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IITI research explores impacts of cancer-causing virus on brain cells

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A research team from IIT Indore utilised the Raman microspectroscopy technique, supported by the Department of Science and Technology (DST) under the FIST scheme to explore the possible impacts of a cancer-causing virus on brain cells. The technique, based on the Raman Effect, is a simple, cost-effective tool to find sensitive chemical changes in biological samples.

The team consists of group leader from Infection Bioengineering Dr Hem Chandra Jha, along with his students, Omkar Indari, Shweta Jakhmola and Meenakshi Kandpal, in collaboration with the group leader of Material and Device Laboratory (Department of Physics) professor Rajesh Kumar and team, including Dr Devesh K Pathak and Manushree Tanwar.

"The cancer-causing virus, Epstein Barr Virus (EBV), can infect the neuronal cells and drive various changes in biomolecules, such as fatty acids, carbohydrates and protein components, leading to diseases of the central nervous system, as well as brain cancer," Jha said. He added that the EBV virus had been found to be widely present in the human population. "In some unusual conditions, such as immunological stress or immunocompetence, the virus may lead to various complications, such as a type of blood cancer called Burkitt's lymphoma, stomach cancer, multiple sclerosis and so on," he added.

The IIT Indore research team found some common biomolecular changes at times in these cells.

The study, published in the journal, ACS Chemical Neuroscience, showed that there could be timely and gradual changes in various biomolecules in the neuronal cells under viral influence. Additionally, these changes were distinct when compared to the changes observed in other supportive brain cells (that is, astrocyte and microglia).

They observed that the lipid, cholesterol, proline and glucose molecules increased in the cells under viral influence. These biomolecular entities could, ultimately, play a pivotal role in the viral usurpation of cells. The study also provided insights into whether these biomolecular changes can be correlated to virus-associated impacts and linked to neurological complications.

"The research work aids in the understanding of EBV-mediated biomolecular changes in the various compartments of the central nervous system leading to better understanding of nervous system diseases," said Jha.

Professor Rajesh Kumar pointed out that the study was also helpful in establishing the advantages of Raman microspectroscopy, a cost-effective and non-invasive technique, in carrying out studies on virus-associated cellular complications in clinical settings. It could provide an upper hand in analysing clinical samples in comparison to other techniques which require advanced set-ups for studying the virus-associated changes in cells, tissues and organs.