NANOMEDICINE: FUTURE TREATMENT FOR CANCER AND CARDIOVASCULAR DISEASES

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Abstract: Cardiovascular disease (CVD) and cancer are globally the two leading causes of morbidity and mortality. According to World Health Organization (WHO), CVDs are the number one cause of death globally accounting for 17.3 million or 30% of total global deaths in 2008. Similarly, cancer accounted for 8.2 million deaths (around 20% of all deaths) in 2007, according to WHO. Conventional treatment strategies for cancer and CVDs have several limitations and hence more effective alternative therapeutic approach especially nanomedicine are urgently needed to combat these deadly diseases. In this context, my group at CSIR-Indian Institute of Chemical Technology (IICT) is currently perusing various nanomedicine research projects aimed at developing advanced nanomaterials and nanoparticles drug delivery systems (DDS) for treatment of cancer, cardiovascular and ischemic disease.

Metal nanoparticles based nanomedicine approach has been extensively used in biomedical therapeutics & diagnostics for diseases such as cancer, diabetes, Alzheimer’s, and cardiovascular related diseases due to their unusual optoelectronic and physicochemical properties in the nanoscale range. Recently, we have demonstrated europium hydroxide nanorods (EHNs) and zinc oxide nanoflowers (ZON) that exhibit excellent pro-angiogenic activities (Angiogenesis: formation of new blood vessels from pre-existing vasculature). These nanoparticles could be used as an alternative treatment strategy for CVDs and ischemic diseases in near future using nanomedicineangiogenictherapy. Similarly, we have designed and fabricated gold, silver and other metal nanoparticles based drug delivery systems (DDS) using chemical and biological approach. We have observed that administration of metal nanoparticles based DDS resulted in significant inhibition of cancer cell proliferation in vitro and tumor growth in vivo. These DDS could be useful towards the development of alternative treatment strategies for cancer theranostics.

References: