Title: Organ-specific migration of mesenchymal stromal cells: Who, when, where and why?

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Abstract: Mesenchymal stromal cells (MSC) represent a type of multipotent cells that can differentiate to various mesenchymal lineages. MSC can be isolated from different tissues and require ex vivo expansion to exert their regenerative and immunosuppressive function for various clinical applications. The efficacy of these MSC-based therapies at least partly depends on migration and specific homing towards the site where the cells are needed. MSC express a wide variety of integrins, chemokine- and growth factor receptors, though culture-expansion dramatically alters their migratory and engraftment potential. However, it has become clear that tissue damage and/or inflammation can enhance the efficacy of MSC homing. In this review, we focus on the migratory potential of MSC to target organs, including bone marrow, bone, spleen & lymph nodes, intestine and heart, and the underlying molecular mechanisms in various preclinical and clinical settings. Better understanding of directed MSC migration will offer new perspectives to modulate MSC expansion and/or clinical protocols to improve their efficacy upon transplantation.