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## **The Benefit of Nanomedicine and Nanotechnology in Medicine and Nutrition**

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**Abstract** Currently nanomedicine and nanotechnology have been widely used in the community. However, some people still do not understand what the meaning of nanomedicine and nanotechnology is currently increasingly widespread use in the field of cosmetics and even drugs, as well as food and beverages. Lack of public understanding is due to the low level of publication about the benefits of nanomedicine and nanotechnology in the public media in the community. Many ordinary people have not understood the importance and usefulness of nanomedicine and nanotechnology itself for the medical world and what is the difference with cosmetics and drugs without nano formulations and even foods / beverages that do not use nano technology in food processing. Even medical personnel and nutritionists as well as many other health workers have not understood the meaning and benefits of nanomedicine and nanotechnology for medicine and nutrition. It is therefore the purpose of this paper to discuss the benefits of using nanomedicine and nanotechnology in the field of nutritional science and the field of medical science.

**Keywords** nanomedicine, nanotechnology, medicine, nutrition

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### **Introduction**

International cooperation is needed in the development of nanoscience and nanotechnology. One of the designated areas of the country to develop scientific knowledge in the field of nanoscience and nanotechnology is Latin American Country [1]. Some countries that contribute to the development of nanoscience and nanotechnology based on documents indexed from Scopus during the period 2003-2013 are BRICS countries (Brazil, Russia, India, China, South Africa and 9 Latin American countries). These BRICS countries contribute to documents in the field of nanoscience and nanotechnology more than those generated by the US and among the BRICS countries, the Chinese state is the largest contributor of documents in the field of nanoscience and nanotechnology [1].

The development of nanomedicine and nanotechnology is evidenced by the fact that nanocarriers contribute 40% of the total biotechnology shipping market worth approximately 136 billion US dollars by 2021. The information also states that of the 10 kinds of nanocarriers technology studied show that liposomes and gold nanocarriers get the most market is about 45% of the total market. Nanocarriers / nanoshells / nanoparticles measuring between 1-100 nm have an important role in transporting drugs so that the sampat to the target site and finally the drug works according to the expected effect [2]. As is known today nanomedicine and nanotechnology have been used in cosmetic processing, food / beverages and medicine. However, the terms nanomedicine and nanotechnology and the relationship with everything is still common to the hearing of ordinary people, even the medical staff still not many who understand about the benefits of nano technology and its utilization in medical bidag, especially in the field of nutrition. Many countries have begun to look at and make innovations in the field of cosmetics, medicine and nutrition using nano technology. But the use of nanomedicine and nanotechnology in the field of processing and



utilization especially in the field of nutrition related medicine is still not really understood by the public even medical personnel as well as other health experts and is still being studied.

Developing countries as well as developed countries continue to learn about nanoscience and nanotechnology [1]. Many of the world's people have used nanotechnology in their lives to make innovations in medicine, medicine and even nutrition. Some countries have used nanomedicine and nanotechnology or may at least have glanced at the benefits and started trying the use of nanomedicine and nanotechnology in the fields of medicine, nutrition and medicine as well as cosmetics. But experts in the fields of nanomedicine as well as related nanotechnology in the fields of nutrition, medicine and even cosmetics are still very low in understanding in the field of nanomedicine and nanotechnology so that efforts for the use of nanomedicine and nanotechnology are still limited.

Currently, there have been many studies suggesting the benefits of nanomedicine and nanotechnology in medicine, nutrition and cosmetics, but there are still inappropriate views on this nanotechnology. This is due to the low understanding, not many articles that clearly discuss about the advantages and disadvantages of nanomedicine and nanotechnology compared with previous technology. So, it is reasonable if there is inappropriate information about the use of nanotechnology in the field of medicine and nutrition as well as cosmetics. Therefore, the purpose of this study review writing to discuss about nanomedicine and nanotechnology in the field of medicine and nutrition for developing the actual benefits of nanomedicine and nanotechnology to the advancement of science and its application in the community.

## **Discussion**

### **Why is nano technology used and what are the reasons?**

Currently there are still many uses and utilization of active ingredients in the field of medicine, health, nutrition and beauty / cosmetics that have not touched nano technology. The lack of understanding of community knowledge and the lack of importance of the benefits of nanotechnology for the advancement of technology and its application in society is one of the reasons that should be given a thorough attention. This is worth noting because the development of a science and technological progress will not be able to increase rapidly without a thorough understanding of the community and users of the technology itself.

### **The benefit of nanomedicine and nanotechnology**

One of the reasons that need to be noticed is the importance of using nanotechnology in the present and future because of the following things that need attention:

- Low oral bioavailability and solubility of an active ingredient is one of the reasons for the use of nanoformulation [3]. The meaning is the lack of solubility and the achievement of the active ingredients to the target organs in question so that the level of effectiveness of the active ingredients as a healer, preserver or prevent the occurrence of a disease and even abnormalities of cells, tissues and organs become reduced. Example: Quercetin as one of the study-based phytochemicals has activity as a cancer preventer. Therefore, the use of nanoformulation for quercetin aims to effect the work of the bioactive substances in accordance with the expected target so that its use as an oncotherapeutic agent will be more successful [3]. Another example is the use of polyphenol compounds, where these compounds also have low bioavailability, so it is necessary to designing different types of formulations to improve the bioavailability of these compounds. One of the ways that can be used is nanonization [4]. Polyphenols are one of the most common bioactive compounds in curcumin, epigallocatechin-3-gallate [4] and quercetin [3,4] and have health and medical benefits such as antioxidant, anti-inflammatory, cytotoxic and antineoplastic. Even also have the ability as immunomodulatory [4]. In addition polyphenol compounds also have benefits as antiobesity [5] in which obesity is associated with cancer [6]. Therefore, polyphenols as phytochemicals have the capability of chemopreventive agents and chemotherapeutic agents for various types of cancer [4-6]. So in the presence of nanomedicine and nanotechnology and the use of nanoformulation, the bioavailability and toxicity of normal cells can be avoided and the effects of drug therapy on target cells in the form malignant cells can be more successful and more effective [4].



- Lack of working effectiveness of some bioactive compounds derived from plants for topical treatment of skin diseases. Examples of resveratrol and curcumin are two bioactive compounds that have antioxidant, anti-inflammatory and anticarcinogenic effects, but limited clinical application due to poor water solubility. Therefore, Lipid core nanocapsules (LNC), which are drug carrier systems have the potential to increase the effectiveness of both topical treatment of skin diseases so as to penetrate deeper skin layers [7].
- Lack of therapeutic effect on chronic inflammation diseases such as arthritis and the presence of hepatic side effects. In the use of resveratrol and curcumin as a natural polyphenol that has activity as anti-inflammatory, then by nanoencapsulation can improve the activity of anti-edematogenic / lowering paw oedema at the same dose of polyphenol. It also proved no hepatotoxic effect / no change in hepatic biochemical markers [8].
- Lack of drug effectiveness in accordance with the expected effects and inappropriate work of the drug against the target tissue as well as the expected organ. Therefore, nanoencapsulation is used to improve drug delivery. PCL / Poly-E Caprolatone is used as a polymer to prepare various types of nanocapsules according to the chemical nature of the core so that the nanocapsules are able to control drug expenditure and improve photochemical stability. In addition to skin disease therapy, it can also modulate cutaneous drug penetration and work as a physical sunscreen [9].
- There are several other benefits of using nanotechnology in medicine for diagnosis, for the purpose of screening examples of early detection of cancer, for cellular protein production, and offering tools capable of monitoring individual cells and other effects [10-11].
- Some of the benefits of nanotechnology in the field of nutrition such as being able to modify the taste, color, and texture of food, and detect pathogenic bacteria. It also helps identify and characterize molecular targets of nutrient activity and biomarker effects, so as to inform the nutrients personally [10, 12-14].

### Conclusions

Many of the benefits of nanomedicine and nanotechnology in medicine, health and nutrition where the focus of these benefits is to improve the expected work effectiveness of a drug, bioactive compounds from natural ingredients derived from plants, food / beverages, nutritional content, as well as cosmetics for the benefit of society in the present and future so as to match the expected effects or targets.

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