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Poster Presentation

Non-Viral Human ProGDNF Gene Delivery to Rat Bone Marrow Stromal Cells under Ex Vivo Conditions

Ali Noori-Zadeh[1*], Seyed Alireza Mesbah-Namin[2], Taghi Tiraihi[3], M Rajabibazl[4]

[1]Shefa Neurosciences Research Center, Khatam Alanbia Hospital, Tehran, Iran.
[2]Department of Clinical Biochemistry, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.
[3]Department of Anatomical Sciences, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.
[4]Department of Clinical Biochemistry, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

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Abstract

Traumatic brain injury (TBI) affects millions worldwide, yet no therapy exists which prevents cell death. One of the options in the treatment of TBI is neurotrophic therapy such as using glial cell line-derived neurotrophic factor (GDNF). It is one of the most important proteins playing a pivotal role in growing and repairing of the nervous system. GDNF therapy is one of the suggested options in the treatment of neurodegenerative diseases. Limitations in the viral gene delivery and its side effects after therapy have encouraged us to use a non-viral method for this purpose. We transfected rat bone marrow stromal cells (BMSCs) in ex vivo conditions using Lipofectamine 2000 reagent with pEGFP-C1 and a constructed vector carrying the human proGDNF (pSecTag2/HygroB-human proGDNF), transiently and stably; respectively. The rate of transient transfection of rat BMSCs was eight percent and transfected rat BMSCs with pSecTag2/HygroB-human proGDNF stabilized by adding Hygromycin B in cell culture medium at 200 µg/ml. Semi-quantitative data analysis from Western-blot technique showed that stable transfected cells secrete GDNF at higher level in comparison with control cells (6.530 fold in the supernatant). The present study supports the utility of liposome-mediated transfection for over-expressing human GDNF in rat BMSCs. For this purpose and in order to get more yield of human GDNF secretion from the stable transfected rat BMSCs, we used a vector containing another signal sequence instead of its own pre-segment of proGDNF protein. This is the first report in this regard and the data presented will be potentially useful for human gene transfer therapies in a variety of neurodegenerative diseases such as TBI.

Keywords: Lipofectamine, Glial Cell Line-Derived Neurotrophic Factor, Traumatic Brain Injury, Gene Therapy.

Corresponding Author: Ali Noori-Zadeh

E-mail: *Alincbc@gmail.com*