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Effect between stem cell size and in-vitro culture microenvironment

(2020) *International Journal of Pharmaceutical Research*, 12 (3), pp. 2101-2108.

DOI: 10.31838/ijpr/2020.12.03.290

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Abstract
Cell size is one of the deciding factors in tissue engineering for successful tissue regeneration through determining outcome of both cell delivery and cell attachment. This study aimed to determine the effect of different in-vitro culture condition on mammalian stem cell size. The pulp tissue extracted from mice incisors were digested using collagenase 1A. The resulting mice dental pulp cells (mDPC) suspensions were cultured in monolayer and hanging drop in-vitro culture. The human peripheral blood mononucleated cells (hPBC) isolated from peripheral blood using Ficoll-Paque™ Plus and cultured in complete media. After 7 days, the resulting suspension type hPBC were cultured separately in suspension in-vitro culture. The cell size for 30 days was measured using CellB software. The monolayer culture exerted largest changes with an increase (89.12±17.722 %) to the initial cell size of mDPC. Meanwhile, hanging drop culture resulted in smaller changes with a decrease (-25.84±6.706 %) to the initial cell size. While, the suspension culture causes least change with a decrease (-7.60 ± 4.302 %) to the initial size of hPBC in 30 days. All the in-vitro culture conditions exerted their largest changes on the cells at first 7 days compared to the rest of the culture period. The in-vitro viability of mDPC were determined through MTT assay and showed significant (p<0.05) increase in viable cells on day 21 compared to day 0. The mDPSC size attain stability in monolayer and hanging drop culture by day 14 and day 21, respectively. The size of mDPSC in monolayer and hanging drop culture are 13.63±1.613 µm and 10.45±1.145 µm, respectively. mDPSC size in both culture conditions does not show any differences with increasing culturing period and therefore, could be used for further applications.

Author Keywords
Cell Size; Dental Pulp Stem Cell; Mice; Microenvironment

Index Keywords
collagenase; animal cell, Article, cell culture technique, cell proliferation, cell self-renewal, cell size, cell structure, cell viability, controlled study, density gradient centrifugation, hanging drop culture, human, human cell, in vitro study, incisor, microenvironment, monolayer culture, mouse, MTT assay, nonhuman, peripheral blood mononuclear cell, stem cell, suspension cell culture, tissue engineering, tooth pulp, viable cell count

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Publisher: Advanced Scientific Research

ISSN: 09752366
Language of Original Document: English
Abbreviated Source Title: Int. J. Pharm. Res.
2-s2.0-85090256383
Document Type: Article
Publication Stage: Final
Source: Scopus