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## **Human Enhancement in the Context of Disability (Bioethical Considerations from the Perspective of Transhumanism)**

**Abstract:** In the present paper we examine several problems associated with medical development in the field of human-enhancing technologies, particularly with respect to disability. The subject of our considerations partly focuses on the fact that progress in biotechnology and information technology in medicine has contributed to the elimination of diseases and various health disorders (including some aspects of disability). Furthermore, we centre our attention on the dilemma of increasing the efficiency and activity of those who are ‘fully functional’, by introducing, among others, the available exo-extensions (such as exo-prostheses), endo-implantation and reprogenetics (such as PDG and CRISPR methods). Finally, we point out several ethical and legal doubts surrounding the apparent intention of creating a transhumanist vision of the ‘perfect human being’ (‘post-human’, ‘bionic human’, ‘human cyborg’).

**Keywords:** disability, eugenics, health, human enhancement, quality of life, transhumanism,

### **Introduction**

The mission of medicine is identified with care for the patient’s health, in accordance with the principle *salus aegroti suprema lex*, well grounded in both the law and ethics. The traditional purpose of medicine is to treat the ill and ailing. It is achieved with the available pharmacological and surgical means, and with appropriate rehabilitation. In situations where therapy becomes futile, the most important task is to provide appropriate palliative care. It should be mentioned that the classic mission of medicine is linked with health-promoting education. With progress in biotechnology, information technologies and artificial intelligence,

the actions of physicians begin to focus on the 'improvement' ('correction') of the human condition. Aside from therapeutic activities, special importance is currently associated with non-therapeutic 'human enhancement' procedures. Physical condition can currently be improved with different enhancements (so-called exo-extensions and endo-extensions). The brand-new and very controversial methods applied in this area include the brain-computer interface, which became possible thanks to biomedical and computer methods.<sup>1</sup> Prevention of disability has been made possible, many years ago, with genetic eugenics (so-called *reprogenetics*).<sup>2</sup> One of the most important tools in this area is Pre-implantation Genetic Diagnostics (PGD).<sup>3</sup> Recent years have also brought huge hopes associated with the so-called CRISPR method.<sup>4</sup>

The technological capabilities of contemporary medicine allow not only restoring ability to disabled persons but also significantly extending it, sometimes resulting in the transformation of a disabled person towards *super-ability*.<sup>5</sup> The available biotechnology instruments and tools have therefore created real opportunities for the improvement of human genetic potential and physical, mental and intellectual well-being, but also for improvement in the quality of life of societies on the global scale. The new methods for improvement of physical, mental and even emotional conditions are, however, associated with numerous controversies of a philosophical, moral and legal nature. These disputes cover, for instance, the understanding of human nature. Numerous doubts are associated with potential threats to the dignity, integrity, identity, freedom and equality of individuals.<sup>6</sup> Despite the various fears associated with the implementation of technological opportunities, there is huge hope tied to the chance for practical realization of the transhumanistic vision of the 'perfect human' (who is 'super-able') that could be tied to the reduction, or perhaps even elimination, of the problem of disability.

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1 M. Klichowski, *Narodziny cyborgizacji. Nowa eugenika, transhumanizm i zmierzch edukacji*, Poznań 2014, pp. 153–160.

2 J. Domaradzki, Janusowe oblicze reprogenetyki, „Nowiny Lekarskie” 2009, vol. 78, no. 1, pp. 72–73.

3 M. Soniewicka, *Selekcja genetyczna w prokreacji medycznie wspomaganey. Etyczne i prawne kryteria*, Warsaw 2018, p. 151ff.

4 G. Lindenberg, *Ludzkość poprawiona. Jak najbliższe lata zmienią świat, w którym żyjemy*, Krakow 2018, pp. 23–49.

5 M. Klichowski, *Narodziny cyborgizacji*, *op. cit.*, pp. 150–153.

6 T. Żuradzki, Nowa liberalna eugenika: krytyczny przegląd argumentów przeciwko biomedycznemu poprawianiu ludzkiej kondycji fizycznej lub umysłowej, „Diametros” 2014, no. 42, p. 208.

## 1. The Transhumanist Vision of the 'Perfect Human' (the 'Super-able')

The drive towards the creation of the 'perfect human' (which also means 'able-bodied' or even 'super-able') is visible in the ruminations of the transhumanists. The main assumption of this intellectual trend, referred to also as *Humanity plus* (H+), is the symbiosis of *Homo sapiens* with technology, meant to offer humans 'perfection' (super-efficiency) in the near future. According to transhumanist forecasts, the gradual integration of people with modern technological tools would soon make it possible to overcome all biotechnological barriers.<sup>7</sup> According to these predictions, the new 'bionic humans' would live as long as possible and in the best condition possible. In the end, they would start functioning not only as 'able-bodied', but also as super-healthy, super-empathic, super-rational and ultimately even immortal individuals. Finally, one would become a more perfect version of oneself.<sup>8</sup> The transhumanists stress that the contemporary abilities of the human body are nothing exceptional and constitute just one of the phases of evolution. Biotechnology is to make realistic the transfer of humankind to the highest level of evolutionary development. It is through biotechnology that a post-human, technologically enhanced civilization – a civilization of cyborgs – would finally take over control of the universe.

The beliefs of the transhumanists are strictly associated with the concept of *human enhancement*, which is to serve as the basis for the construction of the vision of the 'perfect human'. This idea is tied to the hope that the problem of disability could be completely eliminated some time in the future, or at least significantly reduced. It should be noted that transhumanism is based on a specific interpretation of this idea; it is not the only interpretation, but a very suggestive one. That is why it will become the basis for further considerations of the challenges and ethical dilemmas associated with the restoration of physical ability to disabled persons or indeed with the creation of above-average abilities in people.

The term *human enhancement* literally means the extension or increasing of human abilities. It refers to activities which contribute to positive modifications of human bodily and mental structures and which boost the individual's ability to act. The purpose of these operations is the ultimate improvement of human well-being. Having in mind the available technological solutions, one could conclude that humankind 'as never before faces a whole series of mighty opportunities tied to influencing the life of an individual and the lives of the future generations. Hence the question becomes what these capacities entail, what we can use them for and how

7 The best-known proponents of transhumanism are currently Ray Kurzweil, Hans Moravec, Erich Drexler, Vernor Vinge and Fereidoun M. Esfandiary.

8 K. Szymański, Czy od transhumanizmu można uciec? „Filozofuj! Nowy człowiek?” 2017, vol. 6, no. 18, p. 13.

we can justify these interventions.<sup>9</sup> In the context of the technological opportunities for supporting the physical and mental condition of humans, the crucial issue seems to be the question regarding the meaning of the term 'health' and other terms associated with it. This will be discussed further on in this paper.

## 2. Support for the Physical and Mental Condition of Humans in the Context of Understanding the Term 'Health'

'Health' is an exceptionally polysemous concept.<sup>10</sup> From the standpoint of this paper, two approaches seem particularly important: the positive and the negative approaches. The dominant way of understanding the term 'health' is the 'positive' approach, which is reflected in Article 1 of the Constitution of the World Health Organization (WHO) from 1964. It states that 'The objective of the World Health Organization... shall be the attainment by all peoples of the highest possible level of health.' The preamble to the constitution defines this general purpose as the right of every individual: 'The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being, without distinction of race, religion, political belief, economic or social condition.' Thus, health is defined as the status of well-being – physical, mental and social – and not just the absence of illness and disabilities.<sup>11</sup> This condition enables the individual to adapt to the environment and to fulfill plans and aspirations.<sup>12</sup>

For transhumanists, the manner of defining the term 'health' is most frequently tied to the 'negative' approach. This concept is beginning to be identified with a state of the functioning of the body in which none of the diseases and pathologies known so far has the opportunity to manifest itself. The available medical technologies offer the opportunity to eliminate diseases right at their source.

The context of deliberations on what 'health' really is discloses the vagueness of such terms as, for example, 'normality' or 'happiness'. The relationship of 'full capability' and 'disability' to 'happiness' and 'normality' turns out to be unclear. It can be noted that contemporary democratic societies on the one hand promote the concept of the inclusion of persons with disabilities in social life, believing that such persons can be as happy and productive as 'fully capable' persons. On the other hand, there is the promotion of the 'concept of selective reproduction to counteract

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9 G. Hołub (ed.), *Ulepszanie człowieka. Fikcja czy rzeczywistość? Argumenty, krytyka, poszukiwanie płaszczyzny dialogu*, Krakow 2018, p. 10.

10 There are about 120 definitions; see J. Domaradzki, *O definicjach zdrowia i choroby*, "Folia Medica Lodziensia" 2013, no. 40, p. 6.

11 Constitution of the World Health Organization, [https://www.who.int/governance/eb/who\\_constitution\\_en.pdf](https://www.who.int/governance/eb/who_constitution_en.pdf) (accessed 24.03.2021).

12 On interpretation doubts tied to the positive definition of health, see W. Galewicz, *Zdrowie jako prawo człowieka*, "Diametros" 2014, no. 42, p. 59.

disability, on the basis of the fact that persons with disabilities are, as a rule, less happy than the fully capable ones, which undermines the first assumption.<sup>13</sup> This is arguably tied to the horizontal incoherence of biolaw, related to the danger of a utilitarian, often highly simplified, moral arithmetic.

An in-depth analysis of the problem referred to above would require separate exploration, reaching well beyond the scope of this paper. It is however undisputed that technological capabilities influence a change in the manner of understanding many terms correlated with the concept of 'health'. Zygmunt Bauman aptly noted this many years ago, analyzing the manner of understanding the categories of 'health' and 'fitness'. He wrote that both these terms 'are often taken to be coterminous and are used synonymously; after all, they both refer to the care of the body, to the state in which one wishes one's body to achieve and the regime which the owner of the body should follow to fulfill that wish. To treat the two terms synonymously is, though, a mistake – and not merely for the well-known fact that not all fitness regimes "are good for one's health" and that what helps one to stay healthy does not necessarily make one fit. Health and fitness belong to two quite different discourses and appeal to very different concerns.'<sup>14</sup>

'Health' should therefore be understood as the proper and desirable state of the human body and spirit that can be more or less exactly described and precisely measured. It refers to a bodily and mental condition that enables the satisfaction of the social role assigned to an individual. 'To be healthy' means in most cases 'to be employable'.<sup>15</sup>

Meanwhile, 'fitness' means being ready to take on challenges which were so far unknown and unpredictable. 'It does not refer to any particular standard of bodily capacity, but to its (preferably unlimited) potential of expansion. "Fitness" means being ready to take on the unusual, the non-routine, the extraordinary – and above all the novel and the surprising. One may almost say that if health is about "sticking to the norm", fitness is about the capacity to break all norms and leave every already achieved standard behind.'<sup>16</sup>

Bauman also points out the fact that health used to be measured with set (countable and measurable) categories, such as bodily temperature or blood pressure. The concept was clear thanks to the distinction between the 'norm' and the 'pathology'. However, nowadays the status of all criteria, including health criteria, is severely undermined and has become very uncertain: 'What yesterday was considered normal and thus satisfactory may today be found worrying, or even pathological and calling for remedy. First, ever-new states of the body become legitimate reasons for medical

13 M. Soniewicka, *Selekcja genetyczna*, *op. cit.*, p. 197.

14 Z. Bauman, *Liquid Modernity*, Cambridge 2000, p. 77.

15 *Ibidem*, p. 78.

16 *Ibidem*.

intervention – and the medical therapies on offer do not stay put either. Second, the idea of “disease”, once clearly circumscribed, becomes even more blurred and misty.<sup>17</sup>

To illustrate the ‘blurring’ of the meaning of such concepts as ‘health–disease’ and ‘fitness–disability’, one can use the example of the famous runner Oscar Pistorius, who lost both legs as a baby. Prostheses made of carbon fibre made it possible for him, as a disabled person, not only to return to ‘ordinariness’ (in terms of health), but also to win major titles in track and field competitions for people with disabilities. Pistorius has also successfully competed against fully fit runners. A doubt has arisen regarding the category in which he should compete: as a healthy person (‘able-bodied’ or perhaps even ‘super-able’) or as a ‘person with disabilities’?

It is probably not an exaggeration to say that Pistorius has become an ambassador of the idea, mentioned in the introduction, of the transformation of a ‘disabled’ person into a ‘super-able’ one. His case clearly contributed to a change in the understanding of the concepts referred to above. It gave the impulse to the doctrinal discussion of the following problem: Do some modern medical technologies really provide a ‘repair’ (the restoration of health) or perhaps rather an ‘improvement’ (a correction)?

We should note that the concept of ‘therapy’ – in its classical understanding – is tied to ‘repair’ (i.e. the restoration of ordinary health). In the case of Pistorius, the therapy resulted in an ‘improvement’ (a ‘correction’), that is, it led to above-ordinary ability. A person who so far was disabled was given above-ordinary (superhuman?) abilities, demonstrating a higher efficiency (of course, in a certain narrow area) than an ‘able-bodied’ person.<sup>18</sup> Did he therefore become a ‘cyborg’? Michał Klichowski, author of the book *Narodziny cyborgizacji. Nowa eugenika, transhumanizm i zmierzch edukacji* (*The Birth of Cyborgization. The New Eugenics, Transhumanism and the Decline of Education*), believes that ‘the strategies of the fight against disability started turning into strategies of cyborgization, the disabled persons became models for cyborgs and super-ability became a phase of transhumanist techno-progress.’<sup>19</sup> Perhaps, as Jerzy Kopania claims, the road to health (defined in the negative manner) shall lead through various forms of cyborgization in terms of quality, ‘meaning the gradual replacement of natural organs with artificial ones, connection of the brain to computer systems, controlling bodily processes via external electronics, etc.’<sup>20</sup>

We should not exclude the possibility that further progress in the knowledge and development of biotechnology and information technology will enable continuous and increasingly far-reaching improvement of the physical and spiritual sphere of

17 *Ibidem*, p. 122.

18 M. Klichowski, *Narodziny cyborgizacji*, *op. cit.*, p. 151.

19 *Ibidem*, p. 152.

20 J. Kopania, *Projekt udoskonalenia człowieka w świetle relacyjnej koncepcji osoby*, (in:) P. Duchliński and G. Hołub (eds.), *Ulepszanie moralne człowieka. Perspektywa filozoficzna*, Krakow 2019, pp. 130–131. H. Fry, *Jak być człowiekiem w epoce maszyn*, Krakow 2018, p. 146.

humans (their 'repair' and 'improvement'). Perhaps with time, as the transhumanists predict, the human body will stop being susceptible to all kinds of ailments, and its strength and ability will reach the maximum possible level. Thus, both the *soma* and the *psyche* of humans would be improved to such a degree that the final result would be 'perfect well-being' or perhaps even eternal life.<sup>21</sup>

### 3. Practical Implications of Biotechnological Progress in 'Human Improvement' and the Reduction (Elimination?) of the Disability Problem

Despite numerous controversies (such as those mentioned earlier), biotechnological progress nowadays enables practical medical support for the human body on a scale that earlier was unimaginable. Advances in genetics, information technology and artificial intelligence undoubtedly contribute to this. Algorithms have started diagnosing various diseases even under standard medical procedures.<sup>22</sup> Intensive and interdisciplinary research into the processes of ageing and the possibilities to maximize the length of human life is of great practical importance in the development of technologies that support the human body and psyche. Their results are successfully used to 'improve' the life not only of persons with various disabilities but also of 'able-bodied' people.<sup>23</sup> The contemporary technological tools supporting the body and mind justify the statement that 'cyborgization' is no longer something that belongs purely in the science-fiction sphere. It has become contemporary reality. Exo- and endo-extensions are a fact in countries with the highest level of technological development.<sup>24</sup> The possible interventions for restoring ability and fitness to disabled persons or for boosting the natural abilities of a healthy person have been named *Human Enhancement Technologies* (HET).<sup>25</sup> Technologies of this type can be broken down into two primary areas. The first is associated with the bodily aspect of humans, with health and physical fitness. In this case, new technologies can be used for such purposes as monitoring the overall condition of the body, any increase of height or muscle mass, the elimination of faulty genes and the prolongation of life. The second area covers the psyche, including mental, emotional or behavioural ability. Technologies in this area are used to increase the level of intelligence and improve memory capabilities, but also to eliminate aggression.<sup>26</sup>

21 J. Kopania, *Projekt udoskonalenia*, *op. cit.*, p. 154ff.

22 H. Fry, *Jak być człowiekiem*, *op. cit.*, p. 154ff.

23 The leading role is played by the California-based company Calico, founded in 2013 by Google and Arthur D. Levinson.

24 M. Klichowski, *Narodziny cyborgizacji*, *op. cit.*, pp. 150–160.

25 J. Savulescu and N. Bostrom (eds.), *Human Enhancement*, Oxford 2009, p. 25ff.

26 B. Chyrowicz, *Spór o poprawianie natury ludzkiej*, Lublin 2004, pp. 47–61.

Let us begin from examples of strengthening the body. Physical fitness is supported with various devices and applications, used on a daily basis, that enable monitoring of the body and, through this, self-control of health (e.g. trackers that count steps, calories or heart rate). Physical fitness can be achieved or improved with such solutions as tooth implants, cochlear implants and endo-prostheses of the hip or knee joints. The attainment, or even improvement, of ability and fitness becomes possible with bionic limbs. The most technologically advanced tools are equipped with artificial intelligence solutions. For example, a myoelectric hand prosthesis is able to recognize various muscle-activity patterns and therefore can be more perfect than an organic hand. To restore health to the human body, various bionic organs are implanted: an artificial liver, heart or kidney, synthetic skin, blood or bones – and recently even a bionic eye. Exoskeletons enable proper body functioning not only for the disabled (e.g. paralyzed persons) but can be used to increase the strength of healthy persons (e.g. soldiers). It can therefore be concluded that bionics and the tools which have been developed have become incredibly helpful, and not only for persons with various disabilities who can use them to restore their fitness and attain relative independence. Bionics can be used to improve and boost the bodily functions of a ‘fully healthy’ person.

From the point of view of disability considerations, actions involving attempts to eliminate disability play a special role today. Progress in overall genetics is coupled with the intense development of the trend referred to as *genetic enhancement*. It includes the manipulation of human genes, which is frequently very controversial from the ethical and legal standpoint.<sup>27</sup> Concepts of the genetic improvement of humans are associated primarily with *in vitro* fertilization technology (IVF), which offers the opportunity for targeted selection of female and male gametes so as to result in a child with strictly defined physical and genetic characteristics. ‘Pre-birth improvement’ is based on the assumption that the appearance (or non-appearance) of individuals with certain characteristics and genetic predispositions is desirable. Thus, ‘genetic correction’ can, first of all, lead to the elimination of genetically faulty embryos. Its purpose is then to not permit the birth of an individual with certain genetic defects (so-called negative eugenics). Pre-implantation Genetic Diagnosis (PGD) is used to eliminate an embryo burdened with the defect. Implanting non-defective embryos in its place (*screening out*) creates a high probability of conception and the birth of a child free of genetic diseases and other defects and issues.<sup>28</sup> In the opinion of the European Court of Human Rights, the right to conceive a healthy

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27 O. Nawrot, O zakresie dopuszczalności ingerencji wobec ludzkiego genomu, (in:) A. Białek and M. Wróblewski (eds.), *Prawa człowieka a wyzwania bioetyczne związane z nowymi technologiami*, Warsaw 2018, pp. 123–142.

28 K. Bączyk-Rozwadowska, *Prokreacja medycznie wspomagana. Studium z dziedziny prawa*, Toruń 2018, p. 331ff.



child, free from genetic defects and impediments, falls within the sphere of private and family life protected by the Convention for the Protection of Human Rights and Fundamental Freedoms.<sup>29</sup> Prohibiting embryo selection when there is a risk of disease is a disproportionate restriction on this right.<sup>30</sup> Of course, enormous controversy surrounds the work on drafting a catalogue of developmental diseases, including defects leading to disability, that would enable such embryo selection. Some believe that actions of this kind are an attempt at eugenics in its classic, negative meaning, offering the opportunity to eliminate all individuals with any type and degree of dysfunction. They claim that this procedure is a manifestation of undesirable practices, as it enables the selection of embryos due to their 'genetic quality'. PGD is thus seen as a form of eugenic practice that leads inevitably toward the instrumental and commercial treatment of human reproduction.<sup>31</sup>

From the transhumanist perspective, the use of available technologies, including assisted reproduction, to not only eliminate defects but also to strengthen the genetic makeup of a healthy human organism (so-called positive eugenics) is highly advisable. Therefore, genetic correction should also be used to maximize the 'efficiency' of humans. In the opinion of transhumanists, parents actually have a moral duty to guarantee their child the best possible start in life. Therefore, they should use all available genetic knowledge to ensure that their progeny arrives in this world with the best 'equipment' possible.<sup>32</sup> It is noted that the selection of specific characteristics for a child occurs virtually routinely for infertile couples using sperm and egg banks. In these banks, anonymous donors are catalogued according to characteristics such as race, height, eye colour, hair colour, education or even occupation. There is even a sperm bank of Nobel Prize laureates, which specializes in acquiring sperm from outstanding personalities.<sup>33</sup> The procedure of creating so-called *designer babies* is used in IVF practice with the use of genetic material from anonymous donors. There are, however, very significant dangers associated with the technologically possible realization of future parents' subjective ideas about their ideal offspring. It could happen that they would want not only to 'program' a child

29 Convention for the Protection of Human Rights and Fundamental Freedoms (European Convention on Human Rights), [https://www.echr.coe.int/Documents/Convention\\_ENG.pdf](https://www.echr.coe.int/Documents/Convention_ENG.pdf) (accessed 25.03.2021).

30 Judgment of the European Court of Human Rights of 28 August 2012 on the case of Costa and Pavan v. Italy, application no. 54270/10.

31 D. King, Preimplantation Genetic Diagnosis and the 'New' Eugenics, "Journal of Medical Ethics" 1999, vol. 25, p. 178.

32 M. Soniewicka, Czemu ulepszanie genetyczne budzi sprzeciw? 'Filozofuj! Nowy człowiek?' 2017, no. 6, pp. 19–21.

33 D. Plotz, Fabryka Geniuszów. Niezwykła historia banku spermy noblistów, Warsaw 2007.

of a defined sex, appearance, character traits, abilities or level of intelligence, but also a child with a defect and impairment that they themselves have, e.g. deafness.<sup>34</sup>

There are also ethical and legal concerns related to, for example, the possibility of tissue typing. In some countries (e.g. Sweden) this is permitted by law. Tissue typing leads to the birth of *saviour siblings*, sometimes also referred to as ‘medicine children’ (or ‘utility children’). The moral imperative prohibiting the instrumental treatment of humans (in this case, a child conceived in order to enable the treatment of another, already-living child) seems to speak against such ‘saviour conception.’<sup>35</sup> Some also point to the possibility that with time, the goal of scientists would be to create a ‘custom human’, adapted to high technology. There is the risk that when typical therapeutic interference with the human genome is permitted, we can overlook the moment when the genetic makeup of a human being becomes changed without any medical justification.

Numerous controversies of a moral and legal character are nowadays tied to so-called gene therapy, which undoubtedly can be used to improve the human condition. Gene therapy is already used to treat certain genetic diseases (such as epidermolysis bullosa) by taking cells from the patient and modifying the faulty DNA segment. In recent years, ‘mixing genes’ has also become possible, which has led to the creation of so-called chimeras. Their creation has become a common practice in the field of transplantology – two sets of genes in a single human body are today the obvious result of transplantation procedures. Techniques for the modification and editing of genes result in the intensification of bioethical disputes regarding so-called human chimeras. It should be mentioned that children of three parents (children who have genes from two mothers and one father as a result of cytoplasmic transfer into the germline) have already been born. In a 2016 experimental formula of *in vitro* fertilization, performed with the Mitochondrial Replacement Therapy (MRT) technique, an egg cell from the mother, sperm from the father and another egg cell from a donor were used. By developing this method, the scientists wanted to find a way to protect children against mitochondrial diseases inherited from the mother. So far, there are about twenty children born whose mitochondrial DNA is obtained in part from a donor.<sup>36</sup> This leads to questions regarding the potential consequences of having genetic features of different persons.<sup>37</sup>

34 J. Savulescu, ‘Deaf Lesbians, Designer Disability’ and the Future of Medicine, “British Medical Journal” 2002, vol. 325, p. 771.

35 M.W. Wolf and J.P. Kahn, Using Preimplantation Genetic Diagnosis to Create a Stem Cell Donor: Issues, Guidelines and Limits, “Journal of Law, Medicine and Ethics” 2003, vol. 31, p. 331ff.

36 L. Tomala, Wywiad z prof. E. Bartnik: Na świecie żyją osoby o zmodyfikowanym DNA, “Nauka w Polsce”, <http://naukawpolsce.pap.pl/aktualnosci/news%2C80306%2Cprof-bartnik-na-swiecie-zyja-juz-osoby-o-zmodyfikowanym-dna.html> (accessed 27.01.2020).

37 M. Leźnicki and A. Lewandowska, Biomedycyna a genetyczne udoskonalanie człowieka w kontekście analiz bioetycznych, „Acta Universitatis Lodzianensis” 2013, no. 45, pp. 113–129.

A harbinger of previously unimagined genetic possibilities is the CRISPR method, referred to as ‘molecular scissors’. It enables interference in the DNA structure much more precisely than ever before and is perceived as an alternative to the genome-editing methods employed so far.<sup>38</sup> Matthew Cobb predicted in 2017 that ‘it seems inevitable that the world’s first CRISPR baby will be born sometime in the next decade, most likely as a result of a procedure that is intended to permanently remove genes that cause a particular disease.’<sup>39</sup> However, the birth of such a baby occurred much earlier than Cobb predicted: in 2018, the first genetically modified twins were born in China. Although the new method of ‘gene improvement’ raises immense controversies, it is also tied to huge hopes for effective treatment of genetic diseases. The question arises, Since this method offers the opportunity to eliminate the risk of all potential diseases from the DNA of the future child, should it be used at all? Or, as Grzegorz Lindenberg asks provocatively, should we maybe go even further and ‘remove certain inconveniences, which are not serious diseases, but which make life harder for various reasons? Perhaps we should correct the genes so that the child is not born colour-blind? Or that, as an adult, he or she does not suffer from myopia or does not go bald prematurely? Another step that awaits us in relation to CRISPR leads from medical to aesthetic applications. Since we eliminate myopia in children, why not make boys taller, and give women bigger breasts, to increase their odds with the opposite sex? Why not improve musculature? Change the colour of eyes and hair? Boost intelligence? Give them more sensitivity, or quite the opposite – certain psychopathic traits (depending on what the parents believe would be more useful for the child)? In brief, let’s design a custom child.’<sup>40</sup> While such visions are widely opposed, in 2018 the Nuffield Council on Bioethics in Great Britain decided that the alteration of DNA can be an option for parents who would like to influence the genetic makeup of their child. This is expected to apply not only to the removal of genetic defects but also to adding certain traits which, in the opinion of the parents, can facilitate the child’s future success.<sup>41</sup> Thus, in the future, the CRISPR method may be used not only to treat genetic diseases and to prevent diseases at the embryo stage, but also to improve genes for aesthetic purposes. Finally, as the result of the method’s use, human DNA could in the future be combined with the genes of animals, plants and even synthetic, laboratory-produced genes.<sup>42</sup> This could lead to the transformation of the current *Homo sapiens* species into some other species: the ‘improved human’ –

38 G. Lindenberg, *Ludzkość poprawiona*, *op. cit.*, p. 43ff.

39 M. Cobb, *The Brave New World of Gene Editing*, <https://www.nybooks.com/articles/2017/07/13/brave-new-world-of-gene-editing/> (accessed 20.01.2020).

40 G. Lindenberg, *Ludzkość poprawiona*, *op. cit.*, p. 46.

41 S. Knapton, *Designer Babies on Horizon as Ethics Council Gives Green Light to Genetically Edited Embryos* <https://www.telegraph.co.uk/science/2018/07/16/designer-babies-horizon-ethics-council-gives-green-light-genetically/> (accessed 20.01.2020).

42 G. Lindenberg, *Ludzkość poprawiona*, *op. cit.*, p. 48.

*Homo sapiens*+. Not only chimeras (with mixed genes from several persons) would be created, but also hybrids (human–animal, techno–human, techno–human–animal, etc.). This scenario can become true not only through genetics: information technologies and artificial intelligence would also certainly be helpful.

Speech synthesis and technological interfaces allow disabled persons to communicate with others already at this stage of biotechnological progress. Better functioning of the human body is also possible thanks to so-called smart drugs. These include nootropics (cognition-enhancing supplements) – consisting of various supplements and substances (including psychotropic ones). They are meant to enhance cognitive functions, such as memory, creativity, logical thinking, concentration, etc. These agents can also affect processes related to the nervous system, e.g. by increasing motivation and the will to live, delaying mental fatigue or improving mood. Thus, not only human organs but also the senses, memory and even such abilities as creativity or reasoning skills can be improved with the products of modern technologies. These technologies are the foundation of the new era whose advent is imminent and which is referred to as the ‘computer-processing age’ (or the ‘age of cognitive systems’ or the ‘age of turbo-experience’). These technological ‘boosters’, equivalent to pills, capsules or syrups, can dramatically alter sensory experiences and perception of reality. The new generation of machines will not only think for humans, but also sensitize them, heighten their senses and even replace them. Machines will enable the making of better decisions. They will allow the removal of barriers that limit people, including barriers resulting from disability.

These predictions give hope for solving many problems related to existing human disabilities and for improving the condition of ‘able-bodied’ people. At the same time, it is not possible to disregard arguments that actions undertaken to create a perfect human are similar to ‘playing God’. They represent a ‘downward spiral’, and their effects may be unimaginable from the perspective of individual rights, subjectivity, dignity, integrity, individuality, identity, freedom, equality, etc.<sup>43</sup> Above all, it is necessary to take into account the fears that in the future, people who are not genetically improved, or who are not fitted with computer parts, could become members of a sub-species with a status similar to the one currently accorded to animals.<sup>44</sup> Therefore it is extremely important to set ethical and legal boundaries for the application of technology.<sup>45</sup>

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43 B. Chyrowicz, *Bioetyka i ryzyko. Argument ‘równi pochyłej’ w dyskusji wokół osiągnięć współczesnej genetyki*, Lublin 2002, p. 161ff.

44 M. Nowacka, *Transhumanistyczny sens prawa dziecka do otwartej przyszłości*, (in:) P. Duchliński and G. Hołub (eds.), *Ulepszanie moralne człowieka*, *op. cit.*, p. 115.

45 K. Trzęsicki, *Medyczna etyka informatyczna: Przedmiot i główne problemy*, „Archeus. Studia z bioetyki i antropologii filozoficznej” 2006, vol. 7, p. 66.

## Conclusions

Modern technologies are able to limit, and even to eliminate – to a certain extent – problems tied to disability. They also allow the enhancement of the physical and mental capabilities of healthy persons. However, due to numerous ethical controversies, it is crucial to establish legal frameworks for actions that are made possible by biotechnological progress in medicine. These regulations should take into account the culturally defined standards of ‘normality’, which are difficult to define unambiguously. Undoubtedly, the fluidity of the criteria and the evolution of extra-legal considerations must be taken into account: ‘We have long ago agreed to the improvement of our health condition through solutions such as spectacles for those with poor eyesight or the technical correction of the malfunctioning of the various organs. To what interventions would we agree in the subsequent phase of our civilization’s development?’<sup>46</sup> It is difficult to provide a clear-cut answer. The supervision of biotechnological opportunities undoubtedly requires, in the first place, that boundaries be drawn, i.e. a distinction made between ‘therapeutic’ and ‘improvement’ activities.

Taking into account the dramatically limited access to treatment in Poland, it is hard to ruminate on the directions for the development and implementation of modern technologies in medicine.<sup>47</sup> Nevertheless, it appears that even despite enormous societal backwardness, the Polish philosophical and theoretical–legal discourse should consider the tendencies that dominate bioethics in developed countries. Bioethical reflection undoubtedly supports the holistic understanding of the concept of disability and its related problems. It helps resolve the emerging moral dilemmas and may constitute grounds for future legal regulations in this area.<sup>48</sup>

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