Proceedings
International Journal of Nanomaterials, Nanotechnology and Nanomedicine

Special Issue: NCNN-2014
(National Conference on Nanoscience and Nanotechnology - 2014)

Emerging as Promising Tool of Nanotechnology: Gold Nanoparticles

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The use of nanotechnology in cancer treatment offers some exciting possibilities, including the possibility of destroying cancer tumors with minimal damage to healthy tissue and organs, as well as the detection and elimination of cancer cells before they form tumors. A method being developed to fight skin cancer uses gold nanoparticles to which RNA molecules are attached. The nanoparticles penetrate the skin and the RNA attaches to a cancer related gene, stopping the gene from generating proteins that are used in the growth of skin cancer tumors. The applications of nanotechnology in commercial products, although most applications are limited to the bulk use of passive nanomaterials. Examples include titanium dioxide and zinc oxide nanoparticles in sunscreen, cosmetics and some food products; silver nanoparticles in food packaging, clothing, disinfectants and household appliances such as Silver Nano; carbon nanotubes for stain-resistant textiles; and cerium oxide as a fuel catalyst. Nanotechnology is being used in developing countries to help treat disease and prevent health issues. The umbrella term for this kind of nanotechnology is Nanomedicine. Gold nanoparticles are emerging as promising agents for cancer therapy and are being investigated as drug carriers, photothermal agents, contrast agents and radiosensitisers. This review introduces the field of nanotechnology with a focus on recent gold nanoparticle research which has led to early-phase clinical trials. In particular, the pre-clinical evidence for gold nanoparticles as sensitisers with ionising radiation *in vitro*and *in vivo* at kilovoltage and megavoltage energies is discussed.

Citation: *Singh S, Dhruv G, Banjare T, Sonboir H, Sharma H (2015) Emerging as Promising Tool of Nanotechnology: Gold Nanoparticles. Int J Nanomater Nanotechnol Nanomed S: 191.*