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Nanoencapsulated phytochemicals based gold nanoparticles and their application in nanomedicine

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Nanotechnology based therapeutics and imaging represent a new platform for treatment and diagnostics. Despite the versatility of nanomedicine based therapies, it is important to develop the cost effective nanoparticles with more efficacy and less side effect. Our laboratory focuses on the Green Nanotechnology, where we develop the nanoparticles from naturally occurring phytochemicals. Nanoencapsulation of phytochemicals based formulations has shown great promise in enhancing drug efficacy, increasing drug tolerance, and improving targeted drug delivery. Among the other, gold nanoparticles possess a tremendous opportunities for the next generation bio-agent. Herein, we comprehensively develop the nanoparticles from phytoextract and their phytochemicals by simple mixing with gold salt. We explored the synthesis and characterization of phytoextract and their phytochemicals based gold nanoparticles and their anticancer activity against metastatic breast and prostate cancer cell line and their cellular internalization. We have explored various plant extract like broccoli, tea leaves, and mango peel. These plant extracts showed the presence of most promising phytochemicals like mangiferin in mango peel, isothiocyanates and glucosinolates in broccoli and EGCG in green tea. The synthesis of phytochemicals conjugated nanoparticles was confirmed by various spectroscopic techniques like UV visible, transmission electron microscope, atomic absorption spectrometry, and the size was confirmed by dynamic light scattering instrument. We showed that nanoparticles treatment resulted in decreased cell viability and suppression of metastatic potential in terms of migration and invasion in metastatic cancer cells. Among the other, mangiferin conjugated nanoparticles induce down regulation of NFkB factor and induce apoptosis in the cancerous cells. These findings suggest that phytochemicals based gold nanoparticles might be a very promising candidate for cancer intervention and prevention.

Biography

Menka Khoobchandani has completed her PhD at the age of 26 years from Dayalbagh Educational Institute, Dayalbagh, Agra, India. She is a Postdoctoral researcher at Department of Radiology and Cardiovascular Medicine, University of Missouri, Columbia, MO, USA. She has published more than 10 papers in reputed journals and presentation to her credit. She has filled one patent through a recent discovery on Cardiotherapeutic nanopharmaceuticals - A new alternative to drug coated stents.

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Waste plastics in to fuel

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Plastic uses are increasing all over the world day by day. Due to plastics lightweight and durability, its practice is very efficient in all sectors of the world. However, once plastics are discarded after use, they end up in land and ocean creating many sorts of environmental problems because the waste plastics do not bio-degrade. These waste plastics are left alone in the land and ocean and remaining there for a long period of time. Given that, plastics are initially produced from petroleum which derives from crude oil. To clean up or removing these waste plastics from the environment requires huge amount of money and abundant land. The scientific societies in the world today are conducting research to find alternate ways to the current limited energy source. An established process has been developed to convert waste plastics into liquid hydrocarbon fuel using thermal degradation process that is environmental friendly and inexpensive. Since, Waste plastics are available everywhere, it becomes feasible for to gather raw materials for the fuel production process. The produced liquid hydrocarbon fuel is tested and proven to be compatible with all types of internal combustion engines such as transportation vehicles and generators. Furthermore, due to plastic fuel's high energy content, it can be used to produce electricity through the use of a generators or power plants. The invented process will be able to remove all types of waste plastics from land and ocean creating a new source of energy also helping the environment in the process.

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