

Patient Characteristics and Anatomic Site Selection Affect Yield and Differentiation of Adipose Derived Stem Cells

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Abstract

Purpose: Utilizing adipose-derived stem cells (ASCs) is an emerging method to harvest adult stem cells capable of differentiation into a number of cell types associated with the mesenchymal lineage¹. This study is directed by the hypothesis that the Stromal Vascular Fraction (SVF) cellular yield and ASC growth are affected by patient characteristics, harvesting technique and harvest site.

Methods: Adipose was obtained via en-bloc resection or tumescent liposuction. Forty-five adipose samples were collected from subject's arm, thigh, abdomen, or flank. Growth curves were obtained by incubating samples for average 14 days with periodic cell counts. Cells were also cultured in osteogenic, adipogenic and endothelial cell differentiation media for 14-21 days. qRT-PCR was used with osteocalcin, lipoprotein lipase; CD31 as markers for differentiated osteocytes, adipocytes, and endothelial cells, respectively.

Results: Gender or age in did not affect SVF yield. Obese subjects had a decreased SVF yield (figure 1), while those with a history of smoking trended towards a decreased SVF yield. There was not a difference in the SVF yield between adipose tissue harvested by liposuction versus resection. However, there was a difference in total cell yield based on anatomic site—the highest yield from the upper arm (figure 2). Cell doubling time was shorter for ASCs from lipoaspirated tissue. ASCs isolated from the arm have greater osteogenic differentiation ability than the abdomen, flank, and thigh. ASCs differentiated into adipocytes, osteocytes, and endothelial cells expressed appropriate markers using qRT-PCR.

Conclusions: Obese subjects have a lower SVF yield per gram of tissue. Smoking history shows a trend toward decreasing SVF yield. Cells harvested from the arm have shown a difference in the SVF cellular yield and osteogenic differentiation ability. Our findings suggest that ASCs from different harvesting techniques and anatomic sites does affect SVF yield and ASC growth.

Figure 1. SVF Yield Based on BMI. Patients with BMI <30 produce a greater SVF yield than those with BMI ≥30 (p=0.05).

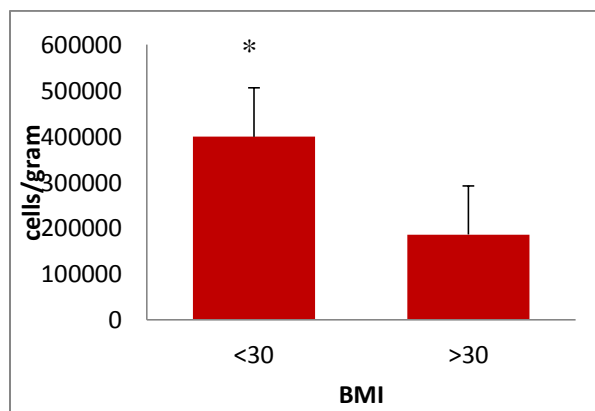
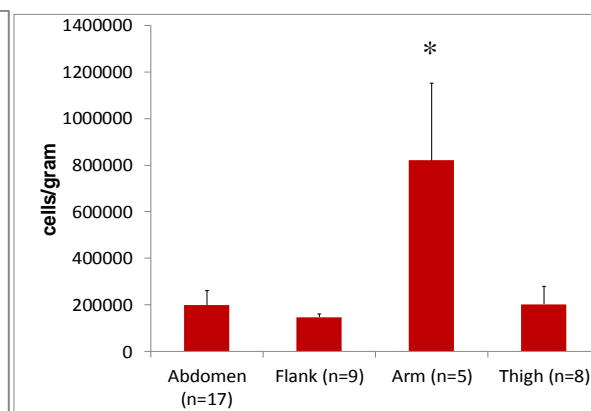


Figure 2. SVF Yield Based on Anatomic Site. ASCs harvested from the arm has a significantly greater SVF yield than cells harvested from other sites. p=0.008



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