THE CENTER FOR BIOETHICS AND HUMAN DIGNITY

2065 Half Day Road
Bannockburn, IL 60015 USA
847.317.8180 (PHONE)
847.317.8153 (FAX)
cbhd@cbhd.org (EMAIL)
www.cbhd.org (WEB SITE)

## IN THIS ISSUE...



# DIGNITY

THE NEWSLETTER OF THE CENTER FOR BIOETHICS AND HUMAN DIGNITY

*Christian perspectives on bioethical challenges, such as end-of-life care, euthanasia, genetic and reproductive technologies, abortion, and the changing face of health care.*

## HUMAN/ANIMAL TRANSGENICS: WHEN IS A MOUSE NOT A MOUSE?

Nancy L. Jones, Ph.D. *Wake Forest University School of Medicine (North Carolina)*
Linda K. Bevington, M.A. *The Center for Bioethics and Human Dignity*

Transgenic animals are animals which have had DNA from another species inserted into their genome. The goal of transgenics is to produce a hybrid animal that is able to pass on genetic material from two different species to the next generation. Inserting genes from one species into another species to create a transgenic animal is considered the most powerful technology for modeling disease processes and for determining the mechanisms by which genes are regulated during development. Transgenic animals, also called "bioreactors," allow the effects of various factors on a gene's function to be tested in a whole animal rather than merely in a test tube or cell. By inserting human DNA into an animal such as a mouse, medical researchers are provided with important information which may help them in their efforts to conquer human disease. Transgenic technology has undergone explosive growth in the last decade. A 1989 search of the NIH Computer Retrieval of Information on Scientific Projects (CRISP) database for government-funded human/animal transgenic research revealed only 21 grants–a number which grew exponentially to 1,820 grants by 1999. Today nearly 20% of government-funded research grants go toward underwriting research in transgenics.

Until recently, most transgenic animals were created by inserting just one or two genes from one species into an animal of another species. However, the current trend is to insert more and more human DNA into an animal of another species. Newer techniques using yeast artificial chromosomes (YACs) and bacterial artificial chromosomes (BACs) allow insertions of up to 1/3 of a chromosome to create a transgenic animal. This YAC transgenic technology is currently being employed to create transgenic pigs for the purpose of developing organs for human transplantation (a technique known as "xenotransplantation"). The successful application of these techniques has raised important ethical questions. For example, should there be a limit to the amount of human DNA inserted into an animal? Should such limits be enforced for transgenic research which has great therapeutic benefit for human beings? How would such "therapeutic benefit" be determined?

In Europe, concern over transgenic animals has focused on the breach of species barriers and the violation of species integrity entailed by the creation of such animals. The Bible tells us that God designed procreation so that plants, animals, and humans always reproduce after their own kind or seed. In the biblical view, then, species integrity is defined by God rather than by arbitrary or evolutionary forces. Christians involved in and/or concerned about transgenics should seek to determine whether the creation of a human/animal hybrid violates this biblical notion of species integrity.

The complete fusion of human and animal genomes via the union of sperm and egg from these different species runs

CONTINUED ON PAGE 7

## GENETIC INTERVENTION: ETHICAL CHALLENGES AHEAD

Ray Bohlin, Ph.D.
*Probe Ministries (Texas)*

As scientists continue to race toward their goal of mapping all of the genes in a human being, more and more people are asserting that the repercussions of the genetic revolution will outstrip the effects of the industrial, atomic, and computer revolutions combined. This belief stems from the reality of our newly found ability to deliberately and specifically change the fundamental qualities of a living organism by simply adding to, subtracting from, or rearranging its genetic structure. This power is expected to extend to human beings in ways previously hardly even imagined.

CONTINUED ON PAGE 4

As our knowledge of human genes and the proteins they code for becomes more complete, our awareness of just how much our individual genetic codes matter in defining our strengths and weaknesses will increase. This awareness will intensify the pressure to predetermine or alter our individual gene sequences. Many parents will feel compelled to do what they can to ensure that their children have the best genetic health possible and also may likely choose gene therapy for themselves to stave off the onset or progression of a genetically-based illness.

While the interface between genetic technology and health is itself fraught with many ethical challenges, the prospect of genetically engineering other "desirable" traits into human beings is perhaps the messiest quagmire of all. Most people are comfortable with using genetic engineering to combat the effects of a deadly genetic disease, but few would believe that we should allow the indiscriminate use of genetic technology to suit a personal whim. However, this attitude will likely change as genetic technology becomes more familiar.

Simply arriving at a fair and consistent system of where to draw the line will be more difficult than it may seem. It is tempting to suggest that we simply allow genetic engineering for strictly medical, or "therapeutic," reasons and avoid the pitfalls of "designer babies." However, this often-voiced solution would likely be less than straightforward.



For example, to the extent that the medical community regards a learning disability as a medical problem, gene therapy intended to raise a child's IQ might be classified as therapeutic. Would a child's inability to concentrate also fall into this category? What about a difficulty in retaining information? At some point the line where genetic intervention is carried out for the sake of improving health will be crossed, but people will surely disagree about where this line lies. Such a lack of clarity might likely be heightened when parents are faced with making decisions which will affect their own child.

There are a host of other significant problems on the horizon if genetic enhancement is allowed. First, there is the issue of who would pay. If people undergoing such intervention must pay for it themselves, then only those who are rich would be able to afford it. Such a scenario could lead to the creation of separate classes of human beings: the enhanced and the non-enhanced. Second, we would also have to wrestle with the fact that we would often be making irrevocable decisions for our children that would affect them for the rest of their lives. This prospect is particularly poignant when considering the possibility that a single gene may have multiple effects. What if enhancing verbal skills reduces athletic abilities? Could a child sue? Enhanced individuals also face the pressure of exaggerated expectations. The normally produced child of a genius faces pressure enough, but what if the child of a genius has her intellectual gifts even further enhanced? Shouldn't she outperform her father? Might it be best–perhaps ethically required–to make available only to consenting adults any enhancement that a person could conceivably not want?

Eventually we will all be affected by the increasing power of genetic knowledge and technology. Whether we ourselves face genetic technology choices or are asked to vote for candidates who will pass genetic legislation, we need to be able to make informed decisions. Given the enormity and personal nature of the coming genetic revolution, we can no longer afford to be ignorant of these issues. ■

## The Reproduction Revolution: A Christian Appraisal of Sexuality, Reproductive Technologies, and the Family

*From the Preface by:* John F. Kilner, Ph.D.; Paige C. Cunningham, J.D.; and W. David Hager, M.D.

Few social or technological developments in history have captivated people's imagination or raised more ethical questions than today's reproduction revolution. There are certain foundational issues that must be addressed by anyone interested in dealing with these matters. For example, does having the technological capability to carry out various scientific endeavors give us the moral right to pursue those challenges? Do worthy outcomes (babies) justify any measures necessary to obtain them? Is procreation an innate right or a God-given blessing to be received responsibly? How important is it for children to be the fruit of a one-flesh love relationship rather than merely of donors to the cause? Is a human embryo truly a child—simply at an early stage of growth—or is a human embryo, ultimately, discardable research material (regardless of the "respect" we may profess for "it")? Rather than merely offering the world's response to the challenging questions associated with sexuality, childbearing, and the family, this book grapples with them from a Christian perspective.

### Contents