Chapter 16
The Role of Bioengineering in Healthcare

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ABSTRACT

Bioengineering, also known as biological engineering, is a discipline that explores the application of mathematics, chemistry, physics, and computer science to analyze and design new processes or tools to bridge gaps in the life sciences. It is a field that encompasses a wide range of sub-disciplines, including food and biological process engineering, agricultural engineering, technical resource engineering, and biomedical engineering. Bioengineering uses so-called biotechnology, which the United Nations defines in the Convention on Biological Diversity as technology that uses the biological systems of living organisms or their derived biological systems to produce or modify products or processes for specific uses. This chapter deals with the area of bioengineering that currently benefits or will benefit in the future from the possibilities of artificial intelligence.

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1. INTRODUCTION

The field of artificial intelligence was still in its infancy before the Covid-19 pandemic in healthcare. However, the pandemic has caused an increase in demand for the support of healthcare with artificial intelligence (Becker, 2019). One of the areas with the greatest use of artificial intelligence in healthcare is biotechnology. Scientific progress in the field of health care is growing exponentially and is more and more fundamentally dependent on the use of the enormous amount of data generated by modern biotechnologies. Scientists have read the human genome, learned to recognize differences in DNA and thereby detect birth defects. During life, it is possible to prevent diseases through personalized holistic medicine. Gene scissors make it possible to precisely remove and replace (manipulate) a specific gene and thereby control evolution. The world's giants and visionaries are founding companies where they concentrate experts dealing with precisely targeted possibilities with the help of artificial intelligence and nanotechnology. Data obtained by modern instrumental methods are combined in thousands of databases, and the possibility of their use depends on the capabilities of artificial intelligence. While in the period before the reading of the human genome, discoveries took place mainly in laboratories by conducting and analyzing experiments, when research centers mostly worked with a small amount of data, in the period after the reading of the human genome, this method of research has changed significantly and it is no longer possible to achieve significant progress without use of data from comprehensive databases and without the use of so-called Big data.

The global biotechnology market in 2021 represented almost 753 billion US dollars. Biotechnologies have become a very popular item among investors due to the long-term growth tendency of the market, which did not change even during the financial crisis in 2008, and during the Covid-19 pandemic, the biotechnology market even strengthened strongly.

2. THE ROLE OF BIOENGINEERING IN HEALTHCARE

Bioengineering, also known as biological engineering is a discipline that explores the application of mathematics, chemistry, physics, and computer science to analyze and design new processes or tools to bridge gaps in the life sciences. It is a field that encompasses a wide range of sub-disciplines, including food and biological process engineering, agricultural engineering, technical resource engineering and biomedical engineering.

Bioengineering uses so-called biotechnology, which the United Nations Organization defines in the Convention on Biological Diversity as technology that uses the biological systems of living organisms or their derived biological systems to produce or modify products or processes for specific use (White et al., 2020).

2.1. History of Bioengineering

Today, biotechnology refers to molecular and cellular technologies that began to appear in the 1960s and 1970s, mainly in connection with the company Genentech, but humans have been using biological processes to improve the quality of their lives for about 10,000 years, starting the emergence of agriculture. About 6,000 years ago, humans began to use the biological processes of microorganisms to make bread, alcoholic beverages and cheese, and to preserve dairy products. In medicine, thanks to