The Effect of Harvesting Technique and Anatomic Site Selection on Yield and Growth of Adipose Derived Stem Cells

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Purpose:

Adipose-derived stem cells (ASCs) are emerging as an easy to harvest adult stem cell capable of differentiation into a number of cell types associated with the mesenchymal lineage. Accordingly, the stromal vascular fraction (SVF) derived from adipose tissue contains an abundance of ASCs that can differentiate into fat, bone, cartilage, muscle and endothelial cells. In cosmetic and reconstructive surgery, these cells aid in the retention of autologous fat grafting. However, retention results are variable. This study is directed by the hypothesis that the SVF cellular yield and the ASC growth are affected by harvesting technique and harvest site.

Methods:

Adipose was obtained via en-bloc resection or tumescent liposuction. Thirty adipose samples were collected from subjects from the arm, thigh, abdomen, or flank. Cell number was counted by Coulter Counter. Cell growth curves were plotted by cell number at different culture days and cell doubling times were determined based on cell growth curves. SVF yield in lipoaspirated vs. resected tissue was evaluated using unpaired, two-tailed t-test. One-way ANOVA was used to determine the difference in SVF yield and cell growth of the anatomic sites.

Results:

There was a statistically significant difference in the SVF cellular yield between adipose tissue harvested by liposuction vs. resection. There was no significant difference in total cell yield based on anatomic site, but the highest yield from adipose tissue from the upper arm. The cell doubling time was shorter for ASCs from lipoaspirated tissue. Thigh cells had a shorter doubling time than flank, arm and abdominal adipose stem cells. However, these results were not statistically significant. Adding to these results are studies currently under way to compare the yield of pre-capillary CD31 cells as well as the potential for ASCs from the different sites to differentiate to bone and fat.

Conclusions:

Our results show that harvesting technique does not affect SVF yield. While there was a difference in the SVF cellular yield based on the anatomic harvest site, more data are under way for statistical comparisons. Preliminary studies show both harvesting technique and anatomic site affects ASC growth and that all sites yield encouraging results suggesting ASCs are capable of differentiation to bone or fat, however relative differences wait further analysis. Our findings suggest that ASCs from harvesting techniques and anatomic sites may affect graft retention rates due to the difference in SVF yield and ASC growth.