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A Non-Transgenic Method to Generate Adult Stem Cells from Mouse and Human Somatic Cells

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Introduction: Adult stem cells (ASCs) can be cultured with difficulty from most tissues, often requiring chemical or transgenic modification to achieve adequate quantities. We show here that mouse primary fibroblasts, grown in suspension, change from the elongated and flattened morphology observed under standard adherent culture conditions of generating rounded cells with large nuclei and scant cytoplasm and expressing the mesenchymal stem cell (MSC) marker (Sca1; Ly6A) within 24 h.

Methodology/Results: We describe here a suspension culture method that, irrespective of the lineage used, mouse fibroblast or primary human somatic cells (fibroblasts, hepatocytes and keratinocytes), is capable of generating a high yield of cells in spheroid form which display the expression of ASC surface markers, circumventing the anoikis which often occurs at this stage. Moreover, mouse fibroblastderived spheroids can be differentiated into adipogenic and osteogenic lineages. An analysis of singlecell RNA sequence data in mouse fibroblasts identified eight distinct cell clusters with one in particular comprising approximately 10% of the cells showing high levels of proliferative capacity expressing high levels of genes related to MSCs and self-renewal as well as the extracellular matrix (ECM).

Conclusion: The rapid, high-yield generation of proliferative, multi-potent ASC-like cells via the process we term suspension-induced stem cell transition (SIST) could have significant implications for regenerative medicine.

Biography

Behzad Yeganeh is a distinguished expert in regenerative medicine with extensive experience in advancing therapeutic solutions for tissue repair and cellular regeneration. With a focus on mesenchymal stem cells and their applications, he has contributed significantly to the fields of aesthetic and regenerative medicine. Behzad has been actively involved in research on stromal vascular fractions, bone marrow-derived stem cells, and Wharton's Jelly-derived mesenchymal stem cells, as well as MSC-derived exosomes. His work emphasizes innovation, safety, and efficacy in regenerative therapies, making him a respected figure in this transformative field.