

■ medical ethics

To Be or Not to Be— Preimplantation Genetic Diagnosis

The case and commentary are reprinted from Ethics Rounds, 10(4), 2001. KFHP Inc, and TPMG Inc.

The development of reproductive technologies throughout the last four decades has given birth at a daunting pace to a host of formidable questions for ethical reflection. The 60s ushered in the birth control pill and prenatal testing for

some genetic defects by amniocentesis. During the next decade, abortion was legalized and the first test-tube baby was born. The abortion drug, RU-486, became available in the 80s. In the last decade, Dolly the sheep was cloned, and a child was birthed by a 63-year-old postmenopausal woman and another conceived from sperm that had

been harvested from a dead man.

With each major developmental milestone, we encountered fresh dilemmas unique to the new innovation while simultaneously revisiting older, fundamental arguments about the definition of life itself. New reproductive technologies aiming to foster the creation of life always brought with them addi-

By Kate Scannell, MD,
Editor

Commentary by Jeffrey R
Botkin, MD, MPH

Commentary

Preimplantation Genetic Diagnosis and the Biologic Selection of Children

By Jeffrey R Botkin, MD, MPH, Professor of Pediatrics and Medical Ethics, University of Utah

This case is by no means science fiction, as the ability to select future children for their genetic traits is now available. For the past 30 years, prenatal diagnostic technology has offered the ability to perform a negative selection—that is, the ability to detect an abnormal fetus and terminate the pregnancy prior to fetal viability. Now, as this case illustrates, preimplantation genetic diagnosis (PGD) offers the ability to perform positive selections—that is, the ability to select an embryo for desirable traits, as well as to discard those embryos with genetic flaws.

PGD is offered in over 50 centers around the world, and it is estimated that more than 500 children have been born following this procedure.¹ PGD has been used primarily by couples who are at increased risk of bearing a child with a genetic disease or chromosome abnormality. The obvious advantage of PGD for some couples is the ability to initiate pregnancy with what is considered a healthy embryo rather than take a chance with traditional reproductive means and face the prospects of a termination decision four to five months into the pregnancy. Of course, for those who believe human life should be afforded full moral status at the moment of fertilization, PGD involves greater ethical trans-

gressions than does abortion, since a number of embryos are created and discarded in the process.

But the ethical complexity of PGD goes well beyond right-to-life issues for embryos. The complexity arises from this ability to perform positive selections. We can imagine a day in the not-too-distant future in which a woman would undergo an ovarian biopsy via endoscopy to provide tissue with hundreds of immature eggs. Maturation of the eggs in the lab would be performed, followed by fertilization from her partner and then PGD. Emerging technology will permit the analysis of hundreds or thousands of genetic loci. The couple then would have, say, 75 genetic profiles of potential children from which to choose. They might choose #32 for this first pregnancy and #59, along with some other contenders, could be frozen for their next pregnancy. Perfect babies and a family of their dreams.

If something seems less than perfect in this scenario, then we need to unpack our sense of unease. Are we just queasy about new things, or is there a coherent logic to these concerns?

The Patterson case offers the opportunity to think through some of these issues. A similar case received wide publicity last year in which parents used PGD to select an embryo that

Kate Scannell, MD, is an internist, rheumatologist, and geriatrician at Kaiser Permanente Oakland, CA. She is author of the book, "Death of the Good Doctor" and a columnist for the Oakland Tribune/ANG Newspapers. She also edits *Ethics Rounds* for Kaiser Permanente. Email: kate.scannell@kp.org.

Jeffrey R Botkin, MD, MPH, Professor of Pediatrics and Medical Ethics, University of Utah. Co-Editor, *Genetics and Criminality: The Potential Misuse of Scientific Information in Court*; American Psychological Association 1999.

tional concerns about their potential to end life as well.

In this article, we will explore fundamental ethical issues raised by reproductive technologies through a specific focus on preimplantation genetic diagnosis (PGD), a new technology that allows biologic selection of children according to their genetic profiles. Bioethicist Dr Jeffrey R Botkin, Professor of Pediatrics and Medical Ethics at the University of Utah, provides the commentary.

The theme for this article resonates with the recent first anniversary of the September 11 terrorist attacks on New York and Washington, DC. Since that violence, it

has been difficult to reflect on matters of life and death without some degree of refraction through the lens of war. Speaking to this, one could remark about broad conceptual similarities between them; of using value judgments—about a particular nationalism, religion, genetic makeup—to determine the appropriateness of another's continued potential to live; of attempting to control or minimize the native biologic and socioethnic diversity of the human population; or even of asking in each circumstance by what agency and authority each of us decides how life begins and how it should end.

CASE: The Biologic Construction of a Child

Oscar and Nadine Patterson present Nadine's gynecologist, Dr Quatrain, with their request for preimplantation genetic diagnosis (PGD) in order to create a healthy baby harboring the exact type of cells needed by their desperately ill five-year-old daughter, Randy, for an organ transplant. The procedure involves hormonal stimulation and egg harvest from Nadine, followed by in-vitro fertilization of the eggs with Oscar's sperm. The subsequently formed test-tube embryos would then undergo genetic screening tests, and those embryos not

was both free of a mutation for Fanconi anemia and a tissue match for their six-year-old daughter who suffered with the disease. Stem cells from her new brother's umbilical cord were transfused into the little girl and, remarkably, the procedure worked.² In that case, a new life was created to save a life in jeopardy.

If we accept the use of PGD for, say, Tay-Sachs disease or cystic fibrosis or muscular dystrophy, must we accept its use for gender selection or for the right HLA type, or, some day, intelligence or perfect musical pitch? While professional societies discourage the use of PGD for gender selection (other than for sex-linked genetic conditions), there are no articulated standards for the use of PGD that delineate its ethical applications.³

To work through these issues, we must start with the most basic question: What justifies preimplantation genetic diagnosis or any form of prenatal diagnosis? Potential justifications focus on the welfare of the fetus/child through preventing a burdensome existence—the parents through preventing the burdens of an impaired child, or on social welfare by avoiding the social costs of ill or disabled individuals. While these issues deserve more exploration than can be provided here, it strains logic and common experience to claim that the vast majority of individuals with heritable conditions do not benefit from their lives. Simi-

larly, the investment society makes in the health of individuals with heritable or congenital conditions affords them great benefit with many secondary benefits extending through society. It is difficult to claim that these investments do not produce a substantial net benefit to society. Therefore, of the potential justifications for prenatal diagnosis, the most compelling, if not the only real justification, is to assist prospective parents in their desire to avoid the difficulties of an impaired child.

Note that this justification is not founded on a simple philosophy of parental autonomy. Prospective parents have strong negative rights to be left alone with their reproductive decisions, but they do not have positive rights to obtain any or all prenatal diagnostic services for any purpose they wish. This is simply because these diagnostic services are provided by moral agents—such as doctors, nurses, and counselors. As moral agents, professionals have the prerogative of deciding the scope of their services based on personal and professional values. As providers undertake an ethical analysis of the issues, they must balance the potential welfare of the prospective parents with the potential harms to others. In the case at hand, Dr Quatrain has every right to analyze the Pattersons' request in terms of his personal values and in terms of values that he would promote for his profession.

Continued on next page.

matching Randy's cell type or those carrying the gene for her immunologic disease would be discarded. Embryos passing the tests would be implanted in Nadine's womb. Once a baby was born, some of his or her bone marrow would be removed and transplanted to Randy in hopes of establishing a healthy immune system for her.

The Pattersons had not planned to have another child. The work of raising Randy through multiple infectious complications had stressed their relationship, and the family finances suffered after Nadine quit

her job to provide for Randy's care.

But the Pattersons stumbled across a newspaper account of a "test tube baby" engineered by PGD in order to save his sick sister's life. They also read that the involved procedures cost approximately \$30,000 and were not covered benefits of insurance policies. Instantly, they envisioned a potential for their daughter to be made well and survive her otherwise fatal illness.

Dr Quatrain is uncomfortable with the Pattersons' request. A devout Catholic, he views embryo discard as a form of abortion. Even

when he tries to separate out a medical decision from his religious beliefs, he still concludes that it is wrong to create "designer babies" and to generate one life in order to sustain another's.

Mr Patterson is annoyed by Dr Quatrain's hesitation. He even suggests that the \$30,000 fee should be paid by the health plan because Randy is a plan member and entitled to treatment to save her life.

What should be done? What ethical issues are raised by this case? ❖

Continued from previous page.

So what should Dr Quatrain decide in this situation? If, as a devout Catholic, he is opposed to the whole enterprise of PGD, then **the discussion need not go any further**. However, if he is willing to consider assisting with PGD for this purpose, he will need to think through the pros and cons more carefully. Beyond the harm of embryo destruction with PGD, the other potential harm with positive selections is to the children who would be created. Selection of children by parents for their purposes in life poses a threat to the child's autonomy as s/he grows to chart his/her own course in life. Selection for traits that normally would be beneficial could be seen as a curse by the child, as parents bear down to achieve their goals and to make their investment worthwhile. Uninhibited selection of children may threaten the very foundation of the parent-child relationship that must embody a strong element of unconditional love.

But note that this risk to the future child hinges on the parents' desire to use the child as the instrument for their goals. In this case, the Pattersons want to select a child, not for the qualities s/he would have as a person, but simply for his/her HLA matched cells. Once the cells were harvested from [the infant], any special expectations for him/her would cease. Certainly the child is being used for his/her cells; but, presumably, s/he would not be used only

for cells, but would become a loved and welcomed member of the family. The Pattersons' need for this help is compelling, and no harm to others is apparent (the discarded embryos aside).

So the deep problems inherent in the positive selection of children do not pertain to this case. PGD for the Pattersons looks like a win-win scenario—a new life is created and a threatened life can be saved. Would this selection place our society on a "slippery slope" to other kinds of unacceptable selections? Possibly, but only if we continue to use this powerful technology without a thorough analysis of its ethical justification and without a professional standard that clearly articulates a strong set of moral values.⁴ ❖

References

1. Lewis R. Preimplantation genetic diagnosis: the next big thing? *The Scientist* 2000; 14(22) 16.
2. Weiss R. Test-tube baby born to save ill sister. *Washington Post*, Oct 3, 2000, p A01.
3. Botkin JR. Ethical issues and practical problems in preimplantation genetic diagnosis. *Am J Law, Med and Ethics* 1998; 26:17-28.
4. Botkin J. Fetal privacy and confidentiality. *Hastings Center Report* 1995; 25(5): 32-40.