

Genetic and Reproductive Technologies in the Light of Religious Dialogue

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Abstract

Objectives: This paper identifies areas of controversy in the application of genetic and reproductive technologies (from genetic testing to stem cells) having relevance to the health of communities and populations. Dilemmas arising from their application call for resolution based on a broader set of principles than secular principlism can offer. Six categories of genetic and reproductive technology from the “Genetic Frontiers” series in Detroit will be presented, showing how religious considerations offer more satisfactory solutions. Elements of group discussion and dialogue are defined.

Background: Since the gene splicing debates of the 1980s, the public has been exposed to an ongoing sequence of genetic and reproductive technologies. Final policy compromises often lose track of people’s inner values. Discussion of genetically modified foods and stem cell research, for example, has been reduced to issues of labeling and safety. These resolutions seem unsatisfying to consumers and professionals who feel that significant moral concerns have been lost. Yet, many genetic and reproductive areas, such as prenatal testing and cloning, have outcomes that engender opposing religious viewpoints defying final resolution. This paper relocates the discussion of what is an acceptable application from the individual to the societal level, examining those technologies that stand to benefit large numbers of people, thus call for policy resolution, rather than individual fiat, in their application.

Methods: Since April 2002, the Detroit regional branch of the National Conference for Community and Justice (NCCJ), with the support of Metanexus and local religious organizations and universities, has sponsored a 3-part conference and ongoing professional discussion series – “Genetic Frontiers: Challenges for Humanity and our Religious Traditions”. The range of topics covered – from the Human Genome Project to genetically modified foods to genetically engineered humanity – has been as broad as the attendance, including consumers of diverse racial-ethnic and religious background, and professionals from different fields. Emphasis has been on what Iris Marion Young calls “communicative democracy”.

Results: The series has yielded two baskets of concerns: A. interventions having a broad public health relevance: standard genetic testing, preimplantation genetic diagnosis, gene variation research, food bioengineering, and life extension / aging modification, including stem cell research; B. voiced religious principles: the sanctity of divine creation, humanity’s creation in the image of God, human co-creativity with the divine, caring compassion, the principle of solidarity, social justice and equity, stewardship and respect for life, and responsibility to heal. These principles suggest policies that are more inclusive of people’s diverse moral values than standard ethical frameworks. The bounds of technologic use become more sharply defined and amenable to the search for common ground.

Conclusions: Focus on genetic and reproductive technologies having potential collective benefit motivates discussion participants to find common moral ground on how they should be employed. Novel alternatives appear when participants are enabled to explore beyond standard ethical principles. Group discussion can be dialogue-oriented to allow a broader range of expression.

Biography

Dr. Stephen Modell is the Director of Research - Genetics Policy, in the Department of Health Management and Policy, University of Michigan School of Public Health. He has been an ongoing participant in the Metanexus-supported Detroit area "Genetic Frontiers" religion and genetics series, hosted by the National Conference for Community and Justice. Dr. Modell has embraced religious and metaphysical perspectives in various writings on genetics, aging, and systems theory he has published in Zygon, Ultimate Reality and Meaning, and the Union of American Hebrew Congregations Bio-Ethics Program guide series. He is current acting President of the International Society for the Study of Human Ideas on Ultimate Reality and Meaning.

Dr. Modell is active on two federally funded projects: a Haplotype Mapping / Public Engagement project being co-managed by the University of Michigan and conducted by the Genetic Alliance (National Institutes of Health-funded), and the Michigan Center for Genomics and Public Health (Centers for Disease Control-funded). He co-teaches the "Issues in Public Health Genetics" course at the University of Michigan. This course looks at genetics from multiple perspectives, among them theological, and motivates students to seek policy solutions for the issues they are examining.

Introduction

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, but 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 go one step further in utilizing 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 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, assisted reproductive technologies, and rerogenetic techniques arise in the blink of an eye by historical standards, and stand to benefit from religious insight.

Debates about the use and application of techniques such as prenatal testing, stem cells, 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 those individuals able to afford the expensive technologies will have access. The demand from a limited clientele determines their use. Citizens who cannot afford the service, or who have alternative suggestions regarding range of application, 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 are also moral (based on customs and traditions) and religious.

This paper presents religious perspectives on a range of genetic and reproductive technologies, from prenatal testing to stem cells. The approach taken is eclectic, drawing examples and commentary from a variety of sources. Chief among the sources are strands of thought developed over the last three years by participants taking part in the “Genetic Frontiers: Challenges for Humanity and our Religious Traditions” program hosted in Detroit, Michigan by the National Conference for Community and Justice (NCCJ) with major support from the Metanexus Institute and other organizations. The program consists of a nine-part professional dialogue series and three major conferences combining professional and lay members. The technologies reviewed below correspond to the array of topics discussed by participants in the program. Because genetic and reproductive technologies that can only be afforded by the few often only receive input from the few, and can be purchased despite vast areas of consumer disagreement, this paper will emphasize those technologies which have a clear population relevance. Technologies which 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 will launch 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 now in use, including preconceptional testing, prenatal testing, adult carrier testing, and predispositional testing. Prenatal testing has generally produced the largest basket of moral challenges, since it can lead to abortion of the fetus after 9 weeks of gestation. This fate is by no means the only possible decision for couples utilizing prenatal testing services, however. Prenatal testing can introduce certainty into a situation where couples are concerned with 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. Many lives of future persons have actually been saved by the information gained through prenatal testing.

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. Talmudic scholars view the beginning of human life as taking place after 40 days (at which point the fetus is no longer considered liquid), with full moral rights not acquired until the infant is actually born. The 40-day limit suggests why Orthodox Judaism has been against fetal termination, instead opting for alternative approaches such as preconceptional (before conception) testing. Tay-Sachs disease is a pernicious condition leading to blindness, paralysis, and inexorable death by 4 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 can pose even greater moral challenges, since 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 “Genetic Frontiers” series, Down syndrome and congenital deafness, call for arguable interventions. Cystic fibrosis, a disease that plugs the lungs and intestines, can currently be treated effectively, allowing patients to live into their forties. Couples at risk for having a child with either Down syndrome or cystic fibrosis face similar decisions when presented with the option of prenatal genetic testing.

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. Indeed, Down syndrome is often a mosaic condition where 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 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.

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 side-by-side with them in the signing community. Many congenitally deaf couples resist the opportunity to have cochlear implants inserted into their progeny, since 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. These preferences dramatize more than simply the issue of the morality, or lack of morality, of abortion. For couples placing a premium on this style of life, they point towards the value of human life with natural, acceptable limits set by nature or by God, 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 might be considered a genetic condition. A deaf child for a 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 where quality of life is at issue.

Preimplantation Genetic Diagnosis and Preconceptual Genetic Testing

The desire to avoid abortion in a child with a genetic condition can lessen as the condition becomes more severe, but also as the opportunity to abort drifts earlier in

gestation. This is the reason why Congress has passed the Partial Birth Abortion Act prohibiting abortion of the fetus with any part of its body visible outside the womb (performed with dilation and curettage, usually during the third trimester), while allowing the general act of abortion to remain the decision of the mother (Roe v. Wade). Legality, of course, is different from morality, thus many couples with religious convictions remonstrate the idea of abortion at any trimester. However, most couples are not faced with having to contemplate aborting a severely or fatally ill future child at the same time that they wish to uphold their religious convictions.

Orthodox Jewish couples where the woman is already pregnant with a Tay-Sachs child have discovered a new option that some would view as avoiding abortion – preimplantation genetic diagnosis (PGD). This procedure involves screening the egg at the very early 4- to 8-cell stage after fertilization in the petri dish (in vitro fertilization). Many Jewish and Islamic theologians would say the early embryo at this stage has elements of humanness, but has not yet attained human identity. For many couples of these two major faiths, PGD represents a way of avoiding giving birth to a child affected with a genetic condition by a means that could be viewed as avoiding abortion. On average, 45% of couples in the Arab world today practice marriage between blood relatives, so that conditions like spinal muscular atrophy and thalassemia, a disease family related to sickle cell disease, can be of concern.

In Saudi society, the incidence of type-I diabetes is also on the rise. Sets of investigators have proposed utilizing 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, therefore, notes a drift in the suggested applications away from couples facing a child with a severe, possibly fatal condition, towards less dire circumstances. The contemplated applications either appear later in life, or touch on future generations.

Throughout the three "Genetic Frontiers" conferences hosted by the National Conference for Community and Justice, the speakers affirmed the duty to heal in the context of their own faiths. The family is part of the healing unit, and is inevitably affected in numerous ways by the birth of a child with a severe genetic condition. PGD is certainly an option for families which may undergo appreciable future hardship as a result of a birth, and who can afford the technique. Dr. Al-Hayani, an Islamic scholar, noted that the public interest is also at stake. Addressing chronic conditions which could affect a large proportion of the population might also receive moral approval for this technique. However, Jewish bioethicists have stressed the value of alternative techniques when considering innovative medical procedures and applications, so that more traditional approaches reserved for the future individual's adulthood might be viewed as taking precedence.

In addition, Rabbi Peter Knobel cited a duty to the generations. The real question is how far the duty to the generations extends. Some bioethicists 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 as a whole voiced eugenic concerns, paralleling similar concerns present in the bulk of denominational genetics policy

statements. Rabbi Knobel's comment was launched in reference to genetic engineering of animals. The argument 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, which will be taken up shortly.

It should also be noted that Roman Catholicism views the embryo as having human identity and rights from the point of conception onwards. In vitro techniques other than intracytoplasmic sperm injection directly into the egg can involve considerable wasting of seed, transgressing another religious prohibition. Roman Catholic policy statements do not sanction in vitro techniques, of which PGD is one. From this religious viewpoint, also shared with Jewish religious Orthodoxy, avoidance of 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 several cultures, this form of testing is also used premaritally to suggest whether the partners might reconsider marriage. Screening programs to detect the gene for beta-thalassemia, which can result in death by adulthood and requires regular transfusions, take place on a widespread scale in several Mediterranean countries. Couples in which both partners have a gene copy for the same condition can reconsider marriage. Though many couples proceed with marriage, and ultimately face the array of

birth options discussed so far, there have been reports emerging from Sardinia and Cyprus of social ostracism for partners refusing to break off marriage. Stigmatization is a negative consequence of such programs.

In contrast, the Dor Yeshorim programs in Jerusalem and Brooklyn, New York have been used to inform Ashkenazic Jewish couples of marriages that could lead to children with Tay-Sachs disease, Canavan neural degenerative disease, and a variety of other potential genetic conditions. NCCJ program members have spoken of the need to balance the right to individual privacy against the welfare of society. In public health contact tracing, HIV, for instance, privacy may be breached to protect others from being infected. The two factors are skillfully blended in the Dor Yeshorim programs. 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 above information keep privacy at a maximum. The programs avoid the possibility of stigmatization, at the same time allowing couples to make crucial decisions to avoid the birth of an affected child through preconceptual means. 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 NCCJ “Genetic Frontiers” conference series, Philip Hefner touched on a technology that has pertinence for current and future generations – gene therapy. Dr. 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. Cautionary secular bioethics literature is ripe with discussions on the issue of safety, especially concerning sophisticated genetic technologies like gene therapy. Religious authorities have also shown appropriate concern for safety issues, particularly for experimental procedures and those which might have an effect on the environment. Some human gene therapy trials attacking cancer immunologically and lowering malignant levels of blood lipoproteins in familial hypercholesterolemia have shown efficacy with very little down side. Other recent 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 trials in France, merit the secular and religious authorities’ cautions. 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, and pharmaceutically induced caloric restriction that might alter the body’s energy substrates thus regulate the process of aging. Theologians like Abraham Joshua Heschel and many others have suggested not so much a staving of the aging process, however, but a renewal with the fabric of the community and an opportunity for the individual to grow in the direction of greater personal meaning and involvement. 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 will be perpetuated into future generations. As Dr. Hefner stated, we must consider how “our interventions will affect future generations as yet unborn”. 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. This priority arises from the Judeo-Christian precept that we are our brother’s keeper. The argument has often 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 attention. This is quintessentially a “scarce resources” argument. However, the fact is that more than 60% of gene therapy trials are sponsored by corporate sources. The counter-argument, however, is that corporate-sponsored gene therapy trials, like their publicly-sponsored counterparts, can only address the interests of a few individuals at a time. Only 4 gene therapy products are currently undergoing Phase III investigation to check for efficacy in different population subgroups. 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.

The funding and distribution inequity leaves untouched, however, 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? One of Philip Hefner's main contentions 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 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 [they] grow out of the givenness of our human situation today." It is likely that scientists will continue progress in gene therapy, which is one type of the more broad category "genetic engineering".

Genetic Engineering of Plants and Animals

Many examples of plant and animal genetic engineering abound. In the animal category, genes have been inserted into pigs to increase musculature and leanness, and grant them immune compatibility 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 draught, 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". In addition there are the epidemiologic facts. 1.3 billion individuals throughout the world live in extreme poverty. Two-thirds of the world's population lives in constant hunger and malnourishment. Given these and similar facts, the ambition to improve food, vitamin, and pharmaceutical availability is laudable.

“Genetic Frontiers” participants identified two types of moral challenges in connection with genetic engineerings – one metaphysical; the other 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 takes a bit of hubris, as the full consequences of such actions cannot be foreseen. As one participant 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 has been found toxic to the monarch butterfly. In classic Taoist thought, the flap of a wing in one location can cause a thunderstorm in an entirely remote locale. The same could be said of the unanticipated consequences deriving from genetic manipulations.

Deeper questions related to ownership also arise. Though bred for human purposes, people tend to view domesticated animals and livestock, and hybrid plants as being originally created by the divine, thus in a strong sense, still owned by God. When genes from other widely different species are co-mingled, 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, thus runs afoul of God’s protection (or scientifically speaking, the ecological processes which bring species relationships into restorative balance)? Religious thought is not uniform on this matter. Genesis 1 states: “And God said, let us make humankind in our image, after our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, . . . , and over all the earth.” Genesis 2 reads, however, “The Lord God took the man and placed

him in the garden of Eden, to till it and tend it.” 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 the Lord’s purposes and presence in the world. The two interpretations place the human being as “created co-creator” in a position of inherent tension. According to Hefner, the real challenge does not lie so much in how we decide to best handle nature, but in how we adjust to a tension which 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 “techno sapiens”. If Dr. Hefner is right, then genetic engineering is a predictable accoutrement of human evolution.

The adjustment to living with our co-creatorship with God entails social responsibilities which ideally would be addressed concurrently with the introduction of new biotechnologic procedures. Concern exists that the distribution of genetically modified foods to third world countries is not being done in the most socially responsible manner, though. Terminator seed ostensibly was created to avoid the possibility of cross-pollination with native plant species. However, a seed which is not reproducible also places users in a position of dependency to purchase more seed, most likely from the same source, in the next planting. In regards “golden rice,” estimates are that it would take 15 pounds of consumption per day to prevent blindness. Critics argue that use of these bioengineered products could further impoverish farmers in the third world.

According to one Jewish principle, society is judged by how it treats its weakest members. In addition, the dignity of human life exists at every life stage. That dignity is to be respected, cherished, and promoted in the weak and poor. Respect for human dignity would then play out into various 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 so employed, 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 different 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, on the other hand, are used to replace defective or degenerated cells with fresh cells from the outside. Human embryonic stem cell research poses its own set of 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 undertaking 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 bodies such as the National Conference of Catholic Bishops have declared that

the generation and use of human embryonic stem cells is morally wrong since the isolation of the stem cells inevitably involves the perishing of a developing human being. From this perspective, downstream use of stem cells wraps the user in a state of “complicit guilt”, since the only way the stem cells could be used is at the earlier expense of an embryo or fetus.

The use of somatic cell nuclear transfer (cloning) to generate stem cells fares no better, since 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 expensive proposition affordable by few. Arguments and counter-arguments 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 already been alluded to as a primary moral obligation throughout the major Western religions. A Lutheran congregant might view the healing imperative as being most important at the level of the individual patient or sufferer. A Jewish congregant might stipulate that the imperative should be applied to the health of members of the community. Stem cells, so to speak, 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 they potentially offer. More than utilitarian reasoning underlies the proponents’ arguments,

however, since many of the diseases that could be treated involve considerable suffering or have dehumanizing aspects. Compassion, whether resting on religious or humanitarian bedrock, is also part of the driving force that overcomes the impasse left by the beginning of life point-counterpoint.

The wide gulf on the use of cloning separating NCCJ conference speakers was not visible when the speakers referred to human embryonic stem cell use. Isolated stem cells are several divisions removed from the capacity of the fertilized egg to develop into a full human being. On the other hand, cloning could be used to generate another human being in its (human) maker's image, with all the religious questions about sanctity and individuality of human life attending such a procedure. Overall, the weight of argument lies in favor of considerations such as societal benefit and human compassion, which have both a secular and religious footing. Like genetic engineering, religious dialogue tends to take a cautious yet favorable stance when so many human lives can be benefited. A positive stance is qualified, however, by the specifics of how such a resource would be applied and managed, and how the range of viewpoints would practically be incorporated into policy.

Conclusion

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 which 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 liberalness. However, prenatal testing can be used to plan for a child, and other options, such as preimplantation genetic diagnosis and preconceptional 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 find greater consensus when alternative procedures are used. Debates regarding plant and animal genetic engineering to feed the millions are always usually heated, as exemplified in the range of thought on the matter expressed by “Genetic Frontiers” participants. For some technologies, such as genetic engineering of foods, religion serves as a regulatory device, suggesting what sorts of moral, ethical, and social considerations need to be addressed before a technology is widely used. Through the miracle of dialogue, people’s religious values can be weighed in a balanced fashion, leading 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 public open forums can spread awareness of the issues, and produce suggestions and leads 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.

The nine-part professional / three-part public conference series conducted by the "Genetic Frontiers" program offers an example of religious dialogue in its early stages. The process should, and needs to be ongoing. As always happens with papers of this kind, readers may end up assuming that conclusions within the text represent resolution of an issue. Such is not the case. The conclusions one reads represent the attempt to focus several people's thought into a coherent whole that will offer guidelines to future thought. Working premises can later be strengthened or washed away. Not that religious dialogue on scientific topics must lead to consensus, but it may start a process that can lead to areas of satisfactory, if only temporary, agreement, while instilling mutual respect for others' opinions where agreement cannot be achieved. In the beginning stages, participants in the dialogue find a common language to allow 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 new 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. At a certain point, a critical mass of religious thought is brought into the open, and collectively agreed-on, humane approaches towards the use of genetic and reproductive technologies surface.