



AutoPose™ Adipose Harvesting System

Scientific Update



Microfragmented adipose tissue has been shown to have anti-inflammatory effects on osteoarthritic environments during in vitro and in vivo studies. Additionally, adipose tissue from the AutoPose system has been shown to provide superior output in cellular content and to improve tissue environment health as compared to other marketed systems, such as Lipogems®.

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Why Adipose?

[Characterization of microfragmented adipose tissue architecture, mesenchymal stromal cell content and release of paracrine mediators. *J Clin Med.* 2022;11\(8\):2231. doi:10.3390/jcm11082231](#)

Characterization of the structure and cellular content of unprocessed lipoaspirate (LA) and microfat (mFAT). Additionally, investigated the signaling factors that extracted mesenchymal stromal cells (MSCs) produce in the context of osteoarthritis (OA) disease.

- mFAT reduced blood cells and leukocytes while maintaining stromal cells, which maintained their stemness through their ability to differentiate into the typical 3 distinct lineages of cells associated with MSCs
- mFAT was seen to increase proteins associated with healthy cell homeostasis (specifically glycolysis and gluconeogenesis) while downregulating proteins associated with cellular stress and dysfunction (namely oxidative stress and mitochondrial dysfunction)
- Cell signaling analysis showed there was an increase in the polarization of anti-inflammatory macrophages (M2), promotion of cartilage homeostasis, and a reduction in the signaling for matrix degradation and programmed cartilage cell death

Takeaway

mFAT can maintain adipose stem cell populations and provide key signaling to resident cell environments. In turn, this promotes cell health and anti-inflammatory leukocytes while reducing negative cell functions and programmed cell death.

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Scaccia S,
Pettinari L,
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Asiag N,
Martinelli L,
Zahirpour D,
Dumas MP,
Konar M,
Lupi DM,
Fiette L,
Pascucci L,
Leonardi L,
Cliff A,
Alessandri G,
Pessina A,
Spaziante D,
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Animal Study

[Intra-articular administration of autologous micro-fragmented adipose tissue in dogs with spontaneous osteoarthritis: safety, feasibility, and clinical outcomes.](#) *Stem Cells Transl Med.* 2018;7(11):819-828. doi:10.1002/sctm.18-0020

Evaluated the safety, efficacy, and feasibility of mFAT injections in 130 clinical dogs with naturally occurring OA followed to 6 months. Injection sites were primarily knee, hip, and elbow (85% of cases).

- Clinical pain outcomes were significantly improved at each time point out to 6 months with an 88% responder rate and only 1% having worse outcomes
- Owner-reported behavioral reports for gait function significantly improved at 6 months with a 63% responder rate and only 2% having worse outcomes
- There were no adverse events reported in short- or long-term assessments and no CBC and serum biochemistry abnormalities reported

Takeaway

In a clinically relevant OA canine population, mFAT appears to provide safe and efficacious treatment for naturally occurring OA up to 6 months following administration.

Clinical Research

[Micro-fragmented adipose tissue \(mFAT\) associated with arthroscopic debridement provides functional improvement in knee osteoarthritis: a randomized controlled trial.](#) *Knee Surg Sports Traumatol Arthrosc.* 2023;31(8):3079-3090. doi:10.1007/s00167-022-07101-4

Investigation of the effect of microfat in conjunction with arthroscopic knee debridement in a randomized controlled trial.

- Two randomized groups of 39 individuals each; ~70% follow-up results to 24 months
- Both debridement and debridement with mFAT showed significant improvements in almost all patient-reported outcomes (PRO) compared to Knee Injury and Osteoarthritis Outcome Scores (KOOS) function scores significantly improved with the addition of mFAT, addition of which also showed a nonsignificant trend toward improving PROs in most categories.
- Analyzed MRIs for T2 mapping and found significantly better results in the anterior and posterior portions of both condyles

Takeaway

At 24 month follow-up, mFAT appears to have beneficial patient outcomes, with a reduction in OA progression based on MRI T2 mapping.

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Orlandini L,
Messina C,
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Mangiavini L,
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[Autologous micro-fragmented adipose tissue in the treatment of atherosclerosis patients with knee osteoarthritis in geriatric population: a systematic review and meta-analysis.](#) *PLoS One.* 2023;18(8):e0289610. doi:10.1371/journal.pone.0289610

Meta-analysis of 14 studies to systematically evaluate the therapeutic efficacy and safety of autologous microfragmented adipose tissue for the treatment of knee OA.

- KOOS subscale scores improved from a mean range of 14.20-26.01
- Visual analog scale (VAS) pain subscale scores improved from a mean range of 2.17 to 8.24
- Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores improved by a mean of 24.81
- Captured mild adverse events including soreness, swelling, pain, and stiffness that occurred at a rate up to 55%. Moderate adverse events of hematoma and bleeding in up to 15% of cases while infection occurred in 5%.

Takeaway

Microfragmented adipose tissue appears to improve PROs in a satisfactory manner out to more than 12 months, showing primarily mild adverse events and a minimal infection rate.

AutoPose™ System

[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

Analysis of the differences between the AutoPose and Lipogems microfragmented adipose tissue processing systems.

- Outputs were processed for:
 - Cellular characterization
 - Direct in vitro culture to determine differentiation ability
 - Determination of which proteins were released to the local environment
- The AutoPose system:
 - Isolated a higher concentration of MSCs compared to the Lipogems system
 - Had significantly increased concentrations of anti-inflammatory and growth factor related proteins, such as VEGF, TGF-beta1, and M-CSF, compared to Lipogems
 - Provided a significantly higher concentration of immunomodulatory IL-6 and IL-2 compared to Lipogems. Lipogems only provided a higher concentration of FGF.

Takeaway

As compared to Lipogems, output from the AutoPose system provides increases in several protein concentrations that could decrease inflammation and shift the protein environment to a more healing, or anabolic, environment while also having a higher MSC output.