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Nanomedicine and nanotechnology provides an early detection and prevention of diseases resulting in improved diagnosis, proper follow-up and treatment. Nowaday biological testings can be performed quickly and become more sensitive and reliable. Potential impact of nanoscience on healthy care is summarized and given in in this presentation. Electronic networks with semiconductors interface nerve cells can be applied in brain research and neurocomputation. Quantum dots (nanometer-sized crystals) contain free electrons and emit photons when submitted to UV light have been introduced into early tumor detection and could locate as few as 10 to 100 cancer cells.
Nanoparticles are used for site specific drug delivery. This technique required drug dose is lowered therefore side-effects are lowered significantly as the active agent is deposited in that region only. This highly selective approach can reduce costs and pain to the patients. Various nanoparticles such as liposomes, liquid crystals, micelles find an application. Liquid crystal and micelles synthesized in house are used for drug encapsulation. Nanodelivery system together with drug targeting to the organ can deliver drug molecules to the desired location. A targeted medicine reduces the drug dose and side effects.
Nanomedicines may improve drug bioavailability both at specific places in the body and over a specified period of time. The molecules are targeted and delivered to precised cells.

Unique nanostructures were designed for controllable regulation of proliferation and differentiation of stem cells by designing unique nanostructures. This will lead to stem cell-based therapeutics for the prevention, diagnosis and treatment of human diseases. Nanofibers help heart muscle grow in the lab. Viruses are prevented to infect human by nanocoatings over proteins on viruses that could stop viruses from binding to cells. Nanorobots of nanosized delivery systems could break apart kidney stones, clear plaque from blood vessels, carry drugs to tumor cells. In the new era of personalized medicine we can have in vitro diagnostics, in vivo diagnostics, nanotherapeutics and theranostics.
Current and future health care challenges are in the area of infectious diseases, cancer, genetic disorders, aging, obesity and addiction. Gene Therapy may be a solution in several diseases by employing electrostatic gene condensation, efficient cellular entry, non-toxicity and high gene expression/silencing.
Bioimaging has been employed together with new technology in confocal laser scanning microscope, quantum dots, fluorescence microscope. Advanced flow cytometry is capable to detect cells, infected cells and cell endocytosis and even the antibacterial activities from live and death cells.
Thus nanoparticles are promising tools for drug delivery advancement, as diagnostic sensors and bioimaging. The biodistribution of nanoparticles is still under investigated due to the difficulty in targeting specific organs. Efforts are made to optimize and understand the potential and limitations of nanoparticulate systems. It is expected that the benefits will be gained from nanotechnology including lower drug toxicity, improved bioavailability, reduced cost of treatment and extended economic life of proprietary drugs.
Some examples of drug delivery systems are examples of research work in the NANOTEC-PSU on amphotericin B and rifampicin in liquid crystals systems were demonstrated the successful stories of nanotechnology. We can use the liquid crystal as nanocubic and nanovesicle to encapsulate the drugs into the system to give more effectiveness with less toxicity to the cells

Key words: drug delivery stem, cells, bioimaging

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