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Characterization of the secretome of human tooth germ stem cells (hTGSCs) reveals neuro-protection by fine-tuning micro-environment

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Abstract

Bone-marrow-derived mesenchymal stem cells (MSCs) demonstrate neuro-protective effects in several disease models. By producing growth-factors, cytokines and chemokines, they promote survival of neurons in damaged brain areas. Alternative MSC sources, such as human tooth germ stem cells (hTGSCs), have been investigated for their neuro-protective properties. They ameliorate effects of neuro-toxic agents by paracrine mechanisms, however these secreted bio-active molecules are not yet characterized. Therefore, the current study aimed to provide a detailed analysis of the secretome of hTGSCs. Brain cells were exposed to various toxic materials, including Alzheimer's β-amyloid peptide (β-AP) and 6-hydroxydopamine (6-OHDA). When co-cultured with hTGSCs, the activity of a number of anti-oxidant enzymes (catalase, glutathione-s-transferase, glutathione-peroxidase, superoxide-dismutase) was increased and neuronal death/apoptosis was subsequently reduced. The composition of the secreted bio-active materials is influenced by various pre-existing factors such as oxygen and glucose deprivation and the age of cells (passage number). This report reveals for the first time that the neuro-protective secretome of hTGSCs and the micro-environment of cells have a mutual and dynamic impact on one another. © 2013 Elsevier Inc.

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Keywords

Bio-active molecules, Cytokine, Human tooth germ stem cells (hTGSCs), Neuro-protection, Secretome, Toxicity