Information manual

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

Jamia Hamdard (Deemed to be University)
3rd Floor, Faculty of Science,
Hamdard Nagar, New Delhi 110062.

Translating Basic Science into Molecular Interventions in Diseases

**September 2020**

## 1.1. Visions of the Center:

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 JH fraternity. The JH-IMM centre will also pursue a major educational mission providing state-of-the-art meetings and courses in biomedical research.

## 1.2. Goals and its Uniqueness:

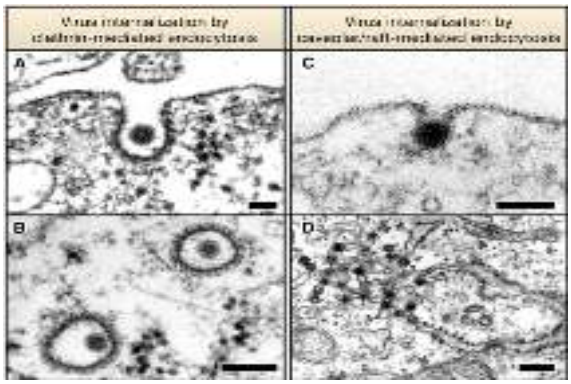
The mission of JH-IMM is to develop a multi-disciplinary approach via successful collaborations to bridge the gap between basic and clinical or translational sciences in India. This multidisciplinary interphase research is an unexplored area in our country, with vast unmet demands relevant to the health needs of the population. Scientists at JH-IMM are involved in scientific programs, which try to integrate laboratory and clinical research, with an aim to develop new and innovative therapeutic modalities with 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.

## 1.3. Research Focus:

Currently, twelve 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:

(a) ***Host epigenetic modulation***: Epigenetic mechanisms are pivotal in regulating gene expression during cellular response to extracellular stimuli. Recent studies suggest that *M.tb* can modify the host epigenome to control the transcriptional machinery and plays a major role in immunomodulation of the host immune response. However, the mechanism of epigenetic alterations during *M.tb* infection has not yet been fully understood. Thus this project has been designed to elucidate the various epigenetic changes that *M.tb* is capable of bringing about in its host in order to enhance own survivability and pathogenesis.

(b) ***Virology***: Here, to understand viral infection and pathogenesis, the major focus of laboratories is to understand virus-host interactions at the entry and post-entry level. This program is combined with translational efforts to apply this knowledge for the development of broad-spectrum host-centered antiviral approaches to combat emerging viruses including but not limited to SARS-Cov-2, Dengue Chandipura (CHPV) and Chikungunya. The current goals include study of entry and exit processes of Dengue virus from host cell which may help understand the mechanisms of virus infection and to develop new antiviral therapies. Research also aims to understand epidemiological dynamics of COVID-19 and dengue in India. In parallel, our research also aims to understand global phospho-proteomic changes in host cells during CHPV infection. Another focus is on identifying the host's factors including receptor(s) for CHPV infection. We approach these problems using state-of-the-art techniques in cell and molecular biology, genetics and bioinformatics.



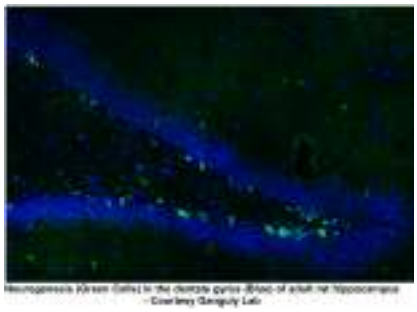
Cell 124, 729–740, February 24, 2006

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

(d) ***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. Identification of coding and non-coding genes to assess their role in development of oral cavity cancer and chemo-resistance by utilizing genome wide CRISPR/Cas9 based gRNA library.

(e) ***Neurobiology:*** In the field of neurosciences, the faculties are focused on (i) deciphering the

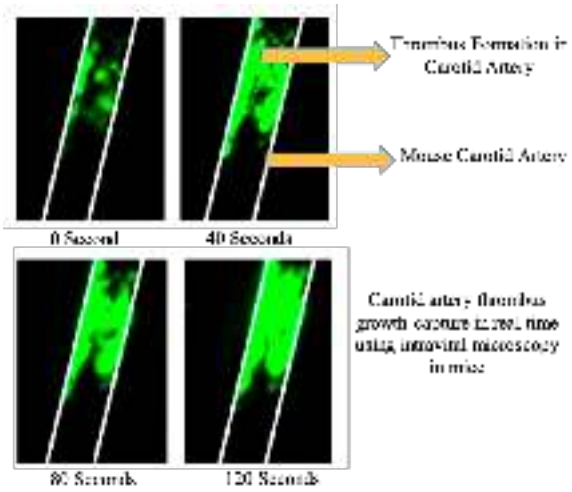
fundamental mechanisms that interfere with adult neurogenesis in the hippocampus leading to cognitive deficits and premature brain aging; (ii) Design and development of neuroregenerative therapeutics using small, bacterial-derived peptides; (iii) Small molecule based metabolic supplement as an intervention strategy in neuropsychiatric disorders.



(f) ***Protein aggregation***: Arranging into well-organized fibrillar aggregate, commonly known as amyloid fibril is an inherent property of proteins. Formation and deposition of amyloid fibrils into various tissues and organs are associated with a number of diseases like the Alzheimer's disease, Parkinson's disease, type2 diabetes, and systemic amyloidosis etc. Since these diseases affect millions of people every year, the aggregation study is a public health priority. However, aggregation is not always evil. They also play many functional roles in living organism and can be used to develop biomaterials, hydrogels and drug delivery system.

(g) ***Drug repurposing***: Drug development is a highly-complex, time consuming and costly process. Repurposing existing medicines is particularly attractive to reduce both time and cost for the drug development.

(h) ***Development of Cardiometabolic disease therapeutics***: Patients diagnosed with cardiometabolic diseases may need medical attention for the rest of his or her life. The strategy to curb such life-threatening diseases at its primitive phase will help patients to live normal or disease-free life and reduces the treatment cost significantly. Our lab research goal is to dissect the role of damage-associated molecular patterns in the progression of cardiometabolic diseases. We have developed a diagnostic test to capture diabetes at its early stages of development. We hope our test will help prevent the progression of diabetes and its associated cardiovascular complications. We utilize state-of-the-art imaging technique intravital microscopy to live image small animals such as rat and mice and conduct cardiovascular-related experiments in real-time.




(i) ***Rapid diagnostic test:*** Globally, human health is frequently challenged by new infections, new infections, and severe disease outcome emerges due to poor diagnostic facilities in a resource-constrain area. A diagnostic test developed on cheap platform, which is independent of electricity and high-end machines requirement is need of the hour. Our lab is focused on the development of single-platform paper based diagnostic test for water-borne infections.

## 2.1. Brief Overview of the Investigators:

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

## 2.2 Investigators:

***Prof. Seyed E. Hasnain, Ph.D***
***Prof. S.K. Sharma, M.D***
***Dr. A. Selvapandiyan Ph.D:***
***Dr. Surajit Ganguly Ph.D*:**
***Dr. Sudeshna Kar Ph.D:***
***Dr. Anuja Krishnan, Ph.D:***
***Dr. Sonam Grover, Ph.D***
***Dr. Basir Ahmad, Ph.D***
***Dr. Prem Prakash, Ph.D***
***Dr. Nishi Raj Sharma, Ph.D***
***Dr. M. M. Khan, Ph.D***
***Dr. Nidhi C. Dubey, Ph.D***

1. **Name of the course:** M.Sc. Biomedical Sciences.

**Duration:** Two years (Including the period of specialization).

**Fee structure:** 60,000/= (Sixty thousand) per semester, (i.e. 1,20,000/= per year).

**Contact information:** Tel: 08840565099
Email: prem@jamiahamdard.ac.in

**Eligibility:** Bachelor's Degree in Biomedical Sciences/ Life Sciences/ Zoology/ Microbiology/ Chemistry/ Biochemistry/ Environmental/ Biology/ Biotechnology/ Toxicology/ Clinical Sciences/ Laboratory Techniques/ B. Pharm/ with at least 50% marks in the aggregate.

**Course overview:** In an effort to cater the post-covid-19 healthcare needs, Jamia Hamdard-Institute of Molecular Medicine (JH-IMM) has designed a 2-year Full-time M.Sc. course in Biomedical Sciences. A state-of-the-art, integrated and coherent curriculum has been developed that recognizes considerable emphasis on practical training and development of analytical and problem-solving skills in addition to formal learning. This course is aimed to equip human resources in areas relevant to drug/vaccine development, analyze medical data to investigate pathogens and chronic diseases, and help develop programs that can improve outcomes in population health of our country. This is a multi-disciplinary course that offers to connect the fundamental biology and clinical sciences with Pharma/Biotech Industry.

**Scope:** This course will be appropriate for prospects who aspire to develop their careers in academia, regulatory bodies and healthcare Industry to combat emerging diseases and future pandemics in the country.

2. **Name of the course:** Ph.D. Molecular Medicine

**Duration:** Minimum three years (excluding the period of coursework).

**Eligibility:** Candidates having passed MSc in any branch of Life Sciences, M.Tech (Biotechnology) or any other related qualification with minimum of 55% marks or equivalent grade from any recognized Indian University or foreign University recognized by Association of Indian Universities (AIU).