Roles for mesenchymal stem cells as medicinal signaling cells
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Understanding the in vivo identity and function of mesenchymal stem cells (MSCs) is vital to fully exploiting their therapeutic potential. New data are emerging that demonstrate previously underappreciated roles of MSCs in vivo. Understanding the behavior of MSCs in vivo is crucial as recent results suggest these additional roles enable MSCs to function as medicinal signaling cells. This medicinal signaling activity is in addition to the contribution of MSCs to the maintenance of the stem cell niche and homeostasis. There is increasing evidence that not all cells described as MSCs share the same properties. Most MSCs reside in a perivascular location and have some functionalities in common with those of the pericytes and adventitial cells located around the microvasculature and larger vessels, respectively. Here we focus on the characteristics of MSCs that have been demonstrated to be similar to those of pericytes located around the microvasculature, defined as perivascular MSCs (pMSCs). Although we focus here on pMSCs, it is important to bear in mind that pericytes are found in many types of blood vessels, and that not all pericytes are thought to be pMSCs.

**Roles for pMSCs as medicinal signaling cells**

- **Mesenchymal Stem Cells (MSCs) in vivo**
  - Bone marrow (BM)
  - Umbilical cord
  - Amniotic fluid
  - Synovial fluid
  - Dental pulp
  - Adipose tissue
  - Perivascular (pMSCs)
  - Synovium
  - Bloodstream
  - Brain (subventricular zone, dentate gyrus)
  - Kidney
  - Liver
  - Spleen
  - Pericardium

- **MSCs in vitro and therapeutic applications**
  - Neurogenic differentiation
  - Osteogenic differentiation

**References**

5. Lugassy, C. et al. Angiotropism, pericytic mimicry and extravascular migratory characteristics of MSCs that have been demonstrated to be similar to those of pericytes located around the microvasculature, defined as perivascular MSCs (pMSCs). Although we focus here on pMSCs, it is important to bear in mind that pericytes are found in many types of blood vessels, and that not all pericytes are thought to be pMSCs. This medicinal signaling activity is in addition to the contribution of MSCs to the maintenance of the stem cell niche and homeostasis. There is increasing evidence that not all cells described as MSCs share the same properties.