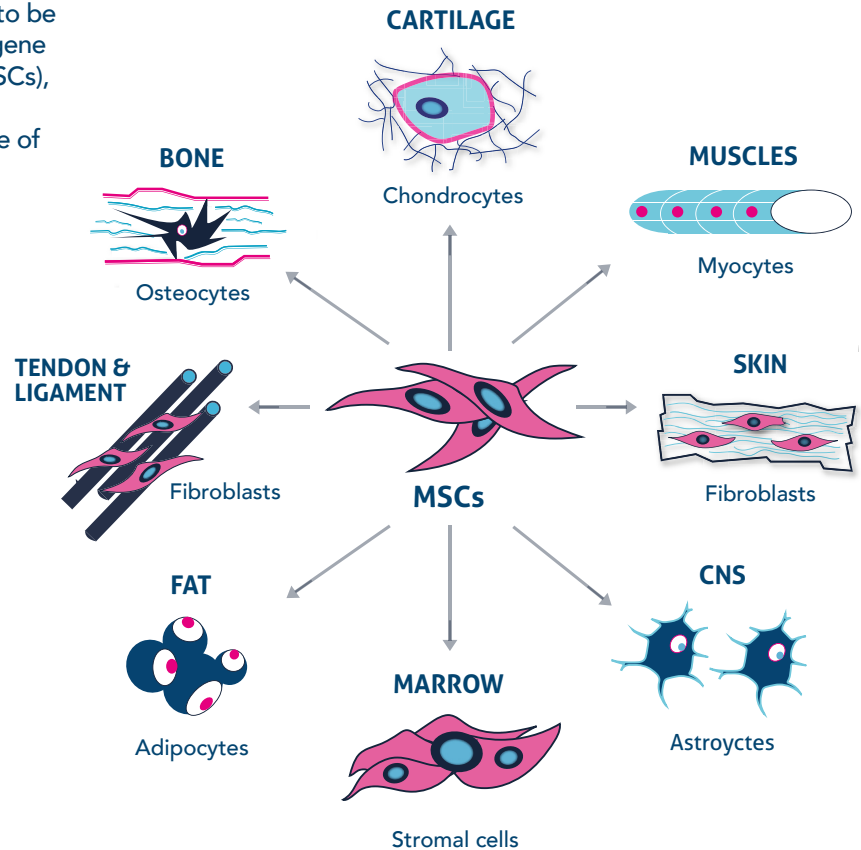


Mesenchymal Stem Cell

Mesenchymal Stem Cells (MSCs) are considered to be the most promising tools for cell and cell-based gene therapy. Similar to Hematopoietic Stem Cells (HSCs), MSCs are also found in bone marrow and are commonly known as “multi-lineage cells” because of their wide range of potential applications.



| Uses |
|---|
| Regenerate structure and connective tissues |
| Repair bones and cartilage |
| Stimulate angiogenesis |
| Reduce inflammation and scarring |


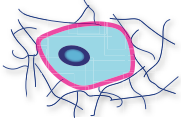


| Where are they found? |
|-----------------------|
| Adipose tissue |
| Amnion |
| Synovial fluids |
| Muscles |
| Dermis |
| Deciduous teeth |
| Umbilical cord tissue |

Mesenchymal Stem Cell Markers

| Positive Markers | | Negative Markers |
|------------------|--------|------------------|
| CD13 | CD106 | CD11b |
| CD29 | CD117 | CD14 |
| CD36 | CD45RO | CD19 |
| CD44 | CD54 | CD31 |
| CD73 | CD106 | CD34 |
| CD90 | STRO-1 | CD45 |
| CD105 | CD71 | CD79a |
| CD146 | | HLA-DRA |

Mesenchymal Stem Cell

Depending on the environment MSCs grow in, they can give rise to a variety of lineage-specific cell types. The four principal cell types they differentiate into are myocytes, chondrocytes, osteocytes, and adipocytes. The table below contains a summary of the key growth factors needed for the differentiation process, and the antibodies used to detect markers of these cell types.

| Cell Type | Growth Factor used for Differentiation* | Antibody Markers** |
|---|---|-----------------------------|
|  <p>Myocytes</p> | FGF basic (HZ-1285) | Alpha actinin |
| | FGF-4 (HZ-1218) | Calponin |
| | FGF-8b (HZ-1103) | Myosin Light Chain 2/MLC-2V |
| | TGF-beta (HZ-1011) | SMA |
| | PDGF-bb (HZ-1308) | SMMHC |
|  <p>Chondrocytes</p> | IL-6 (HZ-1019) | Troponin I |
| | FGF basic (HZ-1285) | Annexin VI |
| | FGF-4 (HZ-1218) | CD44 |
| | FGF-8b (HZ-1103) | CD151 |
| | TGF-beta 1 (HZ-1011) | FOXC1 |
| | TGF-beta 2 (HZ-1092) | FOXC2 |
| | TGF-beta 3 (HZ-1090) | ITM2A |
| | BMP-2 (HZ-1128) | SOX5 |
| BMP-4 (HZ-1045) | SOX6 | |
| BMP-7 (HZ-1229) | SOX9 | |
|  <p>Osteocytes</p> | FGF basic (HZ-1285) | Biglycan |
| | TGF-beta (HZ-1011) | Fibronectin |
| | BMP-2 (HZ-1128) | MEPE |
| | BMP-4 (HZ-1045) | Podoplanin |
|  <p>Adipocytes</p> | | Sclerostin |
| | | SPARC |
| | | Adiponectin |
| | FGF basic (HZ-1285) | CD36 |
| | TGF-beta (HZ-1011) | CLTCL1 |
| | BMP-2 (HZ-1128) | DLK1 |
| BMP-4 (HZ-1045) | DLK2 | |
| BMP-7 (HZ-1229) | HOXC8 | |
| | PPAR γ | |