Combined Application of Drug and Stem Cells for Treating Alcohol-Induced Brain Damage and Depression

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In alcoholism and fetal alcohol spectrum disorder (FASD) research, alcohol exposure-induced disorders of neural circuit development and neuronal regeneration/degeneration are central to the pathology and clinical expression of these disorders. A number of in vitro and in vivo studies demonstrate the impact of neurogenesis impairment as the common mechanism in pathophysiology of alcoholism and other psychiatric disorders such as depression. Many researchers have suggested that antidepressant increased neurogenesis which was required for the behavioral effects and alcohol treatment decreased this function.

Stem cell-based regenerative therapy promises great benefits for patients with incurable brain diseases. We studied the involvement of corticolimbic GABAergic interneuron disruption in cognitive and social impairment in FASD and its recovery effect of stem cell treatment. We created new rat model of refractory depression by combination of fetal (alcohol) and adolescent (corticosterone) period stress exposures. We have indicated that depressive behavior described in this model could be recovered by combined treatment of antidepressant with stem cells but not by antidepressant treatment alone.

Our results suggest that alterations of neurogenesis function, especially GABA neuron production underlie the pathogenetic mechanism of alcohol-induced brain damage and depression and possible therapeutic mechanism of stem cell treatment combined with drug for these disorders.