

Quali-quantitative differences of adipose tissue-derived stromal cells from superficial and deep subcutaneous lipoaspirates: a matter of fat

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Subcutaneous fat (or hypoderm) represents a valuable reservoir of adipose-derived stem cells (ASCs), residing in the stromal vascular fraction (SVF), widely exploited in regenerative medicine applications, being easily harvested through lipoaspiration. The lack for standardized procedures for autologous fat grafting, guided research efforts aimed at identifying possible differences related to the harvesting site, that may affect cell isolation yield, cell growth properties and clinical outcomes. The hypoderm features a complex architecture: the superficial fascia separates the superficial adipose tissue (SAT) from the deep layer (DAT). Aim of this study was to unravel the differences between SAT and DAT, considering morphological structure, SVF composition and ASCs' properties. SAT and DAT specimens were collected from three distinct anatomical regions (abdomen, thigh and knee) of female individuals and comparatively analyzed through histology, flow cytometry, and qPCR. ASCs were isolated in primary culture and used for in vitro differentiation assays. Our results indicated that liposucted SAT contains a higher stromal tissue compound, along with a higher proportion of CD105-positive cells, compared to DAT from the same anatomical region. Also, cells isolated from SAT displayed increased multipotency and stemness features. All differences were mainly evidenced in specimens harvested from the abdominal region. According to our results, SAT features overall increased stem properties. Given that subcutaneous adipose tissue is currently exploited as the gold standard source for high yield isolation of somatic stem cells, these results may provide precious hints toward defining a prioritization of tissue harvesting site for regenerative medicine applications.

Keywords

Subcutaneous fat, adipose-derived stem cells, superficial hypoderm, deep hypoderm, regenerative medicine.