
ETHICAL ASPECTS OF THE DEVELOPMENT OF GENETIC ENGINEERING

Dorota Probuca*

*Pedagogical University of Cracow, Institute of Philosophy and Sociology,
Department of Particular Ethics, Podchorążych 2 street, 30-084 Cracow, Poland*

(Received 15 February 2018, revised 20 April 2018)

Abstract

The purpose of my paper is an attempt to answer the question of the social and ethical consequences of the development of genetic engineering. Firstly, the development of biotechnology will deepen social divisions and lead to the separation of two social groups: rich people, improving themselves and their offspring genetically, and poor people condemned to 'genetic roulette'. Secondly, in ethical terms, the biggest danger associated with the development of genetic engineering is a dehumanization of representatives of the species 'Homo sapiens' involving interference in its autonomy. I underline that freedom of scientific research is not the absolute value. It is necessary to abstain from a biotechnological research for the sake of human dignity.

Keywords: ethics, genetic engineering, biotechnology, human, dignity

1. Social consequences of the development of genetic engineering

Genetic engineering, also termed Biotechnology, is a vast scientific field, the bases of which are genetic manipulations and modifications based on the techniques of recombinant DNA. Currently, such a type of methods is most often used as regards plants and animals. The goal of such a practice is to obtain more efficient species resistant to diseases. Another field of genetic engineering activity involves gene therapy, which covers the treatment of people having diseases caused by genetic defects. The management of such people would consist in introducing to their bodies the correct version of the damaged gene. That way, it would be possible to eliminate genetic defects and physical disabilities which are conditioned genetically. Diagnosing genetic defects in the prenatal period proves particularly interesting. Diseases induced by defective genes do not fall into the group of ailments that medicine is able to treat using traditional medicine. One of the ways to solve the problem is to improve tests to detect genetic defects at the early stage of the foetus's life. The development of methods used to eliminate genetic defects in a foetus led to developing in vitro fertilisation at the end of the 1970s. The technique enables direct access of the ovum and embryo at the early stage of development under laboratory conditions, which makes it possible to

*E-mail: dorotaprobucka@op.pl

perform tests and genetically modify the embryo prior to implantation in the uterus.

Let us imagine a fictional situation that the parents-to-be, using a computer programme, will be able to choose their child's genotype, one that is most suitable for them. Oocytes will be collected from the mother, later they will be fertilised in the lab with the semen collected from the father. That way, using the *in vitro* fertilisation method, a specific number of embryos will be created. Every embryo will be subject to a thorough inspection genetically and a computer programme will show to the parents-to-be the biological profile of their future child. The parents will be able to check which embryos have genetic defects, which ones are exposed to specific diseases in the future. Moreover, owing to biotechnology, the parents will be able to specify the child's sex, select the sought-after traits of character and appearance [1]. As a result, a question remains to be asked: Do we really want to be a society, where the parents are able to search in the DNA catalogue and design their own child, just as clothes in the supermarket? Do we agree to discriminate people before they are born or prevent against somebody's birth, because we do not like their genes? [1, p. 210]. What will happen if a child is born with traits not being the parents' preferences? How huge will their disappointment be when as a result of a technical fault their child is born ill? Selecting all the preferred traits even at the level of a highly advanced genetic engineering is very difficult and an error may occur.

At this point, it is important to differentiate between two types of gene therapy. The first one is of somatic nature and consists in treating diseases by introducing to the patient's body the preferred genes to replace the defective ones. However, the genes are introduced only to the sick cells, not being gametes, therefore their presence has no impact on the future generations. They will die together with the patient they were introduced to. Another type is gene therapy of gametes, which consists in inserting additional genes to human embryos at an early stage of development in a way that the future cell division takes place with the new gene. This type of therapy would influence the genetic code not only of the embryo, but also a grown-up human and their offspring.

Although manipulating the genetic code nowadays is considered unethical, it seems that it will also be condemned in the future. People may deem that the only barrier blocking gene manipulation are moral dilemmas of scientists and they should be considered a not very significant factor and insufficient for abandoning such a practice. Should experiments on animals prove the benefits, people will demand making the medical practice based on modifying a human genetic code more common. In democratic countries the law is passed with majority of the votes and therefore people will get what the majority demands. The scientist John Newell asks a question: is playing God safe for the future generations? Perhaps, in the beginning scientists will use genetic engineering methods to eliminate the most serious genetic diseases, such as: cystic fibrosis or sickle cell anaemia. Over time, the scope of the activity of genetic engineers will be broadened and cover levelling diabetes, obesity, asthma, circulatory disorders, heart diseases, etc. Perhaps, it will be possible to introduce genes to the body that will improve the

general health condition and immunity. Let us imagine that scientists are able to equip the future generations with better genes and create healthier, stronger, more intelligent and more beautiful people [2]. Therefore, there will be biotechnological possibilities used to eliminate any biological inequalities between people. Will the parents not seek the possibility to 'buy' better genes for their offspring? Will there not be any postulates that the division of the better genes be made according to the principle 'equal share for everyone'? Maybe the decisive voice will be given to the advocates of the principle 'give everybody as their financial capabilities are'?

Let us compare the development of genetic engineering and the development of plastic surgery. Initially, this field of medicine was supposed to help people with serious body defects. However, along with the development, its methods started to be used not only to treat sick patients, but also the healthy ones, who were not satisfied with their looks. People observed that plastic surgery may improve their body and make them more beautiful and therefore they will be successful in life. Medicine, therefore, made it possible for the society to improve their physical looks and people made advantage of the offer quickly. It should be emphasised that in comparison with plastic surgery, genetic engineering offers incomparably more sophisticated and permanent forms of bodily modification [3].

A question is to be asked at this point concerning the limits not to cross in the process of genetic human improvement. Are there such limits? Will genetic engineering in the future be able to modify and improve all the human features? Let us assume that in an animal species there is a particularly preferred trait and the scientists have found in the genetic code of that species a gene responsible for the presence of the trait. Genetic engineers will be able to transfer the gene to a human embryo and enhance the human attributes with the presence of that particular feature. That way, the *Homo sapiens* will have the opportunity to enhance their senses in an almost unlimited manner. According to Lee Silver, the relatively easy sense enhancement could, e.g. consist in broadening the scope of the light visible to the human eye with ultraviolet and infrared, which will make it possible to see in darkness and will enrich our world of colours. Other possibilities obtained as a result of transplanting animal genes to a human embryo is the development of photophores, organs detecting magnetic field, or the ability to produce electricity, the ability to detect and differentiate in the air of particles of low concentration, the ability of echolocation and emitting high-frequency sounds [1, p. 234].

In the view of the scientist John Newell, introducing new genes to the so-called germline will be in the future the main method of biological human improvement [2, p. 43]. Currently, ova or embryos originating from unrelated donors are given to mothers who cannot produce their own ova or suffer from serious genetic diseases. In such cases, this type of procedure constitutes the only chance to have healthy children. However, in the future, such a technique may be used for other purposes. The scientist envisages that in liberal societies there will be institutions functioning as shops selling top quality human embryos. Future mothers who want to have children with outstanding physical and mental traits

will be able to choose in such an institution an appropriate embryo and purchase it. The assumption that the future parents or single mothers will not make use of such an offer is doubtful. Therefore, such a situation will make it possible in the future to have any combination of a child's features, consisting in the fact that the parents may design their child genetically.

Certainly, the so-called tailor-made children will initially be very expensive and available only to rich people. The fact, whether having them will ever be cheap and common will depend on how quickly the genetic engineering techniques get cheaper along with pre-implantation diagnosis. Let us assume that in the future biotechnology will really offer a cheap and effective method of having e.g. more intelligent children using genetic manipulation. In such a scenario, democratic countries with welfare policies will intervene, not to prevent against the reproduction of people with low IQ level, but to financially help poor people to get access to techniques used to increase the level of intelligence of their offspring. The state would be the guarantor of common availability of such medical procedures and them being cheap. In the opinion of Fransis Fukuyama, the consequences of that type of actions will cover not one society, but the whole population [4]. The problem is that genetic modifications used to improve a person based on the principle of equal treatment of all the concerned may paradoxically lower genetic diversification and disturb the normal functioning of the *Homo sapiens* species. The goal of genetic engineering is to remove from the genetic pool of humans the selected sequences of genetic material and change the genotype to obtain the desired result. Let us emphasise that the greater the diversification at the level of genotype, the greater the ability to adapt to the changing environmental conditions and greater guarantee of survival. Paradoxically, genetics, acting for particular persons, may affect the whole humanity. Genetic engineering may violate the natural principle of genotype mixing and therefore, from the evolutionary point of view, it may be very dangerous [5].

There are two possible scenarios. In the first one, methods of genetic selection of human embryos will become cheaper and generally available. Therefore, all the people will have a free-of-charge access to this type of medical services and nobody would complain about social injustice in that matter. In the other scenario, only the richest ones would be able to use genetic modifications of their own bodies and offspring, since the social policy of countries dominated by liberal thinking will not support common refunding of such procedures. Lee Silver envisages that in such a situation there will be social division into two radical social groups, which would transform within a few generations into two diverse biological species. First of all, it would radically upset the social structure and lead to the discriminating of those people, who for financial reasons have no access to that type of biotechnology. Second of all, the society will be dominated by a caste of genetically modified and enhanced individuals that Silver terms 'genetically enriched' people. They will be the only ones who would be able to genetically improve themselves and their offspring through financing the more and more complicated gene therapies of their own gametes. Every generation will

have stronger, healthier, more beautiful and intelligent ones. Based on those traits, it will be possible to determine the social origin of a given person. Moreover, in the case of every new generation, such sought-after traits will become stronger and stronger and they will make it possible to take power over people belonging to a lower sub-species in terms of evolution. These are people, who due to poverty are doomed to 'genetic roulette'. In the opinion of Silver, biological difference between the two subspecies will be so clear in the future that the representatives of those two groups will be no longer able to have offspring together [1, p. 243-245].

On the other hand, Fukuyama, apart from that scenario, also envisages two other visions of the world caused by the development of genetic engineering. In the first one, the development of Biotechnology will enable pharmaceutical companies to thoroughly adjust the medicines to genetic profiles of the patients and eliminate side effects. Therefore, e.g. phlegmatic people will become lively and introverts will become sociable and open. In the new world, there will be no place for depression or sadness. All the people, as a result of medications intake, will live in the state of continuous happiness [4, p. 21]. It is worth mentioning at this point the book by Aldous Huxley 'Brave New World', whose characters are given a drug termed 'soma' on everyday basis, which brings instant feeling of happiness, fulfilment and relaxation [6]. In the other vision of the future, advancement in genetic testing over stem cells will make it possible for scientists to recreate any tissue of the human body, which will result in longevity. The average age will be over 100. Every person will be able to order a new heart or liver grown in the body of a cow or swine. The problem is that making the physical life longer will not be tantamount to mental fitness of the elderly [7]. Genetic testing over stem cells may really lead to organ growing, but they will most probably not eliminate such threats as the Alzheimer's disease. Therefore, the life of people will be longer, yet it will have the features of idle vegetation. The world will start to resemble a huge old people's home, where people live up to the age of 150, but at the same time they function as mentally retarded children totally dependent on their caregivers. This is the vision of the future – a civilisation of old people, not working, not starting families, not having children, lonely, dependent and infirm [4, p. 102].

2. Ethical evaluation of the development of Genetic engineering

Let us think about the ethical aspect of genetic engineering development on a mass scale. It is a very important issue, since many scientists think that the development of Science in Biotechnology has gone beyond our capabilities related to its moral evaluation [8]. To that end, let us go back to the futuristic vision of Aldous Huxley, where people, under the influence of drug called soma, live in constant happiness, but they have probably lost the significant attributes of the human nature. Although they are never sad, never feel the pain, are not lonely, at the same time they do not love, do not long for anybody or anything, have no families, no children, no plans for the future and make no moral choices. As a

result of biotechnological interference, their nature has been modified to the extent that they stopped being humans in the previous understanding of that word [4, p. 19]. Therefore, the greatest ethical threat related to the development of genetic engineering is dehumanisation of the representatives of the *Homo sapiens* species. The danger would consist in the fact that applying biotechnology in practice would lead to change in the human nature, so far defined in the categories of modern humanism and initiate a new stage – post human, from the perspective of which we – the people living now – will be interpreted as subhumans.

Why, then, being a human in the traditional sense of the word is a value? In the classical perspective, it means having a human nature based on brains, moral agency, autonomy and independence from others. Moreover, the essence of being a human is respecting in oneself and other people of some metaphysical trait being dignity. It is the essence of our humanity, termed in Latin *dignitas*. It would be an autotelic value, which – in the ontic sense – every person is born with and simultaneously in the axiological sense makes it real, associating their lives with goodness, truth, integrity, justice. A question arises: do the projects related to genetic therapy of the whole germline, causing permanent changes as regards inheritance, aim at the dignity and integrity of the humans? These features are the basis for human autonomy, which on the basis would consist in the fact that a human is not determined by other people. Let us emphasise the fact that engineering interference in genotype means a radical change in the manner of treating the *Homo sapiens* species representatives. People are no longer treated, brought up, but grown. Many scientists think that the modern methods of genetic manipulation belong to the modern growing techniques [9]. Therefore, may a human be grown? Does the growing approach towards people not mean the degradation of all those features that constitute their human nature? Is the consent to grow people not a simultaneous consent to level humans with animals? In the future, people will most probably be treated the way breeding animals are treated now, but much more from a scientific point of view and more effective through the selection of genes passed on to the next generations. It is the idea concerning growing people that has the greatest threat related to dehumanisation as a consequence of the development of genetic engineering. Dehumanisation means in this case taking what is the most important in us – our humanity. It is worth mentioning the 2nd categorical imperative by Kant, obligating us to act in such a way that you treat humanity, whether in your own person or in the person of any other, never merely as a means to an end, but always at the same time as an end [10]. The formulation bans using another person and interfering in their free will. It excludes treating another person as a subject of manipulation, influence, use. Therefore, a person may not be a means for other people's ends, desires, interests. In the case such ends (e.g. the aspirations of parents towards children) become the leading value, then the addressee must necessarily be treated as the means. This means its reification, ontic levelling with the material constituents of the reality. Let us once again refer to Kant, according to whom a human and every human being generally exists as an end in themselves, and not as a means that could be used by somebody's will as they like [10, p. 60].

3. Conclusion

In conclusion, social acceptance of unlimited, genetic interference in the human body means depriving a human of the axiological and normative protective layer guarding the immunity in physical and spiritual sense [11]. Such ascertainment is strictly correlated with the issue concerning the borders of scientific curiosity. Should the curiosity of a scientist be the absolute good? Are the curiosity and freedom of a scientist ultimate values, the accomplishment of which allows sacrificing other values? Perhaps ceasing some scientific search should be deemed necessity used to protect our humanity and dignity.

References

- [1] L.M. Silver, *Remaking Eden: Cloning, Genetic Engineering and the Future of Humankind*, Avon Books, New York, 1997, 199-200.
- [2] J. Newell, *Playing God? Engineering with Genes*, Broadside Books, London, 1991, 45.
- [3] E. Thacker, *The Global Genome: Biotechnology, Politics and Culture*, MIT Press, Cambridge (MA), 2005, 264.
- [4] F. Fukuyama, *The End of History and the Last Man*, Free Press, London, 2006, 107.
- [5] R. Winston, *The Future of Genetic Manipulation*, Orion, London, 1997, 56.
- [6] A. Huxley, *Brave New World*, Rosetta Books, London, 2010, 78.
- [7] D.L. Steinberg, *Genes and the Bio-imaginary: Science, Spectacle, Culture*, Ashgate, Farnham, 2015, 134.
- [8] M. Reiss and R. Straughan, *Improving Nature?: The Science and Ethics of Genetic Engineering*, Cambridge University Press, New York, 1996, 144.
- [9] E. Chargraff, *Nature*, 327(6119) (1997) 199-200.
- [10] I. Kant, *Groundwork for the Metaphysics of Morals*, English translation, Vail-Ballou Press, New York, 2002, 62.
- [11] F. Cramer, *Interdiscipl. Sci. Rev.*, **26(1)** (2001) 162-166.