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Classified as

New Finding | Technical Advance

The heterogeneity of ex-vivo expanded populations of stem/progenitor cells is a critical issue in regenerative medicine. In their work, the authors focused on bone marrow stromal cell (BMSC) colonies, which are assumed to represent the progeny of individual skeletal stem/progenitor cells, and tackled the problem from a relatively novel and very interesting perspective. By using time-lapse image analysis, they demonstrated that BMSC colonies isolated from the same donor and grown in standard culture conditions were heterogeneous in terms of proliferative capacity and biophysical properties, that this heterogeneity emerged during in vitro growth and that it occurred even within individual colonies for which a single-cell origin was well documented. Based on these findings, they conclude that "cells within the same generation could exhibit behavior more similar to each other than to cells belonging to the same colony or cells in their own progeny born later in time".

The results of this work, along with previously published data (1) confirm the importance of rigorous studies of the biophysical, biological and functional properties of clonal populations of progenitor cells to be used for tissue regeneration. Investigating the heterogeneity of BMSC colonies, and the mechanisms thereof, may help to develop cell expansion protocols able to maintain the essential properties of skeletal stem/progenitor cells, as properly remarked by the authors. At the same time, it may have other less evident, but very important, implications for the use of skeletal stem cells and of their progeny in bone regeneration. For example, it may help to understand if and how the emergence of heterogeneity within skeletal stem cell-derived clonal populations relates to the establishment of the intrinsic 3D structure of bone. Since most skeletal diseases involve a disruption of bone shape (modeling) and architecture (remodeling), identifying all the mechanisms through which skeletal stem/progenitor cells and their progeny contribute to the bone morphogenesis and to the maintenance of the bone structure is essential for their use in bone repair and, at large, in the tissue engineering/regenerative medicine of the skeleton.

References

1. Reversible commitment to differentiation by human multipotent stromal cells in single-cell-derived colonies.
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Disclosures
None declared

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