Acta Scientific MICROBIOLOGY (ISSN: 2581-3226)

Volume 5 Issue 5 May 2022

Research Article

Biological Nanotechnology. Current Research Lines for both Medical and Engineering Solutions

Laura Bermudez Garrido* and Begoña de Frutos Martínez

Department of Molecular Biology, University of Helsinki, Finland

***Corresponding Author:** Laura Bermudez Garrido, Department of Molecular Biology, University of Helsinki, Finland.

DOI: 10.31080/ASMI.2022.05.1057

Received: February 17, 2022

Published: April 07, 2022

Abstract

Biological nanotechnology is a new field of study in expansion. Nanoenzymes for viral diagnosis, engineered cell membranes or nanographene for cancer therapy is some of the possibilities of this science from the future. The application of nanotechnology could improve diagnosis, treatments of symptoms, cure diseases and create new materials. In this review, we will explore some current research of nanobiology and thusly provide a closer understanding of the direction of future research lines.

Keywords: Nanobiology; Biological Nanotechnology; Nanotechnology; Nanobiotechnology; Biological Nanotechnology Future Predictions; Nanotechnology Future; Nano-GO; Nano-Graphene Oxide; Graphene; Nanozymes; Viral Diagnosis; Cancer Therapy; Nanotubes

Abbreviations

Nano-GO: Nano-Graphene Oxide; CCMs: Cancer Cell Membranes

Introduction

Nanotechnology is defined as the field of study that matters about a broad variety of solutions under 1μm dimensions such as molecular manufacturing or material sciences. Biological Nanotechnology is a branch of the study of nanotechnology that is applicable to living beings or inspired by nature. Consequently, biological nanotechnology implies solutions such as protein and genetic engineering and gene therapy (1), material studies such as graphene for cancer therapy (2), butterfly-inspired nanotubes (3) or nanozymes in viral diagnosis (4), among others. This knowledge is useful in the study of diseases, treatment developments, the creation of new materials.

The techniques are innovative perspectives in multiple research groups due to the broad possibilities of biological nanotechnology studies. For this reason, it is experiencing exponential growth recently and it is predicted to continue during the following years. Hence, taking a closer look at these will definitely influence a better evaluation of the current situation of life sciences future projections.

Materials and Methods

For the accomplishment of this purpose, several articles from different techniques have been selected, compared and summarized. The potential challenges of them and future possibilities have been also analyzed.

Results and Discussion

The extracted information is ordered depending on the technique and research approach.

Nanoenzymes in viral diagnosis

As the COVID-19 pandemic has taught us, there are great challenges in viral diagnosis and treatments. Nanotechnology has a huge potential in this field. The synthesis and use of nanozymes

have some advantages compared with natural ones like a higer physiochemical stability and versatility, high durability and are more convenient for mass production due to both manufacturing is easier and reduced in costs and easier storage [4]. For this reason, there are a variety of bibliography about biosensing and treatments.

The use of nanozymes can be a useful antiviral therapeutic approach for diseases such as COVID-19. There have been developed toolkits for several therapeutic porpuses such as introducing immunity that suppresses virus proliferation, prevention of invasion-mediated damage, a reduction in mutations [4].

Although these present a great potential, most of the bibliography is focused on active sites of enzymes and not enough in protein scaffold mimic or in enzymes that need to function within a lipid membrane. Consequently, nanozymes will be a promising biomedical research topic in the following years.

Nano-GO graphene

Cancer is one of the more extended causes of death in the world, and nanotechnology has potential also in this field. Nano-Graphene Oxide (Nano-GO) has a chemical versatility that arises from the oxygen functional groups on the carbon structure. This group make possible its easy functionalization under mild conditions, with organic molecules or biological structures in covalent or non-covalent linkage [2].

The synergistic effects resulting from the assembly of well-defined structures at nano-GO surface, in addition to its intrinsic optical, mechanical and electronic properties, allow the development of new multifunctional hybrid materials with a high potential in multimodal cancer therapy [2].

Butterfly wings inspired nanotubes

Nanobiology is also useful when it comes to technology and engineering. A group of scientists of Japan's National Institute of Science and Advanced industrial technology has created a carbon nanotube net on a butterfly wing, developing a new material of biological origins which heats quicker and possesses better electric conductivity. The idea comes from butterfly wings' effective absorption of solar energy and high hydrophobicity [3].

The results of this experiment promote the development of a hybrid technology that takes advantage of living beings´ powerful engineered structures.

Engineered cancel cell membranes

Theranostics is the combined technique of using a marked drug for identifying and delivering the treatment for tumours. There have been engineered cancer cell membranes (CCMs) for theranostics, helping the targeting and reducing non-specific effects. They have been coated using nanoplatforms [5]. There are various methods used for this purpose but in all cases, an improvement in targeting delivery, activation of immunity and better detection have been observed.

Although more research in the optimization for prevention of damage of the original membrane and biosafety investigations will be needed in future, the engineered CCMs present characteristics that label them as a potential target in cancer research.

Conclusion

There are many examples of promising research lines related to this field, and the number of articles increases day by day. Biological nanotechnology has implications in both health and engineering porpuses and it is already experiencing great growth in the life sciences field.

Acknowledgments

I would like to thank my friend for her support in this article.

Conflict of Interest

There is no conflict of interest in this article.

Bibliography

1. Bartmos C. "Nanotechnology and predicting the future review of the current state of nanotechnology and making future predictions with a discussion of forecasting methods" (2016).

2. Gonçalves G., *et al*. "Nano-graphene oxide: a potential multifunctional platform for cancer therapy". *Advanced Healthcare Materials* 2.8 (2013): 1072-1090.

3. Miyako E., *et al*. "Self-assembled carbon nanotube honeycomb networks using a butterfly wing template as a multifunctional nanobiohybrid". *ACS Nano* 7.10 (2013): 8736-8742.

4. Lee J., *et al*. "Exploration of nanozymes in viral diagnosis and therapy". *Exploration* 2 (2022): 20210086.

5. Guo Y., *et al*. "Engineered cancer cell membranes: an emerging agent for efficient cancer therenostics". *Exploration* 2 (2022): 20210171.