Pharmaceutical Nanosystems

Andreas Theodorou, Konstantinos Kalogeropoulos, Maria Malliaroudaki,
Iakovos Papaioannou, Pelagia-Lydia Petropoulou
Β΄ Lykeiou, Α΄ Arsakeio Geniko Lykeio Psychikou
Advisors: Evdokia Patsilinakou (Chemistry Teacher PhD),
Maria Dimitropoulou (English Language and Literature Teacher)

Εικόνα 1: Φαρμακευτικά Νανοσυστήματα
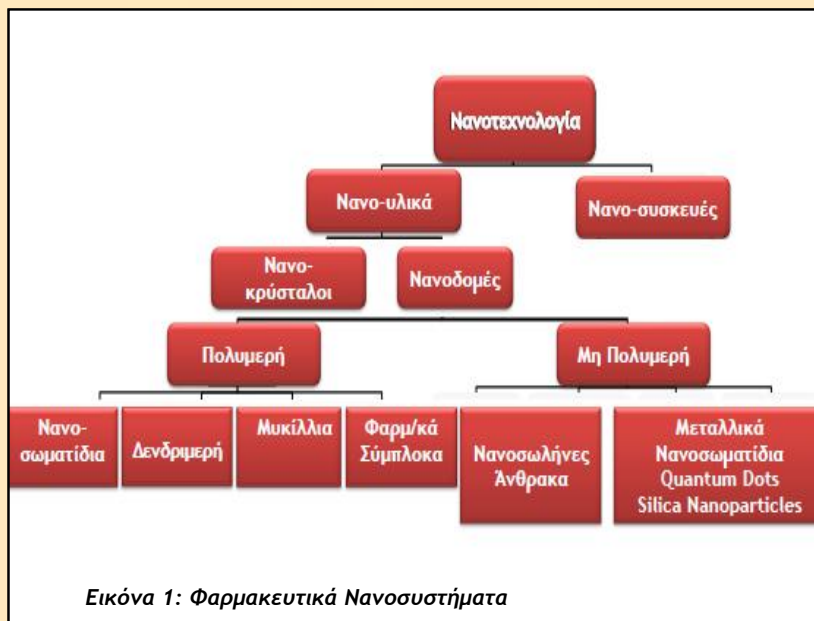
Nanotechnology applications in drug research and development which has the objective of diagnosing and effectively treating human disease does not depend solely on the study and the future design of drug delivery systems in the nanoscale (1-100 nm). Successful diagnosis and medical treatment presupposes putting in good use the unique new properties of the nanomaterials so that the active drug substance:
- Reaches target organ faster and treats disease more effectively,
- Bypasses normal metabolic routes of the organism, which may lead to severe adverse reactions if the drug is administered via typical administration routes[1].

Our bibliographic study focuses on the classification and design of pharmaceutical nanosystems so as to transfer the drug substance to the target organ effectively and safely.
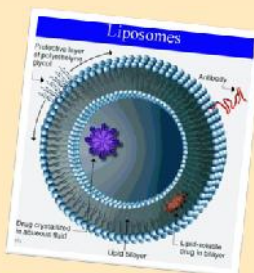

Dendrimer
Polymer structure in which atoms are branching out around a central backbone of carbon atoms
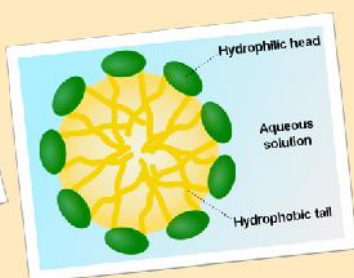
Micells
Self-assembling nanosized colloidal particles with a hydrophobic core and hydrophilic shell currently used for the solubilization of various poorly soluble pharmaceuticals.
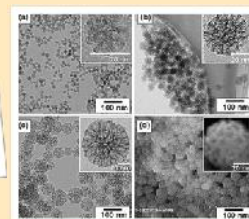

Liposomes: Vesicles composed of one or more bilayers of amphiphatic lipid molecules enclosing one or more aqueous compartments.
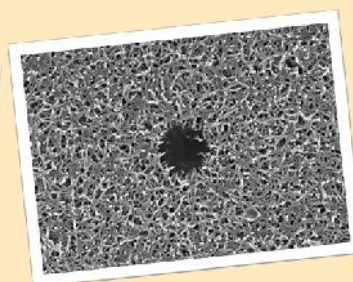
Nanocrystals:
Nanoscale solid formed with a periodic lattice of atoms, ions, or molecules.

Nanomaterials:
(cryo-TEM snapshot)

The targeted drugs currently in circulation, either in pre-approval or in research and development phase, may treat a number of diseases like cardiovascular disease, diabetes, cancer, neurodegenerative diseases, etc. Thus, the funding for the research and development of drugs and diagnostic tools is expected to exponentially increase until at least 2020[2].

Hence, we aim to delineate the complex legal framework of regulatory approval of medication treatment and diagnostic tests resulting from nanotechnology applications. The underlying reasons for the concomitant implementation of a rigorous legal framework to protect and better exploit innovation in science and technology forms a continuous challenge in this study, as this issue raises societal awareness with a view to resolve unmet medical needs aiming at improving the human quality of life.

References:
1. National Nanotechnology Initiative Definition (NNI); http://www.nano.gov/, last accessed 9th Dec 2012
2. Morigi et al. (2012) 'Nanotechnology in Medicine: From Inception to Market Domination', Journal of Drug Delivery, Vol.10:1-7