

Stem Cell Res Ther 2018 Jan 16;9(1):10

PMID: 29338788

PMCID: PMC5771027

DOI: 10.1186/s13287-017-0755-3

High-throughput immunophenotypic characterization of bone marrow- and cord blood-derived mesenchymal stromal cells reveals common and differentially expressed markers: identification of angiotensin-converting enzyme (CD143) as a marker differentially expressed between adult and perinatal tissue sources

Eliana Amati, Omar Perbellini, Gianluca Rotta, Martina Bernardi, Katia Chieragato, Sabrina Sella, Francesco Rodeghiero, Marco Ruggeri, Giuseppe Astori

Abstract

Background: Mesenchymal stromal cells (MSC) are a heterogeneous population of multipotent progenitors used in the clinic because of their immunomodulatory properties and their ability to differentiate into multiple mesodermal lineages. Although bone marrow (BM) remains the most common MSC source, cord blood (CB) can be collected noninvasively and without major ethical concerns. Comparative studies comprehensively characterizing the MSC phenotype across several tissue sources are still lacking. This study provides a 246-antigen immunophenotypic analysis of BM- and CB-derived MSC aimed at identifying common and strongly expressed MSC markers as well as the existence of discriminating markers between the two sources.

Methods: BM-MSC (n = 4) were expanded and analyzed as bulk (n = 6) or single clones isolated from the bulk culture (n = 3). CB-MSC (n = 6) were isolated and expanded as single clones in 5/6 samples. The BM-MSC and CB-MSC phenotype was investigated by flow cytometry using a panel of 246 monoclonal antibodies. To define the markers common to both sources, those showing the smallest variation between samples (coefficient of variation of log₂ fold increase ≤ 0.5 , n = 59) were selected for unsupervised hierarchical cluster analysis (HCL). Differentially expressed markers were identified by directly comparing the expression of all 246 antigens between BM-MSC and CB-MSC.

Results: Based on HCL, 18 markers clustered as strongly expressed in BM-MSC and CB-MSC, including alpha-smooth muscle antigen (SMA), beta-2-microglobulin, CD105, CD13, CD140b, CD147, CD151, CD276, CD29, CD44, CD47, CD59, CD73, CD81, CD90, CD98, HLA-ABC, and vimentin. All except CD140b and alpha-SMA were suitable for the specific identification of ex-vivo

expanded MSC. Notably, only angiotensin-converting enzyme (CD143) was exclusively expressed on BM-MSC. CD143 expression was tested on 10 additional BM-MSC and CB-MSC and on 10 umbilical cord- and adipose tissue-derived MSC samples, confirming that its expression is restricted to adult sources.

Conclusions: This is the first study that has comprehensively compared the phenotype of BM-MSC and CB-MSC. We have identified markers that could complement the minimal panel proposed for the in-vitro MSC definition, being shared and strongly expressed by BM- and CB-derived MSC. We have also identified CD143 as a marker exclusively expressed on MSC derived from adult tissue sources. Further studies will elucidate the biological role of CD143 and its potential association with tissue-specific MSC features.

Link all'articolo: <https://pubmed.ncbi.nlm.nih.gov/29338788/>