Session 3: Cutting Edge Precision Therapies

Devin Carree

MSU

Introduction of nanotechnology in oncology and cutting-edge precision medicine

In this paper I hope to express nanobiotechnology's potential to discover novel information pertinent to clinical medicine. One of the most important aspects of cutting-edge precision medicine is novel information, materials, and/or procedures. Nanobiotechnology in precision medicine offers potential to attain a significant amount of novel information about a broad range of biological subjects including, physiology, neurology, pathology and much more. As we move further along in the technological age, nanobiotechnology will be the field of study that moves clinical medicine into the future. Nanobiotechnology is material that allows researchers and scientists the ability to control matter on the scale of 1-100 nanometers, where unique phenomena enable novel applications. Nanobiotechnology is made of nanoparticles. These nanoparticles are very small inorganic molecules that straddle quantum and Newtonian mechanics.

Quantum mechanics is a field of physics that deals with matter at a size so small that the field of classical Newtonian physics does not apply, due to negligible forces and unstudied properties and phenomena. It is due to this field that the subject of nanobiotechnology hold such substantial potential in learning important novel biological information. Some nanoparticles that are being studied as nanobiotechnology today include carbon nanotubules, gold nanoparticles, quantum dots, highly branched dendrimers and more. It is their quantum properties that gives them the unique potential of bringing forth novel biological information.

Nanobiotechnology has a wide range of applications over a large range of medical disciplines, many of them having already been studied for proof of concept. Numerous nanodevices and nano systems for sequencing single molecules of DNA are feasible, and magnetic nanoparticles can bind to drugs, proteins, enzymes, antibodies or nucleotides and can be directed to an organ, tissue or tumor using an external magnetic field. Other applications of nanobiotechnology include the use of nanoparticles as biomarkers, the use of nanoparticles as delivery vehicles for drugs, cell therapy, genetic therapy, or material for any targeted therapy, and many more novel applications yet to have been experimented on or even thought about. Nanobiotechnology will be useful in the field of oncology and precision medicine by discovering novel biomarkers, new information regarding pathogenesis of many different cancers and innovative diagnostic images.

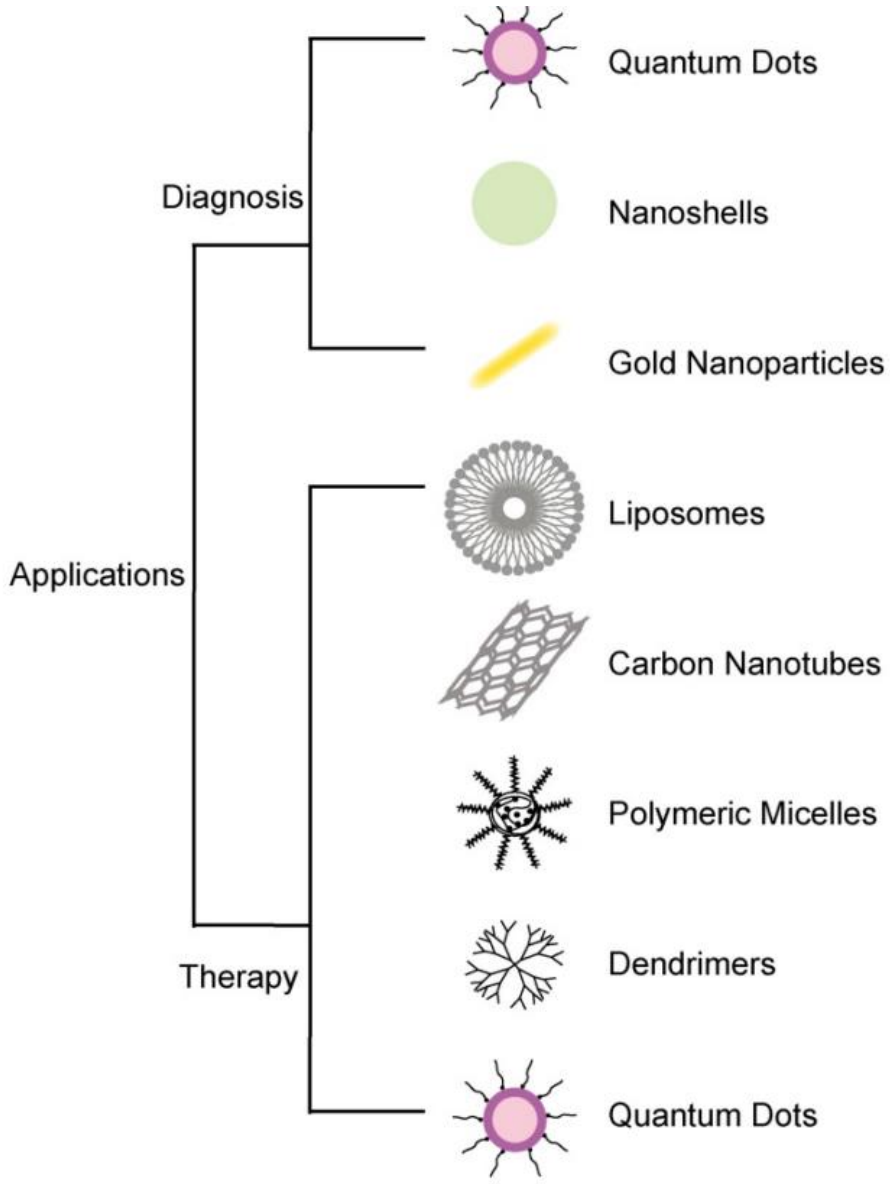

Fig. 1 Different types nanomaterial used in nanobiotechnology