

Identification of the Human Skeletal Stem Cell.

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Public Summary:

Stem cell regulation and hierarchical organization of human skeletal progenitors remain largely unexplored. Here, we report the isolation of a self-renewing and multipotent human skeletal stem cell (hSSC) that generates progenitors of bone, cartilage, and stroma, but not fat. Self-renewing and multipotent hSSCs are present in fetal and adult bones and can also be derived from BMP2-treated human adipose stroma (B-HAS) and induced pluripotent stem cells (iPSCs). Gene expression analysis of individual hSSCs reveals overall similarity between hSSCs obtained from different sources and partially explains skewed differentiation towards cartilage in fetal and iPSC-derived hSSCs. hSSCs undergo local expansion in response to acute skeletal injury. In addition, hSSC-derived stroma can maintain human hematopoietic stem cells (hHSCs) in serum-free culture conditions. Finally, we combine gene expression and epigenetic data of mouse skeletal stem cells (mSSCs) and hSSCs to identify evolutionarily conserved and divergent pathways driving SSC-mediated skeletogenesis.

Scientific Abstract:

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