

Two Cell Transplantation studies impact dental stem cell research for therapeutic purposes

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Two studies appearing in a recent issue of *Cell Transplantation* (20:11-12), now freely available [online](#), evaluate stem cells derived from dental tissues for characteristics that may make them therapeutically useful and appropriate for transplantation purposes.

Induced pluripotent stem cells from immature dental pulp stem cells

A Brazilian and American team of researchers used human immature dental pulp stem cells (IDPSCs) as an alternative source for creating induced pluripotent stem cells (iPSCs), stem cells that can be derived from several kinds of [adult tissues](#). According to the study authors, production of iPSCs "opens new opportunities for increased understanding of human genetic diseases and [embryogenesis](#)" and will likely have a "great impact on future [drug screening](#) and toxicology tests."

The authors note, however, that the reprogramming methodology for making iPSCs is relatively new and "needs refining" in terms of technique, efficiency and cell type choice.

The researchers report that they easily, and in a short time frame, programmed human immature dental pulp stem cells into iPSCs with the hallmarks of pluripotent stem cells.

"Human IDPSCs can be easily derived from dental pulp extracted from adult or 'baby teeth' during routine dental visits," said study lead author Dr. Patricia C.B. Beltrao-Braga of the highly ranked National Institute of Science and Technology in Stem and Cell Therapy in Ribeirao Preto, Brazil. "IDPSCs are immunologically privileged and can be used in the absence of any [immune suppression](#) protocol and have valuable cell therapy applications, including reconstruction of large cranial defects."

Human dental cells analyzed for telomere length, telomerase activity

A research team from the Republic of Korea has isolated a population of stem cells derived from dental tissues of third molars and found that human dental papilla stem cells (DPaSCs; dental papilla develops into [dentin](#) and dental pulp) have biological features similar to bone marrow-derived mesenchymal stem cells (MSCs) in terms of telomere length, telomerase activity and reverse transcriptase (Rtase) activity.

MSCs, one of the most studied and clinically important populations of adult stem cells, do have shortcomings associated with their isolation and expansion from bone marrow, said study lead author Dr. Gyu-Jin Rho of the College of Veterinary Medicine, Gyeongsang National University, Republic of Korea.

"The role of telomere and telomerase are critical biological features of normal tissue stem and progenitor cells," said Dr. Rho. "Telomeres are a specialized region of repetitive DNA, and telomere shortening is related to cellular life span. Lack of telomerase indicates cellular aging. We compared the telomere length and telomerase activity in DPaSCs with those in MSCs and found that DPaSCs possessed ideal characteristics on telomere length, telomerase activity and reverse transcriptase activity, making DPaSCs suitable alternative candidates for regenerative

medicine."

The researchers concluded that DPaSCs could provide a source of stem cells for tooth regeneration and repair as well as a wide range of regenerative medicine applications in humans.

"These two studies highlight the potential value of two populations of [stem cells](#) that can be derived from the immature [dental pulp](#) and papilla of teeth" said Dr. Shinn-Zong Lin, professor of Neurosurgery and superintendent at the China Medical University Hospital, Beigang, Taiwan. "Their MSC-like abilities, ease of transformation to induced [pluripotent stem cells](#), and ease of availability make them a potentially valuable cell therapy".

More information: 1. Beltrão-Braga, P. C. B.; Pignatari, G. C.; Maiorka, P. C.; Oliveira, N. A. J.; Lizier, N. F.; Wenceslau, C. V.; Miglino, M. A.; Muotri, A. R.; Kerkis, I.

Feeder-free derivation of induced pluripotent stem cells from human immature dental pulp stem cells. *Cell Transplant.* 20(11-12):1707-1719;2011.

2. Jeon, B. G.; Kang, E. J.; Mohana Kumar, B.; Maeng, G. H.; Ock, S. A.; Kwack, D. O.; Park, B. W.; Rho, G. J. Comparative Analysis of Telomere Length, Telomerase and Reverse Transcriptase Activity in Human Dental Stem Cells. *Cell Transplant.* 20(11-12):1693-1705; 2011.

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