OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference on
Clinical & Cellular Immunology
October 15-17, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

Novel negative selection marker CD54 enhances differentiation of human adipose-derived mesenchymal stem cells

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Due to their multi-differentiation potential and immunosuppressive function, mesenchymal stem cells (MSCs) hold huge promise in regenerative medicine. Lack of specific selection markers to isolate MSCs renders their use at risk of fibroblast contamination. The aim of the study was to identify new surface protein markers that can be used for MSC purification during *in vitro* expansion. With real-time RT-PCR, we demonstrated that primary human dermal fibroblasts expressed CD54 mRNA 10-fold more than early passage human adipose-derived MSCs (AMSCs). Flow cytometry illustrated 88.0% ± 4.1% of dermal fibroblasts strongly expressed CD54 on their surface with a mean fluorescence intensity ratio of 24.0 ± 0.0 compared to 11.0% ± 0.7% and minimal intensity for AMSCs. Evaluation of CD54 sorted AMSCs revealed CD73 expression was 2.2-fold higher in the $CD54^-$ versus $CD54^+$ fraction. CD54- AMSCs demonstrated increased adipogenic and osteogenic differentiation potential relative to $CD54^+$ AMSCs. In conclusion, we identified CD54 as a novel selection marker capable of distinguishing MSCs from fibroblasts and thus enhancing MSC osteogenic and adipogenic differentiation potential.

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