Impact of individual platelet lysates on isolation and growth of human mesenchymal stromal cells

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Introduction: Culture medium for mesenchymal stromal cells (MSC) is frequently supplemented with fetal calf serum (FCS). FCS can induce xenogeneic immune reactions, transmit bovine pathogens and has a high lot-to-lot variability that hampers reproducibility of results. Human supplements have been used as substitutes for FCS before and several other groups demonstrated that pooled human platelet lysate (HPL) provides an attractive alternative. However, the composition of heterogeneous subpopulations might be affected by serum supplements and lot-to-lot variation of individual platelet lysates has not yet been addressed in detail.

Methods: In this study we compared the impact of serum supplements on initial fibroblastoid colony forming units (CFU-F). Subsequently, we addressed the activity of lysates from platelet units of individual donors on proliferation, in vitro differentiation and long-term culture of MSC. These data were correlated with chemokine profiles of HPLs.

Results: Isolation of MSC with either HPL or FCS resulted in similar CFU-F frequency, colony morphology, immunophenotype, and adipogenic differentiation potential. Osteogenic differentiation was more pronounced in HPL than in FCS. There was some variation in MSC proliferation with individual lysates but it was always higher in comparison to FCS. Proliferation of MSC correlated with the concentration of platelet-derived growth factor (PDGF) and there was a moderate association with platelet counts. All HPLs facilitated expansion for more than 20 population doublings.

Conclusions: Reliable long-term expansion was possible with each lysate of individual platelet units and this supports the notion that donor recipient matched or autologous HPL can be used for therapeutic MSC products. However, there was some variation in growth supportive potential and this correlated with PDGF concentration.