

## **Mechanical Isolation of Adipose-Derived Stromal Vascular Fraction: Is It Becoming a Growing Trend?**

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**Disclosure/Financial Support:** none

**Background:** Adipose stromal vascular fraction has demonstrated utility in fat grafting and regenerative medicine. Standard stromal vascular fraction isolation is an expensive and lengthy process relying on the use of bacterial collagenase. The type and concentration of collagenase is not standardized, and adipose tissue exposed to the enzyme has been considered more than “minimally manipulated” by American regulations. Recent efforts to find alternative methods have resulted in the use of non-enzymatic isolation methods. The purpose of this study was to explore the published literature reporting the use of non-enzymatic isolation of adipose stromal vascular fraction to improve the understanding of the current methods and potentially make their use more approachable.

**Methods:** A systematic review of the literature was performed with a search of six terms on the PubMed and Medline databases. One thousand sixty-six articles were subject to evaluation by predetermined inclusion and exclusion criteria.

**Results:** Two level II evidence articles and 7 level IV evidence articles were selected. Stromal vascular fraction was isolated by subjecting human lipoaspirate to centrifugation, shaking/vortexing, or filtration<sup>1-4</sup>. Six articles reported performing isolation in a laboratory setting and three in the operating room. Non-enzymatically isolated stromal vascular fraction contained cells expressing CD44, CD73, CD90 and CD105 that when expanded in culture differentiated along adipogenic and osteogenic lineages. When compared to enzymatic isolation, mechanical isolation methods required less time but produced lower cell yields. Two articles reported improved volume retention in fat grafts supplemented with mechanically isolated stromal vascular cells.

**Conclusions:** Stromal vascular fraction isolated by non-enzymatic methods contain regenerative cells that may be analyzed *in vitro* or applied *in vivo*. Because lower cell yields are observed, they may be suitable and expedient for cases in which there is an abundance of adipose tissue that may be directed towards stromal vascular fraction isolation. Additionally, further randomized case-control studies to compare and improve these techniques are needed to optimize the number and quality of isolated cells and to identify the ideal clinical applications for these cells.

**Reference Citations:** 1. Baptista LS, do Amaral RJ, Carias RB, et al. An alternative method for the isolation of mesenchymal stromal cells derived from lipoaspirate samples. *Cytotherapy*. 2009;11(6):706-715.

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