Current proposals and designs for nanorobotic in medicine

Elena Cruze*

Cruze E. Current proposals and designs for nanorobotic in medicine. J Nanosci Nanomed 2022;6(1): 09-010.

ABSTRACT

Technological advancements have expanded our power to alter the environment around us on a smaller and smaller scale. Nanotechnologies are fast gaining traction in the world of medicine, which has given rise to the topic of nanomedicine. Nanoparticle technology has grown increasingly recognisable and prevalent, particularly in pharmaceutical technology. The construction of nano-robots, which are machines with nanoscale components, is an intriguing and promising field of nanotechnological research. There are several possible applications in this field of study, many of which are actively being investigated and developed. The purpose of this study is to present an overview of the burgeoning subject of nanorobotics in medicine, as well as a discussion of nanorobotics' potential applications in domains ranging from neurosurgery to dentistry.

Key Words: *Surgery; Nanorobotics; Nanomedicine; NNI; Magnetotatic bacteria*

INTRODUCTION

Researcher's capacity to investigate and understand the world around us on a smaller and smaller scale has highlighted advances in science and medicine. New therapeutic options and frameworks of knowledge were generated with each order of magnitude of access to lower dimensions. The germ hypothesis and microbiology were two of these breakthroughs.

The advent of nanotechnology, which allows researchers to operate on the scale of nanometers, is the next step in the ever-decreasing size of operations. The National Nanotechnology Project (NNI), a United States government initiative to encourage nanotechnology research and development, defines nanotechnology as "science, research, and technology undertaken on the nanoscale." This scale, according to the NNI, ranges from 1 to 100 nanometers. A cell surface receptor is around 40 nanometers in diameter, a strand of DNA is about 2 nanometers in diameter, and a molecule of albumin is about 7 nanometers in diameter.

Nanobiotechnology is a branch of nanotechnology that applies the ideas and techniques of nanotechnology to biological sciences and medical research and progress. Nanobiotechnology entails the creation of nanoscale technology, such as medicines and mechanical devices, for the study of biological systems and pathological treatment. This article will focus on nanobiotechnology's advancements in device development, especially the building of nanorobotics and their applications in medicine. Microbiology, haematology, oncology, neurosurgery, and dentistry will all be discussed with specific instances.

MICROBIOLOGY

Microbiology has shown to be an effective springboard for the early development of robotic functionalities in nanobiotechnology. Although microrobots and nanorobots can be built and function, transportation and propulsion issues restrict their usage within the vascular system. Coupling microrobots and nanorobots to magnetotactic bacteria such as magnetococcus, magnetospirillum magnetotacticum, or magnetospirillum magneticum is an effective technique for allowing propulsion of microrobots and nanorobots. The bacterial cell component would be the greatest component of these nanorobots incorporated with magnetotactic bacteria. The marine magnetotactic spirillum is the smallest known species of magnetotactic bacterium, measuring 0.5 m (500 nanometers), barely over the upper limit of the NNI's definition of the nanoscale. The creation of such a gadget has a number of theoretical practical applications. A highly customizable structure including therapeutic substances such as medicines and artificial antibodies for activity at the target location can be ligated to the bacteria. There's also the possibility of using these devices to gather data and act as sensors. Larger robots have a greater capacity to function in and move through larger channels, whereas capillaries and tiny veins have limited functionality. Smaller nanorobots are extremely effective in capillary settings and the microvasculature, but they cannot attain high enough velocities in big vessels to control them.

HEMATOLOGY

In the discipline of haematology, there is a wealth of research and prospective applications for nanomedicine and nanorobotic applications. Nanorobotics in haematology is being studied for a wide range of applications, from emergency transfusions of non-blood oxygen-carrying molecules to restoring primary hemostasis. In this field, nanorobots might also be used as phagocytic agents. "Microbivores" is the name given to these nanorobots. The exterior surface of these robots would be intended to include a large number of adjustable binding sites for antigens or diseases ranging from HIV to *E. coli*. Microbivores are thought to be up to 80 times more powerful than our natural phagocytic skills, and may be able to eliminate septicemia within hours of administration. With the worrying growth in antibacterial resistance, developing nanorobotical capabilities to combat infection might pave the way for new ways to cure illness.

ONCOLOGY

The Institute of Medicine has set a goal of improving the quality of cancer therapy and clinical results, as well as lowering the mortality and morbidity associated with oncological disorders and their treatment. The rising number of seniors in the community, as well as the rising number of cancer diagnoses that occur with an ageing population, highlight this need. Nanotechnology has already showed a lot of promise in terms of cancer treatment. Nanoparticle technology is playing an increasingly important role in cancer imaging tools, overcoming medication resistance, and improving metastatic treatment, to name a few examples. One of the drawbacks of traditional chemotherapy has been the toxic effects of chemotherapeutic drugs on normal cells, which has can autonomously detect malignant cells limited the dose. As targeted medicines have progressed, and nanoparticle technology has enhanced treatment selectivity, this barrier has been overcome. It has been successfully built a nanorobot that and deliver therapy chemicals at the site of these cancerous cells. This nanorobot can be built to respond to a variety of cell surface receptors, and the payload it delivers when activated may be altered as needed. This nanorobot is built out of synthetic DNA strands that have been manipulated to fold into a desired tertiary structure.

Nanotechnology has opened the door to a plethora of new approaches to better cancer treatment, and as nanorobotic technology advances, additional uses will undoubtedly emerge. The suggested designs have the potential to set new standards in cancer treatment, screening, and prevention if existing technology is further developed.

Editorial Office, Journal of Nanoscience and Nanomedicine, United Kingdom

Correspondence: Elena Cruze, Editorial Office, Journal of Nanoscience and Nanomedicine, United Kingdom, E-mail nanoscience@esciencejournal.org

Received: 01-Jan-2022, Manuscript No. PULJNN-22-4539; Editor assigned: 03-Jan-2022, PreQC No. PULJNN-22-4539(PQ); Reviewed: 16-Jan-2022, QC No. PULJNN-22-4539(QC); Revised: 16-Jan-2022, Manuscript No. PULJNN-22-4539(R); Published: 23-Jan-2022, DOI: 10.37532/puljnn.2022.6(1).09-010

CONCLUSION

The scientific community is seeing a technological breakthrough on scale orders of magnitude smaller than it has ever been before. We can have more control over the environment around us as technology progresses and we investigate on smaller and smaller sizes. Developing the power to alter the environment on a smaller scale in the past resulted in significant changes in the scientific community and the rest of the world. Nanotechnology is set to transform many of the paradigms with which we think about illness diagnosis, treatment, prevention, and screening, much as it did with the era of microscopes ushering in the field of bacteriology or the beginning of the atomic age with the study of particle physics.