Medicinal Chemistry Division

Overview

The research in medicinal chemistry division includes the design and synthesis of new medicinal agents, development of new concepts for the design of selectively active ligands, improvement of existing drugs by molecular modifications and structural elucidation of biologically active natural products. The major program is aimed at chemistry-biology interface. The main focus of research is to discover novel compounds using rational design approaches based on ligand and structural information derived from clinical compounds to treat cancer, inflammation, obesity and tuberculosis.

The department has state-of-the art research facilities. The students, who are pursuing their doctoral degree, have opportunity to gain expertise in both organic and medicinal chemistry. They also have an opportunity to broaden their knowledge in the area of drug discovery, molecular biology, pharmacology and biochemistry.

Mission and Goal

- Synthesis of complex carbohydrate based GPI's to study its biological significance as cell surface anchors.
- Receptor based drug discovery: design and synthesis of novel target based anticancer therapeutics.
- Development of novel peptide based cancer vaccine conjugates.
- Development of novel immune-adjuvants for sub-unit vaccines.
- Total synthesis of complex carbogenic molecules of structural and biological interest.
- Development of novel synthetic methodologies.
- Design, synthesis and conformational studies of peptides.
- Peptide foldamers containing non-protein amino acids.
- Biologically active natural peptides.
- Peptide-Based Enzyme Inhibitors & Conjugates.
- Design and synthesis of novel hybrids for skin/beauty care applications.
- Screening of natural peptides by mass spectrometry.
- Protein-protein interaction study by MALDI-TOF/TOF.

Competencies

- Well equipped laboratory with state-of-the-art facilities.
- Expertise in synthesis of carbohydrate based complex molecules.
- Expertise in structural chemistry of peptides & proteins.
- Total synthesis and structural modification of bio-active natural products for lead discovery.
- Protein/peptide identification, sequencing and characterization by MALDI.

People

S. No.	Name	Expertise/ Interests	E-mail Id
1.	Ram A. Vishwakarma	Organic Synthesis; Biosynthesis; Medicinal Chemistry; Drug Discovery; Natural Products Chemistry; Glycobiology; Cell & Membrane Biology.	ram@iiim.ac.in director@iiim.ac.in
2.	Sanghapal D. Sawant	Rational Synthetic Modifications of Bioactive Natural Products; Synthetic Method Developments.	sdsawant@iiim.ac.in
3.	Parvinder P. Singh	Total Synthesis & Structural Modification of Natural Products; Carbohydrate Chemistry.	ppsingh@iiim.ac.in
4.	Deepika Singh	Peptides/Proteins Sequencing.	dsingh@iiim.ac.in
5.	Rajkishor Rai	Peptide/Protein Chemistry; Chemical Biology.	raj@iiim.ac.in

Area of Research

- Drug discovery
- Chemical biology
- Carbohydrate chemistry
- Protein/peptide chemistry
- Bio-conjugate chemistry
- Development of novel synthetic methodologies
- Improvement of existing drugs by molecular modifications
- Screening of natural peptides by mass spectrometry

Facilities

- MALDI TOF/TOF mass spectrometer
- High Performance Liquid Chromatography (preparative & analytical)
- Freeze Dryer
- UV spectrophotometer
- Gel electrophoresis system /gel cutter
- Icematic
- Rotary evaporators
- Flash chromatography systems
- Deep freezers, refrigerators, refrigerated centrifuges
- Chillers and shakers

Current Research

- Structural modification of bioactive natural products for lead discovery against cancer, diabetes, inflammation and tuberculosis.
- Total synthesis of bioactive natural products.
- Synthesis of complex carbohydrate based GPI's to study its biological relevance as cell surface anchors.
- Design and Synthesis of natural product based isoform selective inhibitors of PI3-Kinase.
- Design, synthesis and conformational studies of peptides of biological importance.
- Development of new synthetic methodologies for glycosylation and synthesis of bioactive heterocyclic entities.
- Development of novel skin care molecules and melanin repairing agents.

Projects

Ongoing

- "Development of novel target based anticancer therapeutics"
  (CSIR Supra Institutional Project: SIP0027)

Completed

- "Development of novel skin care hybrids for cosmeceutical applications" (Sponsored by Colgate-Palmolive, NJ-USA).
- "Develop understanding and control of SK-II pitera fractionataion, benchmarking molecular bioactivities, chemical characterization and potential synthetic approaches" (Sponsored by Procter & Gamble, Kobe-Japan)