**Ethical Issues in Genetic Engineering**

**Introduction**

Genetic engineering, or genetic modification, uses a variety of tools and techniques from  biotechnology and bioengineering to modify an organism’s genetic makeup.Genetic engineering  has been a topic of varying contention for years. Genetic engineering technology has numerous  applications involving companion, wild, and farm animals, and animal models used in scientific  research.One of the most prominent applications of genetic engineering is in agriculture and in  the past few years we have been inundated with news on the controversy over genetically  modified crops. Scientists and companies are saying genetically engineered crops are safe,  sound, and ethically important because they may save lives.

Ethics is based on well-founded standards of right and wrong that prescribe what humans ought  to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues.If  ethical theories are to be useful in practice, they need to affect the way human beings  behave.Some philosophers think that ethics does do this. They argue that if a person realizes that  it would be morally good to do something then it would be irrational for that person not to do it.

In genetic engineering there are many achievements of genetic engineers. These achievements  take the world to another level of technology. Nowadays everyone can fulfill all of their wishes  by using these technologies, even they can design their own baby.

**Current Developments of Genetic Engineering**

The field of genetic engineering allows scientists to develop organisms that express a novel trait  not normally found in a species.Genetic engineering may be also used to save endangered  species such as the American Chestnut tree, which is currently being repopulated by Chinese American chestnut hybrids specifically engineered with a genetic resistance to the chestnut blight  which is the deadly fungus that nearly decimated native populations.In genetic engineering  scientists combinations may also include plant-animal-human transgenes, such as when the DNA  of human tumor fragments is inserted into tobacco plants in order to develop a vaccine against  non-Hodgkin’s lymphoma. Researchers have similarly developed a flu vaccine using human  DNA and tobacco plants.Another area of genetic engineering research, that of babies. Now there  are several reasons one might alter a baby's genes, from getting rid of a heritable disease before  the child is born, to favoring genes for strength or intelligence, or even selecting a preferential  feature like blue eyes. There are several issues that are raised here.

Genetic engineering and transgenic combinations represent a significant aspect of current  biotechnology research. Other examples include:

• Xenotransplantation, or the transplantation of living tissues or organs from one species to  another, is often seen as a potential way to alleviate the shortage of human hearts and kidneys.  Pigs have a similar physiology and organ size, making porcine (pig) organs ideal candidates for  transplantation into human recipients. Researchers are also exploring the use of cell  transplantation therapy for patients with spinal cord injury or Parkinson’s disease.

• Genetic manipulation of stem cells now includes the growth of tissues on a scaffolding, or a 3-D  printer, which then can be used as a temporary skin substitute for healing wounds or burns.  Tissue engineering is becoming a viable alternative in procedures that involve replacement of  cartilage, heart valves, cerebrospinal shunts, and other organs.

• Commercial companies are deriving therapeutic proteins, such as monoclonal antibodies, from  the milk of transgenic cows, goats, rabbits, and mice, and using them to administer drugs in  treatment protocols for rheumatoid arthritis, cancer, and other autoimmune disorders.

• Research Animals: Biomedical applications of genetically engineered animals are numerous,  and include understanding of gene function, modeling of human disease to either understand  disease mechanisms or to aid drug development, and xenotransplantation. Through the addition,  removal, or alteration of genes, scientists can pinpoint what a gene does by observing the  biological systems that are affected. While some genetic alterations have no obvious effect,  others may produce different phenotypes that can be used by researchers to understand the  function of the affected genes. Genetic engineering has enabled the creation of human disease  models that were previously unavailable. Animal models of human disease are valuable resources for understanding how and why a particular disease develops, and what can be done  to halt or reverse the process.

• Designer Babies:The specter of designer babies is commonly raised by opponents of human  genetic engineering. Advancement in genetic modification techniques could allow parents to  influence their child’s eye color, hair color, height, intelligence and athleticism. It sounds like  something out of a dystopian sci-fi story, but the possibility of designer babies is not as far fetched as it sounds.

• Lengthened Lifespan: Human genetic engineering has the potential to lead to a longer average  lifespan. Researchers have identified the portion of human chromosomes responsible for  determining how many times a cell can divide and, thus, how long an organism will live.

Human genetic modification could alter this portion of the chromosomes, extending a person’s  lifespan.

• Testing For Genetic Diseases: Genetic testing is not terribly new. Amniocentesis has been a  staple of modern pregnancies for many years, and many at-risk people choose to be tested for  genetic diseases such as Huntington’s disease. Improved genetic testing would lead to earlier  diagnosis of such diseases. Earlier diagnoses would allow people destined to develop genetic  diseases to make the most of their healthy years.

Human genetic engineering has the potential to do more than identify a faulty gene.  Furthermore, germline genetic engineering could lead to the eradication of certain genetic  diseases all-together.

**Why Consider Ethics In Genetic Engineering?**

If you had the ability to make yourself stronger, would you? Maybe you would do this so that  you could fight off an attacker and thus save yourself and maybe your family. And you'd do this  by working out a lot.

Well, in science, we also want to make things stronger, and there's another way we can do it  without running miles and hitting the gym every day. Scientists can use genetic engineering to  alter the basic genetic material of an organism, by inserting genes (functional agents of heredity)  from one organism into the genetic code for another. Scientists can use genetic engineering to  make plants or animals grow faster and stronger, but they can also do things like clone animals  or create glow-in-the-dark cats.

There's a big ethical dilemma as to whether we should be doing genetic engineering, now or in  the future. By ethics, I mean a branch of philosophy that deals with human conduct and how  right or wrong an action or the motives behind an action may be.

**Ethical issues of Genetic Engineering**

Ethical issues, including concerns for animal welfare, can arise at all stages in the generation and  life span of an individual genetically engineered animal. Transgenic biotechnology presents an  exciting range of possibilities, from feeding the hungry to preventing and treating diseases;  however, these promises are not without potential peril. Some of the issues that need to be  considered are the following:

**Social Concerns**

• If the blending of animal and human DNA results, intentionally or not, in chimeric entities  possessing degrees of intelligence or sentience never before seen in nonhuman animals, should  these entities be given rights and special protections?

• What, if any, social and legal controls or reviews should be placed on such research? • What unintended personal, social, and cultural consequences could result?

• Who will have access to these technologies and how will scarce resources-such as medical  advances and novel treatments-be allocated?

**Extrinsic Concerns**

• What, if any health risks are associated with transgenics and genetically modified foods?

• Are there long-term effects on the environment when transgenic or genetically modified  organized are released in the field?

• Should research be limited and, if so, how should the limits be decided? How should the limits  be enforced nationally and internationally?

**Intrinsic Concerns**

• Are there fundamental issues with creating new species?

• Are species boundaries “hard” or should they be viewed as a continuum? What, if any  consequences are there of blurring species boundaries?

• Are chimeras and transgenics more likely to suffer than “traditional” organisms?

• Will transgenic interventions in humans create physical or behavioral traits that may or may not  be readily distinguished from what is usually perceived to be “human”?

• What, if any, research in genetic engineering should be considered morally impermissible and  banned (e.g., research undertaken for purely offensive military purposes)?

• Will these interventions redefine what it means to be “normal”?

**The Issue of Species Boundaries**

Some individuals argue that crossing species boundaries is unnatural, immoral, and in violation  of God’s laws, which presumes that species boundaries are fixed and readily  delineated. However, several books and journal articles demonstrate that the concept of fixed  species boundaries continues to be a hotly debated topic. Some bioethicists point out that a  variety of species concepts exist: biological, morphological, ecological, typological,  evolutionary, and phylogenetic, to name a few.All of these definitions of what a species is reflect  both changing theories and the varying purposes for which individuals conceptualize and utilize  different species. If species boundaries are simply a matter of a naming convention, and there are  no truly fixed boundaries to cross, then many philosophical objections to transgenics are  rendered less problematic. While the morality of crossing species boundaries reflects differing  worldviews and is subject to disagreement there are, however, several known risks associated  with the transplantation of cells or organs from animals to humans. For example, there is a small  but significant risk of the transmission of usually fatal zoonotic diseases.

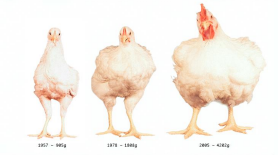
In addition to the issue of species boundaries, there are other issues that need to be considered  and discussed prior to large-scale acceptance and usage of transgenics and other genetic  engineering research, including:

• the risks and benefits of the experimental use of animals;

• the risk of creating new diseases—for which there is no treatment—by combining animal DNA  or human DNA with plant DNA;

• the potential long-term risks to the environment;

Various bioethicists, environmentalists, and animal rights activists have argued that it is wrong  to create animals that would suffer as a result of genetic alteration.



**Conclusion**

Ethics is based on well-founded standards of right and wrong that prescribe what humans ought  to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues. If  ethical theories are to be useful in practice, they need to affect the way human beings behave.As  the technology advances to the point at which it is both safe and effective to use, humankind  must be particularly careful not to make changes from which it cannot return. Though this issue  may seem similar to the argument of irreversibility refuted above, it actually involves an entirely  different matter altogether. It is possible that certain alterations to the genetic code may modify  the drives and motivations of human generations in such a way that humans simply stop caring  about their own survival or advancement and get trapped in a state of apathy or worse. Still, this  is not sufficient reason to not pursue the development of genetic engineering, but rather reason to  remain reasonably cautious about its future.