

# Nanomedicine- Impacts, Medical needs and Applications

Sandeep Kumar Kar\*

Department of Cardiac Anesthesiology, Institute of Postgraduate Medical Education & Research, India

Nanomedicines represent subsequent era in drug innovation. Current research has demonstrated improved performance, reduced side effects, and revolutionary new treatment strategies like personalized medicine. It uses the properties developed by a cloth at its nanometric scale 10-9 m which frequently differ in terms of physics, chemistry or biology from an equivalent material at a much bigger scale.

Moreover, the nanometric size is additionally the size of the many biological mechanisms within the physical body allowing nanoparticles and nanomaterials to potentially cross natural barriers to access new sites of delivery and to interact with DNA or small proteins at different levels, in blood or within organs, tissues or cells.

Commonly, nanomedicines contains active pharmaceutical ingredients (API) like small molecules or biologics packaged into nano-sized carriers made from excipients like lipids and polymers. Nanoparticles tend to be smaller than cells but larger than most biomolecules, therefore the nanomedicine can interact with the body differently than the API alone. The properties of nanomedicines are often designed to regulate when and where within the body the API is out there at the nano-scale, the surface-to-volume ratio is such the surface properties are getting an intrinsic parameter of the potential actions of a particle or material. Coating of the particles and functionalization of their surfaces (even on multiple levels) are during this way extremely common to extend the biocompatibility of the particle and its circulation time within the blood, also on ensure a highly selective binding to the specified target. Nanomedicine has the potential to enable early detection and prevention and to drastically improve diagnosis, treatment and follow-up of the many diseases including cancer but not only. Overall, Nanomedicine has nowadays many products under clinical trials, covering all major diseases including cardiovascular, neurodegenerative, musculoskeletal and inflammatory.

Enabling technologies altogether healthcare areas, Nanomedicine is already accounting for approximately 80 marketed products, starting from nano-delivery and pharmaceutical to medical imaging, diagnostics and biomaterials.

## Nanomedicine Impacts all Fields of Drugs

Nanomedicine is known to be a key enabling instrument for personalized, targeted and regenerative medicine by delivering subsequent level of latest drugs, treatments and implantable devices to clinicians and patients, for real breakthroughs in healthcare.

Beyond that, Nanomedicine provides important new tools to affect the grand challenge of an ageing population and is assumed to be instrumental for improved and price effective healthcare, one crucial factor for creating medicines and coverings available and affordable to all or any.

\*Corresponding author: Sandeep Kumar Kar, Department of Cardiac Anesthesiology, Institute of Postgraduate Medical Education & Research, India, E-mail: sndpkar@yahoo.co.in

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## Medical Needs

Mankind remains fighting against a high number of great and sophisticated illnesses like cancer, cardiovascular diseases, MS, Alzheimer's and Parkinson's disease, and diabetes also as different sorts of serious inflammatory or infectious diseases (e.g. HIV). Most of these diseases have an incredible negative impact not only on the patient himself but also on the entire society and linked social and insurance systems. It's of utmost importance to face these plagues with appropriate means, largely addressed by Nanomedicine applications.

Nanomedicine, raises high expectations for many patients for better, more efficient and affordable healthcare and has the potential of delivering promising solutions to several illnesses. From diagnosis to disease monitoring, browsing surgery and chemotherapy or regenerative medicine, nanotechnologies virtually impact all fields of current medicine.

Several areas of medical aid are already taking advantage of the benefits that nanotechnology offers. The primary nanotechnology-based targeted drug delivery systems are already on the market, others are in clinical trials or, far and away the most important part, are under development. Another highly attractive area of nanomedicine is diagnostics at nanoscale. The aim is to spot a disease at the earliest possible stage. Ideally already one cell with ill behavior would be detected and cured or eliminated. New concepts for regenerative medicine give hope to several patients with organ failure or severe injuries. Already today covering, bone and cartilage are in a complicated stage of development and partly already on the market.

## Applications of Nanomedicine

- Protect the API
- Control API Release
- Alter Biodistribution
- Target drug delivery to the location of disease
- Enhance solubility and bioavailability

Using traditional methodologies, drug researchers face significant challenges in producing nanomedicines for R&D, clinical testing, and commercial manufacture.

Nanoparticles contains many molecules that require to return together and add concert, and traditional production methods adapted from processes developed over decades for little molecule drugs don't adequately address the unique needs of nanomedicine production.

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