

Nanomedicine: Where we stand and where can we go?

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Editorial

Volume 2 Issue 1

Received Date: February 27, 2017

Published Date: March 08, 2017

DOI: 10.23880/nnoa-16000115

Editorial

“Nanotechnology” was introduced by Norio Taniguchi and according to him “nanotechnology mainly consists of the processing of separation, consolidation and deformation of materials by one atom or one molecule” [1]. The term “nanomaterials” represents the class of materials, the size of which ranges from 1-100 nm [2]. Since Richard Feynman established the concept “nanomaterials” in 1959 in his article [3] “*There’s Plenty of Room at the Bottom. An invitation to enter a new field of physics*”, the field witnessed a sharp growth. However, the potential of nanotechnology in various aspects of technical and scientific discoveries have just started to be explored owing to the advancement of sophisticated instrumental techniques. Among them, “nanomedicine” or “nanomedicinal science” is relatively new and upcoming area of research and essentially describes the utilizations of nanomaterials/nanotechnologies for medicinal purposes. Though the term “nanomedicine” was first used by Freitas in his book, [4] the use of the nanoparticles for the medicinal purpose can be traced back to ancient ages. Given the recent upsurge in interdisciplinary collaborative works, the area of “nanomedicinal science” can only be portrayed as an amalgamation of different parts of basic sciences and technologies.

As far as the “medical science” is concerned, it can broadly be divided into three stages: 1) diagnosis, 2) treatment and 3) prevention, all of which can again be sub-divided into several classes. Irrespective of categories, the contribution of nanoscience in developing medical science continues to be enormous and given the current status, the involvement of nanotechnology seems only to grow. In the case of medical diagnosis, the development of nanomaterials-based biosensors, as well

as advanced nanotechnology-based imaging and monitoring techniques, presents the noteworthy advantages as compared to other techniques. The treatment stage also requires significant involvement of nanotechnology including targeted drug-delivery systems, development of novel drug candidates etc. While emerging biological studies, coupled with state-of-the-art monitoring techniques offers unique advantages of present and practical tackling of the diseases, the potential of utilising the combination of basic research and nanotechnological information for the future development of nanomedicines, becomes increasingly essential and can be emphasised in the “prevention” part. In addition to monitoring and treating the current and existing diseases by developing different drugs and/or immuno-strategies, the prevention of future medicinal hazards also has a significant role to play in modern society. For example, the short and long-term toxicology aspects of nanotechnology/nanomaterials-based various medicinal approaches have often been overlooked and should require significant attention for the future prevention of possible harmful diseases.

Based on the current research in the field of nanomedicine, the works are primarily focused on the development of novel techniques for imaging/monitoring systems, new drug-delivery systems, innovative biological assays (both *in-vivo* and *in-vitro*), nanomechanical devices etc [5]. However, despite the realisation that the promise of nanotechnology-based medicinal studies is endless, unfortunately, the progress of such studies is somewhat hampered from different economic, social, ethical and geographical aspects. The primary reason for this can often be stretched to the lack of communications between

the different parts of the systems which often raises the uncertainty among the researchers, industry personnel and funding agencies. Like in every other research forms, such challenges can only be overcome through extensive, fruitful collaborations, leading to possible solutions of particular medical problems via successful development of ideas/strategies in respective fields.

In addition to pursuing research in the field of “nanomedicine”, the communications of ideas through publications and/or patents have also become integral parts of the overall process. Considering the upcoming journals based on “nanomedicine”, *Nanomedicine & Nanotechnology Open Access (NNOA)* definitely provides an open (and peer-reviewed) platform for communicating the research findings, especially to young and talented researchers. Despite being relatively new, it stands up among the other alternatives not only in terms of quality of the communications but also in its approach to serve the scientific community especially focusing on overall nanotechnology and in particular nanomedicine. The current issue includes different research communications and reviews on nanomedicine and nanotechnology and hopefully provides unique opportunities and information to the research community, leading to the overall development of nanomedicine and related fields.

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