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Press Release

**Illuminating the brain: Researchers from JMI and NIH, USA jointly develops optogenetic tool for neurological disorders**

Researchers at the Multidisciplinary Centre for Advanced Research and Studies (MCARS), Jamia Millia Islamia (JMI), in collaboration with the National Institutes of Health (NIH), USA have developed an optogenetic reporter to study molecular trafficking in neurons. The tool was developed by the lead author of the study, Dr. Tanveer Ahmad who did his postdoctoral training at NIH, before joining MCARS, JMI as Assistant Professor.

Leveraging the potential of phototropic receptors known as Light-oxygen- voltage sensing domains derived from the plant *Avena sativa* (used to derive the common cereal oats, and abbreviated as AsLOV2, the researchers generated innovative chimeric molecular designs by conjugating a light-sensitive domain of LOV2 with a protein called neuregulin3 (NRG3). Genetic screening and molecular methods previously developed by other research groups and by Dr. Ahmad and Dr. Vullhorst, who is one of the authors in the study have shown NRG3 as an important protein implicated in psychiatric diseases. Further, disease like Alzheimer's, schizophrenia and depression have genetic polymorphisms in NRG3 due to which it is considered as a susceptible gene for these diseases. Using this innovative tool, the researchers discovered a new mechanism of protein trafficking in hippocampal neurons of the brain which they termed as "trans-synaptic retention".

Dr. Ahmad said that their optogenetic tool has potential to be used to understand brain disorders like Alzheimer's disease, depression and schizophrenia. Understanding the molecular details of these diseases will help to develop targeted therapies, in particular viral- and mRNA-based methods, which are specific to a particular target molecule in the cells. Dr. Ahmad further said that this optogenetic tool can be applied to address other biological questions like memory formation, and for the development of inducible light-activated therapies for the treatment of cancer and neurodegeneration.

Professor Mohd. Zulfeqar, the Hon. Director of MCARS, JMI said that these novel futuristic optogenetic techniques will provide unprecedented ease to understand the human diseases and to find innovative treatment solutions. Prof.

Zulfequar further said that the optogenetic technique has revolutionized the field of neuroscience and our collaboration with premier institutes of the world like NIH, USA shows that India is in the forefront to develop and implement these cutting-edge technologies.

The study was published in a highly reputed peer-reviewed scientific journal “Journal of Cell Biology”, by The Rockefeller University, USA. Besides Dr. Tanveer Ahmad, Ms. Rituparna Chaudhuri and Ms. Nisha Chaudhary are the other contributing authors in this study from India. The team from NIH includes Dr. Andres Buonanno, who is the senior author and Dr. Detlef Vullhorst, Dr. Carlos Guardia, Dr. Irina Karavanova, and Dr. Juan Bonifacino as other co-authors.

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