

Biopharmaceutical innovation: benefits and challenges

Abstract

There is an urgent need for new discoveries and development in biopharmaceutical field. Indeed, the continuous development mutations of viruses and microbes and the emergence of distinct types of diseases along with numerous patients with specific cases push the industrial and biopharmaceutical sectors to collaborate with each other to innovate and develop new biopharmaceutical to face this dilemma and serve the interest of all mankind healthcares. This would lead to an increase in the lifetime expectancy and an improvement of life quality via providing better therapies. However, the biopharmaceutical innovation faces numerous challenges and difficulties before giving birth to a new biopharmaceutical but this did not stop it from discovering and boosting the development and innovation of drugs with huge benefits and better health outcomes for the population. Such development improves the quality of life for the society and the coming generations. Within this review, we describe selected examples that illustrate the benefits of the biopharmaceutical innovation as well as the related challenges.

Keywords: biopharmaceutical innovation, Benefit, Challenge, Innovation of drugs

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Introduction

One day we may look back at the last era and notice that there were huge development and progress in the field of biopharmaceuticals. The innovation is considered as fundamental for the evolution and development of the biopharmaceutical manufacturing.¹ Although the remarkable modern advances, the overall rate of divers' diseases and health problems is still rising, the biopharmaceutical and healthcare professionals are working hard and continuously to control this dilemma.² Nowadays, changes in the biopharmaceutical fields are clearly noticeable. While novel biopharmaceuticals and new drugs development tools are discovered and improved, the improvement and the development of the biotechnology is the impulse of this development.³ However, biopharmaceutical innovation is facing numerous challenges from different sides to innovate and promote the newly-developed biopharmaceuticals. However, this did not stop the biopharmaceutical companies, the researchers in the related fields and the pharmacists to continue their noble work and innovate more, because the biopharmaceuticals are among the most important approaches to shape and improve the healthcare, extend healthy productive longevity and reduce the spread of severe diseases. Moreover, the biopharmaceutical innovation represents also a key for development and a successful leadership toward boosting the industrial production, such innovation represents also a factor of economic growth and it ensures its competitiveness in the global market⁴ at the international level.

The benefits and outcomes of the biopharmaceutical innovation: selected examples

One of the most important objectives of the biopharmaceutical innovation is to contribute in the decrease of mortality and premature death averages. Recently the Manhattan institute published a research study about the reasons why the average of lifetime expectancy and longevity varies from a country to another, the effective contribution of new biopharmaceuticals proves that the more we use new biopharmaceuticals the more we gain longevity and provide welfare to the population.⁵ In

addition, adapting drug formulations to specific patients and cases leads to improved cures and premature mortality reduction, which is a substantial public health goal too? Since the biopharmaceutical field was further revolutionized and initiated-to develop and discover new biopharmaceuticals-, we noticed that this contributes to extend the life expectancy average⁶ reflecting an important impact. According to a conservative valuation, the biopharmaceutical research and development one-time outlay is around 15 billion US dollars then save approximately 1.6 million life-years per annum, showing that the development of novel biopharmaceuticals plays a basic role in prolonging lifetime expectancy and extending healthy productive longevity and lifetime income by around 0.75% to 1.0% per year.⁷

Lifetime average expectancy improved from 46.5 years for a person born in 1950-55 to 65.0 years for those born in 1995-2000 according to the United Nations datum. Such observations support that the new biopharmaceuticals have a substantial role in decreasing mortality and premature death average.⁸ Moreover, the biopharmaceutical innovation has also numerous economic outcomes and other benefits that cannot be neglected. Indeed, the availability, the abundance and the divers variety of several new biopharmaceuticals in the market result in the prices reduction of some medicines, increase drug accessibility and further develop the drug market.^{9,10} Such development in the biopharmaceutical innovation makes that the doctors and the healers have a variety of therapeutic options and curative choices to treat their patients. Thus, in case some of the biopharmaceutical is not suitable, cannot improve their health or have serious side effects if given to a specific patient, they may prescribe a different biopharmaceutical from the same category¹¹ as an alternative. Laboratories and biopharmaceutical firms ensure and guarantee their funding continuity via, at least partially, the continuous innovation and discoveries. Indeed, it is accepted that the more they invent and innovate the more they get financial incomes.

This makes the biopharmaceutical firms relying on divers' sources of income and their financial fund box rich due to the development and innovation which are the future of every company. Such concept pushes to innovate and invest in biopharmaceuticals research and development

along with the marketing of new medicines.¹² The research and development boost the economy toward an economic growth and prosperity of the firm, and the civil society as a whole, via creating good values to enhance life features^{13,14} because there are important interaction and strong relationship between the economic growth and the productivity. When the health outcomes are advanced this will result in a decrease in diseases and disabilities which contributes to a revolution in the development and prosperity of the society.^{15,16}

Illustration of the challenges facing biopharmaceutical innovation

Nowadays the biopharmaceutical companies, the health professionals and the stakeholders are facing a lot of challenges and struggles during the innovation of the new biodrugs and before the promotion of these novel products. For instance, according to the pharmaceutical protocols, every biodrugs goes through many steps and procedures before the marketing, and among these stages, we have the animals and clinical studies. Indeed, this new medicine would be tested on the laboratory animals during the development process, sometimes there are a shortage and lack of this animal samples or restrictions on their usage because there are associations and animal rights authority which consider the use of some animals in scientific tests or other scientific purpose a kind of torture and consider this as an unethical issue, which is a big challenge that the biopharmaceutical innovation is facing¹⁷ while developing new therapeutic agents. Following the same line of thoughts, the European Union political platform and its Scientific Committee on Health and Environmental Risks, and in order to avoid animal extinction and for animal protection, suggest to amend and reconsider the use of non-human primates in clinical experiments and made new laws to protect some animals used for clinical tests.

Regarding this case, the use of human sample average is predictably in the way of rising.¹⁸ Furthermore, another challenge the biodrugs innovation is facing is the lack and the insufficiency of financial resources that support research in the biopharmaceutical research and development. Moreover, the lack of experience and qualified individuals in some countries is also another issue biopharmaceutical innovation is facing. In addition, the research and development depends also on other different facts including the poverty, the regime of the country and the country policy. Obviously, the developed countries innovate more than the developing countries and the democratic countries innovation average is clearly higher than autocratic countries.^{19,20} In some situations, the biopharmaceutical market produces and promotes a new biodrugs which is similar to another existing biodrugs,²¹ but this medicines are not made according to the “copy past” method, this new biodrugs just belong to the same treatment category and treat the same kind of illness but their formulation, posology, composition or the cure condition and cure rapidity might be different. Such drugs have specific regulations in different countries.

Biopharmaceutical innovation got a lot of criticism which might affect their reputation; this is considered as one of the big challenges which the pharmaceutical firms are confronted to.²² Ethical challenges are also among the issue biopharmaceutical innovation has to deal with. In fact, before being promoted in the market, the drug goes through many steps while it is developed to become eligible to be marketed. Innovating a new biodrugs is confronted to many ethical challenges at different levels. For instance, a discussion and a lot of questions were about the ethical issue of the use of placebo versus

active compounds in pharmacological studies. In some cases, it is considered to have a negative impact on the clinical research because the issue with the placebo is that the patient should show his satisfaction and agreement for using this delusory therapy. Indeed when the individual participating in the scientific study does not receive an active and real therapy, it might be considered, by some professionals, as an unethical issue which stand in the front gate of the biopharmaceutical innovation as a big challenge.²³⁻²⁵

Conclusion and perspectives

The immense progress of biotechnology during the last decades represents the impulse behind the overall changes in process of the biodrugs innovation in several sectors and at different levels. Innovation is the element engine in this operation; when there is collaboration between manufacturers, scientific community and the society to encourage the innovation, it will surely have an impact in terms of saving lives and improving the public health at divers levels. In addition, it will especially ensure a healthy area for the coming generations since one of the best ways to improve the future is to innovate it.

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Conflict of interest

The authors declare that there is no conflict of interest.

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