

A. I. Greybo, D. V. Paramonov

INTRODUCTION OF NANOTECHNOLOGY IN MEDICAL PRACTICE

Tutors: sr. tr. T.G. Novitskaya

*Department of Foreign languages,
Belarusian State Medical University, Minsk*

Resume. *The article presents a number of nanotechnologies used in medicine. A sociological survey on the topicality of applying nanotechnology in medicine in the future has been conducted among the medical students.*

Keywords: *nanotechnology, BSMU, students, sociological survey.*

Relevance. Recent years have witnessed an unprecedented growth in research in the area of nanoscience. There is increasing optimism that nanotechnology applied to medicine will bring significant advances in the diagnosis, treatment, and prevention of disease. Growing interest in the future medical applications of nanotechnology is leading to the emergence of a new field called nanomedicine.

Objective: to evaluate the possibility of applying nanotechnology in medicine.

Material and Methods. The field of “Nanomedicine” is the science and technology of diagnosing, treating, and preventing disease and traumatic injury, of relieving pain, and of preserving and improving human health, using nanoscale structured materials, biotechnology, and genetic engineering, and eventually complex machine systems and nonrobots. It was perceived as embracing five main subdisciplines that in many ways are overlapping by common technical issues [1].

Nanotechnology became widespread in different sections of medicine.

Nanotechnology has provided the possibility of delivering drugs to specific cells using nanoparticles. The overall drug consumption and side-effects may be lowered significantly by depositing the active agent in the morbid region only and in no higher

dose than needed. Targeted drug delivery is intended to reduce the side effects of drugs with concomitant decreases in consumption and treatment expenses. Drug delivery focuses on maximizing bioavailability both at specific places in the body and over a period of time. This can potentially be achieved by molecular targeting by nanoengineered devices [2]. Nanoparticles might also be used to circumvent multidrug resistance (MDR) mechanisms.

A surgical nanorobot, programmed or guided by a human surgeon, could act as a semiautonomous on the site of the surgeon inside the human body, when introduced into the body through vascular system or cavities. Such a device could perform various functions such as searching for pathology and then diagnosing and correcting lesions by nanomanipulation, coordinated by an onboard computer while maintaining contact with the supervising surgeon via coded ultrasound signals. Nanotechnology may be used as part of tissue engineering to help reproduce or repair damaged tissue using suitable nanomaterial-based scaffolds and growth factors. Tissue engineering if successful may replace conventional treatments like organ transplants or artificial implants [3].

We conducted a sociological survey among the students of BSMU to determine their relevance to the technology.

The results and their discussion. The Students had to answer the following questions:

Do you know the latest developments in the field of nanotechnology in medicine?

“95% of the students answered yes to this question.”

What is the prospect of this technology in the future?

“79% answered that it is one of the leading directions in medicine, 1% of respondent's claims that this technology will not receive proper attention and distribution. And 20 percent were undecided.”

Many people have now been treated with caution by this technology, what is your opinion?

“69% of respondents replied that this technology is safe for humans. 21% of respondents replied that these developments will facilitate the lives of people, however, it is need to monitor their use. 9% of respondents expressed their fear related to the invasions of various nanoparticles and their replanting in the human body. 1% of respondents said that they are categorically against it.”

How do you feel about the constant monitoring of condition of your body by nanorobots?

“59 % of respondents didn't express any concern about it. 38% of respondents replied that continuous monitoring is alarming, but it is probably a good way to monitor health. 3% of respondents were against it.”

Do you see the proliferation of this technology in Belarus and its further popularization?

“Only 42% of the students answered: "yes, it is possible". 47% responded that probably no. 6% responded that it was difficult to answer. And 5% gave their own answer that due to insufficient funds, this technology will get very slow distribution and

development in our country.”

Conclusions:

1) Nanotechnology will change healthcare and human life more profoundly than many developments of the past. They have potential to bring about significant benefits, such as improved health, better use of natural resources, and reduced environmental pollution.

2) Although realization of the full potential of nanomedicine may be years or decades away, recent advances in nanotechnology-related to drug delivery, diagnosis, and drug development are beginning to change the landscape of medicine nanotherapies could, in the long term, be much more economical, effective and safe and could greatly reduce the cost of current medical procedures.

References

1. Future impact of nanotechnology on medicine and dentistry/ M. Patil, D. Mehta, S. Guwa/ J Indian Soc Periodontol. 2008 May-Aug; 12(2): 34–40.
2. Small-scale systems for in vivo drug delivery/ David A LaVan, Terry McGuire, Robert Langer et al. / Nature Biotechnology 21, 1184 - 1191 (2003).
3. Freitas R., Jr Nanotechnology, nanomedicine and nanosurgery. Int J Surg. 2005;3:243–6