



MHRD
Govt. of India

Nanoparticle technology & applications in targeted drug delivery towards treating various cancers

Overview

Nanoparticles based drug delivery is a promising field that involves manipulating properties and structures at the nanoscale level. Nanoparticle technology is being extensively used by various industries such as cosmetics, medical, water treatment and biotechnology for a long time. Nanotechnology in medicine is leading to breakthroughs in terms of detecting, diagnosing, and treating various forms of disease and cancer. Nanoparticles can be engineered for drug delivery so that they can be used to target specific diseased cells/tissue. Current clinical trials are using being targeted to deliver the chemotherapeutic agents loaded in nanoparticles for targeting cancer cells. In the coming years, nanotechnology for targeted drug delivery could have far reaching implications in human health and better living. Furthermore, nanoparticles are being delivered using different routes of administration for targeted drug delivery. This novel drug delivery platform could potentially have significantly low side-effects and can be proved to be more effective than traditional therapies. The numbers of products that are approved or currently under review by the FDA are likely to increase because for new innovation and discoveries in field of nanoparticles. In addition to drug delivery, researchers worldwide are also investigating the use of nanoparticles to deliver vaccines and immunotherapeutic agents; nanoparticles are able to protect the encapsulated biologic, provide targeted delivery of these agents to various immune compartments in the host and also could act as an adjuvant.

To better understand current and future applications of nanotechnology in the field of medicine, this course will consist of various topics focused on cancer therapy using nanoparticle drug delivery systems.

Course	October 8th 2018 to 18th October 2018
Host Institute	University of Allahabad, Allahabad-211002
Maximum Number of Participants	25
You Should Attend If...	<ul style="list-style-type: none"> ▪ Master students, Ph.D. students, Research Scholars, MBBS students, Faculty members and Industrial persons. Specialization in Biochemistry, Biotechnology, Molecular Biology, Nano technology, Microbiology, Agricultural Sciences, Botany, Chemistry, Bioinformatics, Zoology and material sciences.
Fees	<p>The participation fees (excluding lodging and boarding) for taking this course is as follows:</p> <p>Faculty/Scientists/Industry Personnel from abroad : US \$200 Student participants from abroad : US \$100 Persons working in Industry/ Consultancy Firms: Rs. 8,000/- Faculty (Internal & External)/ Scientists from Research Organizations: Rs. 4,000/- Students: Rs. 2,000</p> <p>The above fee includes all instructional materials, computer use for tutorials and assignments, and session refreshments. The participants will be provided accommodation on payment basis.</p>

The Faculty



Dr. Pavan Muttill is an Associate Professor at The University of New Mexico (UNM), College of Pharmacy. He did his postdoctoral research at the University of North Carolina (UNC), Chapel Hill, U.S.A, before accepting a tenure-track faculty position at UNM. He has published more than 30 high impact research papers in peer-reviewed journals, three review papers and four book chapters. His research articles have appeared in journals such as the Proceedings of the National Academy of Science (PNAS; impact factor- 9.67), PLOS Pathogens (Impact factor- 7.003) and ACS Nano (Impact factor 12.88), a journal that focusses on nanoparticle drug delivery. His work discusses nanotechnology for vaccine and drug delivery and how to translate this technology into clinical practice for treating cancer and infectious diseases. He recently published the development of a novel lung cancer animal model (PLOS One; impact factor 3.23) that could be used to evaluate various nanoparticulate drug delivery systems. Dr. Muttill was awarded the prestigious Bill and Melinda Gates Foundation grant to develop an inhaled vaccine against tuberculosis in 2012; he developed a live bacterial vaccine as dry powders, and when delivered by the pulmonary route was shown to be more potent compared to systemically delivered vaccine. His research interest includes targeted delivery of micro-nanocarriers loaded with vaccine, drug and therapeutic proteins to the respiratory tract for treatment of lung diseases. Dr. Muttill has had research funding from many funding agencies in the US such as National Institute of Health (NIH), Bill and Melinda Gates Grand Challenges Exploration, Defense Threat Reduction agency (DTRA; US Department of Defense) etc. Dr. Muttill is also a young and dynamic teacher and was awarded the "Faculty Appreciation Award" for teaching in 2015 (see CV). He was also awarded the "teacher appreciation award" by the professional pharmacy students at the University of New Mexico, College of Pharmacy in 2016. These awards are given only to faculty who have made exemplary contributions to their professional and graduate teaching duties based on motivation and facilitation of student learning and establishing a positive teacher-learner relationship. Therefore, having Dr. Muttill as part of this proposal will provide enhanced teaching experience to the students and the scientific community.



Dr. Awadh Bihari Yadav is currently Assistant Professor at the Centre of Biotechnology (CBT), University of Allahabad. Dr. Yadav was a Postdoctoral Researcher at the Royal College of Surgeons in Ireland (RCSI) from 2009-2011. He has a Master degree in Biochemistry from CSJM University Kanpur and PhD in Targeted drug delivery from JNU, CDRI campus Lucknow. He also worked at the Imperial Life Sciences in Gurgaon for one year before joining the University of Allahabad. He has been working at CBT for the past four and a half years. His area of interest is targeted delivery of vaccine, therapeutics proteins, siRNA/shRNA and drugs using different nanocarriers. He has been awarded Yong Scientist award from DST. Dr. Yadav received 5 grants from DBT, DST, MHRD, Nanomission and UGC. Dr. Yadav has published 15 papers in international peer reviewed journal and 3 book chapters.



Dr. Munish Kumar, Raman Fellow; is currently Assistant Professor at the Department of Biochemistry, University of Allahabad. Dr. Munish has more than 12 years of teaching and research experience. He did Postdoctoral research from University of Louisville (2007-2010) and recently he has visited Cleveland Clinic for UGC Raman Fellowship for 12 months for advance research in microRNA and cancer. He has a Master degree in Biochemistry from Dr. R. M.L. Awadh University and Ph.D. in Biochemistry from IITR/University of Lucknow. Prior joining University of Allahabad he served at Department of Biotechnology, Assam University. His area of research is in understanding genetic polymorphism, microRNA and genotoxicity in Cancer. Dr. kumar has published 35 articles in high reputed journals (Blood, PNAS, Oncogene) and have citations of more than 1500.

Course Coordinators

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He was been awarded Yong Scientist award from DST. Dr. Kumar received grants from DBT, DST and UGC and is member of several societies and editor of journals.

Course Outline

Lecture 1: Brief introduction to nanoparticle technology.

Lecture 2: Nanotechnology: definition, concepts and applications for cancer therapy.

Lecture 3: Introduction to different types of cancer and the use of nanoparticles

Lecture 4: Routes of nanoparticle drug delivery against cancer.

Lecture 5: microRNA and RNA interference for cancer treatment.

Lecture 6: Targeted immunotherapy using nanoparticles: hope or hype?

Lecture 7: Cellular Nanostructures; Nanopores.

Lecture 8: Criteria for selection of nanostructures for biological applications and their efficacy.

Lecture 9: Nanostructures for drug delivery and its applicability for cancer treatment.

Lecture 10: Basic characterization techniques for nanoparticles for efficient drug delivery

Lecture 11: Nanoparticles for diagnostics and treatments (theranostics).

Lecture 12: Nanoparticles for diagnostics and imaging of cancer as future aspects.

Lecture 13: Practical: Hands-on training for nanoparticle preparation and characterization (Practical).

Lecture 14: Nanotechnology and its application in translation research.

Lecture 15: Demonstration of nanoparticle stabilization by lyophilization (Practical).

Lecture 16: Nanoparticle characterization for size and other unique properties (Practical).

Lecture 17: Nanostructures for drug delivery and its applicability for cancer treatment.

Lecture 18: Basic characterization and techniques for different nanostructure for efficient drug delivery.

Lecture 19: Nanotechnology and its application in Cancer biology. Pros and cons of nanotechnology in translational research.

Lecture 20: Various cancer animal models to evaluate nanoparticles drug delivery.