RESEARCHER PROFILE

DRUGS OF ABUSE AND HIV PATHOGENESIS

DR SANTOSH KUMAR

DR SANTOSH KUMAR is Associate Professor of Pharmaceutical Sciences at the University of Tennessee Health Science Center. As a prolific researcher and publisher, Kumar is primarily interested in understanding the effects of drugs of abuse in HIV-1 infected individuals.

In 2014, 36.9 million people worldwide were estimated to have HIV, a virus that attacks the immune system, weakening the individual’s ability to fight infections and diseases. There are two major types: HIV-1 and HIV-2. HIV-1 was the first to be discovered, and is the most widespread type across the world. The primary reason for which there are many different forms of HIV is that each time the virus replicates by infecting a new cell, small changes and mutations can occur. Ultimately, this means that there can be different forms of HIV within one individual.

The fact that medical care for HIV has significantly improved in recent years means that it is no longer the death sentence it once was, with more and more people living long and fulfilling lives with the disease. One problematic condition associated with HIV-1 infected individuals, however, is alcoholism – but comprehensive information about this correlation is lacking.

ALCOHOLISM AND PREVENTING DAMAGE

Alcohol consumption enhances HIV-1 replication and decreases the body’s response to antiretroviral drugs. However, the mechanisms by which this reduced effectiveness occurs are unknown. In response to this, Kumar leads a team dedicated to investigating these mechanisms. In a perfect world, HIV-1 sufferers would resist consuming alcohol, tobacco and other drugs altogether, but this is not always feasible. Therefore, Kumar hopes that by identifying the mechanisms, new and improved drugs can be developed that can effectively treat the condition regardless of the damaging chemicals present in the patient’s bloodstream.

Since its initial proposal, the team has expanded its project to design, synthesise and characterise novel diallyl sulphide analogues, which have the potential to prevent liver damage caused by alcohol and drugs. Additionally, they could function as a form of adjuvant therapy for HIV-infected individuals – particularly those who consume alcohol.

As part of the project, the group also investigates the effects of HIV-infected macrophages and microglia on neurotoxicity in HIV-infected alcohol users, and how these cells release components that could lead to neurotoxicity and cause neuroAIDS – any neurological condition caused by the infection. The aim is to provide therapeutic targets for the development of adjuvant therapy for alcohol consuming HIV patients who are suffering from neuroAIDS.

This brief insight into Kumar’s work shows only one of the research avenues he is pursuing in his quest to better understand the roles played by drugs of abuse in HIV pathogenesis.