Isolation ,Culture, and Characterization of Human Dental Pulp Mesenchymal Stem Cells

*P Mahdiyar[1], Sh Zare[2], R Robati[1], M Dianatpour[2,3], K Torabi[4], A.D Tamadon[1], I Razeghian Jahromi[2], A Tamadon[2], *D Mehrabani[2]

[1] Department of Biology, Science and Research Branch, Islamic Azad University, Shiraz, Iran.
[2] Stem Cell and Transgenic Technology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran.
[3] Department of Medical Genetics, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran.
[4] Department of Fixed Prosthodontics, Faculty of Dentistry, Shiraz University of Medical Sciences, Shiraz, Iran.

Introduction

Based on previous researches, dental pulp stem cells (DPSCs) are easily accessible with limited morbidity after collection. Their embryonic origin, from neural crests, explains their multipotency. DPSCs are primarily derived from the pulp tissues of the teeth. Objective: This study was undertaken to isolate, culture, and characterize two different third molar and first premolar human dental pulp mesenchymal stem cells.

Methods:

To obtain DPSCs, pulp tissues were removed from human third molar and first premolar teeth. They were digested by treating with collagenase type I. The extracted cells were passaged from primary culture up to passage 8. To enumerate the cells, the specified number of the cells were seeded into 24-well culture plates and the number of cells were counted to determine the growth curves of isolated cells from both type of teeth and the population duplication time (PDT) was determined. PCR and karyotype assays were performed to determine the cell surface mesenchymal markers and demonstrate the genetic stability of DPSCs, respectively.

Results:

The human DPSCs from both the third molar and the first premolar teeth were spindle-shaped in morphology. As growth curves showed, the proliferation rate of DPSCs in passage 8 among both teeth was different denoting to an increase in doubling time in the first premolar when compared to the third molar teeth. Normal karyotype of DPSCs derived from both the third molar and the first premolar teeth were exhibited. The isolated dental pulp stem cells expressed mesenchymal stem cell surface antigen. These cells were positive for CD73 but were negative for CD45 (hematopoietic stem cell marker).

Conclusion:

DPSCs can be an attractive candidate in regenerative medicine. As growth curves revealed, the first premolar teeth are suggested as a better source of MSC isolation.

Keywords: Dental pulp, Growth curve, Mesenchymal stem cell, Molar tooth, Premolar tooth.

Poster Presentation

***Corresponding Authors:** P Mahdiyar(Department of Biology, Science and Research Branch, Islamic Azad University, Shiraz, Iran). D Mehrabani (Stem Cell and Transgenic Technology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran).