



# editorial



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## Changing biotechnology dynamics — a blessing or a curse?

Technology and organism . . . The more artificial one is, the more natural the other. In the first place, we can think of two completely opposite concepts. However, we know that ‘the mixture of artificial intelligence and human’ concepts that we place in the future are not as far away as we might think. The biggest supporter of this trend is transhumanism, which challenges disease, aging, and even death, hand-in-hand with technology [1].

Biotechnology, on the other hand, is a rare concept that brings together both living organisms and technology in one. It is a science that existed in the far past and is expanding in the present, with no end in sight. The evidence, found in Gobekli-tepe, Anatolia, shows that man carried out fermentation, which is the first example of biotechnology in 10.000 BC. From penicillin to the

first production of recombinant human insulin, we see that biotechnology is developing at a very rapid pace.

Seeing as how it is as old as human history, what does biotechnology have to do with modern ethics?

First of all, let’s take a general look at the technology that leads to social transformation. As Postman states in his book, technology can transform people into healthier individuals and extend their lives. Conversely, companies focus on making money while moving away from moral responsibility and may develop a sub-culture without moral foundation [2].

Do we want to live longer? What if the person, whose life has been prolonged, is the one who kills many people or causes damage to the world? Or, conversely, it could be a person who saves people. Should the prolongation of life only apply to rich societies? Is not access to medicine produced with advanced technology and healthy living the fundamental right of all people? All these questions point to the need for discussing what we really want or need.

Biotechnology necessitates an intervention with a living organism and such interventions present many possibilities for introducing risk. Such biotechnological modifications have the potential to affect the environment, nature and, indeed, social life itself. The long-term effects of these high-tech products (materials in nanotechnology, etc.) in humans and the environment are, unfortunately, not known. Moreover, scientists working in this field are also potentially exposed to, as yet, unknown risk [3].

Modification of living organisms may have the intention of improving human life in some way, but paradoxically, it might result in highly detrimental effects? If so, how can we establish the extent of a permissible intervention? Is it necessary? Who can do this intervention?

There are many examples of dual-use of biotechnology [4,5]. CRISPR-Cas9 technology has made a breakthrough in biotechnology by allowing gene regulation in living things. Many applications have been made so far: from dogs with hyper muscles to humans whose genes have been manipulated. For example; a third CRISPR baby was born in July 2019 in China. Additionally, the fact that an ordinary person can have CRISPR, which is now sold over the internet, as home kits shows how rapidly science can impinge on general society.

Although Frankenstein's creation, devised by Mary Wollstonecroft Shelly, is a character from a novel, it may represent a good example of how well-meaning intervention can go horribly wrong. In the process of revival, Frankenstein was not asked whether he wanted to be revived, because, as told in the story, even if the creature that came to life was monstrous, his life instinct prevailed. There is, and will be, the instinct for survival in all living things, from single-cell amoeba to the superior humans that are planned to be created. Pushing the boundaries of social, geographical, or mental existence has been around since the Sumerian Epic of Gilgamesh [1].

Before the intervention, as in Frankenstein, a baby is not asked whether he/she wants to come to life. Abortion has similar ethical contradictions as well. The concept of bioethics, although briefing and consent processes are developed nowadays, does not apply to all living things and under all conditions. How much of consent is a formality and how much is real, should be discussed.

What about privacy? Particularly, how should we consider the fact that an intervention on genes can affect a person's whole life from finding a job to getting health insurance [6]? For example, what will the identification of CRISPR infants in China cause in the future? Will they be excluded from society or will they be seen as an element of pressure on society?

While technology continues to trigger social transformation, some become dependent upon technology yet others reject it completely. The confidence erosion experienced by the pharmaceutical industry ("big pharma") affects people's approach to new drug-related technologies and leads to the generation of societal resistance.

Transhumanism advocates that human beings have evolved and should be transformed into superior human beings through technology; however, a conservative element in society is convinced that human existence is stable and immutable. We know, however, that change is inevitable. Neither threatening humanity and the world with the use of unlimited technology, nor making no progress and preventing the finding of new drugs and new treatments represent appropriate paths for humanity.

The most reasonable approach, in my opinion, would be to adopt Aristotle's Golden Mean approach. In other words, to find an appropriate balance between a constant stagnation and swimming in uncontrolled dangerous waters.

We know that a technology-oriented utopia imagined by technophiles has the potential to turn into dystopia at any time. Why should the development of the superior man advocated by Transhumanism not lead to the end of ordinary people who are sick and aging?

First of all, we have to say that the concept of the superior human is contrary to the declaration of human rights. It is also a specific human right to indulge in intellectual inquiry. In order to interrogate, however, it is essential that information is gathered in advance.

Technology, however, can alter the perception of reality [2]. If the perception of reality can be easily manipulated, then we can foresee that accessing the right information will become much more valuable (and difficult) in the future.

Nowadays, information can be easily propagated through the internet, but the accuracy of much of this data is a particular moot point. The preponderance of information pollution makes the

identification and distillation of accurate communication ever more important. At this point, ethics should serve as a protective filter as an indispensable part of science. For ethics to function in real terms, it is important to explain science and technology to the public with both its good and bad sides.

In order for this to occur, initially, scientists must establish a connection with society. Health professionals, such as physicians and pharmacists, should act as bridges to inform the community about new biotechnological drugs and therapies. More importantly, good storytellers are needed for people to question and adopt advanced technologies. We see that biotechnology is explained with art through cinema, literature, and games. For example; a video game named, "Detroit: Be Human", offers alternative decision-making and encourages players to decide on behalf of humans or machines. As a result, this subconsciously reduces all questions about ethics, morals and human/machine relations to a simple yes or no answer.

In these examples, it is important to involve scientists as consultants in writing scenarios, novels and creating works of art. This will have the advantage of bringing society and the scientific world closer together, increasing scientific literacy and encouraging people to think about and question scientific issues. On the other hand, these artworks do not decrease but increase the concerns of society. Therefore, it will be important for scientists to adopt trust-based communication and transparency [7].

Bio-art, which is a relatively recent medium, unlike more traditional art forms carries ethical concerns that accompany aesthetics hand-in-hand. It should not be ignored, however, that such works created by artists enable people to become involved in and empathize and hence be in a better position to inform the public about science. It would be expected that the collaboration of artists and scientists will provide more effective results on these platforms [8,9].

When we consider from the point of the regulations of the countries, it is noteworthy that there are different practices varying from country to country, especially for biosimilars. The smallest change in biological products can cause major effects. The risks including immunogenicity, adverse effects, stability problems, and easy manipulation of these living products and interchangeability are not known to many people, including healthcare professionals. It is important for scientists to be proactive at this point to ensure safety [10].

At the same time, countries should allow access to biotechnology by making regulations, but take measures to reduce the risk of potential danger (bioterror, etc.). However, at this point, as in nano-divide, the question arises whether countries can keep poor societies out of developments or use them as a field of experimentation. So, should control be taken by scientists, rather than by countries, or by an independent organization? This is yet another issue that deserves further discussion [10].

We know that ethical dilemmas will continue as long as humanity exists. Everyone believes they have the right answer and most of the time there will not be a single right answer. Which raises the question: When we are in the dilemma of ethics in biotechnology, what if the path that we choose for the good of all humanity is not the right path?

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