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Revisiting Stem-Cell Markers in Human Dental-Pulp and Apical-Papilla Cells

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Objectives To investigate CD-184 (CXCR4) as a stable surface marker of human dental pulp stem cells (hDPSCs) and stem cells from the apical papilla (SCAPs).
Methods hDPSCs and SCAPs were isolated using the outgrowth method from immature human third molars extracted from young, healthy patients. After isolation, the cells were cultured and passaged until P5 using DMEM + 10% FBS + 1% antibiotics/antimycotics. The expression of stem-cell surface markers, including Stro-1 and CXCR4, was evaluated by flow cytometry using two collection methods (trypsin digestion vs cell scraper). The proliferation, migration and multiple lineage differentiation capacity were tested using a battery of tests. The data was statistically analyzed using SPSS/Python using $p<0.05$ as statistical significance reference.
Results hDPSCs and SCAPs showed a high positive expression of CD73, CD90, CD105, and varying positive levels of Stro-1 and CXCR4. The hematopoietic markers CD31, CD34, and CD45 were not detected. However, the expression of CXCR4 was significantly higher than Stro-1 in both cell types ($P<0.05$) for both collection methods. The scrapping method yielded a significantly higher detection of Stro-1+ and CXCR4+ cells than trypsinization. On the other hand, hDPSCs and SCAPs showed similar proliferation and multi-differentiation potentials ($P>0.05$).
Conclusions CXCR4 appears to be a more specific stem cell surface marker for labeling hDPSCs and SCAPs compared to STRO-1. Moreover, the collection method significantly affects the characterization of hDPSCs and SCAPs.