Information Brochure

Jamia Hamdard - Institute of Molecular Medicine (JH-IMM)

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Translating Basic Science into Molecular Interventions in Diseases

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Vision of JH-IMM

JH-IMM aims to be a leading international research Institute with expertise in and emphasis on biological, medical, chemical and computational approaches to biomedical research, particularly for investigating the molecular basis of human diseases and intervention. Our vision is to articulate and lead in the evolving area combining 'traditional and modern medicine', to be a major center of discovery in biomedical research and develop into a world-class science and educational research entity within the Jamia Hamdard fraternity. The JH-IMM will also pursue a major educational mission providing state-of-the-art courses and training progemmes in biomedical research.

Goals and its Uniqueness

The mission of JH-IMM is to develop a multi-disciplinary approach via successful collaborations to bridge the gap between basic and clinical or translational sciences in India. This multidisciplinary interphase research is an unexplored area in our country, with vast unmet demands relevant to the health needs of the population. Scientists at JH-IMM are involved in scientific programmes, which integrate laboratory and clinical research with an aim to develop new and innovative therapeutic modalities. It has an active interest in disease intervention strategies and assay development for diagnostic and therapeutic purposes. Interest will not be limited to vaccines or macro/micro-molecular clinical intervention but will also include traditional Indian medicines (Unani/Ayurvedic) along with marketed or phase III compounds to "repurpose or reposition" for various biological targets using proprietary assays and software. Thus, we will add and be synergistic to and not duplicate or subtract from, other Indian institutes.

Research Focus

Currently, four Principal Investigators are actively involved in setting up JH-IMM research programs. The research thrust converges to molecular intervention paradigm in niche areas as follows:

Virology: Study of entry and exit processes of Dengue virus from host cell which will help to understand the mechanisms of virus infection and to develop new antiviral therapies; Understand epidemiological dynamics of dengue in India.

Vaccinology: Development of vaccine against parasitic diseases (visceral and cutaneous leishmaniases); development of diagnostic tools against blood borne pathogens; genetic typing of pathogens.

Cancer biology: Study of bacterial genetics, host-microbe dynamics and mechanisms in pathoetiogenesis of disease states like colorectal cancer, sepsis and neurological disorders related to aberrant gut microbiota; Development of microbe-based animal model and detection panels for colorectal cancer.

Neurobiology: (i) Design and development of neuroregenerative therapeutics using small, bacterial-derived peptides. (ii) Small molecule based metabolic supplement as an intervention strategy in neuropsychiatric disorders.

The Investigators' Team

JH-IMM Scientists, trained in reputed laboratories in the USA, are former faculties or employees of prestigious International organizations like FDA, NIH, Johns Hopkins, etc. After returning to India, they have established their labs in Delhi by securing generous funding from multiple government agencies (DBT, DST, ICMR, etc). They have proved their credentials to the government funding agencies and scientific organizations through their publications, collaborations, research presentation and grant evaluations.

Investigators' profiles

A. Selvapandiyan PhD: Selva has more than 27 years of experience working at International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi, Food and Drug Administration (FDA), USA, and Institute of Molecular Medicine, Delhi (IMM). He has contributed extensively in parasitic vaccine development and pathogen diagnostic areas. He was instrumental in the development of one live attenuated *Leishmania* vaccine candidate against the fatal 'visceral leishmaniasis' disease, which is currently in for a clinical trail after its successful efficacy studies as vaccine candidate in mice, hamster and dogs. In addition he has teaching and regulatory

experiences at the above institutes. He has published over 50 refereed research papers; submitted 2 US patents; received several prestigious national and international awards. Selva is currently leading a number of large projects funded by Department of Biotechnology and Indian Council of Medical Research, New Delhi and in collaboration with number of national and international Institutes. He is also member of several national and international professional scientific organizations.

Other researchers:

- Dr. Rati Tandon PhD (PDF from DST-SERB)
- Ms. Kavita Ahuja MSc (SRF from DST-INSPIRE)
- Mr. Mirza Adil Beg MSc MTech (SRF from ICMR)

Patents:

1. Live Attenuated *Leishmania* Vaccines, US patent WO 2005/021030.
2. Detection and discrimination of hepatitis c virus, human immunodeficiency virus type1 and hepatitis b virus. US patent #: WO 2007084567 A2
3. Live Attenuated *Leishmania* Vaccines. India patent #: 243725

Publication highlights:

- Fiuza *et al* 2015 Vaccine. 33(2):280-8.
- Dey *et al* 2014. J Immunol 193(7):3513-27.
- Selvapandiyan *et al* 2014 Vaccine 32(31):3895-901.
- Fiuza *et al* 2013 Vaccine. 14:1785-92.
- Selvapandiyan *et al* 2012 PLOS one 7(9) e45288.
- Selvapandiyan *et al* 2012 J Trop Med 1-12.

Sudeshna Kar PhD: Sudeshna is working in a multi-disciplinary interface of biochemistry, host-pathogen interaction, molecular genetics and cancer biology, with a focus on cell fate transitions during pathological conditions like infection and cancer, using natural and engineered gut commensal microbes and their products. She has over 18 years of total experience in working at National Cancer Institute, NIH, USA and IMM, New Delhi in various research positions and team-lead scientist. Current research in her lab is focused on uncovering aberrant host- gut microbe dynamics in the pathogenesis of colorectal cancer and developing strategies to identify and target the microbiome for screening and therapeutic prevention in colorectal cancer. She is also working on characterizing and developing cell-permeable bacterial histone-like peptides as ameliorative and restorative agents through global epigenetic modification in neurodegenerative disorders like Parkinson's disease. She has published several high impact papers and owns a patent. She is a recipient of HHMI award for internship training and teaching among several other awards.

Other researchers:

Ms. Upasana Sahu MSc (SRF from DBT)

Patents:

Gene-cassette for enhancement of protein production.-PCT/US05/017001,WO2005/11622.

Publication highlights:

- Koli *et al* 2011 mBio 2(5):e00182-11.
- Kar *et al* 2006 J Biol Chem 281: 40144-41053
- Kar *et al* 2005 Proc Natl Acad Sci U S A. 102(45):16397-402.
- Rao *et al* 2005 Proc Natl Acad Sci U S A 102(34):11993-8.
- Roy *et al* 2005 Biochemistry 44(14):5373-80.
- Kar and Adhya 2001 Genes and Development 15(17): 2273-81

Anuja Krishnan, PhD: Anuja has PhD degree from National Institute of Immunology (NII) with over 12 years of experience (post PhD) in virology. During her post doc at Delhi University she worked on target-specific virosome based drug delivery vehicle. She was awarded the Indo US Science and Technology Forum (IUSSTF) visiting scientist award for which she worked at Albert Einstein College of Medicine, New York towards elucidating the intracellular receptor for Ebola virus which were published in high impact factor journal. Her current work involves uncovering the mechanisms by which Dengue viruses exploit their host cells to gain entry into the host cell. Apart from understanding the basic biology the long term

goal is to identify critical host factor in Dengue virus infection which could provide the means for the rational design of novel intervention strategies. Her research interest also includes studying molecular epidemiology of Indian centric viruses (dengue, chickengunya, rotaviruses etc).

Publication highlights:

- Miller *et al* 2012 EMBO J. 31:1947-60,
- Krishnan *et al* Viruses 4: 2471-2484, 2012
- Krishnan *et al* J Virol 83:1727-1741, 2009

Surajit Ganguly, *PhD*: Surajit has a PhD degree in Biochemistry with over 18 years (post PhD) experience in Neurobiology Research. He specializes in Molecular Neuropharmacology, Neuroendocrinology and Cell Biology. He was trained in Neurosciences during his post-doctoral period at National Institute of Health (NIH), Bethesda, Maryland. He held various US Federal Government Scientific positions at NIH and subsequently, was a research faculty at Johns Hopkins Medical Center, Maryland before relocating to India. His works at NIH lead to the elucidation of circadian regulation of melatonin production in higher mammals including humans. His contribution in the research area was honored with Award of Merit from the US public health service at NIH. He is also recipient of Prof. B Uvnas Prize (Gold Medal) from the Indian Pharmacological Society and has authored over 25 research articles in reputed International journals. Currently, he is using animal models (Funded by DBT and DST) to identify metabolic supplements as a strategy for managing cognitive functions in neuropsychiatric disorder. He is also involved in developing stage–specific diagnostic marker panels for Head-Neck cancer (CSIR-NMTLI consortium).

Other researchers:

Ms. Priya Gusain MSc (SRF from CSIR)
Mr. Arnab Chourhury, MSc (SRF from ICMR)

Publication highlights:

- Singh *et al* 2016 Psychopharmacology (Berl). 233(7):1257-68.
- Choudhury *et al* 2016 Behav Brain Res 297:204-12.
- Chatterjee *et al* 2012 Neuropharmacology 63 (6):1161-1171
- Ganguly *et al* 2005 Proc Natl Acad Sci U S A. 102(4):1222-7.
- Ganguly *et al* 2001 Proc Natl Acad Sci U S A 98(14):8083-8088
- Obsil *et al* 2001 Cell 105(2):257-267.

EQUIPMENT/FACILITIES

- Tools for advanced molecular biology work, Cell biology work, in vitro culture of parasites, bacteria and mammalian cells.
- Imaging facilities - Live cell Imaging; Inverted microscopes (Nikon); Photo documentation (Biorad); chemiluminescent imaging system (Syngene).
- Sample storage facilities - Deep freezers and liquid nitrogen storage tanks (Thermo Scientific); Cold cabinets; refrigerators.
- Other Capital Instruments - Spectrophotometers/nanodrops; Electroporator; BOD incubators; Cell culture shakers of various capacities; PCR machines (Thermo Scientific, Biometra, Abi); Biosafety hoods (Thermo Scientific).

LABORATORY TRAINING SERVICES

- Molecular Biology – Cloning; extraction and QC of RNA/DNA from body fluids (clinical samples included), mammalian/microorganisms tissues; Real-Time PCR; etc.
- Diagnostics – Diagnosis and typing of microorganisms in various body fluids using multiple molecular biological tools, eg. Fluorescence qPCR, and Sequencing.
- Cell culture techniques, genetic manipulation of bacterial and viral genomes, techniques for mammalian cell differentiation; infection of macrophages by parasites.

- Microscopy/Flow Cytometry: Immunocytochemistry and immunohistochemistry; Detection of microbe (fluorescence)-infected host cells by fluorescence/confocal microscopy. Sorting of infected host cells by Flow Cytometry.
- Protein over-expression; Purification techniques; Protein detection and CHIP techniques; multiplex Elisa.
- Workshop offered on: “Drug screening - Cell-based assay development concepts and practices”.
- Workshop offered on: “Parasite – host interaction studies ex vivo” using modern methodologies including, Flow Cytometry, Confocal Microscopy, and Fluorescence Real Time-PCR.
- Workshop offered on: “Diagnostics of *Leishmania* parasites in human blood” using Fluorescence Real-Time PCR.

RESEARCH ADVISORY COMMITTEE OF JH-IMM

(Notified vide University Order No. AS/(RAC)/JH-5/2016 dated 13/06/2016)

Chairman
Vice Chancellor, Jamia Hamdard

Members
Prof. S.E. Hasnain, Former Vice Chancellor, University of Hyderabad; Director, CDFD
Prof. N.K. Ganguly Ex-DG, ICMR
Dr. Surinder Singh, Ex-Director, DCGI; Director, NIB, Noida
Prof. N.K. Mehra, Dept. of Biochemistry, AIIMS, New Delhi
Prof. Javed Iqbal, Ex-Director, CSIR-RRL, Trivandrum
Prof. S. N. Das, Dept. of Biotechnology, AIIMS, New Delhi

Member- Convener
Prof. S. Raisuddin, Coordinator JH-IMM, Advisor (Research), Jamia Hamdard

Contact Information for Research Training and Proposals for Collaboration

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Coordinator JH-IMM: Prof. S. Raisuddin, Advisor (Research)
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Limited number of positions are available for candidates with NET-CSIR/UGC/ICMR or equivalent fellowships for registration in PhD programme. We also welcome young researchers with Post-doctoral Fellowship to join JH-IMM. Interested candidates are encouraged to send their queries via email directly to the Investigator of their choice or should write to Advisor (Research), Jamia Hamdard.