13th Young Investigators' Meeting 2021

17-19 March 2021

IndiaBioscience

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Department of Biotechnology
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The Young Investigators' Meeting Series

Building a community of young Indian biologists

The YIM series aims to build a vibrant community of biologists by allowing young Indian scientists from different regions and institutions to establish friendships, initiate collaborations, and learn from peer-to-peer mentoring.

The annual Young Investigators' Meeting (YIM) brings together exceptional young and senior scientists, heads of institutes, and representatives from funding agencies for discussions and interactions focusing on science and careers in a broad range of disciplines of biology. Since its inception in 2009, the YIM has established its brand in the life-science fraternity. The meeting has created a vibrant atmosphere for exchanging ideas for improving science in India and catalyzing friendships and collaborations between young Indian scientists.

Perhaps the greatest accomplishment of the YIM series is building a vibrant community of well connected biologists, allowing young Indian scientists from different regions and institutions to establish friendships, initiate collaborations, and learn from peer-to-peer mentoring. Every year the YIM is organised by a different committee, comprised of young faculty members from institutions across the country. India-Bioscience plays an administrative and advisory role in each year's YIM.

YIM 2021 is the thirteenth in a series that has grown in popularity, size and content since its inception in 2009. Taking place for the first time in virtual mode, YIM 2021 will proceed for 3 days and provide an opportunity for a larger cohort of participants to experience all the flavours and components that a traditional YIM offers.

While eminent researchers and administrators invited as mentors and speakers will share their experiences in building a career in scientific research, there will also be special talks on topics that are broadly relevant to everyone interested in science. Besides, there will be a series of panel discussions on topics including mentorship, setting up a research group, navigating the post-COVID world, funding opportunities and research assessment.

Although it is not an in-person meeting, YIM 2021 has been designed in such a way that it will enable the participants to network and forge connections. It will also give them the opportunity to share their experiences and become a part of the larger scientific community, which the YIMs are already known to cater to.

YIM 2021 is majorly supported by funding from the Department of Biotechnology (DBT), Govt. of India.

Acknowledgements

IndiaBioscience and the organizers of YIM 2021 are thankful for the support they received from:

- the volunteers:
  Harshini Chakravarthy, IISER Tirupati
  Basabi Bagchi, Ashoka University
  Snehal Kadam, Savitribai Phule Pune University
- the sponsors of YIM 2021:
  Department of Biotechnology, Govt. of India
  CACTUS Communications Pvt. Ltd.
  European Molecular Biology Organization
- the staff of the administration and purchase departments of NCBS and inStem, and
- the board members of IndiaBioscience

They also thank the Indian life science community for their engagement!

Table of Contents

YIM 2021 Organizers

IMROZE KHAN

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Imroze is a DBT/Wellcome Trust Intermediate Fellow and Assistant Professor of Biology at Ashoka University. He is an evolutionary geneticist with major interests in understanding how organisms adaptively evolve against/with infection and disease, using experimental evolution, genetics and genomics as primary tools. Among his other interests are studying the parallelism between evolutionary concepts and the cultural history of the world, and integrating the two within the framework of liberal education.

He did his doctoral studies in Evolutionary Biology at IISER Kolkata. Before joining Ashoka, Imroze was a postdoctoral fellow at the National Centre for Biological Sciences (NCBS), Bengaluru and a visiting researcher at the Free University of Berlin.

KARISHMA S KAUSHIK

Savitribai Phule Pune University, Pune
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Karishma is a physician-scientist at Savitribai Phule Pune University, who returned to India in 2018 to start her independent research group. Her group focuses on the study of complex infection microenvironments, with a focus on biofilms, and aims to develop human-relevant infection models that provide alternatives to animal studies, and enable the development of composite infection therapeutics. As a young investigator herself, she is looking to build a dynamic and committed, yet open and transparent team environment that reflects the change we want to see in academic science. In addition, her group is actively engaged with science communication and outreach initiatives (for children) that interface with the larger science ecosystem and wider community in India.

YIM 2021 Organizers

SHANTALA HARI DASS

IndiaBioscience, Bengaluru
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Shantala completed her PhD in behavioural neuroscience from Nanyang Technological University, Singapore following which she moved to McGill University, Canada for her post-doctoral studies. Across the continents and research questions, her interest in communicating science and facilitating the evolution of the scientific community has stayed strong. At IndiaBioscience, she is keen to see their network grow, expand their activities bringing greater national and international visibility to the Indian life science community and think of creative and bilateral modes of engagement with the community.

SMITA JAIN

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Smita has a PhD from the Indian Institute of Science, Bengaluru in the field of Cancer Biology. After exploring industry for a couple of years, she moved into the field of scientific management. With her keen interest in management, ability to communicate, she played a key role in establishing the business and processes at C-CAMP, Bangalore. She also has experience working as a research analyst with a digital content organization. She is deeply motivated to take the activities of IndiaBioscience to all possible corners of the country and make a strong-knit network of Indian life science researchers and professionals. She is passionate about 'Careers in Science', 'Mentoring', and developing courses for 'professional development'.

Smita is a recipient of IRMI Research Management Grant of India Alliance. She is also a nominated member of the review group for the programmes and activities of NSTC, DST, GoI and an invited member of the committee set up by DST, Govt of Rajasthan for the welfare of Women in Science.

YIM 2021 Organizers

VASUDHARANI DEVANATHAN

IISER Tirupati
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Vasudharani is a neurobiologist at IISER Tirupati, focussing on understanding neuronal response to altered glucose conditions. Along with her team, she focuses on how the neurons try to cope with glucose insults. At IISER T, she teaches graduate students both foundation and advanced level courses. Passionate about research, she reaches out to the local community via Unnati, the student outreach team at IISER Tirupati, which she leads. She is also the chair of student affairs at IISER Tirupati. She graduated from ZMNH in Hamburg, and her ties with Germany continue via collaborative science, and she is a DAAD Research Ambassador.

About IndiaBioscience

IndiaBioscience is an organization that fills a unique niche in the ecosystem of the life sciences in India, by being a catalyst to promote changes that affect the culture and practice of the field, through engagement with academia, government and industry at various levels. IndiaBioscience aims to increase the visibility of science in society, by being a hub for policy discussions, science communication, and as an aggregator of information.

IndiaBioscience plays an administrative and advisory role in each year's YIM, but its engagement with the participants extends beyond the meeting. IndiaBioscience sets out to forge a long-standing bond with the YIM alumni to promote the development of their career and aid the flourishing of their research groups. Through this sustained ripple effect, it hopes to create a meaningful and lasting impact on the research ecosystem in the life sciences in India

Team Members

Manjula Harikrishna
Senior Program Associate

Shantala Hari Dass
Associate Director

Shreya Ghosh
Program Manager - Science Communication

Shwetha C
Office Administrator

Smita Jain
Executive Director

Suchibrata Borah
Program Manager - Digital Initiatives

Vijeta Raghuram
Program Manager- Science Education

Zill-e-Anam
Program Associate for International Grants

Engage with us

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- Attend our webinars
- Follow us on social media
- Join our online discussion at discuss.indiabioscience.org
- Write for us
- Advertise jobs, events and grants on our website

YIM 2021
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Programme Schedule

Note: The schedule may change. You can find the updated schedule on the YIM 2021 webpage.

17 March

Day 1: Young Investigators' Meeting 2021

16:30 - 16:35	Welcome Address (Karishma Kaushik, SPPU, Pune)
16:35 - 16:40	Housekeeping Instructions
16:40 - 16:45	Introduction to IndiaBioscience: Engaging Communities, Enabling Change (Smita Jain, IndiaBioscience)
16:45 - 16:50	Opening Remarks (Satyajit Mayor, NCBS)
16:50 - 17:20	**Special Talk 1:** Developing Future Leaders (Renu Swarup, Secretary, DBT)
17:20 - 17:50	**Mentor Talk 1:** Translational Cancer Research in a Premier Engineering Institute: A Rewarding Journey (Bushra Ateeq, IIT Kanpur)
17:55 - 18:55	**Panel Discussion 1:** The Changing Times - Impact of COVID-19 Pandemic on the Scientific Ecosystem (Jyotsna Dhawan, CCMB; Ron Vale, Janelia Research Campus, USA; Sandhya S. Visweswariah, IISc; Shahid Jameel, Ashoka University; Moderator: Rashna Bhandari, CDFD)
19:00 - 20:00	**Breakout Session 1:** How to Steer Your Research and Mentor Students (B Nagaraj, IISER Pune; Lolitika Mandal, IISER Mohali; Vidita Vaidya, TIFR, Mumbai)

18 March

Day 2: Young Investigators' Meeting 2021

16:30 - 17:00	Lounge Room
17:00 - 17:05	Introduction to Day 2
17:05 - 17:35	**Mentor Talk 2:** Leveraging the Local (Aurnab Ghose, IISER Pune)
17:40 - 18:40	**Panel Discussion 2:** Building a Research Group (Bodhisatta Nandy, IISER Behrampur; Deepa Agashe, NCBS; Roop Mallik, IIT Bombay; Urmila Kulkarni-Kale, SPPU, Pune; Moderator: Imroze Khan, Ashoka University)
18:45 - 19:15	**Special Talk 2:** Connecting with Communities (Sarah Iqbal, India Alliance)

Programme Schedule

19:15 - 19:45	**Special Talk 3:** Academic Communication Beyond Publications (Shane Rydquist, Cactus Communications)
19:45 - 20:45	**Panel Discussion 3:** Indian & International Funding Scenarios & Opportunities (A.V. Balachandar, SERB; Meenakshi Munshi, DBT; Sanjay Mishra, DST; Vasan Sambandamurthy, India Alliance; Moderator: Vasudharani Devanathan, IISER Tirupati)

19 March

Day 3: Young Investigators' Meeting 2021

16:30 - 17:00	Lounge Room
17:00 - 17:05	Introduction to Day 3
17:05 - 17:35	**Mentor Talk 3:** Lessons from Adaptive Shifts in Metabolic and Regulatory Networks in Mycobacteria (Sharmistha Banerjee, University of Hyderabad)
17:40 - 18:10	**Special Talk 4:** EMBO | IndiaBioscience Online Seminar: Good Scientific Practice - Dos and Don'ts in Life Sciences (Reinhard Jahn, Georg August University Göttingen, Germany)
18:15 - 19:15	**Panel Discussion 4:** Research Assessment: What is DORA? (Anna Hatch, ASCB; K VijayRaghavan, PSA, Govt of India; Rahul Siddharthan, IMSc; Satyajit Mayor, NCBS; Shahid Jameel, Ashoka University; Moderator: Satyajit Mayor, NCBS)
19:30 - 20:30	Informal Networking Session (LS Shashidhara, Ashoka University)
20:30 - 20:40	Closing remarks

Special Talks

RENU SWARUP

Secretary, DBT
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Special Talk 1: Developing Future Leaders

SARAH IQBAL

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Special Talk 2: Connecting with Communities

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Special Talk 3: Academic Communication Beyond Publications

REINHARD JAHN

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Special Talk 4: EMBO | IndiaBioscience Online Seminar: Good Scientific Practice - Dos and Don’ts in Life Sciences

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The Changing Times - Impact of COVID-19 Pandemic on the Scientific Ecosystem

Panel Discussion 1
17 March 2021 (17:55 - 18:55)
Moderator
Rashna Bhandari, CDFD

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Building a Research Group

Panel Discussion 2
18 March 2021 (17:40 - 18:40)
Moderator
Imroze Khan, Ashoka University

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URMILA KULKARNI-KALE

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Indian & International Funding Scenarios & Opportunities

Panel Discussion 3
18 March 2021 (19:45 - 20:45)
Moderator
Vasudharani Devanathan, IISER Tirupati

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Research Assessment: What is DORA?

Panel Discussion 4
19 March 2021 (18:15 - 19:15)
Moderator
Satyajit Mayor, National Centre for Biological Sciences (NCBS)

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K VIJAYRAGHAVAN

Principal Scientific Advisor, Govt. of India

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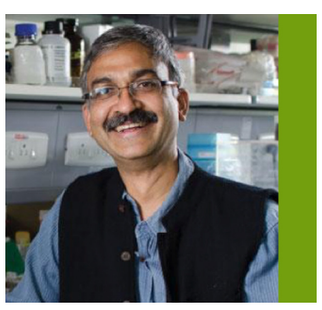

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Advancing Discovery and Innovation to Improve Health

DBT/Wellcome Trust India Alliance (India Alliance) is an independent, dynamic public charity that funds research in health and biomedical sciences in India. India Alliance invests in transformative ideas and supportive research ecosystems to advance discovery and innovation to improve health and well-being. India Alliance is funded by the Department of Biotechnology (DBT), the Government of India, and the Wellcome Trust, UK.

Building Capacity in Biomedical and Health Research

With a commitment to build research capacity in India and catalyse internationally competitive research, India Alliance successfully steers three types of fellowship programmes that support researchers at different stages of their career—**Early Career, Intermediate,** and **Senior**—in the fields of basic biomedical research as well as clinical and public health research. The focus of our fellowship programme is setting researchers on a leadership track through a continuous system of engagement and mentoring.

To enhance India's health research ecosystem and address major health challenges for India and the world, India Alliance also offers funding for collaborative research projects and clinical research training through its **Team Science Grants** and virtual **Clinical/Public Health Research Centres.**

Team Science Grants fund teams that bring together high-quality scientists from multiple institutions with complementary skills, knowledge, and resources in order to address an important health challenge for India.

Clinical/Public Health Research Centres (CRC) are envisioned as virtual, research-oriented centres focusing on either crosscutting or vertical research themes. To build clinical research capacity, integrate basic and clinical/public health research, and develop physician-scientists, the CRCs can have an embedded **Clinical Research Training Programme (CRTP)**—funding 3- to 4-year mentored research training fellowships for medical graduates (MBBS) and postgraduates (MD/MS).

Fostering Interdisciplinary and International Collaborations

Finding solutions to the problems of modern society requires interdisciplinary and collaborative science. Besides its fellowship programmes, India Alliance funds major scientific meetings and provides travel grants aimed at resource-sharing and forging national and international research collaborations.

India | EMBO Lecture Courses

India Alliance and the European Molecular Biology Organization (EMBO) jointly fund up to six lecture courses per year in India. The aim of the lecture course is to teach contemporary topics in life sciences and provide technical and professional skills training to PhD students and postdocs.

Africa-India Mobility Fund

India Alliance, in partnership with the African Academy of Sciences, launched the Africa-India Mobility Fund (AIMF) in 2018. AIMF is a two-year programme designed to provide researchers from Africa and India a travel grant for short visits in either direction. In recognition of the fact that Africa and India face similar health challenges, the AIMF initiative intends to encourage South-South collaborations, improve research capacity, and build leadership in biomedical research in India and Africa.

Strengthening Research Ecosystems in India

In addition to identifying and supporting the best scientific talent in India, the India Alliance constantly endeavours to support and implement enabling policies and interventions to create a robust research ecosystem in the country.

Research Leadership Workshops

Scientists manage people and projects; this makes leadership skills critical to a successful career. India Alliance, in partnership with EMBO, organises research leadership workshops for its fellows and young Indian researchers to help them recognise and cultivate their leadership style and develop management skills.

Developing Indian Physician Scientists (DIPS) Workshops

DIPS workshops, launched in 2017, are designed to encourage young physicians to participate in research by facilitating exposure to scientific methodology and inspirational role models.

India Research Management Initiative

India currently lacks a well-developed research management system, which is important for institutions to navigate the high demands for funding, outreach, and governance of research. To address this lacuna, India Alliance launched the India Research Management Initiative (IRMI), a research management programme for India, which aims to strengthen institutional ecosystems. IRMI will also provide opportunities to Indian research managers to receive training and create a network of practitioners for serving broader career development needs.

Enabling Engagement with Science

At India Alliance, we empower researchers to make their science accessible to all through open access publication, science communication, and public engagement.

Open Research

Open research ensures the unbiased, instantaneous, and unhindered flow of knowledge produced by researchers, thereby promoting communication and collaboration. To keep all of India Alliance-funded research openly accessible, India Alliance joined **Wellcome Open Research** and **Europe PMC** in 2017/2018. Adoption of the open research policy is bound to improve the relationships between researchers, policymakers, educators and society at large.

Science Communication Workshops

Effective communication of scientific facts and findings helps science to thrive and also helps people to better appreciate its implications for society. In addition to organising various unique science communication events in the country, India Alliance regularly conducts science communication workshops in three formats: Pan-India SciComm (a two-day workshop in which participation is based on a pan-India competition), SciComm101 (a one-day workshop held at institutions on request), and the Science Communication and Career workshop (a one-day workshop conducted in partnership with Nature India and Nature Careers at major scientific meetings).

Public Engagement

India Alliance aims to bridge the gap between science and society through public engagement programmes that bring the scientific community and the public together to share, debate, and deliberate on important matters of science that have implications for society, especially human health.

India Science Media Fellowships

India Alliance in collaboration with Nature India launched the India Science Media Fellowship in 2019 to strengthen science journalism in the country and to help establish science as a distinct genre of journalism. This fellowship will enable journalists to explore science and the craft of journalism in depth and to write nuanced science stories.

For more information on India Alliance's initiatives visit **www.indiaalliance.org.**

Follow us on Twitter (@India_Alliance), Facebook (@IndiaAlliance) and LinkedIn (/IndiaAlliance) for regular updates.

Catch glimpses of India Alliance's 10-year journey at **10years.indiaalliance.org.**

IndiaAlliance
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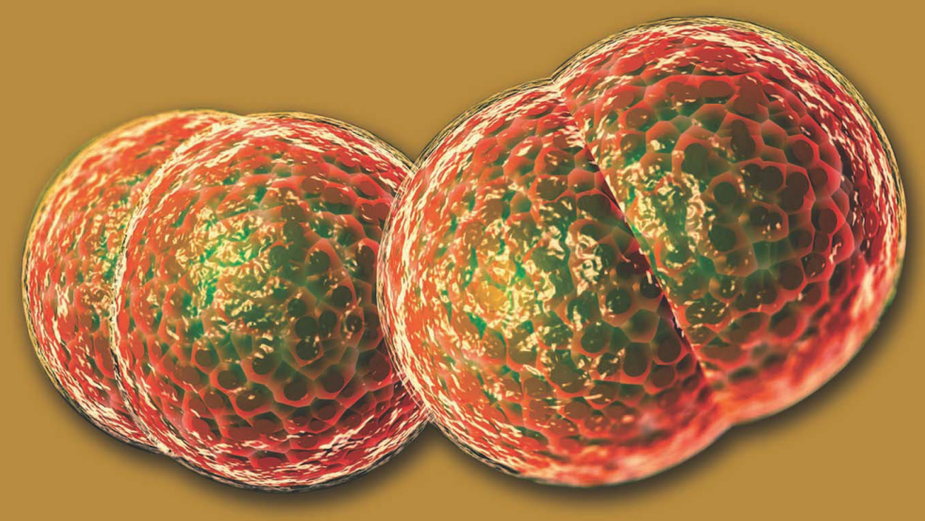
ENGAGING COMMUNITIES ENABLING CHANGE



OUR ACTIVITIES

- NETWORKING SCIENTISTS AND EDUCATORS
- COMMUNICATING EXCITING NEW FINDS IN BIOLOGY
- AIDING RECRUITMENT OF YOUNG TALENT
- RESOURCES FOR RESEARCHERS AND EDUCATORS
- JOB, GRANT AND EVENT LISTINGS
- DATABASE OF BIOLOGY ORGANISATIONS

ENGAGE WITH US

- SUBSCRIBE TO OUR NEWSLETTER
- PARTICIPATE IN OUR MEETINGS AND EVENTS
- WRITE FOR US
- START A DISCUSSION ONLINE

Life sciences and its allied sectors are gaining more importance in India than ever before, whether it be industry, biomedical and basic research or the understanding of our spectacular biodiversity.

IndiaBioscience, a non-profit organisation, fills a unique niche in the ecosystem of the life sciences in India, being a catalyst to promote changes that affect the culture and practice of science, by engagement with academia, government and industry at various levels. We aim to increase the visibility of science in society, by being a hub for policy discussions, science communication, and as an aggregator of information.

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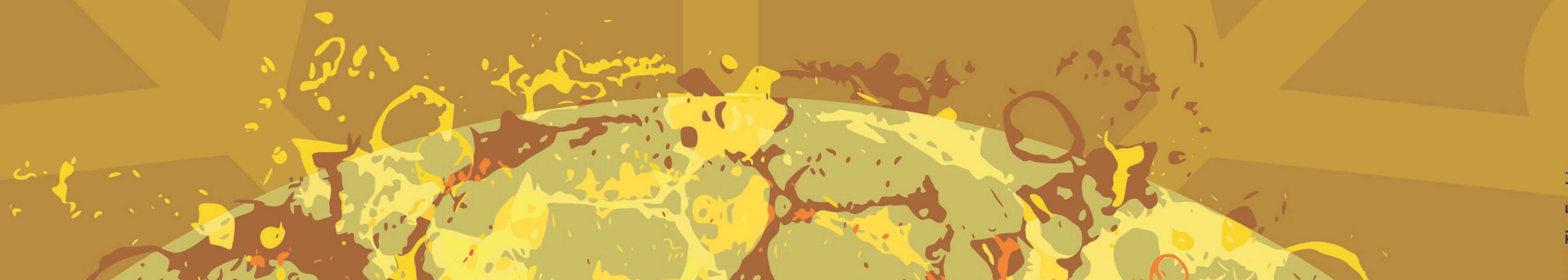


IndiaBioscience

ENGAGING COMMUNITIES. ENABLING CHANGE

GET MENTORED

"Young Investigators' Meeting" - a national platform for postdoctoral fellows and young investigators to network and seek mentorship

STARTING A NEW LAB?

GO LOCAL

"Regional Young Investigators' Meetings" - regional platforms for science professionals to seed local collaborations and network

FIND PARTNERS

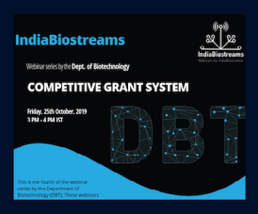
> 500
Researchers in the database

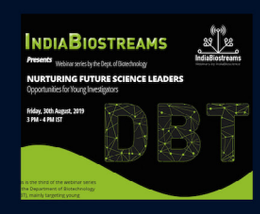
Interactive database of 500+ life science researchers in India

IndiaBioscience has the resources to help you

IndiaBioscience

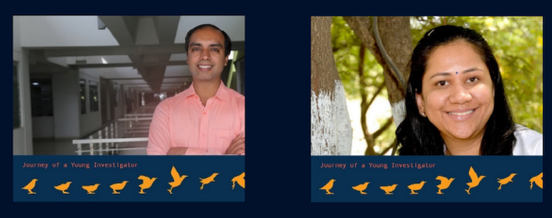
STAY INFORMED

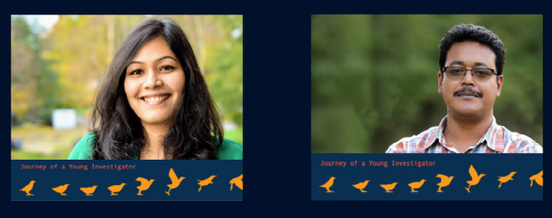




"IndiaBiostreams" - webinar series on science policy, funding, training opportunities and more

LEARN FROM PEERS





"Journey of a Young Investigator" (JOYI) - articles by early career researchers about their journeys towards becoming independent investigators

LEARN FROM LEADERS

"10 Leaders, 10 Questions" - interviews on leadership skills

STAY ALERT

Videos, events, jobs and other resources for young investigators

To know more, visit www.indiabioscience.org

IndiaBioscience

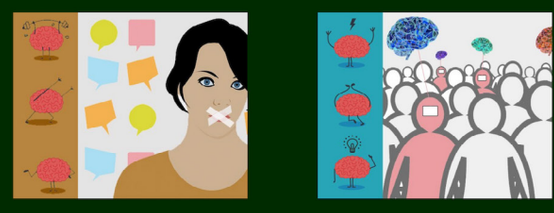
ENGAGING COMMUNITIES. ENABLING CHANGE

WANT TO BE A GOOD MENTOR?

LEARN

"Young Investigators' Meeting" - a platform for young investigators to gain an insight on how to be good mentors from senior scientists

PROTECT



Articles on mental health awareness and mental well-being of students and employees

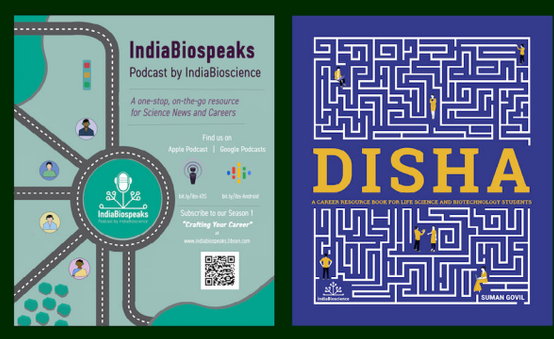
NURTURE

Articles by group leaders about how they create a happy and motivating working atmosphere

IndiaBioscience has the resources to help you

IndiaBioscience

GUIDE



Podcasts, workshops, webinars, articles and booklets providing information on various career options in India for science students

LEAD

"10 Leaders, 10 Questions" - interviews on leadership skills

INSTIL ETHICS

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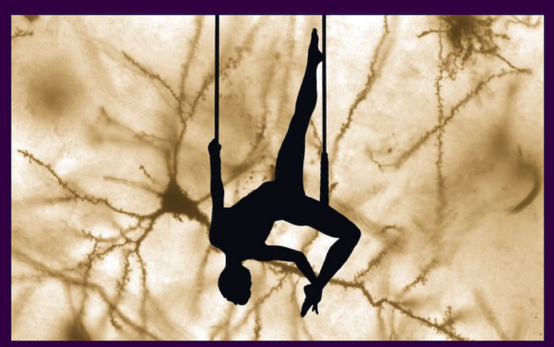

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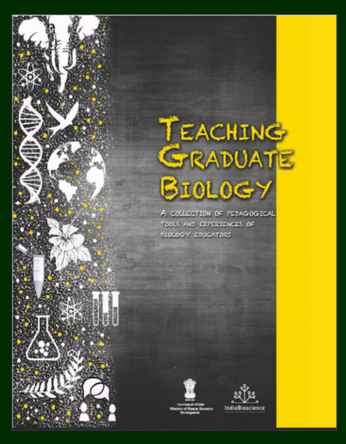

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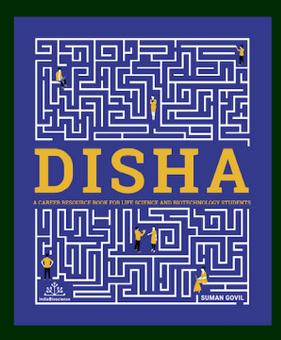

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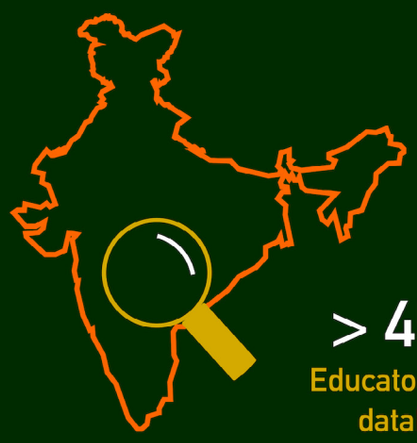

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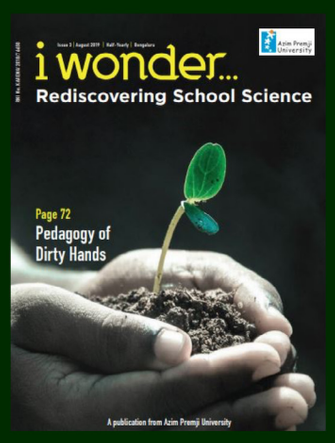

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Young Investigators' Abstracts

YI 01 **AMARJEET SINGH**

Plant molecular biology; Functional genomics; Plant abiotic stress signaling; Crop improvement; Lipid remodeling

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Post-translational modifications; Proteomics; Systems biology; Bioinformatics; Multi-omics

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Systems biology; Adaptive laboratory evolution; Infectious disease biology; Microbiology; Bioenergetics

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YI 24 **MANASI MISHRA**

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YI 25 **MANISH DWIVEDI**

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YI 41 **SANTOSH KUMAR**

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Young Investigators' Abstracts

YI 45 **SHRUTHI VEMBAR**

Molecular parasitology; Epigenetic regulation; Post-transcriptional regulation; Genome editing technologies; Population omics

YI 46 **SIBU SIMON**

Plant hormones; Strigolactones; N-stress; Arabidopsis thaliana; Tomato

YI 47 **SOURAV HALDAR**

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YI 48 **SUDIPTA TUNG**

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YI 49 **SURABHI SONAM**

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YI 50 **SUTHARSAN GOVINDARAJAN**

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YI 51 **VIJAY MORAMPUDI**

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YI 52 **VIJAY VERMA**

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YI 53 **VIJI SUBRAMANIAN**

Meiosis; DNA breaks; DNA recombination; Chromosome inheritance; Budding yeast

YI 01

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Plant molecular biology; Functional genomics; Plant abiotic stress signaling; Crop improvement; Lipid remodeling

The research interest of my group is to dissect the signaling networks to improve abiotic stress and nutrient (N,P,K) deficiency tolerance in crop plants. Plants tolerance or susceptibility to stresses and therefore, the productivity is determined by coordinated function of various genes and proteins. Understanding their molecular behavior can help in developing stress tolerant and high yielding crop varieties. Therefore, important stress and development signaling components in rice and chickpea, including phosphatases, phospholipases and calcium transporters were identified, their genomic and structural complexity and expression were analysed. Importantly, several stress and development related genes were identified and characterized. These vital candidates are being and will be utilized to develop high-yielding and stress-tolerant crop varieties.

To improve the nutrient use efficiency (NUE) in crop plants, understanding the molecular mechanism of nutrient uptake, transport and assimilation is important. Towards understanding the plants' adaptive mechanism under low-K^+ stress, a protein phosphatase AP2C1 and a $Ca2^+$-regulated Ser/Thr kinase CIPK9 were found to interact and antagonistically regulate low-K^+ stress response in Arabidopsis. Dephosphorylation of CIPK9 by AP2C1 was identified as the underlying regulatory mechanism of this response. Thus, a new paradigm of K^+ deficiency signaling and response was established. Several crucial genes that via regulating phytohormone signaling (JA, Auxin, ABA, ethylene) modulate root system architecture and thus, may improve nutrient (N, P, K) uptake have been identified in rice and chickpea, and are being utilized for making transgenic and CRISPR-Cas9 edited crop plants with improved NUE.

YI 02

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Post-translational modifications; Proteomics; Systems biology; Bioinformatics; Multi-omics

I am applying my computational skills to understand protein post-translational modifications (PTMs) in cardiovascular and liver diseases. Using genomic data and integrating it with PTMs from known disease-SNP relationships, we found hotspots of PTMs and diseases. We also found PTM cross-talk hotspots to overlap with disease associated variants in sirtuin interactors and various PTM crosstalks that can drive CVDs. These findings have revealed mechanistically important proteins which can be studied further to trace disease stages using modifications in proteins which can be useful as biomarkers as well as carry therapeutic potential as drug targets.

YI 03

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Systems biology; Adaptive laboratory evolution; Infectious disease biology; Microbiology; Bioenergetics

Centuries of knowledge generation followed by an unprecedented rise in data analytics has placed us in a position where we can attempt questions from atomic to the systems level. Despite this scientific advancement, the estimation of bacterial stress defense capabilities has remained elusive. Infectious diseases persist as a global threat; notoriously, claiming fourth place worldwide and 1st place in lower-income countries among the leading causes of death.

Among many, one of the factors responsible for the limited success against bacterial pathogens is the oversimplified view of the microbial lifestyle. It is widely recognized that the life of bacteria is complex and routinely challenged in natural settings; also, rarely any bacteria live in a homogeneous single species community. Another bottleneck is the resolution between the proximal and distal impact of any intracellular or environmental perturbations on bacteria.

A lack of protective barriers to the environment exposes the bacterial cells to every change in the external environment and, therefore, bacterial physiology has evolved to be very plastic. My prime interest is in unraveling the adaptive features accumulated in bacterial metabolism due to the billions of years of mutation sampling to survive under selective pressures. Towards this, I plan to take a top-down approach to study bacterial physiology in complex communities by simulating natural conditions as close as possible and a bottom-up approach to recreate core of pathogenesis by a genome engineering exploiting the minimal cell as chassis.

YI 04

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Personalised oncology; Virus; Drug repurposing; Clinical translational science; Start-ups

My laboratory works in the area of personalised oncology in close collaboration with industries, and earlier I've led a group in the industry in the area of Clinical Translational Oncology. We have provided to physicians with transparent predictions of a patient's response to standard cancer therapies by bio-simulating the impact of each drug using NGS data from a tumour biopsy or altered blood cells. In addition, as a CEO of IICE at IISER Bhopal, my role involves selecting the ideas from academic research labs and bring those to the innovation centre in form of faculty-led start-ups, and then mentoring and helping them achieving milestones, raise funds, IP milestones with product-oriented research.

Recently, my group has started focusing on the repurposing of drugs and published papers suggesting some of the FDA approved existing molecules for the treatment of COVID-19.

In the next few years, I would want to build upon the personalised medicine with a prediction and validation based approach using the genomic data from the oncology patients, precisely in solid tumours.

YI 05

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Disordered proteins; Membraneless organelles; Neurodegeneration; Cancer; Single-molecule imaging (atomic force microscopy)

I specialize in studying the functioning of proteins that do not have a unique 3-D shape and are called intrinsically disordered proteins. Protein disorder is abundant in signaling proteins involved in age-associated diseases like cancer and neurodegeneration. In recent years many of the disordered proteins are shown to form dynamics complexes called membraneless organelles in the cells. How these membraneless organelles form and function is not understood as yet but most of the neurodegenerative diseases and cancer-associated DNA repair processes exhibit faults in their membraneless organelles. My scientific interest is to determine how these membraneless organelles form, function, and default in neurodegeneration and cancer.

During my Ph.D. and postdoctoral fellowships, I studied disordered proteins associated with Parkinson's disease and breast cancer, respectively (by single-molecule atomic force microscopy). As an independent scientist, I want to understand how disorder in proteins contribute to the formation of the membraneless organelles and pathological aggregates in neurodegeneration and cancer. My team and I are working towards developing in-vitro model systems for membraneless organelles in defined volume to investigate the function of various DNA repair and neurodegeneration associated disordered proteins. I want to determine if there is a unifying functional property of the disordered proteins that become dysregulated with age and contribute to age-associated diseases. Fundamental knowledge on the functioning principles of disorder proteins will majorly contribute to understanding the molecular bases of these diseases and enable the development of therapeutic and palliative care in the mid to long-term.

YI 06

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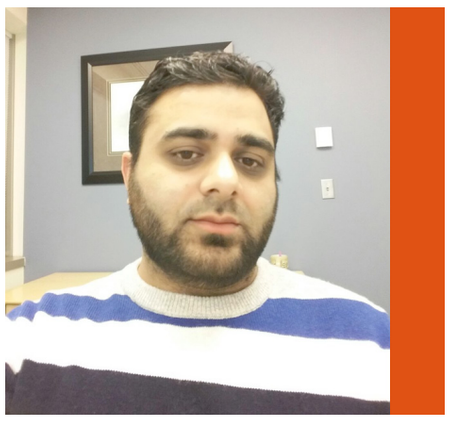

Neuroendocrine prostate cancer; Genomics and transcriptomics; Cancer immunotherapy

Currently i am working on neuroendocrine prostate cancer on Ramalingaswami Fellowship. I study the interaction between oncogenes and tumor suppressors in controlling the neuroendocrine prostate cancer. Previously, I served as an ontrack Research Assistant Professor at the University of Minnesota, USA where I explored the molecular pathways which play key role in the development of Neuroendocrine (NE), castration-resistant (CRPC) and chemo-resistant prostate cancer using Genomics and CRISPR knock-out/ knock-in mouse model. My Postdoc research involves to study the change in genomic landscape during the progression of the primary localized cancer to metastatic prostate cancer. I also developed an Immunotherapy project to treat metastatic prostate cancer during my Postdoc. I further explored the role of Stem cell proteins in the profession of Metastatic prostate cancer.

I Completed my Ph.D in October 2014 from Institute of Microbial Technology Chandigarh and Jawaharlal Nehru University New Delhi under the mentorship of Dr Charu Sharma. My Ph.D work was on host-pathogen interaction and elucidating the virulent pathways in Mycobacterium Tuberculosis using global protein-protein interaction.

My long-time interest is to study the genome and epigenome drivers of NE-type prostate cancer and prostate microenvironment in relation to TGF-ÃŸ signaling. Also, I want to focus on TGF Î² positive and negative regulators on TH1, TH2 and regulatory T (TReg) cells in prostate cancer. Further my interest is to study the Polycomb-group (Pc-G) protein complexes and cGASâ€“cGAMPâ€“STING pathway in the tumorigenesis of Breast and prostate cancer.

YI 07

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Computational biology; Structural biology; Biophysics; Integrative modeling; Circadian biology

My research is focused on studying biological systems using computational methods. To be more precise, I utilise a variety of computational methods derived from well-established fields of science such as graph theory, statistical mechanics, chemistry etc. to understand the three-dimensional structure of proteins and their complexes within cells. Recently, I have been trying to understand the structure and dynamics of proteins involved in regulation of circadian rhythms in mammalian cells. The physiology and behaviour of almost all living organisms is synchronised to a 24-hour solar cycle and referred as circadian rhythms. Within each mammalian cell, there are well-regulated molecular mechanisms that control the circadian rhythms and any disruption in these leads to various disorders and diseases including cancer. This makes it pertinent to understand these mechanisms at the molecular level.

During my postdoctoral research, I used integrative modelling methods to study large protein complexes involved in circadian regulation. Integrative modelling entails using structural information from multiple experiments such as X-ray crystallography, NMR, SAXS, FRET, Mass spectrometry etc. to develop a comprehensive structural model and study the dynamics of biomacromolecular complexes. In future, along with studying the circadian biology in mammals, I plan to collaborate with experimental groups working in the area of structural biology of large protein complexes and establish integrative modelling as a standard approach to study biological macromolecules.

YI 08

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Bacteriophages; Bacteria; Biofilm; Biofouling; Antimicrobial resistance

Our research interests include the application of bacteriophages to control biofilm and biofouling in cooling water pipelines. Currently, chlorine is used in cooling water pipelines to control the growth of bacteria and metamorphosis and barnacle and mussel larvae. But due to the continuous development of chlorine resistance, some of the bacteria and larvae can tolerate the dosed chlorine. As a result, bacteria form chlorine-resistant biofilms and act as a substratum for the settlement and metamorphosis of larvae. The current control regime in the form of chlorine has multiple side effects like the generation of hazardous byproducts and upper discharge limit in the environment. We are trying to target the bacterial biofilm by bacteriophages as an alternative to chlorine. We have isolated bacteriophages from different sources: seawater, freshwater, sewage, and poultry farm using our optimized protocol. Our approach is a self-sustainable and natural approach that is cost-effective without the generation of any hazardous products and discharge limit in the environment. Additionally, we are planning to explore bacteriophages for biofilms and infection control in a medical setup. A century-old concept of phage therapy can be an ideal choice to mitigate infection without facilitating the emergence of antibiotic-resistant organisms. The phage therapy approach will have many advantages over classical antibiotics based approaches. For example,

1) selective elimination of pathogen without harming the normal flora;
2) self-sustaining system, does not require repeated dosing;
3) multiple phage option for single pathogen and thus, control on the evolution of resistance;
4) cost-effective etc.

YI 09

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Glycosylation; MGAT1; Basigin; Integrin

Mechanisms that regulate spermatogenesis in mammals are important to define as they generally apply to fertility in man. N-glycans are differentially expressed in germ cells during spermatogenesis in the mouse (Jones, Morrison et al. 1992, Lemaire and Heinlein,1992). MGAT1/GlcNAcT-I (N acetylglucosaminyltranferase1) initiates the synthesis of complex N-glycans. The Stanley laboratory previously showed that conditional deletion of Mgat1/complex N-glycans in spermatogonia causes a germ-cell autonomous defect in spermatogenesis and infertility. Basigin, also called CD147 or EMMPRIN, is a transmembrane glycoprotein that belongs to the immunoglobulin superfamily. Whole body deletion of basigin also caused multinucleated cells formation. Basigin is a major carrier of complex N glycans in testicular germ cells (Bi, Li et al. 2013). We hypothesise that reduced expression of spermatogenesis specific genes in the Mgat1 null mice may be linked to altered expression and transport of key molecules due to altered N glycans in Basigin. The known Basigin-interacting partners include MCT 1- 9 (monocarboxylate transporters), integrin-β1, cyclophilin and ubiquitin C among others (Xiong, Edwards et al. 2014). The molecular basis for the loss in spermatogenesis is not known, and may include impaired MCT actions, failed integrin signaling (Berditchevski, Chang et al. 1997), or loss of cyclophilin signaling.

YI 10

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Gene-editing; CRISPR; Chemical biology; Medicinal chemistry; Synthetic biology

My research training in Ph.D. was on chemical biology of anticancer drug development. I mainly worked on developing telomerase inhibitors as anticancer agents. My postdoctoral research was focused on CRISPR-based gene-editing and transcriptional regulation. I also worked on pancreatic beta-cell targeted drug delivery for diabetes therapy.

Currently, my research group at Ashoka University focuses on chemogenetic research and synthetic biology. My primary research areas are in the field of genetic-diseases and pathogenic diseases.

YI 11

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Learning; Memory; Stress; Depression; Cognitive impairment

I study learning and memory processes in stress, depression, and ageing. As part of my doctoral and postdoctoral research I explored the effects of stress and depression on memory updating. Short bouts of stress can impair memory updating while effects of depression vary with the sub-types of depression. Unipolar-depression patients retain their ability to update memories while bipolar-depression patients mix-up memories instead of updating them. These findings have applications in the treatment plans for unipolar and bipolar depression.

In older adults, forgetfulness is common but it is also a hallmark of cognitive decline. If ignored, the forgetting may progress to an irreversible neurodegenerative condition. Therefore, prevention and early detection are crucial. Early signs of cognitive decline are often confused with ageing related impairments and are often ignored. To understand how early one can detect cognitive decline, I currently collaborate with a team of researchers at the Transdisciplinary University (TDU) in Bangalore. We are trying to devise convenient methods to identify early changes in cognition in the older adults. We are also trying to understand the nootropic effects of a traditional Indian formulation Brahmi Ghrita (ghee). Although Brahmi's efficacy in boosting memory is well documented in Ayurveda, our goal is to systematically study its nootropic role.

My future plans include understanding the role of chronic stress on memory processes in the Indian population. Hair cortisol and blood-biomarkers are recent techniques that can be used to detect chronic stress and study its effects in longitudinal studies.

YI 12

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Cancer biology; Neuroendocrinology; Tumor immunology; Wound healing; Nanodelivery

I did my PhD in deciphering role of neurotransmitters in cancer progression and did postdoctoral work on regulation of endothelial progenitor cell migration. Since joining as research faculty at CNCI on 2018, I am trying to utilize our clinicial and research resources to address India specific problems, generate scientific knowledge and develop products. One of my Ph.D students is working on identifying autophagy signatures in Indian breast cancer patients that can be prognostic biomarker for different stages and subtypes. My other Ph.D student is working on understanding neuronal regulation genes in metastatic progression of Indian gastric cancer patients.

I have established collaboration with faculties of other institutes with complementary expertise. I am developing a NK cell based immunotherapy prototype which can be a cost effective solution to challenges of CAR-T cell technology.

I am in process of co-developing and validation of a nanomaterial based oral sustainable chemotherapeutic drug delivery system which presently is prototype ready and phase-1 trial is planned. Being part of Kolkata based gynaecological oncology society (Kolgotrg.org), I'm participating in a team science approach project on mitigating hemotoxicity and neurotoxicity of taxol/platinum drugs in ovarian cancer with natural compounds. I am also working on dynamics of insulin and dopamine in burn wound healing process and established that insulin can accelerate wound healing process and antagonising dopamine concentration have the same role. We are trying to synergise these two endogenous processes to develop solution to burn wound and radiation injuries.

YI 13

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Phenotype; Hair shape; Population genetics; Adaptation; Human diversity

Phenotypic diversity determines how we look, what we can eat, what climatic conditions we can tolerate and what disease risks we have. These phenotypic traits are most importantly, reflections of adaptations to various selective pressures by our ancestors.

My lab research interests revolves around understanding these traits, how they differ across populations, how we acquire them, how it influences our biological fitness and which selective forces shaped them. My PhD involved study of two such traits - skin pigmentation and lactase persistence in South Asian populations. My work on indigenous populations of South Asia was the pioneer work on genetics of skin color in local Indian populations. Most importantly, our study inferred that the variants conferring to light skin and ability to digest milk in adulthood, is shared by Europeans and Indians. Our research mainly involves studying modern human genomes but also relating to information drawn from archeaology, linguistics, anthropology and evolutionary Biology. So it is indeed intriguing when you a have a story that connects each evidence or piece of information.

Currently, I am focussed on understanding the genetic basis of hair shape using mouse models. My long-term goal is to set up my independent lab focusing on study of human phenotypes. Understanding the complex genetics of human phenotypic variation is crucial for unravelling biological adaptations in the past and the pathophysiology of accompanying human diseases in present-day populations. Unless we understand what is contributing to normal variation, we cannot understand what goes wrong in disease condition.

YI 14

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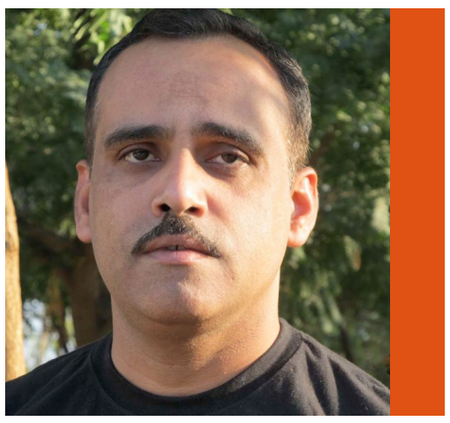

Programmed cell death; Signalling; Cancer; Inflammation

My research is focused on unravelling the molecular mechanism and cross talk between multiple cellular process including oxidative stress, metabolism, inflammation and programmed cell death signalling in cancer. Each cell has complex cellular machinery and signalling networks to regulate various cellular process in defined manner. Dysregulation of cellular machinery and signalling leads to various pathological consequences. Therefore, it is important to find out a new molecular target and explore the cellular and molecular mechanism, which can control to define fate of cell. We are trying to explore possible molecular mechanism and targeting to regulate critical regulators of programmed cell death signalling (apoptosis, autophagy and necroptosis) in cancer cells. Along with that I am also trying to explore Nanoparticle based drug delivery in cancer cells.

YI 15

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Structural DNA nanotechnology; Stem cells and tissue engineering; Biomedical applications; Membrane traffic and cell biology; Advanced microscopy and analysis

Most of the plasma membrane receptors are known to exist in form of nanoscale clusters. This molecular arrangement of receptors is key to their functions in terms of passing the signal inside the cells in proper amplitude for multiple cellular functions. With the long term goal on development of DNA-tools for cellular engineering, we will aim in parallel to develop a multitude of DNA based 1D, 2D and 3D scaffolds as platforms for bio-orthogonal arrangements of biomolecules like ligands to programmable cluster and reprogram cellular receptors for endocytosis and signalling, as well as advanced tools to study various intracellular pathways and developmental organizations of cell and animals at single-particle resolution. In this regard, we will aim to develop different DNA nanocontainers to host-advanced bioimaging entities like quantum dots, nanodiamonds, functionalized with ligands for multiple cellular targeting pathways.

DNA nanocages can also be filled to form inorganic nanoparticles of different shapes. These can be functionalized with ligands to study the phenomena like receptor clustering on membranes. The same ligands for clustering and cellular uptake can be studied quantitatively using these multiple DNA guided approaches. The nanoparticles filled cages can be explored by electron microscopy whereas DNA-SPT can be used for membrane and endocytic structures using super-resolution techniques like dSTORM. Our combined expertise with these tools and cell biology will boost us to ask multiple challenging questions in membrane organization and dynamics using these DNA nanotechnology-based tools.

YI 16

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Nonalcoholic fatty liver disease; Hepatocellular carcinoma; Obesity; Metabolic syndrome; Inflammation

I am the recipient of the prestigious Ramalingaswami re-entry fellowship and presently working as an Assistant Professor at JSS Medical College, Mysore since February 2019. My research interests lie in the area of non-alcoholic fatty liver disease (NAFLD) and hepatocellular carcinoma (HCC).

Obesity is linked to metabolic syndrome and systemic inflammation. The increasing prevalence of obesity that leads to NAFLD has emerged as a serious public health challenge. About 20-30% of Indians have fatty liver and almost all are unaware of it as this is a silent killer. NAFLD with the histological hallmark of hepatic steatosis further transitions to nonalcoholic steatohepatitis (NASH) and cirrhosis. The molecular mechanisms involved in obesity-associated NASH are not clear and this gap in knowledge is a barrier in developing therapeutic approaches. My research work is focused on studying the role of AATF (apoptosis antagonizing transcription factor) and how they regulate the pathophysiology of NAFLD by employing state-of-the-art techniques in both in vitro and in vivo systems to develop therapeutic strategies for the treatment of NAFLD.

HCC is the fourth leading cause of cancer mortality worldwide for which there exists no effective treatment to date. The incidence of HCC is also increasing in India and is poised to become the leading GI cancer. The research work is focused on characterizing the mechanistic role of AATF in the pathogenesis and progression of HCC by employing innovative multifaceted biochemical and molecular approaches and the use of that knowledge to develop effective and targeted therapies for HCC.

YI 17

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Biomechanics; Human gait; Rehabilitation; Assistive devices; Prosthetics and orthotics

I am a translational researcher working in the field of Biomechanics and Assistive Devices. My doctoral research (at IIT Madras) aimed at designing affordable, functionally better, and easy to use orthotic knee joints for people with lower limb disability. A structured user-centric design framework involving prototype development through user feedback, computer aided design, mechanical analysis, load testing of prototypes and mathematical modelling was used for the research. Presently, clinical trials and commercialization aspects of the design are being explored at R2D2 lab in IIT Madras. During postdoctoral stint (at UNO Biomechanics, USA), I worked on a project targeting the use of ankle-foot orthosis and exoskeleton footwear to assist people with peripheral artery disease walk more and with less pain. Presently, clinical trials of both the devices are ongoing to establish the efficacy of this novel treatment regimen.

My current research focuses on investigating the physiological and biomechanical aspects of human gait and various musculoskeletal disorders. The overarching goal of my research is to assist people with walking gait impairments and devise novel treatment strategies for musculoskeletal disorders using non-surgical interventions, such as assistive devices and therapy. In the future, I plan to continue research in the domain of Biomechanics that contributes to empowering and improving the lives of millions of people with disabilities. I also intend to conduct outreach programs in school and colleges to create awareness and motivate children to pursue careers in Biomechanics and allied disciplines.

YI 18

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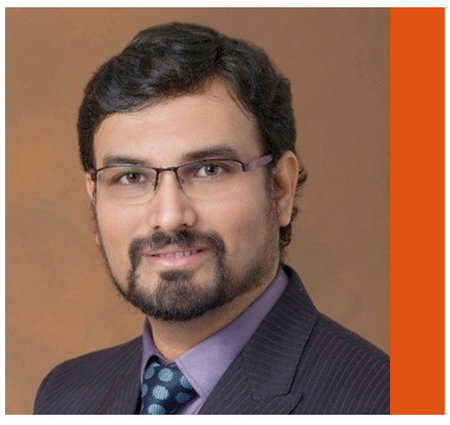

Bacterial cell biology; Microbiome; Metagenomics; Anti-microbial resistance; Bacterial cell interaction

My research experience including my Ph.D. has primarily focused on microbiology, microscopy, and molecular biology with specialization of Bacillus cell to cell communication via nanotubes, assessing spacecraft cleanliness using NASA Standard spore assay, Microscopy characterization of cleanroom fallout particles, and Indoor microbiome and metagenomics. During my Ph.D., I investigated the way how bacteria can create metallic nanoparticles. Bacteria, fungi, and yeast have been used in the synthesis of metallic nanoparticles successfully in recent years. The outcomes enable researchers and engineers to understand how bacteria produce controlled monodispersed silver nanoparticles. Then, as a postdoctoral scholar with Prof. Sigal Ben-Yehuda at The Hebrew University of Jerusalem, I examined nanotubes extending from the membrane of Bacillus subtilis. These tubes are made of bead-like structures that transport cytoplasmic molecules between bacteria.

The research outcome elucidates fundamental new aspects in bacterial capacity to acquire new features and adapt to various extracellular cues. Next, joined CalTech, NASA-Jet Propulsion Laboratory investigated microbial diversity in places where microbes are rare, such as spacecraft assembly Cleanrooms, spacesuits, and the International Space Station (ISS). This study helps engineers to counteract pathogenic bacteria for future long human exploration on other celestial bodies. Currently, our lab wanted to address research questions related to bacterial cellular communication in the defined and natural environment and to combat antimicrobial resistance (AMR) which is a major threat in diverse arenas of human interaction. The expected outcome will be a new drug for bacterial infection which is an alternative to antibiotics.

YI 19

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Extracellular vesicles and immune suppression; Nanotechnology

During my postdoctoral Research at Oxford University, I have been working on engineering extracellular vesicles for delivery of RNA based drugs to brain tissues. I have developed a novel method for loading nucleic acid drugs onto EVs and their successful delivery into different regions of the brain. We have successfully filed a patent at UK for this newly developed method. Interestingly, during my research, I found some serendipity results that led to discovery of novel role of GAPDH protein in regulating secretion of EVS from multi-vesicular bodies. The studies is currently under review at Journal of Nature Communication.

YI 20

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Single-molecule imaging; Chromosome biology; Gene regulation; 3D Genome organization; Mitotic bookmarking

I earned Ph.D. from IIT Bombay (2015) where I explored the molecular mechanism of meiotic chromosome segregation, a process by which gametes are produced in humans. I developed several imaging approaches to quantify chromosome missegregation in live cells and my research provides an avenue for therapeutic development to treat genetic disorders, infertility and cancers. Because of my expertise in advanced imaging technologies and yeast genetics, I was offered a post-doctoral position at NCI/NIH where I developed Single-Molecule Imaging technology to quantify the dynamics of proteins in live cells at the single-molecule level. Using this method, I revealed the dynamics of transcription factor binding and chromatin remodelling at specific gene promoters at the single-molecule level. Recently, I have joined IIT Hyderabad as an Assistant Professor and here I aim to understand the mechanism of cell division/chromosome segregation and gene regulation using cutting-edge single-molecule imaging, fluorescence microscopy, genomics, proteomics, cell and molecular biology and yeast genetics. My broad research interest lies in studying the functions of chromatin remodelers during meiotic chromosome segregation, understanding the single-molecule dynamics of the mitotic kinases such as aurora kinases, cyclin-dependent kinase 1, polo kinases, checkpoint regulators etc. during mitosis, exploring the mechanism of epigenetic transcription memory/mitotic bookmarking and understanding how the mitotic to meiotic transition is achieved at the level of 3D genome organization, kinetochore composition and transcriptome. My basic science research efforts are geared towards developing therapeutics to treat infertility, genetic disorders and cancers.

YI 21

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Rare genetic diseases; Sequencing technology development; Precision oncology; Computational biology; Biostatistics

My interdisciplinary translational research work covers precision oncology, novel low-cost diagnostics development for rare genetic diseases, assessing genetic architecture of autism spectrum disorders and studying the genetics of male infertility. Particularly, I have co-developed several low cost diagnostic assays, for example- NGS based microsatellite instability assay for colorectal cancer patients and indigenously developed enrichment technique for rapid diagnosis of lysosomal storage disorders. I am also involved in studying the genetic architecture of autism spectrum disorders and male infertility in Indian patients. My work is aimed to develop the latest genomic tools and deploy them in routine clinical practices, especially in low-middle income countries across South East Asia. Development and deployment of such technologies is critical to providing highest quality healthcare at an affordable cost to everyone.

YI 22

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Lignin; Hydrogel; Agri-biomass; Functional-materials; Coatings

I have over 15 years of research experience from premier institutions of USA (Harvard University, NC State University) and India. During the past five years, I have significantly contributed to Indian science by carrying out research in agri-biomass valorization through converting it into useful materials in green, economic and scalable manner. I have been engaged in designing and developing of lignin-based noble metal nanocomplexes antioxidant rich microbicidal agents (ACS Biomater. Sc. Engg. 2019, Indian patent 201711047253). Lignin is already known for its multifaceted potential to act as antimicrobial, adhesive, UV-blocker, adsorbent and antimutagenic substance. Here, lignin acted as reducing, capping, and stabilizing the nanocomplexes. Further, we developed a antimicrobial photodynamic hydrogels which could find potential applications in targeted therapeutics for wound healing and other biomedical applications (ACS Biomacromolecules 2020, Indian patent 201711047253).

We successfully designed lignin-based metal oxide nanocomposites in green and scalable manner which effectiveness to act as UV-blocking and antimicrobial agent (Journal of Mat Chemistry B, 2020, Indian patent 201811048498). My other significant contributions encompass constructing lignin based nanospray coating for complete removal of microbes from any surface (Indian patent 201911011852). Moreover, we have a developed photosynthetic nanopigments as effective singlet oxygen generators (ChemNanoMat 2020, Indian patent 201811044076).

We have been successful in fabricating agri-waste based lignin into functional nanomaterials which have direct applications as nanospray, nanocoatings, nanofilms, hydrogels and antiviral agents. The developed methods followed green, scalable and low-cost technology which will be commercialized and will directly contribute to Indian economy.

YI 23

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Non communicable diseases; Interrelationship between diabetes, obesity and malnutrition; Lifestyle- related risk factors; Signaling networks; Epigenetic regulation

I am a cell biologist with post-doctoral training in immunology. As part of my doctoral research, I have used cell line based model to contribute towards understanding of regulation of Rab-GTPases (key regulators of the endocytic pathway) by altered levels of cytokines. (Most of the work published in EMBO J. 25: 2878- 2888, 2006). During my post-doctoral tenure, I have used both cell line based and mice model to contribute towards understanding the role of B cell intrinsic Notch activity in driving B cell extrinsic events underlying formation of the marginal zone niche.

Non Communicable Diseases (NCDs) are becoming the major causes of morbidity and mortality worldwide. Thus the Sustainable developmental goals (SDGs), especially SDG-3, have allotted highest priority to NCDs. In India, the scenario is alarming due to compounding effect of an exponentially increasing population, crumbling healthcare facility and economic inequality. Diabetes is one of the most prominent NCDs affecting populations across various nations, including India. In addition, increased rates of occurrence of obesity have been linked with various NCDs. My current primary interest lies in understanding the genetic and epigenetic basis of diabetes in correlation to obesity and malnutrition. I am also interested in studying the role of noncoding RNAs in regulating these signaling networks. Such studies can be helpful in identifying novel biomarkers which can be utilized for early detection of these diseases. I intend to study both human populations and perform cell line/animal model based studies for understanding these regulatory pathways.

YI 24

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Plant immunity proteins and peptides; Plant bioactive molecules; Botanical therapeutics; Molecular diversity and evolution; Protease inhibitors

My research program is focused on plant immunity proteins and peptides involved in defense and those with relevance in the context of crop improvement and potential therapeutics. My research expertise has been in the area of structure-function correlation of diverse plant defense proteins, molecular diversity and its functional significance. Plants produce an array of defense proteins and peptides to protect themselves from predators, pests and pathogens. Proteinase inhibitors and cyclic mini-proteins occur in high abundance in aerial plant tissues like leaves and flowers of individual plants where their natural function is thought to be host defense as an insecticidal agent. These plant-based scaffolds have attracted huge interest because of their unique topology, exceptional stability, and potential applications in crop improvement as well as protein engineering. Presently, I am working on various aspects of cyclic peptide biology: (i) characterization of novel cyclotides, (ii) understanding their in planta roles and biosynthesis, (iii) bioactivities, (iv) understanding the surface dynamics of cyclotide-membrane interactions, (v) in planta expression of native and grafted cyclotides, and (vi) using the cyclic peptide scaffold for designing novel inhibitors against various molecular targets of pathological significance.

The outcomes of my research work pave the way for exploiting cyclotides for insect pest protection in transgenic crops as well as pharmacological relevance of cyclic peptides as potential therapeutics. Therefore, it presents huge potential in the field of agricultural biotechnology which is of socio-economic importance and one of the prime focus at a global level with respect to food security.

YI 25

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Membrane protein; Biophysics; Protein biochemistry; Drug discovery; Biomolecular interactions; Mutagenesis

I am working as a young faculty (Assistant Professor) and principal investigator at Amity Institute of Biotechnology, Amity University Uttar Pradesh and running my own research lab. I very productive national and international collaboration working on electrophysiology, biochemical and other biophysical analysis of Sodium proton antiporters; NhaA and have proposed a tentative mechanism integrating functional and structural role of targeted residues. Basically, I focus on structural and functional properties of membrane proteins which is elegantly relevant to current trends of the research on drug targets as more than 60% of the membrane proteins are being employed as human drug targets. I have produced good research publication in reputed journals that explored the functioning of membrane proteins, particularly Na+/H+ antiporters, NhaA which was found to be critical for the virulence for many disease-causing microbes such as Vibrio cholerae, Yersinia pestis etc and its homologous in human are proposed to have a crucial role in hypertension, kidney diseases, diabetes etc. I have also proposed research work on human Na+/H+ exchanger in closed collaboration with Prof. Rajini Rao at Johns Hopkins University, USA that may provide beneficial information to cure human diseases and also looking for the fund support to start work on Mycobacterium tuberculosis, and want to exploit my expertise on membrane protein to find out the efficient cure for Tuberculosis. This meeting may give me an opportunity to share my knowledge and innovative ideas for incurable diseases and to find out appropriate collaborators.

YI 26

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Virus biophysics; Lipid membranes; Fluorescence microscopy; Surface functionalization

My research interest is in the field of virus-membrane interactions and cellular imaging of viruses. I have worked on multivalent binding of simian virus 40 and human norovirus using model membrane systems. In cellular imaging side, I worked in imaging HIV-1 integrase and their nuclear import at single particle level.

Currently, I am establishing my research group in IITK and the lab is working in the basic studies of enveloped viruses, with a focus on membrane binding studies of HIV-1 and SARS-CoV-2. The recent emergence of viral endemics and pandemics highlights the importance of fundamental studies of viruses and viral replication. Thereby, studying the early-stage replication of HIV-1 and SARS-CoV-2 that involves their cell membrane attachment and entry is crucial.

YI 27

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Cancer biology; Chemo-resistance; Single cell sequencing; Molecular and cell biology; Immunology

Chemo-resistance development against cancer therapy is the main challenge for recurrence and treatment failure. Therefore, understanding of chemo-resistance mechanisms would help to predict disease progression and to develop new therapies. Despite accessible standard chemotherapy-regimen, the mortality rate of Indian B-cell cancer patients is significantly higher than in the United States, which could be associated with differences in molecular heterogeneity. Using clinical biopsies from Indian cancer-patients, I will understand the various mechanism leading to chemo-resistance development: genetic alterations, acquired resistance, cancer stem cells, tumor microenvironment (TME). In the past 6-months at AIIMS-Rishikesh, I realized that number of lymphoma cases is significantly higher; nearly 30 newly-diagnosed patients are presented every month which suggests that a significant Indian population throughout the country is suffering from this deadly disease. Currently, no research lab in India is working on B-cell lymphoma. This will be the first study on Indian B-cell lymphoma patients. Before joining AIIMS, I did postdoctoral studies from MD Anderson Cancer Centre (August-2015 to July-2019) in the area of molecular biology, genomics and translational research. To identify the genetic basis of chemo-resistance in lymphoma, I performed whole gene sequencing on B-lymphoma patients (1,000) and identified a novel genetic alteration associated to chemo-resistance development. Based on my expertise, I have planned the next five years of research goals to investigate numerous approaches of chemo-resistance development in lymphoma, and subsequently, these tools will be utilized to study chemo-resistance pathways in solid tumors (breast-cancer) of Indian-origin.

YI 28

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Synthetic biology; Cellulase; Fermentation; Biocatalyst; Engineering

My research interests focus on developing efficient platform for biofuel production. I am working towards optimal enzyme production for biomass hydrolysis. During my PhD, I have worked extensively on development of hydrolytic enzyme system which showed significantly higher activity than its native counterpart. Currently, I am working towards understanding cellulose induction system in cellulolytic fungi. We aim at studying role of novel metabolite inducers on expression of biomass hydrolysis enzymes in Trichoderma reesei. Further, we will elucidate the role of novel inducers in modulating the genes involved in overexpression of hydrolytic enzymes and try to understand mechanism underlying its enhanced expression. The other major objective of the group is to develop homologous and heterologous expression system for fungal genes.

This is certainly of interest as employing cellulosic biomass for bio-refineries will dramatically reduce cost-economics of overall process and hence price of all the downstream commodities can be reduced.

YI 29

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Human motor control; Parkinson's disease; Non-invasive brain stimulation; Motor cognition; Neural oscillations

As a faculty fellow (DBT/WT India Alliance intermediate clinical research fellow) at NBRC, I founded the Human Motor Neurophysiology and Neuromodulation lab, which focuses on studying the physiology of human motor control and the pathophysiology of movement disorders such as Parkinson's disease using non-invasive brain stimulation and recording techniques. There is increasing evidence to show that most of the neuropsychiatric disorders are associated with abnormal brain oscillations that result in impaired functional brain connectivity. My lab is the first of its kind in India that uses a multi-modal approach to identify abnormal oscillatory patterns that may underlie certain clinical phenomena observed in patients with movement disorders, and to develop effective non-invasive brain stimulation protocols to curtail them. These research methods can further be extended to other neurological and psychiatric diseases as well. I am working towards successfully establishing a truly interdisciplinary clinical research lab, where students from diverse backgrounds such as medicine and engineering would work together to understand the pathophysiology of movement disorders and thereby identify novel treatment strategies for the same.

YI 30

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Biogeography; Biodiversity informatics; Conservation; Action research; Urban ecology

I am interested in science-driven conservation research, outreach and action, and understanding ecological and evolutionary processes that shape life. In the past, I worked on species-specific questions on their evolutionary history, biogeography, and conservation management.
My research is primarily focused on owls and odonates (dragonflies & damselflies), an extraordinary combination of study taxa! My work area is an intersection of field-work & lab research. It took me some time to realize that for conservation to work, research is just the first step. Presently I am exploring the field of action research, and I plan to engage in it in the future.

I am actively involved in science outreach and enjoy doing it. I believe science needs to be communicated effectively and extensively, and there is an urgent need for it. I am a strong proponent of citizen science. I am working as a caretaker of DragonflySouthAsia (DSA) and OwlIndia, cit-sci-driven communities. Through DSA, I have been conducting capacity building camps since 2014. Apart from citizen science camps, I have delivered several talks on popular science and careers in conservation science in English and Marathi.

I plan to strengthen my lab's analytical capacity and engage in trans-disciplinary research in the next five years. I also plan to establish a great research environment in my university through collaborative research and provide the best academic resources for students. I expect that our future research will have a positive impact on the grass-root level.

YI 31

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Neuroscience; Behavior; Drosophila; Epigenetics; Genomics

My lab studies how environmental stressors and abused drugs affect epigenome and transcriptome in the brain leading to subsequent changes in behavior. Given the public health problem posed by stressors such as social isolation and abused drugs it is important to understand molecular mechanisms responsible for these phenomena. To approach this problem we use fruit fly Drosophila melanogaster.

My earlier work has identified both whole brain and cell-type-specific transcriptional and epigenetic changes in Drosophila using cutting-edge genomic methods. Insights gained from these approaches were combined with high-throughput quantitative behavioral assays to identify causal mechanisms in the brain that shape these behaviors. We identified molecular mechanisms by which stressors such as social isolation alter animal behavior. Social isolation in Drosophila, similar to mammals, induces robust changes in behaviors including aggression and sleep. By modulating group size and isolation length, we identified a graded response in behavior and gene expression. RNA-seq and subsequent behavioral assays revealed a neuropeptide Dsk whose modulation alters isolation induced aggressive behavior.

It has been challenging to measure epigenetic changes in small, defined neural populations. To address this, I developed a method called “mini-INTACT” for studying cell type specific changes in the epigenome. We identified epigenetic signatures due to social isolation in as few as 100 dopaminergic neurons/brain upon social isolation vs. enrichment. My lab is exploring these themes at the level of organism, whole brain and specific cell types.

YI 32

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Parkinson's disease; Mouse models; Neurodegeneration; Dopamine; Protein aggregation

The focus of my entire research career has been on understanding the mechanisms of Parkinson's disease, a progressive neurodegenerative disorder affecting millions of people worldwide.

During my first post-doctorate at Lund University, I generated a novel rat model of Parkinson's disease by injecting a combination of viral vector expressing α-synuclein and fibrils of α-synuclein directly in the brain. It led to quick but progressive neurodegeneration along with other relevant disease hallmarks making it extremely relevant for neuroprotection studies. During my second post-doctorate stint at Goethe University, I focused on identifying the basis of selective vulnerability of only certain populations of dopaminergic neurons to degenerate during the disease process.

Currently, in my own lab at IISER-Thiruvananthapuram, I am taking this work further by combining mouse models and electrophysiological approaches to find the cell-autonomous factors that lead to the neurodegeneration process. This understanding is extremely important to develop therapeutics for this yet incurable disease.

YI 33

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Adult stem cells; Regeneration; Infection; Planarian

Adult stem cells (ASCs) are fundamental players in tissue maintenance as they serve to restore damaged tissue during injury or disease. However, during severe bacterial/ viral infections, tissue regeneration in mammals is hugely inhibited. Recent research suggests that the mammalian ASCs function is affected during infections. Sometimes these ASCs over-proliferate and develop cancer, or they exhaust by terminal differentiation. Both scenarios lead to regeneration failure. Indeed, the failure in the maintenance of healthy tissue is the cause of several deadly diseases. Therefore, my research is focused on investigating molecular mechanisms in ASCs that are affected during bacterial and viral infections. We would like to know whether pathogens influence the ASCs behavior and hence determine the regeneration outcome. The knowledge gained from this study would help to improve the ASCs tolerance to infection burden and thus has profound biomedical importance.

YI 34

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Biological fluids; Microfluidics; Electrohydrodynamics; Red blood cells; Endothelial Cells

Study of biological fluids is complex as their flow is usually responsible to initiate or influence biochemical pathways within the system. The situation is further complicated as the biochemical pathways feedback to influence the flow itself and often the fluids contain cells that affect their properties. My research goal, broadly, is to study these interdependencies of biological fluids with their flow systems. Armed with knowledge of electrohydrodynamic modelling and microfabrication techniques gained during Ph.D and post-doctoral research, respectively, I chose to begin studying blood, perhaps the most commonly studied biological fluid. It is known that blood flows through compliant, endothelialized vessels. Red blood cells (RBCs) govern the behavior of flow within these vessels by changing their numbers and deforming. Endothelial cells (ECs), in turn, regulate vessel tone by biochemically signaling smooth muscle cells that support the vessel wall.

With this knowledge I went on to ask:

a) If deformation of RBCs is important for blood flow, are there other techniques of quantifying it apart from optical? We study electrical techniques for two reasons; 1) RBCs react/deform under electric fields and 2) Knowledge of an electrical RBC signature could have potential applications in point-of-care devices.

b) If ECs regulate vessel tone how does their dysfunction affect the flow velocity profile? For this we study diabetic EC stiffness using atomic force microscopy.

The results from these studies will aid in future research with other flow systems such as flows in lymphatics and esophagus.

YI 35

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Gut microbiome; Metabolic disease; Nutritional biochemistry; Intracellular global metabolome; Immunometabolic homeostasis.

Dr. Dey is trained in immunopharmacology and nutritional biochemistry. His research centers around defining the intestinal-level 3-M interactions between metabolism, microbiome and metabolome in relation to non-communicable chronic metabolic conditions like obesity, type II diabetes, nonalcoholic steatohepatitis and cardiometabolic diseases. These lines of research are essential and timely since obesity is a pre-epidemic in India due to sedentary lifestyle and increased consumption of calorie-rich diet. In parallel, he is also engaged in applied research to develop prophylactic and therapeutic strategies against chronic metabolic disease especially by focusing on intestinal and hepatic health (e.g., dysbiosis, gut barrier dysfunction, endotoxin/TLR4-response). Over the years using a variety of clinical and pre-clinical models, his research work has deciphered therapeutic efficacy of several micronutrients and phytochemical supplements. 'Learning is a continuous process' and 'there is always scope for improvement' are the philosophies of his research career. Apart from research, Dr. Dey is currently also engaged in teaching Medical Biotechnology to GUG and PG students.

YI 36

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Microtubules; Centrosome; Tubulin posttranslational modifications; cytoskeleton; Cell biology

In the current project, I propose to investigate the effect of altered microtubule polyglutamylation on centrosome structure and function. I will establish a new tool for spatio-temporal expression of the polyglutamylases and deglutamylases to specifically target polyglutamylation at centriole at different time points leading to a more precise approach for studying the effect on centriole. Further, the proposed project will provide first structural insight for the polyglutamylated tubulin complex at centrosome. I will also study altered centriolar glutamylation in the context of centriolar proteins to gain insight in the centrosome stability. Using cell biology, super resolution microscopy and electron microscopy approaches, the work will provide the first substantial evidence of a role of microtubule polyglutamylation in the centrosome structure and function, thus expanding the horizons of our current understanding of centrosome biogenesis methods as well as super resolution microscopy and electron microscopy techniques.

During my postdoctorate work aims to determine the role of microtubule polyglutamylation in cell cycle regulation, with special focus on centrosome duplication. In order to address this, I established a lentivirus-based expression system for tubulin glutamylase enzymes, which allowed me to express these enzymes stably in cells. I identified a centrosomal associated polyglutamylase and overexpression of this polyglutamylase lead to over-polyglutamylation of centrosomes. I further demonstrated that hyper-glutamylation of the centriolar microtubules is associated with centriole duplication and stability. This work provides an evidence of a role of microtubule polyglutamylation in the centrosome duplication cycle, thus expanding the horizons of our current understanding of centriole biogenesis.

YI 37

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DNA replication biology; Cancer therapeutics; Microbial genomics; Metabolic syndrome; Proteomics

We have found that DHH family protein has bifunctional behavior and can function as exonuclease and phosphatase under different conditions. These bifunctional activities may be required for survival of mycobacteria in stress conditions. This study paves way for understandings of DNA damage tolerance and repair in mycobacteria.

Also, we are working on DNA interacting proteins. Cell cycle proteins are important components of replisome complex. The depletion of these proteins stalls replication process. These proteins associate with pro-helicase to form active complex, which is required for unwinding during replication process. However, the precise roles of these proteins are still not clear in replisome complex and how these proteins modulate cancer pathogenesis still elusive. Our focus is to understand roles of these factors and development of cancer therapeutics.

YI 38

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http://www.nitc.ac.in/

Next-Generation sequencing; Personalized medicine; Network biology; Functional genomics; Oral squamous cell carcinoma

I am working as an assistant professor at the School of Biotechnology, National Institute of Technology, Calicut, Kerala, India. Before joining here, I was working as a postdoctoral fellow in the Department of Pathology, College of Medicine, the University of Illinois at Chicago USA. During my Postdoc, I was working as a Genome analyst for developing the diagnostic tests based on Next Generation Sequencing for solid tumor cancer gene panel which leads to providing personalized treatment based on found mutations. I was also working on multiple projects such as the identification of a biomarker for Fibromyalgia and characterization of tumor mutation load for lung and breast cancer. Next-Generation Sequencing Analysis of Acquired Cystic Disease-Associated Renal Cell Carcinoma (abstract is accepted in USCAP2019). I was using ThermoFisher's Ion S5XL & S5 Prime and Illumina's NextSeq 500 & MiSeq platform for sequencing. Torrent Suite and Ion Reporter software is used for analyses of the Ion Torrent data and BaseSpace for Illumina's NextSeq 500 & MiSeq data. In-house programming, Perl and R scripts were also used for data handling and statistical analysis. I completed my PhD from the Institute of Life Sciences, Bhubaneswar, Odisha on OSCC biomarkers.

YI 39

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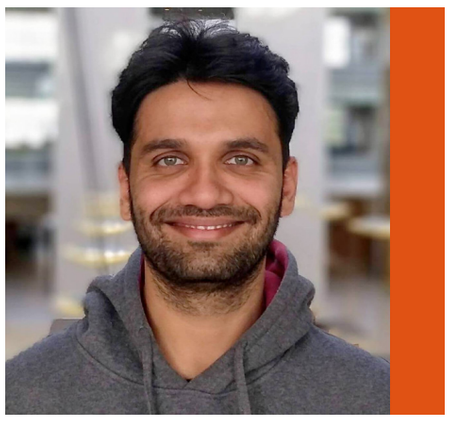

Drosophila; Stem cell - niche microenvironment; Cellular signalling and development; Hematopoiesis; Immunity

My research interest lies in understanding how stem cell fate decisions are made in order to regulate tissue and organ homeostasis. This is largely governed by the molecular regulation of the stem cell niche micro-environment. My past research has been focused on understanding the role of endocytic components, cell to cell and cell to extracellular matrix junction molecules in stem cell homeostasis. Currently my group at ACTREC is trying to understand how organismal ageing impacts the stem cell niche micro-environment and the cellular signalling landscape. This will help in understanding onset and progression of disease conditions. We employ Drosophila as a model organism for our analysis. We aim to understand how various stem cell systems in Drosophila respond to adverse conditions like ageing, tumorigenesis, infection etc. This will help us elucidate how the signalling environment in a niche - stem cell ecosystem transforms.

YI 40

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Circadian clocks and sleep; Infectious diseases; Quantitative proteomics and mass spectrometry; Mechanism of drug action; Systems biology

My inclination is more towards translational research. My doctoral research was on malaria, a fatal tropical infectious disease, which has a devastating impact on human health and the global economy. In my Ph.D. research, I was able to provide some mechanistic insights about malaria pathogenesis using multi-pronged proteomics analyses of patients suffering from vivax and falciparum malaria. Moreover, my findings led to the identification of a potential panel of protein markers for this parasitic infection and its severity.
In my postdoctoral research, I have investigated mechanisms of circadian rhythmicity in mammalian cells lacking the core clock machinery, and the cross-talks among circadian clocks, sleep-wake cycles, and signaling networks applying various systems-level approaches. I have also studied the mechanism of actions of circadian period altering drugs in mammalian systems. This is critical in clearly defining molecular targets to modulate daily rhythms for therapeutic benefits.

Circadian rhythm (biological clocks) exist at almost all levels of life and play a fundamental role in maintaining diverse physiological and behavioral processes. There is an intimate association of circadian dysfunction with different human diseases including cancers, heart diseases, diabetes, and metabolic, vascular, and mental disorders. Consequently, understanding of the mechanisms underlying circadian rhythmicity has profound implications in translational healthcare research.

I have very recently joined IIT Hyderabad as a principal investigator and intending to establish an independent research group focusing on mechanistic studies on circadian rhythms and sleep with an emphasis on infection-clock biology and chronomedicine.

YI 41

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Long noncoding RNA; RNA-binding proteins; Biochemistry of RNA-protein interactions; RNA structure; RNA-protein interaction in human diseases

During my PhD I have studied RNA-protein interactions which play a pivotal role in different cellular processes. My research primarily focused on understanding different molecular forces involved in RNA-protein binding and the factors determining the selectivity of these interactions. Using various spectroscopic and calorimetric techniques I have delineated the thermodynamic forces involved in these interactions. During my postdoc at University of Edinburgh, I worked on repurposing the protein binding activity of oleic acid to be used against miRNA-7-HuR-MSI2 ternary complex as inhibitor. Formation of this ternary complex down regulates the miRNA-7 biogenesis which is found to be associated with more than 50 % of glioblastoma patients. These results also suggested that altered levels of OA could be acting as global regulator of the gene expression by binding to the RRM containing protein.

Currently, my lab is using different in-silico, biophysical and molecular biology approaches to understand the effect of SNP-mediated structural changes of lncRNA on its interaction with different RNA binding proteins. This work will give us important insights into the mechanisms of SNP-associated diseases in relation with lncRNA structure and RBP binding.

YI 42

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Cardio biochemistry; Biomarkers; Inflammatory markers; Pre-natal screening; Neonatal screening

1. I have done an extended study of

- Estimation of the serum levels of Lipoprotein Associated Phospholipase A2 (LpPLA2) in Coronary Artery Disease(-CAD) patients
- Evaluation of the association LpPLA2 with the established markers of CAD like hsCRP, Lipoprotein (a) and other lipid profile parameters
- Explorartion of the suitability of LpPLA2 as a high risk factor for future cardiac event Correlation of LpPLA2, hsCRP, Lipoprotein (a) with the severity of Coronary Artery Disease determined by Angiographic Clinical Vessel Score as a part of my thesis curriculum

2. As a consultant in Biochemistry I have validated and launched Preeclampsia Risk Assessment according to the guidelines set by Fetal Medicine Foundation, UK.

3. As a consultant in Biochemistry I have validated and launched heavy metal testing using ICP MS technology. I headed a project that measured the Lead in blood of approximately 5000 factory workers in Bangladesh.

4. As Assistant Professor in Department of Biochemistry, SMSR I have worked on a project to implement risk management in the biochemistry laboratory.

5. As a specialist in Biochemistry, I have collaborated in Preeclampsia clinic where we are testing for preeclampsia in first , second and third trimester.

YI 43

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Virology; Structural biology; NMR; Peptide therapeutics; Mechanism of action for drugs

Pandemics have profound and lasting effects on economic, social, and political aspects of human civilization. The analysis of the history of pandemics indicates the high prevalence of RNA viral outbreaks in past century including the recent Covid-19 wave. Being a parasitic entity, while the viruses depend on their hosts for replication, they pose severe challenges for global disease control. Pathogenic RNA viruses are the most important group involved in transmitted zoonotic diseases because of their diversity, abundance, and rapidly evolving nature. While the integumentary, respiratory, and nervous systems are the mostly affected one, viruses can attack the muscular, cardiovascular, reproductive, and immune system of humans. Prominent evidences are there for virus driven epigenetic modifications, cancer, encephalopathies and autoimmune diseases. Considering the poor understanding about the diversity and ecology of the possible viral threats, the Global Virome Project (GVP) was launched in 2018 with a hope to identify the bulk of this pathogens and to provide timely data for public health interventions against future pandemics. Current COVID scenario is further emphasizing the importance of viral research for the proper control of these emergent pathogens. At present I am focusing to set up a structural virology lab with an objective to work on viral protein/ nucleic acid at atomic level to decipher how those execute their function and use that knowledge for the purpose of drug discovery. The postdoctoral experience I had on HIV-1 at NIH, USA with Dr. Tycko inspired me to sail my journey towards the field of structural virology.

YI 44

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Biomaterials; Tissue engineering; Cancer; Vascular diseases; Biofabrication technologies

Cancer is a debilitating disease affecting many people around the world (including India). Although various strategies are being developed for discovery and development of novel anti-cancer therapeutics, the translation of the drug candidates from the benchside to the bed is beset with many challenges. The traditional method of testing drug efficacy in in vitro two-dimensional cultured cancer cells is difficult to translate in animal models and further in human trials, owing to inherent differences in the physiological context and complexity. Hence, there is an urgent need to develop in vitro three-dimensional cancer models that can closely recapitulate the complexities of the local tumor microenvironment and work as a reliable drug-testing platform to provide predictive efficacy of drug candidates. In this regard, tissue-engineered models of the tumor microenvironment using biomaterial or hydrogel scaffolds have generated great interest in the cancer research community. By culturing cancer cells in three-dimension within hydrogels with controlled biochemical and biophysical properties, it is possible to recreate the pathological conditions of the local tumor niche. Specific cancer cell-matrix and cell-cell interactions can be investigated, and novel drug targets can be discovered and validated using these models. The engineered models can also be used for co-culture of cancer cells and other stromal cells to study various cancer-associated phenomena. Overall, rational design and development of tissue-engineered cancer models can significantly accelerate the drug discovery and development process for cancer treatment.

YI 45

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Molecular parasitology; Epigenetic regulation; Post-transcriptional regulation; Genome editing technologies; Population omics

For my PhD, I trained as a yeast molecular geneticist and biochemist, where I studied molecular chaperones and their role in protein quality control. For my postdoctoral training, I transitioned to working as a molecular parasitologist characterising the molecular basis of gene regulation in the lethal malaria parasite Plasmodium falciparum. Malaria is a vector-borne parasitic disease that is caused by single-celled, obligate intracellular organisms of the genus Plasmodium. More than half of the world's population is at risk of malaria infection, making malaria eradication and control a continued focus of global public health programs. A better understanding of the molecular and cellular biology of the parasite, host-parasite interactions, and genetic diversity of Plasmodium spp., will aid in the design of effective malaria control and elimination strategies.

My lab has three major areas of interest - elucidating the function of atypical RNA-binding proteins in parasite gene regulation, identifying new modes of epigenetic gene regulation in the parasite, and understanding the diversity of Indian malaria from an epigenomic, genomic, transcriptomic and microbiomic viewpoint. In addition, we are interested in assessing host response to parasite infection in malaria-endemic areas in India and how that modulates virulence and development of drug resistance. To achieve our goals, my lab is also developing CRISPR/Cas-based technologies to genetically manipulate Plasmodium spp. in a stage-specific manner. Overall, a multi-pronged approach is essential to tackle this important tropical disease and achieve the 2030 global malaria eradication goal.

YI 46

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Plant hormones; Strigolactones; N-stress; Arabidopsis thaliana; Tomato

Strigolactones (SLs) are carotenoid-derived signaling molecules, recently designated as plant hormones. They regulate several developmental processes in plants and act as response molecules under various stress conditions, including mineral nutrient deficiency. Nonetheless, the molecular mechanisms behind these responses are largely unknown. To identify novel players involved in this process, a genome-wide association study was conducted with root phenotypic data after exogenous SL treatment in a diversity panel of the model species Arabidopsis thaliana. Candidate genes were cross-checked with data from two SL-based genetic screens to provide a shortlist of thirteen genes. The root phenotypes of knock-out mutants of these candidate genes clearly support their roles in SL-mediated root development. The aim of my research is to characterize these genes in the root developmental context and eventually, to further explore their implication in shaping root morphology in response to nutrient deficiency (namely nitrogen shortage), after finding a direct link between them by applying systems biology approach. This will substantially improve the knowledge on plant nutrient forage adaptation pathways involving SLs. A long-term perspective will be to conduct translational research in tomato (Solanum lycopersicum), utilizing the knowledge gained from model Arabidopsis.

YI 47

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Biophysics; Cell membranes; Virology; Curvature; Reconstitution

My research focuses on the biological membrane organization, dynamics, and lipid-protein interaction of membrane proteins in physiological conditions. Biological membranes are an indispensable part of any cellular organism, and almost half of the biological phenomena take place on the bilayer surface. Lipid bilayer membranes are also the solvent for membrane proteins that constitutes ~ 50% of current drug targets. They are also crucial for understanding infectious diseases such as viral infections like Influenza. Physical properties of cell membranes modulate the function of membrane proteins and hence a wide range of physiological processes. I study the physical properties of lipid membranes in physiological conditions utilizing biophysical chemistry, cell biology, and virology. I develop methods to determine emergent physical properties of lipid membranes such as curvature and potential and study their effect on physiological processes like membrane fusion and viral entry to host cells utilizing reconstitution-based approaches. My long-term goal is to harness the physical properties cell membranes for therapeutic intervention, like wide spectrum antiviral strategies against the ever-changing viral landscape.

YI 48

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Population ecology; Experimental evolution; Computational modelling; Evolutionary medicine; Evolutionary genetics

Previously, I investigated efficiency of multiple control methods to reduce risk of extinction in small biological populations. These experiments form an important link in translating those methods to their real-world applications. Subsequently, I investigated further to understand how life-history of individuals influence the dynamics of population abundance. This interaction forms the basis of the field of eco-evolutionary dynamics, and is therefore a major topic of interest for contemporary ecologists and evolutionary biologists.

Next, I worked on understanding the process and consequences of dispersal, a trait that is crucial for the survival of many populations in the context of global climate change and habitat-degradation. Using experiments with Drosophila melanogaster as model organism, we showed that multiple components of dispersal can evolve rapidly and simultaneously. In conjunction of dispersal evolution, I have also elucidated the concomitant effect on multiple traits of individuals that can increase invasive potential of a species.

Then after, I investigated the genetic basis of spontaneous whole-genome duplication in budding yeast, Saccharomyces cerevisiae via long-term experimental evolution and genome sequencing analysis.

Currently, I am focusing on one of the most fundamental aspect of an organism - food. Often, the available food may not be the best for the survival and proliferation of an organism. Thus, it is fascinating to understand how organisms adapt to such nutritional mismatches at different ecological and evolutionary scenarios. Successful experiments on this topic may help us to understand and give us a clue to tackle several of the contemporary metabolic disorders spreading globally.

YI 49

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Mechanobiology; Cell and molecular biology; Epithelial health-care; Tissue engineering; Microfluidics

My research focuses on Cell Mechanobiology with an emphasis on in epithelial healthcare and microfluidics-based techniques. I have expertise in cellular biology, stem cell biology and cellular biophysics. During my PhD, I developed a microfluidics platform with combination of nano-architecture to control the self-renewal capacity of mesenchymal stem cells. During my post-doctoral research, I studied the microtube formation of epithelial cells inside lab-fabricated PDMS tubes and later, I studied the strength of the adherens junction proteins on microfabricated micropillars and the instability in epithelial cells on micropatterned soft tissue substrates. I am presently developing low cost, paper microfluidics based diagnostic techniques for understanding gut health and quantifying vitamin and mineral absorption.

In future, I want to diversify in gut healthcare and develop low-cost diagnostic techniques to access gut health. This is important to promote well-being, reduce lifestyle induced diseases and eventually improve the quality of life in India.

YI 50

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Bacteriophage; CRISPR-Cas; Bacterial cell biology; Antibiotics; Phage therapy

Cell organization is a fundamental feature of all living systems. Yet how it evolved is an unsolved problem in cell biology. My major interest as a researcher is to understand the evolution of the cellular organization. To this effect, I use two non-traditional cell biology model systems, bacteria, and bacteriophages, to address my question since they evolved more anciently than eukaryotes. In addition, I also investigate how viruses, in particular bacteriophages, take over the host cells by hijacking central molecular processes and by evading the host immune processes.

My Ph.D. research was done in the lab of Prof. Orna Amster-Choder at the Hebrew University of Jerusalem in Israel. There I studied "How things are organized within a bacterial cell?" by focussing on cell polarity and cytoskeletal organization in bacteria. After my Ph.D., I joined the lab of Dr. Joseph Bondy-Denomy at the University of California San Francisco (UCSF) for my postdoctoral research. At UCSF, I worked on the interaction of phages and bacteria by focussing on CRISPRs and anti-CRISPRs.

Currently, I am working as an Assistant Professor at SRM University, Andhra Pradesh where I am establishing an independent research lab that focuses on bacteriophage-bacteria and CRISPR-Cas biology. For the next 5 years, my team will focus on making fundamental discoveries in the field of bacteriophage evolution, alternative functions of CRISPR-Cas systems, and the discovery of novel defense systems in bacteria.

YI 51

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Host-commensal-pathogen interactions; Inflammatory bowel diseases; Intestinal inflammation; Mucosal immunology

During my PhD studies, my research was focused on studying parasites and how they interacted with host cells, and with the mammalian gastrointestinal tract as a whole. Here, I developed skills studying various aspects of host-pathogen interactions specifically at the level of intestine studying virulence dependent signaling pathways and early innate immune responses.

In order to pursue postdoctoral studies, I have chosen to study intestinal bacterial infections and understand their role in studying inflammatory Bowel Diseases (IBD). More specifically, I have investigated the functional role of intestinal goblet cell mediator RELM-Î² under infectious and inflammatory conditions. I also had an opportunity to investigate the mechanism by which vaso-intestinal peptide (VIP) protects the epithelial barrier disruption by enteropathogenic E. coli (EPEC). More recently, by using 3D organoid cultures derived from intestinal stem cells from mouse I have shown an increase in caspase 8 activation in a canonical NLRP3 pathway.

Currently, I am interested in studying host-commensal pathogen interactions using 3D organoids. I wrote two proposals- to study the role of inflammatory cytokines in the development of intestinal crypt proliferation and maturation; and studying the probiotic effect of Lactobacillus Johnsonii on EPEC infection. These two proposals were submitted to UGC and Institute of Eminence (IoE) grant respectively. These studies will explore the molecular and cellular targets during inflammatory and infectious conditions. In the future, I want to expand my research arena to study other emerging human infectious pathogens including adherent invasive E. coli (AIEC) and Enteroaggregative E. coli (EAEC), and Clostridium pefringens.

YI 52

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Human pathogen; Host pathogen interaction; Helicobacter pylori; Persistence infection; Toxin-Antitoxin system

Helicobacter pylori infection is of growing concern today because of its crucial role in the pathogenesis of chronic gastritis, peptic ulcer and gastric cancer, the fourth most common cancer worldwide. I have worked on replication system of H. pylori the replicative helicase (HpDnaB) and primase (HpDnaG) during my Ph.D. The most significant contribution is the discovery of novel H. pylori factor Hp0897 which helps the loading of HpDnaB helicase on the replication origin (oriC) in H. pylori. The Hp0897 factor is specific to H. pylori i.e. present only in H. pylori strains. The Hp0897 has been given a new facet in the loading of HpDnaB helicase. The Hp0897 factor interacts with HpDnaB helicase in vitro as well as in vivo. This work was published in one of the peer reviewed high impact factor journal, Nucleic Acid Research.

I have joined Central University of Rajasthan as an Assistant Professor in Department of Microbiology in January, 2017. Currently, I am employing my expertise in exploring the molecular mechanism of persistent infection which underlie asymptomatic host pathogen coexistence in H. pylori. My future study will enrich the knowledge of asymptomatic host pathogen coexistence and facilitate the better diagnostic and vaccine development for the welfare of society. To explore the molecular mechanism of persistent infection in H. pylori, I have received three grants which includes ICMR-Adhoc research proposal, ICMR; INSPIRE Faculty Scheme, DST; and Start-Up Grant, UGC. I believe that my passion for science will definitely make fruitful contribution for society.

YI 53

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Meiosis; DNA breaks; DNA recombination; Chromosome inheritance; Budding yeast

Infertility, spontaneous fetal loss and birth defects in humans result mainly from mistakes in chromosome inheritance during meiosis, the cell division that forms eggs/sperm. Programmed DNA breaks and repair between "mom-dad" chromosomes aids in their faithful inheritance and also promotes genetic diversity.

My lab is interested in addressing two outstanding questions in the field of meiosis:

a) How are DNA breaks distributed to all chromosomes? Chromosomes that are short (eg. human Chr. 21) are at potential risk for missing out on breaks, which would lead to mistakes in their inheritance. However, short chromosomes grab more than their apparent share of DNA breaks and my research is focused on understanding how this happens.

b) How are breaks preferentially repaired between the "mom-dad" chromosomes? Meiotic DNA breaks can repair using either the "mom/dad" chromosome as a template or between duplicated identical DNA. However, only repair between "mom-dad" chromosomes provides genetic diversity and promotes chromosome inheritance. My lab is interested in understanding how this biased repair is achieved.

The process of meiotic recombination is fundamentally conserved from yeast to mammals and my findings in budding yeast will have a direct impact on our understanding of human meiosis.

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