

Unexpected Potential of Adult Stem Cells

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Abstract

We have identified a population of primitive cells in normal human (h) as well as murine (m) and rat (r), post-natal bone marrow (BM) that have, at the single cell level, multipotent differentiation and extensive proliferation potential, which we named Multipotent Adult Progenitor Cell or MAPC. MAPC differentiate in vitro into most mesodermal cell types (cells with characteristics of osteoblasts, chondroblasts, fibroblasts, adipocytes, skeletal, smooth and cardiac myoblasts, endothelial cells), as well as cells with neuroectodermal and with endodermal features. Using retroviral marking we have shown that multi-lineage differentiation is derived from single MAPC. MAPC express active telomerase and can undergo 100+ cell doublings without telomere shortening, suggesting that they do not senesce. MAPC express oct-4 mRNA. MAPC engraft in vivo and persist for 6+ months, differentiate into hematopoietic and epithelial cells in response to local “cues”, and contribute to all somatic cell types when injected in the blastocyst. The finding that stem cells exist in post-natal tissues with previously unknown proliferation and differentiation potential opens up the possibility of using autologous stem cells to treat a host of degenerative, traumatic or congenital diseases.
