Indian Journal of Novel Drug Delivery

IJNDD

An Official Publication of Karnataka Education and Scientific Society

Editorial

Nanomedicine for drug delivery

A major interest is the use of integrated technological approaches in order to solve problems associated to drug delivery, namely to overcome biological barriers and achieve targeted delivery of drugs (small, peptides, proteins), nucleic acids or antigens in the relevant pathophysiological environment. The limitations of current drug-delivering systems include suboptimal bioavailability, limited effective targeting, potential cytotoxicity, and long, frequent treatments are often required.

In recent years, nanoparticles have played an ever increasing role in biomedical research and clinical applications. Much attention has been devoted toward using nanotechnology to improve health care, and the medical application of nanotechnology has become known as nanomedicine. The unique physical properties of nanomaterials are being exploited in the field of nanomedicine for applications as diverse as drug delivery and targeting, MRI contrast enhancement, gene therapy, biomarkers, targeted hyperthermia and many others. Nanocarriers are also able to maximize therapeutic activity while minimizing toxic side effects and target specific cells rather than tissues because their unique properties allow for easy surface functionalization.

Nanocarriers, including nanoparticles, liposomes and micelles, may be used for the incorporation of drugs allowing their protection from degradation, targeting to desired organs or tissues and the reduction of side effects.

Nanoparticle delivery to the lungs is an attractive concept because it can cause retention of the particles in the lungs accompanied with a prolonged drug release, drug protection and improved bioavailability over the conventional pulmonary drug delivery systems.

Nanotechnology has already significantly improved healthcare, and revolutionary changes will take place as nanomedicine techniques are further incorporated into everyday medicine. Nanomedicine is showing promising results toward some of the most incurable diseases such as HIV and cancer. Perhaps the most intriguing aspect of nanomedicine is that in the near future, doctors will not be treating symptoms; nanosurgery devices will provide the tools to treat individual cells. The versatility and numerous forms of nanocarriers will provide the means of transporting any needed agent to any specific location of the body.

In the near future, nanotechnology will revolutionize health care, as nanomedicine has the potential to cure diseases and repair tissues by manipulating individual cells at the molecular level.

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