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Characterization of gene and protein marker expression by human dental pulp stem cells

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Neurodegenerative diseases result from deterioration of neurons or their myelin sheath that over time leads to brain dysfunction and premature death. Cells of the brain and spinal cord do not readily regenerate therefore excessive damage can be devastating. Our lab focuses on stem cell-based therapies for brain disorders. Previous studies indicate the potential of stem cells for use in therapies to treat neurodegenerative disorders. In particular, my lab project deals with dental pulp mesenchymal stem cells (DPMSCs) that are currently being investigated due to their ability to differentiate into multiple cell types, including neural cells. Our DPMSCs are composed of populations of mesenchymal stem cells harvested from normal human third molars (wisdom teeth). The initial goal of my research is to assess the variation of marker expression by the dental pulp mesenchymal stem cells to describe their developmental potentials, particularly neuronal development since neurons are the functional unit of the brain. Our results identified expression of neuronal-specific markers (indicative of neuronal precursors and mature neurons) at the gene and protein level by the DPMSCs specifically, we observed expression of nestin, β-III tubulin, and GFAP as well as the MSC markers CD 90, CD 73 and CD 44. Based on these findings, we propose that human DPMSCs may possess the capabilities necessary for therapeutic treatment of neurodegenerative disorders. In future experiments, we plan to perform cell transplantations into mouse models with neurodegenerative disorders. Our results are very significant because they could lead to cures for serious CNS disorders.