

Isolation and characterization of stem cells derived from human third molar tooth germs of young adults: Implications in neo-vascularization, osteo-, adipo- and neurogenesis

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Abstract

A number of studies have reported in the last decade that human tooth germs contain multipotent cells that give rise to dental and peri-odontal structures. The dental pulp, third molars in particular, have been shown to be a significant stem cell source. In this study, we isolated and characterized human tooth germ stem cells (hTGSCs) from third molars and assessed the expression of developmentally important transcription factors, such as oct4, sox2, klf4, nanog and c-myc, to determine their pluri-potency. Flow-cytometry analysis revealed that hTGSCs were positive for CD73, CD90, CD105 and CD166, but negative for CD34, CD45 and CD133, suggesting that these cells are mesenchymal-like stem cells. Under specific culture conditions, hTGSCs differentiated into osteogenic, adipogenic and neurogenic cells, as well as formed tube-like structures in Matrigel assay. hTGSCs showed significant levels of expression of sox2 and c-myc messenger RNA (mRNA), and a very high level of expression of klf4 mRNA when compared with human embryonic stem cells. This study reports for the first time that hTGSCs express developmentally important transcription factors that could render hTGSCs an attractive candidate for future somatic cell re-programming studies to differentiate germs into various tissue types, such as neurons and vascular structures. In addition, these multipotential hTGSCs could be important stem cell sources for autologous transplantation. © 2010 Nature Publishing Group All rights reserved.

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Keywords

Germ, Molar, Stem cell, Tooth, Transcription factor