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REGISTRATION FEE:

Participants from outside India	USD 300/-
Industry/Business Organizations	Rs. 5,000/-
Scientists/Academics Institutions	Rs. 4,000/-
Students/College teachers	Rs. 3,000/-

IMPORTANT DATES

- Duration of the course: May 9-20, 2022
- Last date of registration: May 5, 2022
- Certificate to all participants
- Registration details: <http://gian.iiti.ac.in>

After online fee payment, visit <http://gian.iiti.ac.in/> and furnish the below details in <http://gian.iiti.ac.in/courses.php>:

First Name:

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Online fee slip (screen shot) and participant’s details need to be submitted by email (cvenkat@iiti.ac.in) on or before May 5, 2022.



COURSE

on

Principles of Ligand-Targeted Drug Delivery: Design and Development of ‘Smart Drugs’

May 9-20, 2022

Organized by

Indian Institute of Technology Indore

in association with

Purdue University, USA



Khandwa Road, Simrol
Indore- 453 552, MP, India

Website: www.iiti.ac.in

Sponsored by

MHRD Scheme on Global Initiative on

Academic Network

(GIAN)



ABOUT INSTITUTE

IIT, Indore, located in Madhya Pradesh, is an institute of national importance established by government of India in 2009. The institute has developed state of the art infrastructure, well equipped research laboratories, sophisticated instrumentation center, modern library, students hostel etc. IIT Indore's campus is at Simrol which is approximately 25 km from down town Indore. The campus is spread over 510 acres of land in natural surroundings providing ideal atmosphere for the students.

SMART DRUGS

Drug delivery operates at the interface of chemistry, biology and medicine. Beyond the conventional aspects of medicinal chemistry, this field requires extensive understanding of the fundamental differences between diseased cell and healthy cell. While there are multiple approaches currently exist for making this distinction, one of the most promising strategy is to recognize the difference in the expression levels of certain cell surface receptors on diseased cell vs healthy cell. Exploiting this difference to discriminate a pathologic tissue from its healthy counterpart is an efficient strategy for drug delivery. In this class, high affinity ligands targeting these upregulated cell surface receptors were exploited to carry otherwise non-targeted drugs. Thus, hundreds of antibody-based and small-molecule-based ligand-drug conjugates are being investigated and several of them are already approved for cancer applications.

With most non-targeted investigational drugs failing in the clinical trials due to unanticipated toxicities, there is an unmet need to deliver drugs selectively to the diseased tissue. This has led to a growing interest in the field of targeted drug delivery. Along with physicians and academic researchers, many industries have fallen in line to focus research in this area. Consequently, many targeted therapies have been developed over the last two decades and made their way into the clinic.

Dr. Madduri Srinivasarao

Dr. Madduri Srinivasarao is a scientist and researcher at Purdue University, West Lafayette USA. Dr. Srinivasarao is actively pursuing translational research in development of targeted therapeutic and imaging agents for cancer and other inflammatory diseases. A major focus of his research is aimed at the design and development of novel drug delivery strategies with small molecule targeting ligands that target overexpressed cell surface receptors on cancer and other diseased tissues. He has also developed targeted chimeric antigen receptor (CAR) T-cell therapies for brain cancers with small molecule adaptor molecules. He is also a teaching faculty at the Ivy Tech Community College, Indiana, USA.

SPEAKER

Dr. Madduri Srinivasarao

Department of Chemistry

Purdue University, West Lafayette, USA

ORGANIZING SECRETARY

Prof. Dr. Venkatesh Chelvam

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Madhya Pradesh, India

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PROGRAM SCHEDULE

9th-14th May 2022 - Lectures/Tutorial

Day 1-6

16th-20th May 2022- Lectures/Tutorial

Day 7-11

20th May 2022-Exam. 4:00 pm

VENUE

- Lectures: 3.30-5.30 pm (online)
- Tutorials: 8.00-10.00 am (online)

Principles of Ligand-Targeted Drug Delivery: Design and Development of 'Smart Drugs'

Under the aegis of MHRD—Global Initiative of Academic Networks

URL: <http://gian.iiti.ac.in/>

Overview

With most non-targeted investigational drugs failing in the clinical trials due to unanticipated toxicities, there is an unmet need to deliver drugs selectively to the diseased tissue. This has led to a growing interest in the field of targeted drug delivery. Along with physicians and academic researchers, many industries have fallen in line to focus research in this area. Consequently, many targeted therapies have been developed over the last two decades and made their way into the clinic.

Drug delivery operates at the interface of chemistry, biology, and medicine. Beyond the conventional aspects of medicinal chemistry, this field requires an extensive understanding of the fundamental differences between diseased and healthy cells. While there are multiple approaches currently exist for making this distinction, one of the most promising strategies is to recognize the difference in the expression levels of certain cell surface receptors on diseased vs healthy cells. Exploiting this difference to discriminate a pathologic tissue from its healthy counterpart is an efficient strategy for drug delivery. In this class, high-affinity ligands targeting these upregulated cell surface receptors were exploited to carry otherwise non-targeted drugs. Thus, hundreds of antibody-based and small-molecule-based ligand-drug conjugates are being investigated and several of them are already approved for cancer applications.

Recently, numerous pharmaceutical industries have realized this potential of ligand-targeted drug delivery and started looking for new avenues for collaboration. Because there is a growing academic interest in pharmaceutical research, these industries have turned to academia for novel ideas for drug delivery. While training in medicinal chemistry has become prevalent in academia worldwide, there is a dearth of similar training or courses in drug delivery. With a growing number of academic institutions willing to collaborate on industrial projects, it is an appropriate time to expose students and faculty to this developing field. To keep up with these advances in medicinal chemistry, it is prudent to provide drug delivery courses, training, and research facilities to groom the next generation of researchers with the required tools to perform research and develop 'smart' drugs.

Accordingly, this ligand-targeted drug delivery course is designed to provide students a 10,000-foot view of drug delivery in general, and ligand-targeted drug delivery in specific. Targeted to reach students and faculty with a basic understanding of organic chemistry and biochemistry, the course will overview theoretical principles and practical aspects of ligand-targeted drug delivery. The main objective of this course is to shed light on how to translate basic research in this field to the clinic.

Schedule of the Course (Online)

Schedule of the course	: May 9-20, 2022
Total Number of days/lectures	: 10-days/20-lectures and 10 tutorials

Registration Fee

Participant from outside India	: USD 300
Industry/ Business organization	: Rs. 5,000
Scientists/Academic Institutions	: Rs. 4,000
Students/College teachers	: Rs. 3,000

The fee includes all instructional materials and GST.

Topics Covered

Smart Drugs: Introduction to ligand-targeted drug delivery: why targeting? Pros and Cons of targeting, Design of ligand-targeted drug system: general aspects, The so called 'Magic Bullet', Selection of targeted cell- cell types and phenotypes of disease, Identification of targeted receptor-expression profiles, Selection of targeting ligand-the effect of size on drug properties, Selection of targeting ligand- Small molecule vs antibody, Selection of targeting ligand-affinity and selectivity, Identification of optimal drug: mechanism of action and potency, Design of linker-a critical factor to control pharmacokinetics (PK), Targeted receptors in cancer, Targeted drugs in cancer, Translation of targeted therap Targeting inflammatory diseases from bench-to-the clinic, Potential pitfalls of targeted therapy, Targeting tumor microenvironment, Ligand-targeted imaging agents-role of peptides & small molecules, Ligand-targeted imaging agents-role of imaging agents, Fluorescence-guided surgery, Conclusion.

Faculty Information



Teaching Faculty

The course will be delivered by Dr. Madduri Srinivasarao, Scientist, at Purdue University, West Lafayette, USA. Dr. Madduri Srinivasarao is a scientist and researcher at Purdue University, Indiana, USA. After receiving PhD (2010) in organic chemistry from Purdue University, he started his postdoctoral research in drug delivery in the same institution, with Professor Philip S Low (2011-2013). After a brief industrial stint in India, he moved back to academic research and continued ever since to work on targeted drug delivery (2015-to date). He is also an adjunct teaching faculty at the Ivy Tech Community College, Indiana, USA.

In the laboratory of Dr. Low, as Lab Manager, Dr. Srinivasarao is actively pursuing translational research in the development of targeted therapeutic and imaging agents for cancer and other inflammatory diseases. A major focus of his research is aimed at the design and development of novel drug delivery strategies with small molecule targeting ligands that target overexpressed cell surface receptors on cancer and other diseased tissues. He is also developing targeted chimeric antigen receptor (CAR) T-cell therapies for brain cancers with small-molecule

adaptor molecules.

He has published several peer-reviewed articles in the field of organic chemistry and medicinal chemistry. Some of his papers were published in prominent journals such as *Nature Reviews Drug Discovery*, *Chemical Reviews*, *Nature Communications*, *Journal of Organic Chemistry*, *Chemical Communication*, *Bioconjugate Chemistry*, etc. He has filed several US patents on his novel drug delivery research.

Dr. Srinivasarao has taught several undergraduate and graduate-level courses in general and organic chemistry at Wayne State University and Purdue University. Currently, as an adjunct faculty at the Ivy Tech Community College, Indiana, USA, he is also teaching chemistry courses to both pre-med and pre-dental undergraduate students.



Coordinating Faculty

Dr. Venkatesh Chelvam, an Organic Chemist and Chemical Biologist is an Associate Professor in the Department of Chemistry and Biosciences and Biomedical Engineering at IIT Indore. His long-term goal is to establish a centre of excellence in the field of biosciences, especially for the detection and treatment of cancer and inflammatory diseases at IIT Indore. He has more than 10 years of experience in imaging and microscopic techniques for diagnosis and therapy of diseased conditions from Purdue University, USA. He was also a postdoctoral fellow in the laboratory of Prof. Hans-Ulrich Reissig at Freie University Berlin, Germany in 2006-2008, where he was awarded Alexander von Humboldt fellowship and worked on total synthesis of natural products for cancer. He has had published 51 peer-reviewed journal articles in highly reputed international journals along with 4 USA patents that are in clinical trials and 3 Indian patents. Many USA, European, Indian and Chinese patents are filed provisionally out of his discovery recently from India. Some of his outstanding research works were published in prominent journals such as *Biomaterial Science*, *ACS Applied BioMaterials*, *Chemical Biology Current Protocols*, *Nanomedicine:Nanotechnology Biology and Medicine*, *Journal of Cell Sciences*, *Journal of Nuclear Medicine*, *Molecular Pharmaceutics*, *Nanomedicine*, *Bioconjugate Chemistry*, *Journal of Medicinal Chemistry*, *Journal of Organic Chemistry*, *Organic Letters*, *Eur. J. Org. Chem.*, etc. His revolutionary work on the diagnosis and therapeutic applications of cancer and inflammatory diseases are the US patented, and currently in clinical trials. Moreover, he had appeared in ABC news for developing technology for intra-operative guided surgery of ovarian cancer in patients. He is also the founder Director, RONCOV Diagnostics and Therapeutics Pvt.

Who should attend this course?

1. Chemists from Pharmaceutical Industry
2. Researchers from Industry and government organizations including R&D laboratories.
3. Students at all levels (BTech/BSc/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.

Course Coordinator

For any further information and registration, please contact:

Dr. Venkatesh Chelvam

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Relevant Readings for the proposed course:

- ✓ Srinivasarao, M.; Low, P. S. Ligand-targeted drug delivery, *Chemical Reviews* **2017**, 19, pp12133.
- ✓ Srinivasarao, M.; Galliford, C. Low, P. S. Principles in the design of ligand-targeted cancer therapeutics and imaging agents. *Nature Reviews Drug Discovery* **2015**. 14, pp203.