

'100 Days Skill Festival'

Centre for Innovation in Infectious Diseases, Research, Education and Training (CIIDRET)
and
Institution of Eminence (IoE)-Delhi School of Skill Enhancement & Entrepreneurship Development
(IoE-DSSEED), University of Delhi

In collaboration with
Mahatma Hansraj Faculty Development Centre, Hansraj College, University of Delhi
Organise

One-Week Online Faculty Development Programme

"Advanced Technologies in Life Sciences"

February 6- 11, 2023 (online mode; sessions from 1.30 PM - 5 PM)

Faculty

Topic

Date and time

Dr. Manisha Suthar &
Dr. Shashank Misra,
BD Life Sciences



Basics of flow cytometry
and cell sorting &
applications of flow
cytometry

6th February, 2023;
1.45 - 3.15PM

Dr. Parul Tomar
Merck



Innovations in CRISPR
advancing translational
research

6th February, 2023;
3.30 - 5.00 PM

Dr. Vipin Kumar &
Dr. Bhaskar,
Cytiva
(formerly GE Healthcare)



Protein purification
techniques - what why and
how

7th February, 2023;
1.30 - 3.00PM

Protein purification
strategies

7th February, 2023;
3.30 - 5.00 PM

Dr. Shailesh Gochhait,
Thermo Fisher Scientific.



Next generation sequencing
and its clinical applications

8th February, 2023;
1.30 - 3.00PM

Dr. Amit Dutt,
Tata Memorial Centre,
Navi Mumbai,



Genomics-driven cancer
diagnostics

8th February, 2023;
3.30 - 5.00 PM

Dr. Ajay Singh,
Gennova Biopharmaceuticals
Ltd, Pune.



A new era of vaccinology –
the mRNA platform

9th February, 2023 ;
1.30 - 3.00PM

Dr. R. Harinarayanan,
Centre for DNA
Fingerprinting and
Diagnostics, Hyderabad



An overview of human DNA
fingerprinting and its
applications

9th February, 2023;
3.30 - 5.00 PM

Dr. Garima Khare,
Department of Biochemistry,
UDSC, New Delhi



Metabolomics and its
applications -1

10th February, 2023;
1.30 - 3.00PM

Metabolomics and its
applications -2

10th February, 2023;
3.30 - 5.00 PM

Basics of Flowcytometry and Cell Sorting

(6th February, 2023; 1.45 - 2.30 PM)



Manisha Suthar, Application Specialist, BD Biosciences (manisha.suthar@bd.com)

A Postgraduate in Biotechnology, Mumbai University, trained in Flowcytometry in the department of Haematology (2016-2017) at Tata Memorial Hospital, Mumbai. She has worked at the National Institute of Immunohematology (2018-2019), Dept of leukocyte biology which works primarily on Primary Immunodeficiency Diseases. Since 2019, I have been working with BD as an Application Specialist for Flowcytometry for training various students and lab personnel on different BD platforms and helping in standardizing various assays in Clinical and research setups.

Flow cytometry is a technology that simultaneously measures and then analyses multiple physical characteristics of single particles, usually cells, as they flow in a fluid stream through a beam of light. The properties measured include a particle's relative size, relative granularity or internal complexity, and relative fluorescence intensity. This is often achieved by using various fluorescently tagged markers/antibodies. These light signals are converted into electronic signals that are analysed by a computer.

Modern flow cytometers can analyse many thousands of particles per second, in "real-time" which generates statistically robust data and makes it a powerful and popular technology amongst scientists. A specific type of these flow cytometers is a cell sorter, which can purify and collect samples for further analysis at similar rates.

Applications of Flow cytometry

(6th February, 2023; 2.30 - 3.15 PM)



Dr. Shashank Misra, Application Scientist
(shashank.misra@bd.com)

As an Application Scientist, Dr. Misra is responsible for FACS Academy operation, training programs and field application support primarily to the North Region.

He has 4.5 years of experience in field Application Support in various firms such as Beckman Coulter India Pvt. Ltd. and Imperial Life Sciences. During his professional and research career, he has gained expertise in Clinical & Research Flow Cytometry, Cell & Animal Imaging and Protein Detection platforms. He holds a doctorate in Philosophy (Science) degree in Life Sciences from the Institute of Nuclear Medicine & Allied Sciences (INMAS)/ Bharathiar University, Post Graduate Diploma in Business Administration from IMT-CDL Ghaziabad and a Master in Science (Biotechnology) from North Bengal University.

Innovations in CRISPR advancing translational research

(6th February, 2023; 3.30 - 5.00 PM)



Dr. Parul Tomar, PhD, Technical & Product Marketing Manager, Science & Lab Solutions- APAC, Biology (parul.tomar@merckgroup.com)

Parul Tomar obtained her PhD degree in Translational biology & Epigenetics from the Max Planck Institute of Immunobiology & Epigenetics, Freiburg, Germany. Her thesis work focused on the RNA polymerase pausing mediated molecular mechanisms by which chromatin exerts control over stress responses. Prior to that, she obtained her Master's degree in biology from the Tata Institute of Fundamental Research, Mumbai where she worked on molecular and genetic mechanisms underlying complex traits in *S.cerevisiae*. Dr. Parul joined the Commercial & Technical Marketing group at Merck in 2018, where she utilizes her technical expertise to support researchers with Molecular biology and functional genomics products for solving the toughest problems in life sciences.

CRISPR/Cas systems have evolved within bacterial and archaeal organisms as a defence against invading viruses and plasmids. The type II CRISPR/Cas system from the bacterium *Streptococcus pyogenes* has been engineered to function in eukaryotic cells using two molecular components: a single Cas9 protein and a non-coding guide RNA (gRNA). The Cas9 endonuclease can be programmed with a single gRNA, directing a DNA double-strand break (DSB) at a desired genomic location. Merck offers a broad portfolio of products for the use of CRISPR technology, which enables genome modification in a variety of model organisms. In this talk, I will highlight the key requirements of CRISPR reagents for preclinical and translational research, and how they can be used in a variety of applications to provide enhanced specificity without sacrificing cutting activity.

Protein Purification Techniques & strategies

(7th February, 2023 ; 1.30 - 5.00 PM)



Dr. Bhaskar

has completed Doctorate from the Department of Biochemistry, CSIR-Central Drug Research Institute, India. His expertise includes protein biochemistry, protein purification, protein characterization using AKTA protein purification and Biacore SPR System or WB techniques, NGS, etc. He focuses

on managing unpredictable requirements for specific skill sets and providing users with product and application training. Currently, he is associated with Cytiva as an Application scientist, where he leads the protein purification and characterization range of products across the South Asia Region.



Dr Vipin Kumar

Dr. Vipin Kumar has completed his Doctorate from the Department of Biosciences and Bioengineering of IIT Bombay, India. He has 8+ years of research experience in the field of proteomics techniques. His expertise includes Gel-based proteomics, protein purification using the AKTA system, protein analysis using Biacore

or WB techniques, NGS, etc. He focuses on managing unpredictable requirements for specific skill sets and providing user product and application training. Currently, he is associated with Cytiva as an Application scientist, leading the proteomics range of products across the South Asia Region

Workshop conducted by Cytiva (formerly GE Healthcare) designed for Biologists interested in learning chromatographic techniques suitable for production-scale protein purification.

In **Session A - Protein Purification Techniques - What Why and How**) participants will learn about different types of chromatography, different resins, and their applications. The rationale behind protein purification and method selection shall be discussed.

Session B - Protein Purification strategies will give an insight to the participants about the difference between analytical and preparative grade resins followed by resin selection strategies for the experiments. Multiple case studies shall be shared as a testimony to the strategies being discussed.

At the end of the sessions, there will be a Session C - Online Quiz

Next Generation Sequencing and its Clinical applications

(8th February, 2023; 1.30 - 3.00 PM)



Dr. Shailesh Gochhait, Thermo Fisher Scientific.

He completed his PhD. From Jawaharlal Nehru University 2008 under the guidance of Prof.

Bamezai in the field of Genetic heterogeneity in Breast cancer.

Post a small project at Oxford on Genetic susceptibility of Leprosy with Dr. Adrian Hill, joined Applied Biosystems as application support for a variety of technologies including qPCR, Sanger Sequencing, Microarray, NGS, forensics etc.

With more than 12 years of experience, now involved in the exciting field of Clinical sequencing.

In his lecture, he will be covering the basics of how the technology (Ion Torrent Next Generation Sequencing platform) works and the solutions around clinical research.

Genomics-Driven Cancer Diagnostics

(8th February, 2023; 3.30 - 5.00 PM)



Dr Amit Dutt is a Principal Investigator and Scientist G at ACTREC, Tata Memorial Centre, Mumbai (adutt@actrec.gov.in)

He obtained his PhD from the University of Zurich, Switzerland and ICGEB/ JMI, New Delhi. He was a postdoctoral fellow at the Broad Institute of Harvard and MIT. His

laboratory focuses on understanding the somatic changes that occur in human cancer cells and how these changes can help develop the next generation of effective targeted therapies to improve the treatment of cancer patients. Dr Dutt is a recipient of the Swiss National Science Foundation fellowship award; the Julius Klaus Foundation award from the University of Zurich; the Ramalingaswami Fellowship Award from the Department of Biotechnology (DBT); the Wellcome Trust/ DBT India Alliance Intermediate Fellowship Award; YIM Boston Young Scientist Award; Outstanding Alumni award from JMI, and the Shanti Swarup Bhatnagar Award in the field of Medical Sciences 2017.

Massively parallel Next-generation sequencing (NGS) is one of the most powerful diagnostic tools that enable precision medicine in cancer by allowing the rapid and comprehensive analysis of a patient's cancer genome. NGS can be used to identify genetic mutations that are associated with specific types of cancer and also to identify changes in DNA copy number, gene expression, and other genetic variations that affect cancer development and progression. This information can be used to classify cancers based on their molecular mechanisms, which in turn can inform the development of more effective diagnostic and treatment options.

New era of vaccinology – the mRNA platform

(9th February, 2023; 1.30 - 3.00 PM)



Dr. Ajay Singh, Gennova Biopharmaceuticals Limited, Pune. (Ajay.Singh@gennova.co.in)

Dr. Singh completed his doctorate at the University of Delhi South Campus. He has been an integral part of Gennova Biopharmaceuticals Ltd since 2013. He is a proficient molecular biologist and biochemist with a core specialization in mRNA therapeutics, Cell & Gene therapy, antibody engineering, and phage display. The recent outcome of his scientific excellence is the GEMCOVAC™-19, India's first fully indigenous mRNA vaccine for combating COVID-19 followed by an Omicron-specific booster in Human trials. Using a similar platform, mRNA vaccines against many infectious diseases and Cell & Gene therapy products are in the pipeline.

Vaccines are important biological tools involving Live attenuated, Protein subunits, DNA, and mRNA; that help in preventing infection by introducing the antigenic piece of any pathogen into the body, thereby triggering an immune response and preparing the body to fight that infection. Focusing our attention on the most advanced and promising mRNA platform, they are indeed revolutionizing the future path for treatments against cancer and infectious diseases, offering immense benefits of shorter and less time-consuming developmental processes followed by economic benefits. mRNA is a disease agonist platform where the antigenic sequences are just altered keeping the platform un-disturbed.

An overview of Human DNA Fingerprinting Technology and its Applications

(9th February, 2023; 3.30 - 5.00 PM)



Dr. R. Harinarayanan, Ph.D., Scientist In-Charge, Laboratory of DNA Fingerprinting Services, CDFD, Hyderabad 500039 (Hari@cdfd.org.in)

Dr. Harinarayanan completed his PhD, from the Centre for Cellular & Molecular Biology (CCMB), Hyderabad in the area of Bacterial Genetics and followed up with post-doctoral training at the National Institutes of Health, Bethesda, USA in the same field. He joined CDFD as a staff scientist in 2009 and has been part of the Laboratory of Bacterial Genetics and additionally serving as the In-charge of the Laboratory of DNA Fingerprinting Services since February 2020.

DNA Fingerprinting (also called DNA Profiling) is the process of determining characteristics unique to an individual's DNA. It can be used to study the DNA in any living thing but the emphasis in this talk will be on humans. Two unrelated individuals on average share 99.7% of DNA. The 0.3% that is different is spread across the genome and makes each individual unique. The differences in the DNA can be primarily of two kinds, namely, sequence variations and length variations. The method for detection of length variations using short tandem repeats (STR) will be described and how this can be used to infer relationships between individuals will be discussed. Especially, the utility of DNA fingerprinting in paternity/maternity disputes, establishing the identity of the deceased using forensic samples, identification of perpetrators in sexual assault, and establishing relationships between donor and recipient for organ transplants will be discussed.

Metabolomics and its applications

(10th February, 2023; 1.30 - 5.00 PM)



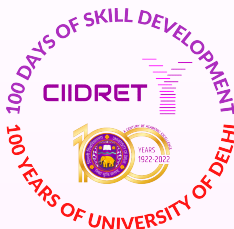
Dr. Garima Khare is working as an Assistant Professor at Department of Biochemistry since 2014. She completed her PhD from the Department of Biochemistry, University of Delhi South Campus in the field of tuberculosis research. She is a recipient of the Innovative Young Biotechnologists Award of the Department of Biotechnology, Government of India in 2013. Dr. Khare is also In-charge of the BSL3/ABSL3 facility dedicated to TB research at UDSC. She has been conducting various training programmes and courses for BSL3 training and handling practices for *Mycobacterium tuberculosis*. She has published several research articles in various international peer-review journals and book chapters.

Her research efforts are focused on the area of Tuberculosis primarily pertaining to the identification of novel inhibitors against *Mycobacterium tuberculosis*, the causative agent of tuberculosis, which can be developed into potent drugs against TB. Her laboratory is also dedicated to understanding host-pathogen interactions involved in TB pathogenesis. Additionally, her laboratory is also working to understand the persistence and drug unresponsiveness of *Mycobacterium tuberculosis* inside unconventional niches such as Mesenchymal stem cells.

Metabolomics is the global-level comprehensive analysis of small molecules, commonly known as metabolites in a biological specimen.

These small molecules and their interactions within a biological system are known as the metabolome. The cellular-level analysis of metabolites represents the final snapshot of the cellular processes occurring in the given cell at the given time. Hence, metabolomics is a powerful approach that directly reflects the underlying biochemical activity and state of cells/tissues.

Metabolomics gained tremendous progress after the advent of mass spectrometry and various metabolite databases. In view of the very high incidence of human diseases, it is urgently required to have a better understanding of the related mechanisms regarding endogenous metabolism. Mass spectrometry-based metabolomics has been used in a variety of disease research areas for various applications including biomarker discovery, development of diagnostic assays, identifying new drug targets etc. The lectures in this FDP will include an overview of metabolomics, various kinds of metabolic profiling, the use of mass spectrometry for metabolomics and a few examples of its use in disease-related applications.



Supported by

DBT-Genomic Facility at UDSC

DBT-CoE on Antibody Technology

BIRAC-Therapeutic antibodies for COVID-19

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