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Respect Life

## GENETIC ENHANCEMENT: CUSTOM KIDS AND CHIMERAS

By Marilyn E. Coors, Ph.D.

Genetic enhancement has emerged as an ethical issue because it involves the power to redesign ourselves, including the potential to impact the very essence of what it means to be human. It presents a choice requiring the wisdom to discern when to say “yes” or “no” to this powerful new technology, and the humility to know what is beyond the limits of our understanding to evaluate or judge.<sup>1</sup>

Is it wrong to produce children with genetically enhanced height and strength to become NBA All-Stars (dubbed “gene doping” by the press)? Take it one step further. What is wrong with designing children with enhanced intelligence? Such a child could potentially grow up to find the cure for cancer, or an environmentally friendly energy source that would benefit society. What about redesigning human aging so that people live as long as Abraham and Sarah from the Old Testament or even Methuselah? What about a hybrid creature with human and animal characteristics enabling him (it?) to perform dangerous or undesirable tasks in society that others loathe? Some of these scenarios invoke an immediate “no,” while others call for ethical deliberation to assess what is right and wrong.

Let us take a step back and define genetic enhancement. The possible uses of genetic technology are sometimes divided according to purpose: enhancement or therapy. Genetic enhancement means altering genes to improve human traits or characteristics *beyond* what is considered “normal” for humans, that is, different from naturally occurring genomes (all the DNA of an organism). In contrast, genetic therapy means altering genes that have harmful mutations in order to prevent or cure diseases. Most agree that a genetic change that reduces the occurrence of devastating disease is good, when it is done morally.

There are some genetic alterations on either end of the spectrum of human traits that are fairly easy to classify as enhancement or therapy. As a case in point, a genetic change that cures cystic fibrosis is undoubtedly therapy, while producing a human eye that can see in the dark is unmistakably enhancement. However, there are genetic alterations that fall in the “gray” zone. For example, where do we draw the line in the enhancement of a short-statured person’s height - from 4’4” to 5’4” or even 6’4”? At what point does therapy become enhancement? You can see that the distinction is difficult and sometimes of limited value.

Pope John Paul II used the enhancement/therapy distinction to address the morality of genetic alterations long before it was scientifically plausible to effect such changes in the human genome. In 1983, he endorsed therapeutic interventions such as those

affecting “chromosomal deficiencies” when the intervention promotes well-being, and does not harm the biological integrity of the human person or cause increased suffering.<sup>2</sup> John Paul II also approved genetic enhancement when the intervention “aims at improving the human biological condition” with two provisos: the intervention must not interfere with the origin of human life in natural conception, and it must respect the dignity of the human person and the “common biological nature” that provides the basis of human liberty.

Catholic teaching, as explained by John Paul II, thus defends a human essence that possesses inherent dignity and deserves respect and protection. John Paul expressed concern that genetic enhancement could result in changes that “provoke fresh marginalization” in the world by altering human traits so as to compromise the integrity of humans. He warned that genetic intervention must not “derive from a racist, materialist mentality aimed at human happiness which is really reductive. Man’s dignity transcends his biological condition.” That which is transcendent in the human being, our dignity and freedom, must be protected from technological assault.<sup>3</sup> These comments reveal John Paul II’s concern that the power of genetics could reduce the human person to his or her genes, a kind of Genes-R-Us mentality that claims we are our genes and nothing more. Even at the purely biological/social levels, there is ample evidence to refute this mindset when we consider the astonishing accomplishments of persons with disabilities, who overcome life-limiting genetic conditions to perform well beyond what their DNA would seem to dictate.

Yet we know from the demand for mind enhancing drugs and assisted reproductive technologies that the consumer will purchase genetic enhancements to produce “custom kids” or “bionic baby boomers” as soon as it is safe and effective to redesign human biological software. (While other issues arise from the scientific process for genetic enhancement of those already born, such interventions do not interfere with procreation or involve the creation and destruction of embryos.)

It is clear that we as a society will need to craft policies to direct the ethical applications of this new technology, or market forces alone will forge the course of genetic enhancement and the results may not be desirable or ethical. In order to participate in the discussion as informed and responsible Catholics we must understand the implications of genetic enhancement on two levels: the scientific process itself, and the potential ethical implications for individuals and society.

## THE SCIENTIFIC PROCESS

### *Custom Kids*

Custom kids are already a reality. Parents can choose the sex of their child using a process known as sperm sorting, in which a technician can sort male sperm from female sperm because the latter carries slightly more DNA and is therefore heavier. A woman is then artificially inseminated with the sperm of the gender she chooses and about 75% of the time, she delivers the baby of her choice. A recent poll found that 60% of Americans are uncomfortable with sex selection, because it treats children like a product instead of a gift from God that is full of surprise and wonder. Catholic teaching also opposes this kind of sex selection for additional moral reasons. The Church teaches that transmission of human life is ordained by God to result from the union of a man and woman in marriage.<sup>4</sup>

“In reality, the origin of a human person is the result of an act of giving. The one conceived must be the fruit of his parents’ love. He cannot be desired or conceived as the product of an intervention of medical or biological techniques; that would be equivalent to reducing him to an object of scientific technology. No one may subject the coming of a child into the world to conditions of technical efficiency which are to be evaluated according to standards of control and dominion. *The moral relevance of the link between the meanings of the conjugal act and between the goods of marriage, as well as the unity of the human being and the dignity of his origin, demand that the procreation of a human person be brought about as the fruit of the conjugal act specific to the love between spouses.*<sup>5</sup>

There is a second way to produce custom children that, according to Catholic teaching, also uses an immoral process. Scientists can produce multiple embryos in the laboratory by in vitro fertilization (IVF), then analyze their genetic makeup by preimplantation genetic diagnosis (PGD). Science is far from conclusively linking gene(s) to complex human traits like intelligence, but some genetic disorders, like cystic fibrosis (CF) are caused by a mutation in one gene that can be identified in the embryo. The technician tests the embryos for the CF gene, discards those carrying the mutated gene, and implants one or two of those that are free of the mutation in the mother’s womb. If there are additional embryos without the mutation, they are frozen for later use. This process does not always result in a pregnancy, but when it does, it is nearly 100% certain that the parents will give birth to a child free of CF. But this process is intrinsically immoral, because it involves the creation and destruction of human lives, replaces the conjugal act and involves third-party intervention in conception.

Custom children with made-to-order intelligence, stature, disposition, etc. are still a thing of the future, because the genes linked to these traits have not been identified. While it is impossible to assess the morality of a future indeterminate procedure, “it is hard to imagine that this could be achieved without disproportionate risks especially in the first experimental stage, such as the

huge loss of embryos and the incidence of mishaps, and without the use of reproductive techniques.”<sup>6</sup> The process by which custom children currently are created is intrinsically immoral according to Catholic teaching, but we must keep in mind that any resulting child would possess the same moral status and dignity as every other child. The intention and means used in his or her creation is irrelevant to the child’s dignity and right to life.

### *Chimeras*

Chimeras are interspecies entities, composed of a blend of DNA from two or more different organisms. Crossing species boundaries can occur naturally (although rarely) in animals, such as the mule, and in plants, such as rhododendrons. Moreover, human genes are routinely placed into microorganisms to produce insulin for the treatment of individuals with diabetes and to produce numerous other drugs. But new moral issues are raised when scientists propose to make creatures whose very membership in the human species is open to doubt.

Scientists are currently involved in genetic alteration to create new interspecies organisms to study the function of human genes in other species, because such trials cannot be conducted in people. The scientific process uses stem cells to transfer human genetic material into non-human embryos. By better understanding the development of human tissues, such as the eye and brain, they hope eventually to be able to repair or enhance those tissues in human beings. New interspecies organisms created in the laboratory include a bonnet monkey with human fetal neural stem cells transplanted into its forebrain, early chick embryos that contain implanted human embryonic stem cells, and mice with human embryonic stem cells in the brain. Their creation has raised many concerns both as to the efficacy of the science and the ethical implications. The momentum of this new technology is evident in the proliferation of patent requests for new life forms.

The National Academy of Sciences recently released new ethical guidelines for research with human embryonic stem cells. Although the recommendations are nonbinding, even the Academy (which favors creating and destroying human embryos for their stem cells) endorsed the creation of chimeras but opposed experiments that involve inserting human embryonic stem cells into human, ape and monkey embryos. The possibility that a human or quasi-human brain might be imprisoned in an animal’s body is reprehensible. Catholic teaching tells us that “Changing the genetic identity of man as a human person through the production of an infrahuman being is radically immoral.”<sup>7</sup>

## ETHICAL IMPLICATIONS

Volumes have been written about the ethical implications of genetic enhancement and the crossing of species boundaries. In the limited space of this article, I will briefly mention only four important ones.

### *Moral Status of the Human Embryo*

The inherent moral status of human beings comes from the reality that God created human beings in His image and likeness (manifest in intelligence and free will). For this reason every human being, regardless of individual traits or circumstances possesses incomparable dignity.<sup>8</sup> John Paul II explained that moral worth begins with the right to life. From the moment of conception until death, he adds, the right to life is primary and fundamental. It is at the root and source of all other rights.” Therefore, the state of being human automatically confers moral status. As a result, any action that relegates any human being - at any stage of development from a one-celled embryo through natural death - to being a mere tool of research or a vehicle of production or profit is immoral.

### *Human Life as a Commodity*

The pricey manufacture of “custom kids” would in fact undermine the value and dignity of human life by reducing these children to customized products like cars or computers.

Rather than surprise and appreciation for the uniqueness and mystery of each individual, custom made children would be judged by how they conform to preset specifications. Beyond that, the genes that determine complex traits like behavior don’t always act the way one would expect. A geneticist once told me that in experiments that attempt to alter the genes controlling the coat color of mice, the mice actually look like what he intended only about 50% of the time. That’s why parents who think they are programming a child to have one or more traits may be in for a real surprise. The uncertainty of gene expression makes it highly unlikely that one could reliably produce a “custom” baby with characteristics that the parents “ordered” and, unlike a car or computer, there are no “return” policies at fertility clinics. In reality, parenting always involves surprises and disappointments. (I speak from experience since my husband and I have six wonderful young adult children.) Genetic enhancements will not be able to alter this reality, but may set up unrealistic parental expectations and ultimately contribute to an attitude that human life is a commodity that must measure up to market standards.

### *Social Justice*

Genetic enhancements could exaggerate existing social inequalities, especially if only the prosperous can afford them. A technology is not just if it neglects the poor or vulnerable or if it widens the gap between the haves and have-nots. Even if this technology could be applied safely and without using immoral means, the concern is that naturally-born children would not be able to compete with those who are genetically enhanced. Our notions of human accomplishment would change. In the extreme, it potentially could lead to a “superior” class of people (dubbed by some the “genobility”) with advantages that far surpass any that parents are now able to bestow on their children through education, coaching, etc. Overlay this on a society obsessed by youth, health and success in which many who lack sufficient income,

education, health care, and nutrition already are excluded from opportunities for advancement. Social justice would mandate improving the well-being of those who are on the margins of society rather than further marginalizing the poor by enhancing a few far above the norm.

### *Harm*

It will be very difficult to make safe and effective modifications to the human genome, and the attempt could result in significant harm to individuals and society. Genetic enhancement involves changes that are a departure from naturally occurring genomes. As such, it will involve the production of new genetic combinations. The complexity of the human genome will make this endeavor difficult, especially because most genes have multiple functions. This means that the challenge of discovering genetic alterations that really improve human function will be much more difficult than designing therapeutic ones. Recall that therapeutic changes are moral when the scientific means are moral. Moreover, because of the inter-connection of the entire genome and the environment, genetic changes may function as predicted in one individual but have a completely different effect in another individual; what is safe for one may not be safe for another.

Potential harms resulting from genetic enhancements could include the following: (1) negative consequences in the targeted intervention, (2) negative consequences in a human function not previously thought to be related to the intervention, and (3) these consequences would not become apparent for a long time. The idea that humans, with our new and still incomplete understanding of genetics, could design real enhancements that are safe and effective is fraught with pride, and has the potential for real harm.

### **CONCLUSION**

It is theoretically possible that genetic enhancement could be truly beneficial for individuals and society and, at the same time, respect the origins of life and the integrity of the human person as a unity of body and soul. The present state of the scientific process does not meet those requirements, however. For these reasons genetic enhancement of human embryos is immoral under Catholic teaching. Our abbreviated ethical analysis also raises issues of respect for life, justice, and safety that call into question the ability of humanity to use this potent technology to benefit humankind. Our impending power to alter our genetic heritage, coupled with a limited ability to predict the consequences of those alterations, cries out for a cautious and humble approach.

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## Notes

- <sup>1</sup> Coors, Marilyn E., *The Matrix: Charting an Ethics of Inheritable Genetic Modification*. New York: Rowman & Littlefield Publishers, Inc. (2003).
- <sup>2</sup> Pope John Paul II, "The Ethics of Genetic Manipulation," Discourse to the Participants in the 35th General Assembly of the World Medical Association, reprinted in *Origins*, 13: 386-389 (Oct. 29, 1983).

- <sup>3</sup> *Ibid.*
- <sup>4</sup> John Paul II, *Evangelium Vitae (The Gospel of Life)*, 1995.
- <sup>5</sup> Congregation for the Doctrine of the Faith, *Donum Vitae*, ("Instruction on Respect for Human Life in its Origin and on the Dignity of Procreation: Replies to Certain Questions of the Day") (1987), no. 4.

- <sup>6</sup> International Theological Commission, "Communion and Stewardship: Human Persons Created in the Image of God," July 23, 2004.
- <sup>7</sup> *Ibid.*
- <sup>8</sup> Gen: 1, 2.

## MODEL PROGRAMS

Young people have always been fascinated by chimeras in mythology and science fiction and the apparently limitless possibilities life would hold in a future world where humans have super powers (the X-Men, for example). In schools and parish CCD programs, sponsor a short story contest for elementary school children. Ask them to write and illustrate a story around a chimera of their imagination in which they explore the drawbacks involved in no longer being entirely human. Stories can be "published," read aloud to classes, and displayed in the school library where all can enjoy them.

Sponsor an essay contest for students grades 7-12. One topic could address the effects on society and individuals if genetic enhancement were available to the wealthy allowing them to create designer children with truly exceptional athletic or intellectual ability. Another topic could ask them to describe a future (along the lines of Huxley's *Brave New World*) in which the only permissible means of creating children is through cloning, and where humans are mass-produced to be suited to various jobs, humans with subpar intelligence for the menial occupations and those with genius IQs to become scientists and academics.

Sponsor a "movie night" for high school students featuring "Gattaca," a PG-13 science fiction movie released in 1997. In a world where children are created in labs with the precise DNA to perform the task the government assigns to them, the hero of "Gattaca" was created the old-fashioned way by his biological parents. He has to take extreme measures to beat the system and become the pilot he's always dreamed of being. The discussion following the movie could consider how the film illustrates the famous observation of C.S. Lewis in *The Abolition of Man*: "All long-term exercises of power, especially in breeding, must mean the power of earlier generations over later ones. ... Each new power won by man is also a power over man. Each advance leaves him weaker as well as stronger. In every victory, besides being the general who triumphs, he is also the prisoner who follows the triumphal car."

See what resources are available on bioethical issues in your school, parish and community libraries. Donate some of books listed below.

## RESOURCES

### Teaching Documents

*Declaration on the Production and the Scientific and Therapeutic Use of Human Embryonic Stem Cells*. Pontifical Academy for Life, 2000. Reprinted in The Pope Speaks, (bimonthly periodical by Our Sunday Visitor), March-April, 2001 (single issue \$4). Available at [http://www.vatican.va/roman\\_curia/pontifical\\_academies/acdlife/documents/rc\\_pa\\_acdlife\\_doc\\_20000824\\_cellule-staminali\\_en.html](http://www.vatican.va/roman_curia/pontifical_academies/acdlife/documents/rc_pa_acdlife_doc_20000824_cellule-staminali_en.html)

*The Dignity of Human Procreation and Reproductive Technologies: Anthropological and Ethical Aspects*, Proceedings of the 10th Assembly of the Pontifical Academy for Life. Juan de Dios Vial Correa and Elio Sgreccia (eds.). Vatican: Libreria Editrice Vaticana, 2005.

*The Dignity of Human Procreation and Reproductive Technologies: Anthropological and Ethical Aspects*, Final Communiqué of the 10th Assembly of the Pontifical Academy for Life, February 21, 2004. Available at <http://www.vatican.va>. For this and other documents of the Pontifical Academy for Life: From mainpage in English, click on "Roman Curia," then "Pontifical Academies," then "Life," and scroll to find document.

*Donum Vitae* ("Instruction on Respect for Human Life in its Origin and on the Dignity of Procreation"). Congregation for the Doctrine of the Faith, 1987. Washington, D.C.: USCCB (\$4.25). Available at <http://www.usccb.org/prolife/tdocs/donumvitae.htm>.

*Ethics of Biomedical Research for a Christian Vision*, Concluding Communiqué of the Pontifical Academy for Life, February 26, 2003. Available at <http://www.vatican.va>.

*The Gospel of Life*. Pope John Paul II, 1995. Washington, D.C.: USCCB (English and Spanish, \$7.95); also available from Pauline Books & Media. Available at <http://www.usccb.org/prolife/tdocs/evangel/evangeli.htm>.

*Observations on the Universal Declaration on the Human Genome and Human Rights*, May 24, 1998, document edited by the "Informal Working Party of Bioethics," Vatican Secretariat of State. Available at <http://www.vatican.va>.

*Prospects for Xenotransplantation: Scientific Aspects and Ethical Considerations*, Pontifical Academy for Life, September 26, 2001. Available at <http://www.vatican.va>.

*Reflections on Cloning*, Pontifical Academy for Life (1997). Available at <http://www.vatican.va>.

### Print

*Body Bazaar: The Market for Human Tissue in the Biotechnology Age*. Lori Andrews and Dorothy Nelkin. New York: Crown Publishers, 2001 (\$24).

*Catholic Bioethics and the Gift of Human Life*. William E. May. Huntington, Ind.: Our Sunday Visitor Books, 2000 (\$17.95).

*The Catholic Citizen: Debating the Issues of Justice*. Kenneth D. Whitehead (ed.). South Bend, Ind.: St. Augustine's Press, 2004 (\$17).

*Consumer's Guide to a Brave New World*. Wesley J. Smith. San Francisco: Encounter Books, 2004 (\$25.95).

*The Future Is Now: America Confronts the New Eugenics*. William Kristol and Eric Cohen (eds.). Lanham, Md.: Rowman and Littlefield Pubs., 2002 (\$19.95).

*Handbook on Critical Life Issues*, 3rd ed., Frs. John A. Leies et al. Philadelphia, Pa.: Nat'l Catholic Bioethics Center, 2005 (\$24.95).

*Human Dignity in the Biotech Century*. Charles W. Colson and Nigel M. de S. Cameron (eds.). Downers Grove, Ill.: InterVarsity Press, 2004 (\$15).

*Life, Liberty and the Defense of Dignity: The Challenge of Bioethics*. Leon R. Kass, MD. San Francisco: Encounter Books, 2002 (\$26.95).

*Moral Issues in Catholic Health Care*. Kevin T. McMahon (ed.). Wynnewood, Pa.: Saint Charles Borromeo Seminary, 2004.

*What Is Man, O Lord?: The Human Person in the Biotech Age*. Edward J. Furton (ed.). Philadelphia, Pa.: Nat'l Catholic Bioethics Center, 2002 (\$24.95).

### Periodicals

*The National Catholic Bioethics Quarterly*, Vol.1, No.2 (Summer 2001). Issue is entitled "Respect for the Human Embryo." Brighton, Mass.: The Nat'l Catholic Bioethics Center (subscription \$48/year).

### Internet

[www.bioethics.gov](http://www.bioethics.gov) (President's Council on Bioethics)

[www.cbhd.org](http://www.cbhd.org) (Center for Bioethics and Human Dignity)

[www.cloninginformation.org](http://www.cloninginformation.org) (Coalition of Americans to Ban Cloning)

[www.ncbcenter.org](http://www.ncbcenter.org) (Nat'l Catholic Bioethics Center)

[www.nrlc.org](http://www.nrlc.org) (Nat'l Right to Life Committee)

[www.stemcellresearch.org](http://www.stemcellresearch.org) (Coalition of Americans for Research Ethics)

[www.usccb.org/prolife](http://www.usccb.org/prolife) (Secretariat for Pro-Life Activities)