

# Comparison Between Stromal Vascular Cells' Isolation with Enzymatic Digestion and Mechanical Processing of Aspirated Adipose Tissue

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## Abstract

**Background:** Adipose stromal vascular fraction (SVF) is an important source of adipose-derived mesenchymal stem cells (ADMSCs) that are used in regenerative medicine (1). Numerous procedures including mechanical and enzymatic methods have been used to obtain stromal vascular cells (SVCs) from adipose tissue (2). The cellular composition of SVF obtained may have an effect on its capabilities. Therefore, we compared the yield and cellular composition of SVCs obtained from lipoaspirates after centrifugation, vortexing and collagenase digestion.

**Methods:** Subcutaneous adipose tissue was obtained from 9 adults aged 21-55 years and an average BMI of 28, by vacuum-assisted liposuction. SVCs were isolated by high centrifugation, vortexing for 3 minutes followed by centrifugation or collagenase digestion. After red blood cell lysis, SVCs were subjected to cell counting, viability measurements and flow cytometry. The relative percentages of ADMSCs (CD45- CD73+ CD90+), endothelial cells (CD45- CD31+) and monocytes / macrophages (CD45+ CD14+) were quantified.

**Results:** SVC yields differed with the highest yield obtained from enzymatic isolation ( $2.3 \times 10^5$  cells/ml lipoaspirate), 10 fold fewer cells from centrifugation and 20 fold fewer from vortex/centrifugation. Cell viability was similar between the methods (80-90%). The cellular composition of SVF was potentially the most significant variation between the methods. Collagenase digested SVF contained fewer cells of hematopoietic origin (32%) than mechanically isolated SVF (70-85%) and greater numbers of ADMSCs (60%) than mechanically isolated SVF (6-13%). In addition, collagenase digested SVF contained fewer inflammatory monocytes/ macrophages and greater quantity of endothelial cells than mechanically isolated SVF.

**Conclusions:** Although regenerative cells were isolated from all 3 processes, the increased hematopoietic and inflammatory cells as well as decreased ADMSCs and endothelial cells in the mechanically isolated cell populations may contribute to reduced therapeutic potential when used in regenerative medicine.

## References:

1. Condé-Green A et al. Effects of centrifugation on cell composition and viability of aspirated adipose tissue processed for transplantation. *Aesthet Surg J* 2010;30(2):249-55.
2. Doi K et al. Stromal vascular fraction isolated from lipo-aspirates using an automated processing system: bench and bed analysis. *J Tissue Eng Regen Med* 2013;7(11):864-70.

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