TRISTAN QUINONES and BRUCE ANTHONY, Department of Chemistry/Biochemistry, West Virginia Wesleyan College, Buckhannon WV, 26201.

Effects of Alcohol Induced Misregulation of the Cell Cycle in Embryonic Derived Neuronal Stem Cells. A Model of Addiction and Fetal Alcohol Spectrum Disorders.

It is well-known that addiction has become a nation-wide epidemic. Exposure in humans induces a wide range of defects, many of which are associated with alterations to neuronal stem cells in the central nervous system (CNS). In the CNS, repetitive exposure reduces stem cell numbers and the potential for neuroplasticity and altering limbic system signaling. Alcohol and drug-exposed neuronal stem cells show extreme reduction in both proliferation and survival through cell cycle misregulation and induced cell death. Both the G1-S and G2-M checkpoints are disrupted through variations in cyclin/cyclin dependent kinase (CDK) activities. Our lab has demonstrated an alcohol induced increased expression of transcription factor E2F1, CDK4/6, and retinoblastoma (Rb), which, accelerates G1-S phase transition and induces premature DNA synthesis. This acceleration in G1/S phase control seems to trigger an early exit from late G1 phase, inducing early DNA replication and altering patterns of chromosomal packaging. This likely contributes to a >40% cell losses from repetitive alcohol exposure (binge drinking).

Research sponsored by WV-INBRE grant P20GM103434.