GENETIC AND REPRODUCTIVE TECHNOLOGIES IN THE LIGHT OF RELIGIOUS DIALOGUE

by Stephen M. Modell

Abstract.   Since the gene splicing debates of the 1980s, the public has been exposed to an ongoing sequence of genetic and reproductive technologies. Many issue areas have outcomes that lose track of people's inner values or engender opposing religious viewpoints defying final resolution. This essay relocates the discussion of what is an acceptable application from the individual to the societal level, examining technologies that stand to address large numbers of people and thus call for policy resolution, rather than individual fiat, in their application. A major source of guidance is the "Genetic Frontiers" series of professional dialogues and conferences held by the National Conference for Community and Justice from 2002 to 2004. Genetic testing, human gene therapy, genetic engineering of plants and animals, and stem cell technology are examined. While differences in perspective on the beginning of life persist, a stepwise approach to the examination of genetic testing reveals areas of general agreement. Stewardship of life, human co-creativity with the divine, and social justice help define the bounds of application of genetic engineering and therapy; compassionate care plays a major role in establishing stem cell policy. Active, sustained dialogue is a useful resource for enabling sharing of religious values and crystallization of policies.

Keywords: dialogue; ethics; gene therapy; genetic engineering; genetic testing; genetics; morals; policy; preimplantation diagnosis; prenatal diagnosis; religion; religion and medicine; reproduction; stem cells

Stephen M. Modell is a genomics research area specialist and Dissemination Activities Director in the Michigan Center for Genomics and Public Health, University of Michigan, 2675 CBPH, SPH-I Tower, 109 S. Observatory, Ann Arbor, MI 48109; e-mail mod@umich.edu.

EXPLORING GENETIC FRONTIERS

Profoundly life-shaping genetic technologies have arisen over the last three decades, with an acceleration in technologic development since the advent of the Human Genome Project and the first human gene therapy trials of the early 1990s. Discussion of the role bioethicists have played in enumerating the broader merits and drawbacks of these developments crops up with surprising frequency whenever interdisciplinary scholars gather to reflect on the human genome. It is clear that sometime in the late 1960s a division formed between secular and moral/religious ethicists and equally clear that a premium is now being placed on religious perspectives on genetic developments. Faith-based approaches often embrace traditional ethical principles such as beneficence and social justice, but they go one step further in using principles that apply to the natural course of human existence, with all its needs, emotions, and limitations, as well as the recorded log of principles emanating from God's interaction with humanity. Religious principles do not conform to the same types of validity tests as do empirical scientific studies and logical syllogisms but gain legitimacy through repeated application to life experience accumulated over many generations. This storehouse of wisdom is available to shed light on genetic research and its applications. New forms of genetic testing and reproductive technology arise in the blink of an eye, by historical standards, and stand to benefit from religious insight.

Debates about the use of stem cells and the application of techniques such as prenatal testing and cloning often reach loggerheads between the disagreeing parties. Interest groups—corporations, scientific organizations, and advocacy groups—enter the fray and attempt to resolve the issues through political persuasion. Worse yet, the technology is offered up to the open market, which decides its fate for mainstream use. When the market is resorted to, as it has been for the clinical delivery of reproductive services, often only individuals able to afford the expensive technologies have access. The demand from a limited clientele determines their use. Citizens who cannot afford the service, or who have alternative suggestions based on their faith-based preferences, get sidelined. This removal explains why input from multiple parties is needed. The perspectives to be shared are not just ethical in the strict academic sense but also are moral (based on customs and traditions) and religious.

In this essay I present religious perspectives on a range of genetic and reproductive (reprogenetic) technologies, from prenatal testing to the use of stem cells. The approach is eclectic, drawing examples and commentary from a variety of groups and literary sources. Chief among the sources are strands of thought developed over a three-year period (2002–2004) by participants taking part in "Genetic Frontiers: Challenges for Humanity and Our Religious Traditions," a program hosted in Detroit, Michigan, by the National Conference for Community and Justice (NCCJ). Following

examination from a religious perspective of four major categories of technology, I consider the merits of dialogue for resolving controversies of adoption and application, then seek common ground.

The funded program consisted of a nine-part professional dialogue series and three major conferences combining professional and lay members. The technologies reviewed here correspond to the array of topics that participants in the program discussed. Because genetic and reproductive technologies that can be afforded by the few often receive input only from the few and can be purchased despite vast areas of consumer disagreement, this essay emphasizes technologies that have a clear population relevance. Technologies that apply to the many are most likely to strike areas of agreement in their application. Prenatal genetic testing has now been used for more than three decades, and it launches our inquiry.

Prenatal Genetic Testing

The first set of ethical challenges for genetic medicine arises from genetic testing, which is aimed at the health of individuals. Many types of genetic testing are in use, including preconceptual testing, prenatal testing, adult carrier testing, and predispositional testing. Prenatal testing generally has produced the largest basket of moral challenges, because it can lead to a decision to abort the fetus after nine weeks of gestation. This is by no means the only possible decision for couples using prenatal testing services, however. Such testing can introduce certainty into a situation where couples are concerned about the fate of their at-risk fetus and would otherwise be inclined to abort if the results of prenatal testing were not available to them. Some religious bodies permit prenatal testing so long as the expected benefit to the fetus is greater than the foreseen risks (Roman Catholic Church), and if it is of benefit to both mother and child (Episcopal Church) (Anderson 2002, RCC-1, EC-1).

Starting in the early 1970s, Jewish bioethical literature began to contemplate—or, more appropriately, to argue—the pros and cons of abortion for Tay-Sachs disease from a theological point of view (Jacobs 1977, 79; Rosner 1976, 275). Talmudic scholars view the beginning of human life as taking place after forty days (at which point the fetus is no longer considered liquid), with full moral rights not acquired until the infant is actually born (Rosner 1991a, 136). The forty-day limit suggests why Orthodox Judaism has been against fetal termination, instead opting for alternative approaches such as preconceptual testing (Tendler 1990, 118). (The corresponding figure by Islamic authorities is one hundred twenty days (Al-Aqeel 2005, 1867).) Tay-Sachs disease is a pernicious condition leading to blindness, paralysis, and inexorable death by four years of age. It is exemplary among genetic diseases as a condition that demands attention, regardless of where one falls along the orthodoxy-liberalism spectrum.

Less hazardous genetic conditions pose more vexing moral challenges, because a lessened disease severity can allow a higher if not fully enjoyed quality of life, and the possibility of death is remote. Two conditions considered on several occasions throughout the NCCJ series, Down syndrome and congenital deafness, call for interventions with arguable levels of necessity. Amniocentesis—removal of amniotic fluid for prenatal testing—offers the possibility of testing for neural tube defects and Down syndrome. Bioethicists early on considered the ethical pluses and minuses of letting a child with a neural tube defect and a blocked or atretic intestinal tract perish on its own, rather than performing restorative surgery. The decision often followed a straightforward utilitarian calculus.

Down syndrome (extra chromosome 21) need not present with the hazards of neural tube defects, though. Indeed, Down syndrome is often a mosaic condition in which the individual inherits a fair share of unaffected cells in addition to those cells displaying the trisomy. Consequently, the child may end up quite suited for life and able to enjoy a high quality of existence, despite some level of mental impairment. The decisional focus, therefore, shifts from the moral rights of a fatally or severely affected future person to that of the sanctity of human life occupying a range of living functionality. The couple may choose to focus on the stresses they will bear by bringing a Down child into existence, but an ethos of compassion, so emphasized in all religions, East and West, may also serve as a guiding principle. They may choose not to abort but to prepare for the emergence of a child with Down syndrome. As one professional participant put it, "We are all born with the image of God in us. . . . God can turn weakness to strength. A Down syndrome child can bring much love into the family."

Congenital deafness offers the opposite situation. Deaf couples for the most part treasure their special identity and would hope to have a deaf child to live with them in the signing community. Many congenitally deaf couples resist the opportunity to have cochlear implants inserted into their progeny, because the ability to hear would effectively cut them off from the deaf community. Abortion of a future deaf child would not even enter their minds. Ironically, instances of deaf couples asking their physician to either grant them a deaf child or abort the fetus have been reported, though this type of request is not the norm. Bioethics literature points out that refusal to consider a cochlear implant and actively seeking to have a deaf child through prenatal means may foreclose the child's right to an opportunity-rich "open future" (Davis 1997, 12–14). Deliberately creating a child to fit the parents' image of "the good life" would seem to contradict the Kantian principle of treating each person as an end in him- or herself rather than a means to an end.

More transcendent principles would seem to apply when either deaf or non-deaf parents are considering abortion to achieve a certain preferential end. Conference and dialogue series participants often evoked the *imago*

dei (image of God) concept: Humans are created in the image of God, and God shows divine care for humankind. This principle points toward the irrevocable value of human life with natural limits or constraints set jointly by God and nature, each in their own wisdom. The innate value of human life further suggests the equality of human life, whether or not the life displays what may be considered a genetic condition. A deaf child for a deaf (or non-deaf) couple shares the same right to life as a non-deaf child for a non-deaf couple. Religious principles of compassion and the sanctity of human life can easily insinuate into any birth decision in which quality of life is at issue.

PREIMPLANTATION GENETIC DIAGNOSIS AND PRECONCEPTUAL GENETIC TESTING

The desire to avoid aborting a fetus with a genetic condition can lessen as the condition becomes more severe and incapacitating but also if the decision to abort comes earlier in gestation. Translated into the public sphere, this is the reason why the United States Congress passed the Partial Birth Abortion Act prohibiting abortion of the fetus with any part of its body surgically pulled outside the womb (a procedure that might be performed during the third trimester) while allowing the general act of abortion (usually relegated to the first two trimesters) to remain the decision of the mother (*Roe v. Wade*). Legality, of course, is different from morality, and many couples with religious convictions oppose the idea of abortion in any trimester.

Orthodox Jewish couples where both spouses carry a Tay-Sachs mutation may resort to an option that avoids fetal termination: preimplantation genetic diagnosis (PGD). This procedure involves screening the egg at the very early four- to eight-cell stage after fertilization in vitro. Faith traditions differ on the acceptability of in vitro techniques, which bypass the natural conjugal act between spouses but satisfy the biblical injunction to be fruitful and multiply. Many Jewish and Islamic theologians would say that the embryo at this early stage has elements of humanness but has not yet attained human identity. For many couples of these two faiths, PGD is a way to avoid giving birth to a child affected with a genetic condition that is not viewed as abortion (Al-Aqeel 2005, 1866; Broyde 2004, 65). On average, 45 percent of couples in the Arab world today practice marriage between blood relatives, so conditions such as spinal muscular atrophy and thalassemia, a disease family related to sickle cell disease, is of concern (Kershaw 2003, A3).

In Saudi society, the incidence of type-I diabetes is also on the rise. Investigators have proposed using PGD not only for severe single-gene conditions but also for chronic conditions such as hypercholesterolemia and diabetes, which involve multiple gene and gene-environment interactions yet still possess major gene loci. Others have described how PGD

could be used to eliminate late-onset single-gene conditions such as Huntington disease, a wasting condition like Parkinson's, in several generations. One notes a drift in the suggested applications away from couples facing having a child with a severe, possibly fatal, condition toward less dire circumstances. The contemplated applications either appear later in life or touch on future generations.

Throughout the three Genetic Frontiers conferences hosted by NCCJ, the speakers affirmed the duty to heal in the context of their own faiths. The family is part of the healing unit and inevitably is affected in numerous ways by the birth of a child with a severe genetic condition. PGD is certainly an option for families who may undergo appreciable future hardship as a result of such a birth and who can afford the technique. Fatima Agha Al-Hayani, an Islamic scholar, noted that the public interest is also at stake. Addressing chronic conditions that could affect a large proportion of the population may advance moral approval for this technique. Jewish bioethicists, however, have emphasized the value of restraint when considering innovative medical procedures and applications, so that more traditional and life-preserving approaches reserved for the future individual's adulthood might be viewed as taking precedence (Rosner 1991a, 190).

Rabbi Peter Knobel cited a duty to the generations, quoting Azriel Rosenfeld on the management of serious genetic defects: "Our sages recognize and perhaps even encourage the use of prenatal (or better preconceptual) influences to improve one's offspring" (Knobel 2004, 10). The question is how far the duty to the generations extends. A number of bioethicists and rabbinic authorities have argued that the focus in gene-selection techniques should be on the child and couple at hand and warn that consideration of effects on the gene pool could run in eugenic directions. Many participants in the Genetic Frontiers project voiced eugenic concerns, paralleling similar concerns present in the bulk of denominational genetics policy statements (UMC 1992, 6; WCC 1989, 11; NCCC 1986, 4). Knobel's comments were lodged in reference to genetic engineering of animals and humans. This line of thought was part of a larger discussion dealing with humanity's biblically appointed dominion over and stewardship of nature. Religion, therefore, can be viewed as delineating the lower and upper bounds of genetic technology applied to future generations. Attempts to alter the human gene pool, and perhaps even to move preimplantation techniques in the direction of trait selection, can be viewed as outside the boundary of the acceptable. Using genetic technology to feed current and future generations merits different considerations.

It also should be noted that Roman Catholicism views the embryo as having human identity and rights from the point of conception onward. "From the time that the ovum is fertilized, a new life is begun . . . the life of a new human being with its own growth" (Congregation for the Doctrine of the Faith 1987, 701). In vitro techniques other than intracyto-

plasmic sperm injection directly into the egg can involve considerable wasting of seed, transgressing religious prohibitions across several faiths. The concern also exists that in vitro techniques like PGD devalue the loving relationship at the heart of procreation and could lead to gradual societal acceptance of designing babies (International Catholic University 2004, 13). Roman Catholic policy statements do not sanction in vitro techniques, of which PGD is one. From this religious viewpoint, also shared by Jewish Orthodoxy, avoiding having children with severe genetic conditions must be accomplished through some other means. That means is preconceptual carrier testing to check whether both members of an at-risk couple carry a single gene copy for the same genetic condition. If they do, adoption is one option. However, in some cultures, this form of testing is also used premaritally to promote the exchange of genetic information between future spouses.

One factor that must be considered in the use of preconceptual testing in a religious or cultural context is whether it will have a bearing on the institution of marriage itself. Persons known to be carriers of Duchenne Muscular Dystrophy mutations have encountered increased difficulty in finding marriage partners (Atkin and Ahmad 1998, 455). Reports also exist of disrupted marital engagements in hemoglobinopathy screening programs in the Mediterranean (for example, Orchomenos, Greece) (Atkin and Ahmad 1998, 455; Wilfond and Fost 1990, 2781). Stigmatization can be an outcome of premarital genetic testing when the results are not handled with sensitivity.

In multiple health contexts (spread of communicable disease, distribution of novel therapies, family-planning services in health-care plans), persons of faith are challenged to simultaneously consider individual interests and those of the family, community, or society. In public health contact tracing—HIV, for instance—privacy may be breached to protect others from being infected. The Dor Yeshorim programs in Jerusalem and Brooklyn have been used to inform Ashkenazic Jewish couples of marriages that could lead to children with Tay-Sachs disease, Canavan neural degenerative disease, and other potential genetic conditions. The two factors can be skillfully blended with concern for the religious community. In Dor Yeshorim, partners are notified when risk exists, but neither individual learns exactly who carries a risk-conferring gene or whether they themselves have a single-gene copy for a genetic condition. Coded results and private communication of the information keep privacy at a maximum (Rosner 1991b, 252). The programs avoid stigmatization, at the same time allowing couples to make crucial decisions to prevent, through preconceptual means, having an affected child. Community screening programs can honor religious precepts regarding the sanctity of human life while granting couples a means of avoiding having children afflicted with a severe genetic condition.

HUMAN GENE THERAPY

In his inaugural keynote address for the Genetic Frontiers conferences, Philip Hefner touched on a technology that has pertinence for current and future generations: gene therapy. Hefner cited both somatic cell gene therapy and germ-line gene therapy. Somatic cell gene therapy, aimed at restoring bodily cells, has generally received approval by policymaking bodies in the various denominations because it so directly carries forward the ethos of healing (Nelson 1994, 180–82). Cautionary secular bioethics literature is rife with discussions on the issue of safety, especially concerning such sophisticated genetic technologies as gene therapy. Religious authorities have also shown appropriate concern for safety issues, particularly for experimental procedures and those that might affect the environment (Nelson 1994, 180–82; Phan, Doukas, and Fetters 1995, 242–43). Some human gene therapy trials attacking cancer immunologically and treating cardiovascular disease have shown efficacy with very little downside (Lyngstadaas 2002, 654, 663). Other trials in the news—the Jesse Gelsinger case resulting in the 18-year-old's death and the recent leukemia cases associated with X-linked severe combined immune deficiency (France)— merit the secular and religious authorities' cautions (Krimsky 2005, 10–11).

For the phenomenon of aging, to which no one is immune, religion would seem to suggest a wider approach. Scientists have tinkered with the possibility of chromosomal repair through telomerase gene therapy, but pharmaceutically induced caloric restriction that might alter the body's energy substrates through down-regulation of intranuclear signaling systems seems a more likely prospect for retarding aging (President's Council on Bioethics 2003, 4–6). Conference participants saw pluses and minuses to this ambition: It could allow time for mastery of one's job or, indeed, for several careers but could also societally deplete resources at the end of life. Theologians such as Abraham Joshua Heschel and others of faith have suggested not so much a staving off of the aging process as a renewal of the inner, creative fabric of the family and community and an opportunity for the individual to grow in the direction of greater personal meaning and involvement in what is most meaningful (Heschel [1959] 1972, 78, 82). These caveats do not obviate the value of attempts at life extension but shift the focus in an existentially deeper direction.

On the other end of life, germ-line gene therapy (GLGT) targeting adult reproductive cells, gametes, and/or early embryos poses overwhelming risks. Errors unintentionally introduced into the genome would be perpetuated into future generations. As Hefner stated, we must consider how "our interventions will affect future generations as yet unborn" (Hefner 2002a, 2). This consideration especially will nullify any attempt to introduce GLGT into the procession of human gene therapy trials in the foreseeable future.

Beyond safety issues, religious perspectives on genetic technologies stress social justice. Religious concern goes beyond the attention of secular ethics to fairness in one-to-one relationships. The focus is also on societal patterns in the distribution of benefits and burdens, particularly for the less well off (Chapman 2001, 134–35). This priority arises from the Judaeo-Christian precept that we are our brother's keeper. The argument often has been made that the federal government should not be pumping so much money into National Institutes of Health–sponsored human gene therapy trials when so many other disease approaches, including other genomic strategies, deserve support. This is quintessentially a scarce-resources argument. The industrial perspective is that more than 60 percent of gene therapy trials are sponsored by corporate sources. Nonetheless, corporate-sponsored gene therapy trials, like their publicly sponsored counterparts, can address the interests of only a few individuals at a time. Only four gene therapy products are currently undergoing Phase 3 investigation, checking for efficacy at the human level. It will be a long time before any situation remotely approaching social justice will be achieved in the gene therapy field. The social-justice perspective does not suggest halting gene therapy research but does temper the amount of social investment that should be placed in this type of approach.

Arguments concerning funding and distribution inequities leave untouched larger ontological arguments connected with human drives. The space program and linear accelerators are also inordinately expensive, yet this fact has not stopped progress in these areas. What is afoot? A main contention of Hefner's is that the development of genetic engineering and similar biotechnologic advancements is an integral part of human nature. "It would be very strange if issues [concerning their appropriateness] did not appear on the scene at this point in human history" (Hefner 2002a, 2). He asserts that the moral challenges posed by genetic engineering do not arise because people these days are "sinful or perverted in some way, but rather grow out of the givenness of our human situation today" (2002a, 2). It is likely that scientists will continue progress in gene therapy, which is one type of the broader category of genetic engineering.

GENETIC ENGINEERING OF PLANTS AND ANIMALS

Examples of plant and animal genetic engineering abound. In the animal category, genes have been inserted into pigs to increase musculature and leanness and make them immune compatible to humans for implantation purposes. Sheep have been engineered to secrete pharmaceuticals in their milk. Salmon have been transformed into giant versions of their native species. In the plant category, characteristics such as hardiness, resistance to drought, and protection from insect infestation have been genetically introduced. A gene for vitamin A production has been inserted into the

rice genome (which scientists have now fully mapped), yielding a new species called golden rice. Then there are the epidemiologic facts: 1.3 billion individuals throughout the world live in extreme poverty. Two-thirds of the world's population live in constant hunger and malnourishment. Given this level of need, the ambition to improve food, nutrient content, and pharmaceutical availability is laudable.

Genetic Frontiers participants identified two types of moral challenges in connection with genetic engineering—metaphysical and ethical. All genetic engineering induces some change of identity. When dealing with plants and animals, the genes introduced may be from another species, even from humans. Therefore, natural species barriers are being broken. This action requires hubris, as the full consequences of such actions cannot be foreseen. As professional dialogue series member Dr. Ernest Krug phrased it, "Only God can know the consequences." The bovine serum growth hormone being supplied to cattle, for example, has led to breast and prostate cancer in recipient livestock. Genetically modified corn is toxic to the monarch butterfly. A chaos theory saying is that the flap of a butterfly's wing in one location can cause a cyclone in another. The same could be said of the unanticipated consequences of genetic manipulations.

Deeper questions related to ownership also arise. Though domesticated animals, livestock, and hybrid plants are bred for human purposes, people tend to view them as being originally created by the divine and thus in a strong sense still owned by God. When genes from widely different species are commingled, who can say whether the taxonomy created is owned by God? Has a wide enough split been accomplished such that the species created no longer partakes in God's dominion and thus runs afoul of God's protection (or, scientifically speaking, the ecological processes that bring species relationships into restorative balance)? In the Bible (Masoretic text) we read, "And God said: Let us make man in our image, after our likeness; and let them have dominion over the fish of the sea, and over the fowl of the air . . . and over all the earth" (Genesis 1:26). In the next chapter, however, "And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it" (2:15). These two versions of humankind's creation in God's image lead to different interpretations of the human relationship with nature. In the first, humanity was created to dominate nature. In the second, humanity is given stewardship over or responsibility for nature. This is the image of the suffering servant, Jesus Christ, endowed by God to embody divine purposes and presence in the world. The two interpretations place the human being as "created co-creator" in a position of inherent tension (Knobel 2004, 3). According to Hefner, the real challenge lies not so much in how we decide to best handle nature but in how we adjust to a tension that is part of the essential makeup of every human being. In fact, Hefner believes we are at the dawn of a human species transformation in which the biologic and electronic changes we are

introducing are becoming an integral part of the human constitution. We are becoming "technosapiens" (Hefner 2003, 73; 2002b, 663). If he is correct, genetic engineering is a predictable accoutrement of human evolution.

The adjustment to living with our co-creatorship with God entails social responsibilities that ideally would be addressed concurrently with the introduction of new biotechnologic procedures. Workshop speakers in the second Genetic Frontiers conference, "Genetics: Feast and Famine," voiced concern that the distribution of genetically modified foods to third-world countries is not being done in a socially responsible manner. Terminator seed ostensibly was created to avoid the possibility of cross-pollination with native plant species. However, a seed that does not reproduce also places users in a position of dependency to purchase more seed, most likely from the same source, for the next planting. And with regard to golden rice, estimates are that one would need to consume fifteen pounds per day to prevent blindness. Critics argue that use of these bioengineered products could further impoverish farmers in the third world.

According to a Jewish principle, society is judged by how it treats its weakest members. In Roman Catholicism and other faiths, the dignity of human life exists at every life stage and is to be respected, cherished, and promoted in the weak and poor. Respect for human dignity would play out into policies touching on co-ownership in the fruits of bioengineering and trust-building actions based on the concerns of recipient populations. The religious conclusion regarding genetically engineered plants and animals is that such manipulations may be morally justifiable but that a sizable degree of scientific caution and social conscience needs to be employed in harnessing this technology. If a religiously informed global perspective is adopted, large numbers of people stand to benefit.

STEM CELL TECHNOLOGY

Stem cells are pluripotent cells capable of self-renewal and differentiation into a vast array of cell types. Genetic engineering and stem cell technology represent geometrically inverse approaches to the conquering of disease. Genetic engineering changes the genetic material residing in the nucleus of cells. Stem cells are used to replace defective or degenerated cells with fresh cells from the outside. Human embryonic stem cell research poses safety issues analogous to those of human gene therapy research. Deeper theological issues also plague the use of human embryonic stem cells. These cells may be derived from the germinal cells of aborted fetuses or from discarded fertilized eggs donated by couples undergoing in vitro fertilization. Derivation of stem cells using the second technique entails destruction of the developing embryo. Death of the fetus or of the embryo is the outcome in either case. Religious groups such as the National Conference of Catholic Bishops have declared that the generation

and use of human embryonic stem cells is morally wrong because the isolation of the stem cells inevitably involves the death of a developing human being (USCCB 2004, 6). From this perspective, downstream use of stem cells wraps the user in a state of complicit guilt, because the only way the stem cells could be used is at the earlier expense of an embryo or fetus (Doerflinger 1999, 141).

The use of somatic cell nuclear transfer, or cloning, to generate stem cells fares no better, because many clones would be required to yield a few viable stem cells. Further, stem cell lines can be perpetuated over a multitude of generations, but clones must be newly created, making them an option acceptable to and affordable by few (USCCB 2004, 8). Arguments and counterarguments have been posed regarding the suitability of another alternative, adult stem cells, for use in tissue replacement. These arguments not being resolved, a strong need still exists for consensus building over the use of embryonic stem cells.

The duty to heal has been alluded to as a primary moral obligation throughout the major Western religions. A Lutheran congregant may view the healing imperative as being most important at the level of the individual patient or sufferer. A Jewish congregant may stipulate that the imperative should be applied to the health of members of the community. Stem cells fit the bill from either perspective. They can be applied to individuals, and even derived from the individual who will ultimately benefit. Their development and use is not as expensive as that of somatic cell gene therapy. Therefore, stem cell technology stands a greater chance of being used on a society-wide basis than does gene therapy. For many, the moral justification for human embryonic stem cell use rests on the immense individual and societal benefit it potentially offers. More than utilitarian reasoning underlies the proponents' arguments, however, because many of the diseases that could be treated involve considerable suffering or have dehumanizing aspects. The element of compassion by itself could be (and in a sense already has been in the existent state and federal policies) part of the driving force that overcomes the impasse left by the beginning of life point-counterpoint.

Consternation over the use of cloning displayed by NCCJ conference speakers was less evident when they referred to human embryonic stem cell use. A comment during the second conference on "Manipulating Life" by Al-Hayani, that stem cells can "enhance health and replace limbs," represented the material perspective. Hefner voiced the existential perspective: "The primary question is not the preservation of the stem cells or blastocyst [four- to six-day-old embryo], but how to transform it for God's purpose? This moves away from self interest to God's purposes." Scientifically and philosophically, isolated stem cells are several divisions removed from the capacity of the fertilized egg to develop into a human being. On the other hand, cloning could be used to generate another human being in

its (human) maker's image, with all of the religious questions about sanctity and individuality of human life attending such a procedure. Overall, a case can be made that the weight of argument lies in favor of considerations such as societal benefit and human compassion, which have both secular and religious footing. Like genetic engineering, dialogue in the general religious context tends to take a cautious yet favorable stance when so many individuals may benefit. A positive stance is qualified, however, by the specifics of how such a resource would be generated and applied and how the range of viewpoints would be practically melded into policy.

THE PLACE OF RELIGIOUS DIALOGUE IN THE PUBLIC DOMAIN

With each of the technologies considered, religion has served as a prime contributor to discussion of whether and in what context a given application should occur. It serves as a "qualitative" check to the contention that just because a technology is possible it should be launched into use (Congregation for the Doctrine of the Faith 1987, 700). The qualitative role implies that religious principles and beliefs are capable of imposing more than just an absolutist stamp on action. They can suggest alternatives based on the type of application envisioned and the circumstances involved. The argument has been made that pressing the time of prenatal genetic diagnosis earlier, from nine weeks back to the early multicellular stage following conception or even further back to preconceptual determination, is one way to accommodate religious doctrines on decisions to be made for future children who will suffer from serious genetic conditions. Consideration of circumstances, such as whether the life of the mother is seriously imperiled by a pregnancy, can help to bring together opinion from different faiths.

Decisions about societal or group use of genetic technology are rarely simply objective. Authors from diverse fields have remarked on the need to balance scientifically based decisions with humanistic and spiritual perspectives. In the health-policy domain, Julius Richmond and Milton Kotelchuck have presented a tripartite model of prevention policy (in Atwood, Colditz, and Kawachi 1997, 1604). For sound health policies to get made, three factors—a scientific knowledge base, adequate political will, and a suitably organized social strategy—must come together. In a similar vein, Roger Shinn has proposed a triangular model of science policymaking with three corners: science (verifiable knowledge), politics (implementation of public policy), and values (Shinn 1996, 71). Values, he notes, embody personal and group interests. However, they also may transcend narrow interests and extend people's horizons. This consideration is especially important in the genetics field, where policy more often than not is set by experts from the scientific-professional community and both commercial and advocacy interests. The third leg of policymaking often is missing.

Conventional ethics can move toward supplying the final balance and, indeed, has become a cottage industry in the biomedical field, but often it is constrained by a principlist orientation or argumentation between principlism (autonomy, privacy, and so on) and other countertheories, such as deontology. The public often bases value judgments on a broader set of criteria. Thus, a Kantian ethical approach stressing the noninstrumentality of the individual—that people are ends in themselves and not means to an end—still lacks the insight of Catholic personalism that individuals' lives are to be cherished because they integrally are persons in body, mind, and spirit (Dailey and Leonard 2004, 2). In a much-cited paper, James Gustafson has parsed the different types of values-oriented discourse into four varieties: ethical, prophetic, narrative, and policy discourse (1990, 127). The tendency in the literature is to assign the religious voice to prophetic discourse—for example, to the enunciation that activities like genetic engineering of plants and animals are "playing God" (Evans 2001, 58). However, it is closer to the truth that religious text issues principles that can also be used in moral (as opposed to strictly secular ethical) arguments, covers instances of human dilemma captured in medical literary narrative, and, as used by a variety of denominations and umbrella religious organizations, can lead to policy recommendations at various formative levels. Religious doctrine is an extremely versatile tool for shedding light on bioethical, especially genetic, dilemmas, provided care is taken to configure its language in a manner understood and appreciated by the other parties in the conversation (Evans 2001, 64; Campbell 1999, 27).

Religious argument may be most complete when fashioned in exact alignment on the written page, but it is most persuasive, legitimate, and sincere when engaging opposing viewpoints in real time. Recent theological dippings into the policy realm emphasize the importance of all participants in a representative democracy, be they of the majority or the minority, being able to express their religious views (Thiemann 1996, 21) and taking the opportunity to voice their views alongside others in a communal setting. Because of religious freedom, clerics of many persuasions were able to voice through collective signatures their initial opposition to patenting life forms for genetic engineering (Andrews 1995, A1) and later were able to publicly express differing viewpoints on the tenacity of their opposition depending on whether they had adopted vitalist or theistic viewpoints (all life sacred versus God as sacred, life as derivative). In our series the conversation drifted from initial quandary during the second professional dialogue session about how human beings could possibly patent life ("Isn't ownership of life the domain of God?") to a more conclusive discussion in the third symposium of what it means to act in the image of God under these circumstances for members of Islamic, Jewish, and Protestant faiths. In each of the above instances, one sees earnest dialogue taking place between rep-

resentatives of various faiths and partaking members of the public (listening policymakers, the media, genetics conference participants).

The break point in the shaping of religious dialogue is the question of what role it should perform in society. As the professional dialogue series gained momentum, its clerical moderator drew a distinction for the group between descriptive theology and prescriptive ideology. Dietrich Bonhoeffer viewed the state ("the domain of politics") as an ideological organ but thought that the church should avoid ideology and remain descriptive in its interpretation of doctrine (Bonhoeffer [1949] 2005, 50, 244). The group distinguished three levels of possible religious involvement: (1) discernment of ultimate principles, such as the sanctity of human life, the image of God, and respect for human dignity; (2) elaboration of what is right or wrong in human actions; and (3) involvement in the body politic. Members thought it perfectly appropriate to discuss underlying principles, but disagreement existed on whether religion should voice for society what is morally acceptable. Legislation was viewed as more a state than a church activity. Constitutional democracy places a premium on religious pluralism, which is a major reason for the reluctance of some members to move into a moral advocacy role (Thiemann 1996, 21). Nevertheless, a respectful attitude toward religious pluralism need not lead to an absolute position of normlessness or a paralysis in terms of judging morality for more than just the self (Stackhouse 1987, 162). Indeed, we found that the technologies under discussion have a tendency to evoke strong feelings of necessity or repugnance based on a person's religious values. Once the issues (and emotions) are on the table, dialogue containing descriptive and prescriptive elements can hardly be resisted.

Daniel Yankelovich, author of *The Magic of Dialogue*, defines dialogue as a process of successful relationship building (Yankelovich 1999, 15). Characteristically it is sustained—ideally over a year—and involves an exchange of values. What shape should a religiously tolerant form of public dialogue take? A variety of faith-tradition sources have distinguished elements for effective dialogue between people or groups of different religious persuasions as well as between religious parties, industry, and the scientific community (Hanson 2001, 103; Willer 2000, 59; Marty, Guinn, and Greenfield 1998). Common to these guidelines is the need to identify the authentic religious dimensions, or contributions, within the dialogue; need to avoid overreaction and absolutist stances; translations that make communication clear and understandable to the other parties involved; and explicit enunciation of values in expressions of concern or approval by religious groups (Hanson 2001, 104–6; Marty, Guinn, and Greenfield 1998, 18–20). Especially prominent in these writings is the tenet that the religious voice can contribute to policy dialogues on genetic technology.

Given that religion has a place in shaping genetic policy, two eventualities can materialize: consensus or disagreement. Consensus certainly is

welcome, but disagreement is not the end of the line. Amy Gutmann and Dennis Thompson contend that one purpose of dialogue (what they call deliberation) is to promote mutually respectful decision making when incompatible moral values exist: "Through a deliberative process, participants can isolate those conflicts, such as abortion, that embody genuinely incompatible values on both sides. Conflicts that do not involve such deep disagreement can then be [more] easily addressed" (Gutmann and Thompson 1997, 40). Ronald Thiemann writes in his *Religion in Public Life*, "By acknowledging the moral force of an argument with which one disagrees, a citizen remains open to the persuasive power of an alternative point of view" (1996, 136). The deliberative framework very much fits the ongoing and iterative nature of the multiple discussions held between professionals, religious figures, and public members in our dialogue series and symposia over a three-year period. There were some areas, such as the beginning of human life and the measure of rights to be accorded an early embryo, in which we ultimately decided to agree to disagree. We moved through technologies of greater and lesser degrees of values opposition and found commonalities in the mutually agreed-upon stewardship of humanity alongside nature, a conservative approach to prenatal testing, and a culturally respectful use of genetic interventions.

Gutmann and Thompson propose "an economy of moral disagreement" when it comes to incompatible values, as has occurred in the abortion and stem cell debates (Lustig 2002, 42). "In justifying policies on moral grounds, citizens should seek the rationale that minimizes rejection of the position they oppose" (Gutmann and Thompson 1997, 40). The principle of minimal opposition is in keeping with the intent of this essay. Middle zones exist in the moral application of genetic and reproductive technologies, where opposing parties may not have it entirely their way but the sting of compromise will be reduced (Marty, Guinn, and Greenfield 1998, 25). The motivation for seeking this ground is the reduction of human suffering, the enlargement of human compassion, and the expansion of benefit in as wide a circle as possible.

AREAS OF CONVERGENCE IN GENETIC POLICY

The one generalization that can accurately be made regarding genetic and reproductive technologies is that no final word exists on the policy decisions that could be formulated.

It is likely that techniques that will remain unaffordable or unavailable to the wider public for the near future, such as sperm-cell sorting, cytoplasmic and nuclear transfer, and cloning, will defy resolution on their range of application and permissibility of use.

The techniques discussed herein have undergone considerable discussion in the public eye and in professional circles. The Genetic Frontiers

series nicely captured the drift of discussion that has taken place and, because of the talent involved, added a seasoned perspective on the technologies and policies worth considering.

Prenatal genetic testing and fetal termination cannot be agreed on by people of all faiths and levels of conservatism or liberality. However, prenatal testing can be used to plan for a child, and other options, such as preimplantation genetic diagnosis and preconceptual genetic testing, may receive wider approval. It is likely that gene therapy will never be widely available and that its extension to the management of chronic disease and aging will be superseded by more conventional regimens. Debates regarding plant and animal genetic engineering to feed the millions are often energetic. For some technologies, such as genetic engineering of foods, religion serves as a regulatory device, suggesting what sorts of moral and social considerations need to be addressed before a technology is widely used. Through active dialogue, people's religious values can be weighed in a balanced fashion and may lead to conclusion on techniques such as use of human embryonic stem cells.

Different levels of communication can take place in the search for solutions on how genetic technologies should be applied. When communication between parties is heated and emotionally driven, it lapses into debate, which can be divisive. In contrast to debates, the reasoned discussion that takes place at many professional conferences and in open public forums can spread awareness of the issues and produce suggestions for further discussion. If the discussion takes place over a period of time so that issues and alternatives can be worked through, and if people's underlying moral values are given a chance for expression, the process of dialogue takes place.

CONCLUSION

The nine-part professional and three-part public conference series conducted by the Genetic Frontiers program is an example of religious dialogue in its trial stages. The process needs to be ongoing. As often happens with essays of this kind, readers may assume that the printed conclusions represent final resolution of an issue. This is not the case. The conclusions here represent the attempt to gather several persons' thoughts into a coherent whole to offer guidelines for future thought. Working premises can later be strengthened or washed away. Not that religious dialogue on scientific topics is meant to lead to consensus, but it may start a process that can lead to areas of satisfactory, if temporary, agreement while instilling mutual respect for others' opinions where agreement cannot be achieved. In the beginning stages, participants in dialogue find a common language that allows the communication to continue.

Religious dialogue can be used to get around the polarities of interest groups and pressure politics. The applications of religious thought in the

present millennium have evolved considerably beyond the casting of simple prohibitions. They can serve as a regulatory device in the setting of genetic and reproductive policy. Religious dialogue incorporates the principles of ethics and moves onward from there. At a certain point, after a critical mass of religious thought is brought into the open and collectively agreed on, humane approaches toward the use of genetic and reproductive technologies surface.

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