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The Effect of Endogenous Expression of HIV-1 gp120 on Glutamate Metabolism in Human Astrocytes

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ABSTRACT

Human immunodeficiency virus (HIV) infection is a global epidemic that targets the immune system. HIV infects white blood cells and spreads throughout the entire body via blood stream and makes its way to the brain. HIV infection in the brain may lead to HIV associated neurocognitive disorders (HAND). To be able to address this problem, we have to better understand how HIV infection damages neurons. We hypothesize that gp120 causes neurotoxicity in the cells by inhibiting the conversion of glutamate to glutamine by glutaminase. As a result, glutamate concentrations will build up both inside and outside the cell causing excitatory neurotoxicity.

To better understand this process, we transfected human astrocytes (U87MG cells) with mock (control), an empty vector (control), and with gp120 plasmid. Seventy-two hours post transfection, the cells were collected and run through a series of tests including SDS-PAGE/Western Blot and qRT-PCR to assess protein and mRNA levels of glutaminase and gp120.

We expect production of gp120 by astrocytes to lead to a decrease in expression of glutaminase. This would inhibit the process of converting glutamate to glutamine and explain how excess of glutamate accumulates inside and outside of the cell causing neurotoxicity and cell death. In conclusion, we expect to find a direct relationship between gp120 and the glutamate metabolism in human astrocytes. Understanding the effect gp120 has on neurons will help develop more effective treatments to better fight the virus.

Key Words: glutamate, astrocytes, gp120, neurotoxicity

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