The 2nd International Neuroinflammation Congress and 2nd Student Festival of Neurosience

Shefa Neuroscience Research Center, Tehran, Iran, 17-19 April, 2018

The Neuroscience Journal of Shefaye Khatam

Volume 6, No. 2, Suppl 1

Poster Presentation

Progress in the Treatment of Alzheimer's Disease by Gene Therapy

Zeinab **Sadat Hosseini***

Neuroscience Research center, Faculty of Medicine, Mashhad Branch, Islamic Azad University, Mashhad, Iran

Published: *17 April, 2018*

Abstract

Alzheimer's disease (AD) is a progressive neurological disorder characterized by the aggregation of two proteins, amyloid-b and hyper phosphorylated tau, and by neuronal and synaptic loss. The progress of gene-modified cells and stem cells is a particularly promising therapeutic method for AD. Gene-Modified Cell-Based Therapy for AD prior to transplantation can be beneficial for increasing cell survival and making them more effective. Furthermore, adapted cells could be used for the transfer of factors that can ameliorate neurological complaints. Because of the loss of cholinergic neurotransmitters in AD, some scientists were interested in developing gene-modified cells that can produce acetylcholine (Ach). Primary fibroblast cell line genetically engineered to express choline acetyltransferase to make Ach after transplantation into the hippocampus of rats. Another example for the simplification of gene therapy in AD is the over expression of neprilysine (NEP), an Ab degrading protease that has been exposed to ameliorate extracellular amyloids. Transgenic mice (APP/PS1) injected with lentiviral vector expressing NEP presented a decrease in Ab deposits, and MSCs overexpressing the NEP gene proved the ability to degrade Ab peptides in vitro. Similar results were found in vivo with transgenic mice that were transplanted with primary fibroblasts transfected with a lentivirus carrying NEP. Currently, no treatment has been established that can stop or reverse the development of AD. Though challenges such as immune rejection and cell survivability need to be addressed. The usage of autologous cells from patients for the generation of iPSC or gathering autologous MSCs may circumvent some of these challenges.

Keywords: Gene Therapy, Alzheimer's Disease, Stem Cells

****Corresponding Author:*** Zeinab Sadat Hosseini

Email: *zeinabsh20@yahoo.com*

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