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ISOLATION OF NON-ADHERENT PROGENITORS FROM ADIPOSE-DERIVED STEM CELLS (NAPADSCS): CAN WE FINALLY CONFIRM ADSCS STEMNESS?

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INTRODUCTION

In recent years, isolation of Mesenchymal Stromal Cells (MSCs) from lipoaspirate, often labeled as adipose-derived stem cells (ADSCs) has been broadly investigated. Following expansion, these cells grow as adherent, fibroblast-like cell colonies, which can differentiate toward different cell lineages. However, there is an ongoing discussion on whether MSCs can be appropriately defined as stem cells. True stem cells, in fact, lack adhesion molecules and grow in suspension maintaining their stemness conditions. Here we describe for the first time an upstream stem cell entity that we have isolated from adipose tissue and that we refer to as non-adherent precursors from Adipose-derived stem cells (n.a.p.A.D.S.C.s), providing evidence of ADSCs stemness.

MATERIAL AND METHODS

Adipose tissue (20-50 cc) was extracted from lipoaspirate samples of 15 healthy donors following patients written consent. Following mechanical and enzymatic digestion, samples were plated in stem cell-specific enriched media and in no-adhesion culturing conditions. Clonal expansion and PKH26 staining were used to assess stemness.

RESULTS

NapADSCs represent an upstream line of mesenchymal precursors compared to the more differentiated, adherent, fibroblast-like MSCs. NapADSCs colonies defined as spheroids (polyclonal) and spheres (monoclonal) are visible in suspension 7-21 days after plating and display expansion patterns similar to colon, thyroid or breast stem cells. NapADSCs stemness was confirmed in vitro by stem cell-specific biological behaviors such as clonal expansion and asymmetric division.

CONCLUSIONS

We hypothesize that napADSCS may represent a more upstream form of the commonly used adherent ADSCs. As napADSCs display expansion and division patterns typical of true stem cells, we believe that the identification of napADSCs dissipates the doubts on the stem-cell origin of the more differentiated and commonly used adherent mesenchymal cells. Ongoing studies aim to assess their multipotency through differentiation toward the desired mesenchymal cell lineages for regenerative purposes.