when using PGD. And the use of PGD can give couples at risk for genetic or inherited diseases peace of mind. However, it is not without controversy. Some groups who support rights for the disabled fear PGD will lead to increased discrimination against people with disabilities. Also, PGD can identify x and y chromosomes, which can be a tool for gender pre-selection. Countries such as Canada and Great Britain currently ban using PGD for gender pre-selection, arguing it could cause gender discrimination. However, PGD is legal and offered by many clinics in the United States.

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sperm in a laboratory. The remaining fertilized eggs are called embryos and a selected number are placed back in the woman's uterus for implantation.

If the number of created embryos exceeds the number of embryos implanted during the IVF attempt, the couple has the option to freeze the embryos for future use or discard them. For some couples, the idea of freezing embryos is appealing because if an IVF cycle is unsuccessful, another IVF cycle can be undertaken without the step of ovarian stimulation. It is also attractive for couples who know they want additional children even if the IVF attempt is successful.

Although IVF is a revolutionary breakthrough, the success rates for conception and delivery hover around 25 to 30 percent, depending on the clinic a couple attends. In addition, the financial burden for couples remains high. A typical IVF cycle costs \$12,400

ICSI is hailed by some as one of the great advances in reproductive technologies because it gives some men a chance to become biological fathers who would have previously been unable to do so. For example, a man with cystic fibrosis, who previously was assumed infertile because of genetically underdeveloped sperm ducts, can use ICSI to father a child. However, since the average life expectancy of someone with cystic fibrosis is approximately 32 years (Orenstein, 2002), the man is unlikely to live late into his child's life.

Preimplantation Genetic Diagnosis (PGD) is a second advance in IVF which improves success rates, but which also has social and moral implications. PGD is a way to screen for chromosomal abnormalities and hereditary conditions prior to embryo transfer to the uterus. This procedure is particularly useful for couples who have a family history of inheritable diseases, or for

Frozen Sperm and Eggs: Legal Dilemmas

A reproductive technology which preceded IVF is the ability to freeze a man's sperm for use at a later date. There are many situations in which a man may decide to freeze his sperm. For example, a man diagnosed with a terminal disease, or a disease that can lead to sterilization, may choose to have his sperm frozen for future use. A man going off to war may freeze his sperm preparing for the possibility he may not return. Or in the most extreme case, the wife of a man who unexpectedly dies may extract his sperm following his death and freeze it for future conception (Fortado, 2004). These scenarios create many legal dilemmas. For example, can the child of the deceased father be the recipient of inheritance, life insurance, or social security survivor benefits?

New Technology Brings New Pressures on Families

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Preimplantation genetic diagnosis (PGD) was initially developed to detect inherited serious genetic disorders—often those fatal in early childhood. For families who have already lost a child to such a disease, or who may be struggling to care for a child with such a disease, PGD can offer hope for the future.

Increasingly, however, PGD is being used as an adjunct to standard IVF by couples with no family history of serious disease, but who are struggling with infertility. In this context, PGD is used to detect abnormalities in chromosome number, called *aneuploidy*, which can interfere with successful IVF and pregnancy. Although the data showing PGD's effectiveness in this context is limited, some IVF providers recommend PGD to infertile patients over 35 or those with repeated IVF failure. Other providers have suggested that eventually, PGD will be offered to every patient. Since over 1% of all U.S. newborns are IVF babies, aneuploidy screening accounts for the biggest growth area in the use of PGD.

PGD creates a number of new issues for families and family therapists. Couples considering the use of PGD face considerable financial and emotional pressures. It adds thousands of dollars to the already substantial cost of IVF, and many prospective parents go deeply into debt. Further, given the limited data available about PGD's effectiveness, prospective parents may struggle to understand whether PGD will improve their chances for success.

Regardless of cost, some parents put pressure on themselves to find a way to afford PGD. They may believe that it will maximize their chances of becoming pregnant, or that PGD will allow them to select the "healthiest" embryo, giving their child the best chance at a healthy start in life. The additional choice of PGD added to the technology menu may bring considerable added stress.

More controversial applications of PGD include its use to select an embryo that is an immunological match for a sick sibling; to select the sex of an embryo in the absence of a sex-linked disease risk; to test embryos for gene mutations associated with diseases such as early-onset Alzheimer's disease or Huntington disease that do not appear until later in life; or to test for mutations that indicate a heightened, but uncertain risk of developing a particular disease such as cancer.

Some observers believe PGD, by allowing parents increased control over the genetic makeup of their children, has the potential to fundamentally alter family dynamics. Human reproduction could come to be seen as the province of technology. Such a shift, if it occurs in large enough numbers, could affect both prospective parents and their future children by changing the expectations of everyone involved.

Some parents may view PGD as merely the latest version of

giving their child every possible advantage—a pre-pregnancy version of private nursery school or swimming lessons. Yet the knowledge that such technology was used could put pressure on a child to live up to the expectations that he or she be "perfect" in some way. The future implications are uncertain: several years down the road, will an adult child who develops a genetic disease resent the parents who did not use PGD to detect that mutation? Or will children born after PGD resent knowing so much about their genetic makeup from birth?



It remains to be seen to what extent PGD may affect family dynamics. A study has been approved at Baylor College of Medicine in Houston to study the impact of allowing prospective parents to use PGD for sex selection. Yet approval of that single study took nine years, and the data that it provides will be a small piece of the puzzle of what the impact of PGD might be. For the future, The Genetics and Public Policy Center, in conjunction with IVF and PGD providers, has begun to design a voluntary, national database that will allow future research on the impact of PGD. PGD is an important new option for prospective parents, but the issues it brings to families and family therapy clearly are still emerging.

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In the case of Rhonda Gillett-Netting, she and her husband froze his sperm after they learned his cancer was terminal. Ms. Gillett-Netting gave birth to twins one year following his death. After her twins were initially denied social security benefits, she sued the state and recently won an eight-year legal battle when the U.S. 9th Circuit Appeals Court ruled that her twins were the legitimate children of her husband and were entitled to the benefits (Fortado, 2004).

While embryos and sperm can easily

be frozen for long periods of time, the same result is not true for female eggs. This is primarily due to the large water content in eggs that expands and crystallizes during freezing. Although the American Society for Reproductive Medicine considers egg freezing experimental, researchers are having some success and are hopeful that egg freezing can become as common as embryo and sperm freezing. Once that occurs, it is likely that the legal issues faced by those who use frozen sperm to create an embryo will also be

faced by those using frozen eggs.

Frozen Embryos: Ownership Issues

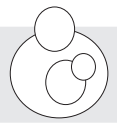
Most couples who freeze embryos assume that they will be together for future IVF cycles. However, some couples with frozen embryos will separate or divorce and will be forced to make decisions regarding the ownership and disposition of the embryos. Although infertility clinics anticipate these disputes and put such agreements in writing prior to freezing (known as embryo

IVF and the Rapid Growth of Multiple Births

Developed countries have seen a staggering increase in the prevalence of twins, triplets, and higher-order multiple births since the introduction of IVF, not to mention the widespread use of ovarian hyperstimulation, with or without intrauterine insemination (IUI). In the U.S., twin births increased by 75% between 1980 and 2000 (Fauser, Devroey, & Macklon, 2005). The same data show that births resulting from infertility treatments account for about 1 to 3% of all singletons, 30 to 50% of twins, and more than 75% of higher order multiples.

Multiple gestation is the primary cause of adverse outcomes in children conceived through IVF (Bergh, Ericson, Hillensjo, Nygren, & Wennerholm, 1999), primarily due to the high rates of premature delivery. According to the American Society for Reproductive Medicine (ASRM), preterm birth occurs in over 50% of twin pregnancies, 90% of triplet pregnancies, and virtually all quadruplet pregnancies. ASRM also reports that compared to singleton pregnancies, a twin is seven times more likely and a triplet is over 20 times more likely to die in the first month of life. Further, prematurity is associated with an increased risk of respiratory distress syndrome, intra-cranial hemorrhage, cerebral palsy, learning disabilities, blindness and low birth weight.

In addition to the dangers the babies face, the mother of multiples is at significantly increased risk of pre-eclampsia (pregnancy-induced high blood pressure), hemorrhage, placental abnormalities, gestational diabetes, anemia and polyhydramnios (excess amniotic fluid). In an effort to prevent premature delivery, she may also face prolonged bed rest and hospitalization. Multifetal reduction (reducing the number of fetuses) may also



Couples often report feeling marginalized and misunderstood by therapists who don't know the basic medical facts regarding IVF and embryo freezing.

disposition agreements), legal wrangling is common.

In three major cases in the United States, three separate courts have used various arguments to arrive at the same conclusion—if one of the parties

responsible for the embryo does not wish to become an involuntary parent, that party will prevail (Daar, 2001). The courts consistently rule that forced parenthood is not in the best interest of the couple, the future child, or soci-

ety—even if embryo disposition agreements exist. In Britain, courts have ruled similarly and denied the use of frozen embryos when one partner disagrees with the decision (Dyer, 2003).

The Role of Marriage and Family Therapists (MFTs)

MFTs can play a key role in helping couples undergoing IVF treatments and facing decisions regarding embryo freezing. First and foremost, MFTs can educate themselves regarding the medical procedures and emotional impact

be advised for the health of the mother and to improve survival of the pregnancy.

In spite of the data, many couples view multiple gestation as desirable and speak hopefully about “getting two or three babies for the price of one.” While most parents of multiples are thrilled with their new family, most will admit they were unaware of the risks the pregnancy posed to both mother and babies. With the single-minded focus that most infertile couples place on conceiving a child, few consider the complications that a high-risk pregnancy, long-term bed rest, or hospitalization could create, let alone the possibility of having premature, and potentially disabled, babies who spend the first weeks or months of their lives in neonatal intensive care. These stresses, particularly if there are other children at home, work requirements, or financial hardship, can be crippling to individuals and to relationships.

In 2004, with the intent of decreasing the incidence of multiple births, the ASRM and the Society for Assisted Reproductive Technology (SART) issued revised guidelines for the number of embryos to be transferred in IVF cycles. While these recommended limits (ranging from one to five embryos depending on maternal/egg donor age, embryo quality, and previous IVF success) have the potential to improve the outcome for IVF patients, there are still very few cases in which doctors or patients will choose to transfer only one embryo. In addition, there are still significant concerns for women undergoing ovarian hyperstimulation with or without IUI. In these cases, the ovaries are stimulated with medication to release an undetermined number of eggs and the couple attempts conception through intercourse or insemina-

tion. Since there is no control over the number of embryos that may be created (other than attempting to regulate egg production through medication management), these couples remain at increased risk for multiple births.

Therapists who work with infertility patients must recognize not only the physical risks that their clients face as they make decisions about treatment, but the emotional and marital risks as well. Couples who conceive multiples experience higher rates of stress, isolation, depression and divorce (Fauser et al., 2005). The multiple—and therefore high-risk—pregnancy, coming on the heels of what is typically several years of emotionally devastating and painful infertility treatments, is cause for significant concern about the psychological well-being of the couple—individually, as partners, and as parents.

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of IVF and reproductive treatments. Couples often report feeling marginalized and misunderstood by therapists who don't know the basic medical facts regarding IVF and embryo freezing. When a couple spends half the session educating the therapist regarding these issues, the therapist is limited in his or her ability to truly join the couple and provide the empathy necessary to create a successful therapeutic alliance. Burns and Covington's (2000) comprehensive guide to infertility counseling can help MFTs gain immediate insight into the myriad of issues these couples face.

For couples undergoing stressful IVF procedures, MFTs can use their expertise in couples therapy to reduce a couple's stress and increase their ability to jointly cope with this challenge. Recent research has shown that coping with the stress of IVF is relational, and that a coping pattern which benefits one member of a couple can have a negative impact on his or her partner (Peterson, et al., in press). For example, a man who distances himself from the importance of having a child is likely to find relief from the stress of infertility. However, if this way of coping is in direct opposition to his partner's, it is related to increases in her reports of infertility stress and depressive symptoms. MFTs need to work with couples to help them jointly cope in ways that benefit both members of the couple.

MFTs can also play a key role in helping couples make decisions regarding embryo disposition. Because of the complexities involved in this area, and because couples are so focused on their own efforts to have a child, they are unlikely to consider all of the potential possibilities. For example, if the couple completes IVF and has remaining frozen embryos, would the couple want to donate or dispose of the embryos? If they choose to donate the embryos, they will have to decide whether to do so anonymously or make a choice to be involved in the child's life. If it is an anonymous donation, they must consider whether they are comfortable with the idea of having a biological child they may never know. Further,



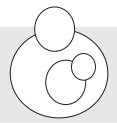
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they must consider the emotional reactions of seeing someone else raise their biological child if they choose involvement. If the couple prefers to dispose of the embryos, religious or moral concerns may come into play.

MFTs may also work with couples who are considering freezing sperm for future use. MFTs can help these couples prepare for unforeseen situations

this decision may create. For example, if one partner faces a terminal illness and they are unsure whether to freeze the husband's sperm, the MFT can help the couple examine whether the decision is in the couple's and the future child's best interest. Some question the couple should consider are: In the event her husband dies, would the wife allow herself time to grieve his loss before she

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attempts to conceive his child? Is the wife prepared to shoulder the demands of parenting on her own after her husband has passed on? Does the wife have adequate family and social support to help with the transition to parenthood?

In all cases regarding a couple's decision making, MFTs should adhere to the AAMFT ethical guidelines to respect the rights of clients to make decisions. Because these decisions will have lifelong implications, MFTs should use their expertise to help the couple understand the future consequences of such decisions, particularly as they pertain to the couple's marital and family relationships.

Conclusion

IVF has brought new promise to many couples experiencing infertility. Couples who once would have been unable to conceive and give birth to their own biological children now have real hope through this remarkable technology. However, many ethical, legal, and social issues unexpectedly arise with each new technological advance. Embryo freezing and possible ownership disputes are real possibilities that couples may face. Courts will continue to have a role in shaping the law related to forced parenthood and embryo disposition. MFTs can provide meaningful emotional support and help couples jointly cope with the challenges of IVF. In addition, MFTs can offer direction to couples making complicated life decisions that will impact their families for years to come. ○



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