Study Summary

Micro-fragmented adipose tissue cellular composition varies by processing device and analytical method

Greenwood V, Clausen P, Matuska AM. Micro-fragmented adipose tissue cellular composition varies by processing device and analytical method. *Sci Rep*. 2022;12(1):16107. doi:10.1038/s41598-022-20581-1

Synopsis

The AutoPose™ Access harvesting cannula and Restore syringe were able to collect and process adipose tissue while maintaining viable mesenchymal stromal cells (MSCs) in culture. Using the AutoPose system showed significantly more viable MSCs, along with increased concentrations of several key anti-inflammatory proteins, than Lipogems®.

Background

- MSCs are a topic of growing interest in the field of orthobiologics due to their ability to differentiate into various tissue types and support cell health by releasing anti-inflammatory, immunomodulatory, and anabolic factors into the environment they are placed in.
- MSCs derived from a bone-marrow source have shown lower concentrations, while MSCs from adipose sources have shown concentrations of >100× those from bone-marrow sources.[1]
- Processing adipose tissue allows for the release of MSCs from their matrix. Digesting tissue with enzymes in stromal vascular fraction (SVF) is currently not FDA approved, meaning tissue resizing is the only approved option for collecting MSCs from adipose tissue.

Study Objective

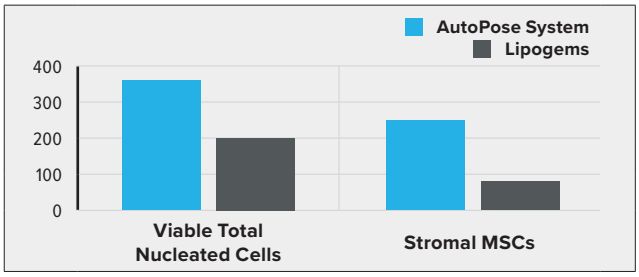
Determine whether there is a difference between the AutoPose system and Lipogems, both of which focus on washing and resizing adipose tissue.

Study Design and Methods

In this study, 60 mL lipoaspirate was collected from each of 5 patients. Then, it was divided into 30 mL amounts for processing by the AutoPose and Lipogems systems following manufacturer protocols. Outputs were processed and analyzed for cellular characterization, differentiation ability via in vitro culture, and determination of specific proteins released to the local environment.

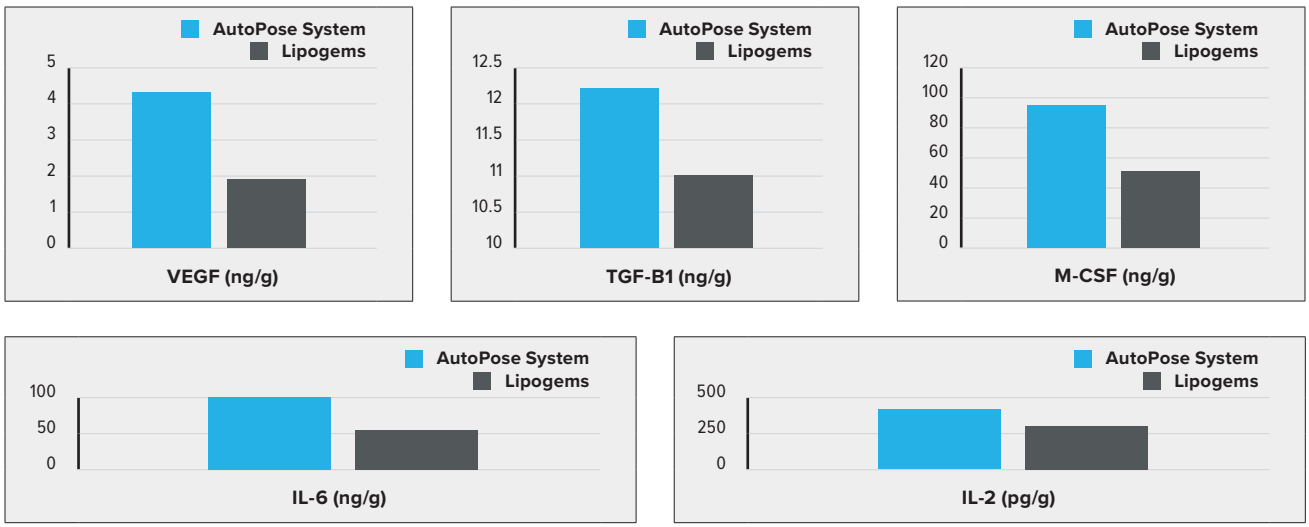
Results

Figure 1. Number of Cells 3 Days After Culture (103/g)



The AutoPose system was able to isolate a higher concentration of MSCs compared to the Lipogems system.

Figure 2. Average Concentration of Cytokines/Growth Factors



The AutoPose™ system produced a significantly higher concentration of the anti–inflammatory-related and growth–factor-related proteins VEGF, TGF-beta1, and M-CSF compared to Lipogems. The AutoPose system also provided a significantly higher concentration of immunomodulatory IL-6 and IL-2 compared to Lipogems. Lipogems only provided a higher concentration of FGF.

Conclusions

- The AutoPose system provides an adipose processing output richer in MSCs than that of Lipogems.
- The AutoPose system's output provides increases in several protein concentrations that may decrease inflammation and have the potential to shift the protein environment to a more healing, or anabolic, environment.

Reference

1. Soysa NS, Alles NA. Sources of mesenchymal stromal cells: an overview. *Am J Pharma*. 2018;1(1):1-7.

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