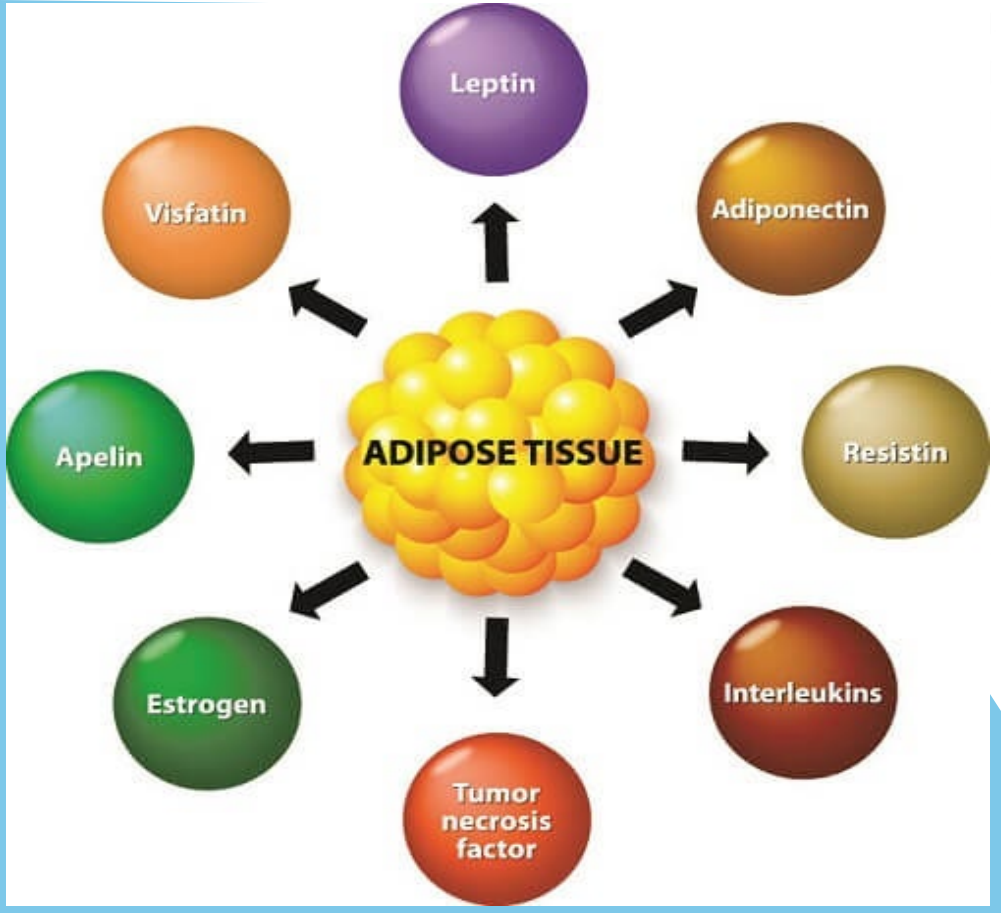
The dynamics of early response to treatment of knee osteoarthritis with microfragmented autologous adipose orthobiologics.

H. Bansal[1], M. Sheinkop[2], M. M. Katz[3], B. Sridhar[4] and A. DeMers[4]

[1]Revita Lifesciences, Rudrapur Specialty Hospital, India
[2]RUSH University, Chicago, IL, USA
[3]School of science and engineering, Tulane University, LA, USA
[4]Restore Orthopaedics, Sonora, CA, USA



Misconception of Fat…

- It's more than just a thermoregulator/lubricant

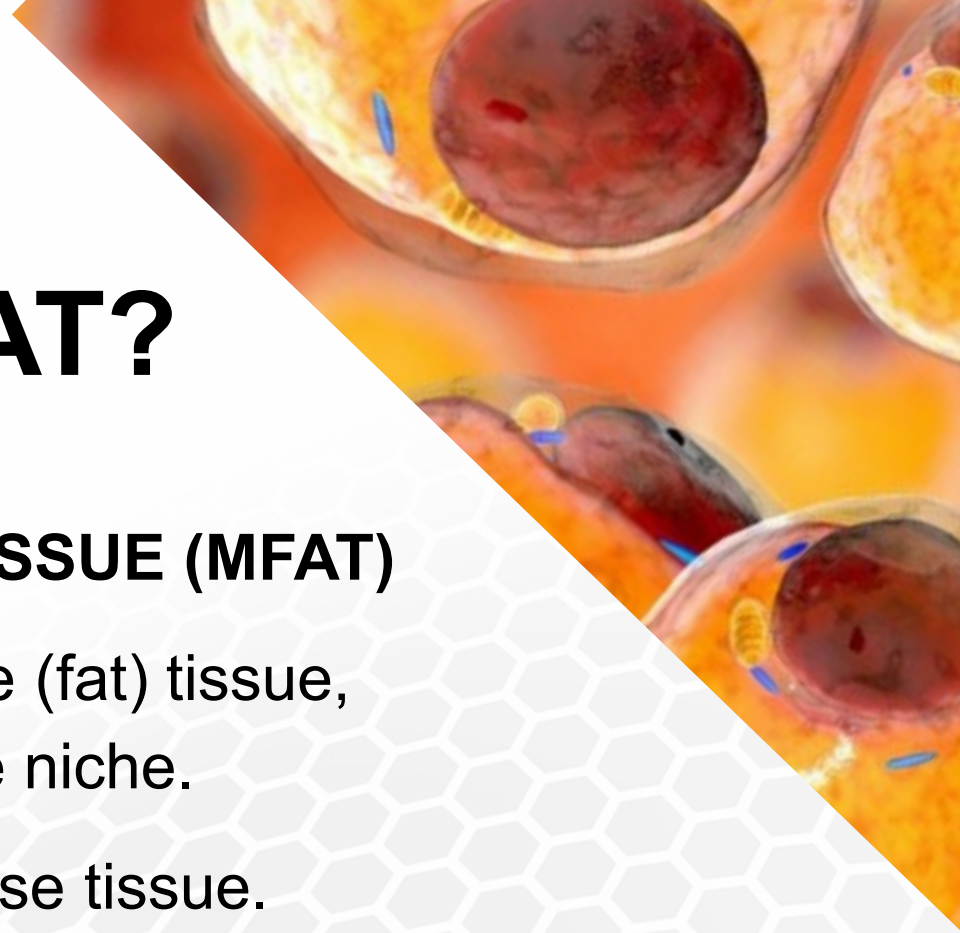
Complex organ:

Vascular - Stem Cell Niche

- MSC's
- Effector Cells
  - Macrophages, Lymphocytes, etc.

Extravascular Content

- Differentiated Adipocytes
- Extracellular Matrix



WHAT IS MICROFAT?

- **MICROFRAGMENTED ADIPOSE TISSUE (MFAT)**
- Microfragmented fat contains adipose (fat) tissue, stromal cells preserved in their native niche.
- It consists of all components of adipose tissue.
- Microfat is typically 300microns-800µm and considered an autologous biological substance for healing, restoration, and repair of tissues.

Materials and Methods

- 27 patients
- Treated with average of 9.4 ml of MFAT(MiniTC, Jointechlabs, USA) injection per joint
- 42 joints were treated in total
- Synovial fluid was aspirated in 20 patients at 0 and 3 month, out of which 6 patients additionally at 6 months; 7 subjects were not evaluated for this parameter.
- All subjects were assessed by VAS, WOMAC and 6MWD at 0 and 3 months and 6 patients at 0, 3 and 6 months.
- Statistic: Analysis of Variance (ANOVA)

Inclusion Criteria:

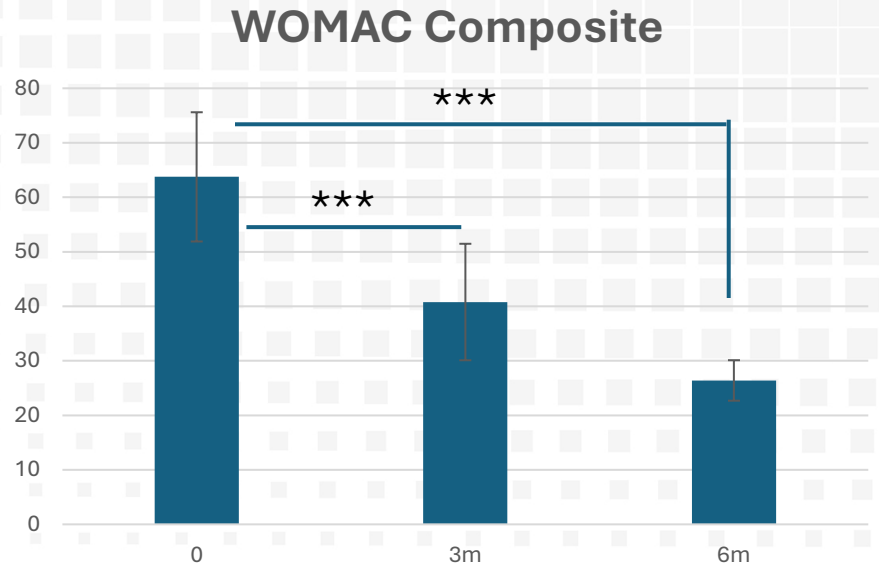
1. Grade III or Grade IV osteoarthritis using Kellgren Lawrence grading scale (K-L Grade) as diagnosed using weight bearing X-ray and physician review, or pre-op MRI.
2. Study Subjects have failed a minimum of at least two conservative therapies, within least 4 months, including (i) oral pain medications, (ii) corticosteroid injection of the knee, (iii) viscosupplementation
3. Males and females 35-75 years old
4. Subjects will be in good health (ASA Class I-II) with a BMI < 35
5. Subjects have continued pain in the knee despite conservative therapies for at least 3 months
7. Subjects with unilateral disease present with a knee pain score ≥6 and ≤16 using the short-form WOMAC pain (A1 subscale, 20 total points).
8. Subjects with bilateral disease treated in both knees. The treated knee has KL grade III or IV with a pain score ≥6 and ≤16 using the short-form WOMAC and the contralateral knee has a K-L grade of I or II with a pain score >6 using the short form WOMAC pain.

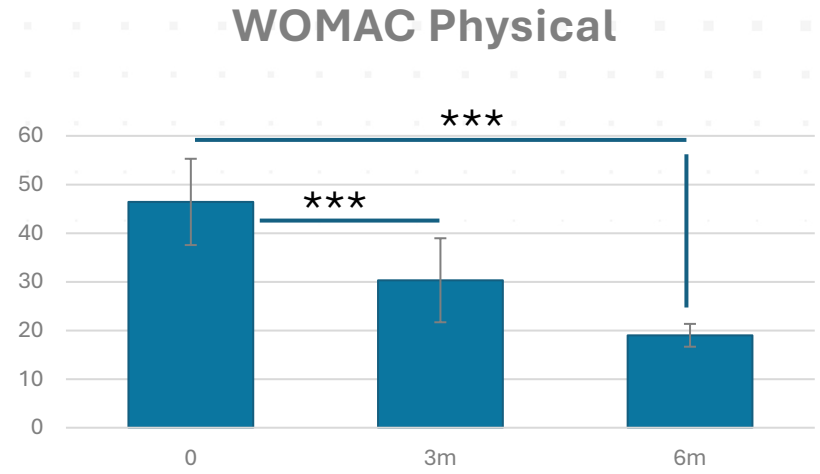
Exclusion Criteria:

1. Subjects whose pain is related to (i) diffuse edema, (ii) displaced meniscus tear with mechanical symptoms, (iii) lesion greater than 1 cm in any direction, or (iv) osteochondritis desiccants
2. Joint range of motion less than 10-110 degrees
3. No malalignment greater than 10 degrees from neutral
4. Laxity greater than 5 mm anterior drawer/posterior drawer
5. Subjects who have had surgery of either knee within 6 months prior to the screening
6. Subjects who have had a major injury to the targeted/treatment knee within pror 12 months
7. Subjects who have had an injection in either knee within the prior 3 months, including corticosteroids, viscosupplementation or platelet rich plasma (PRP)

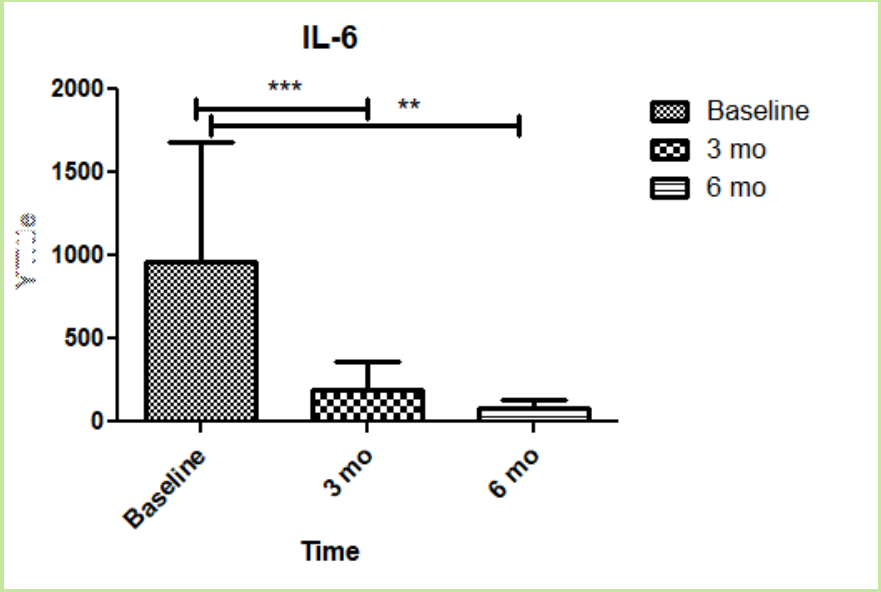
RESULTS

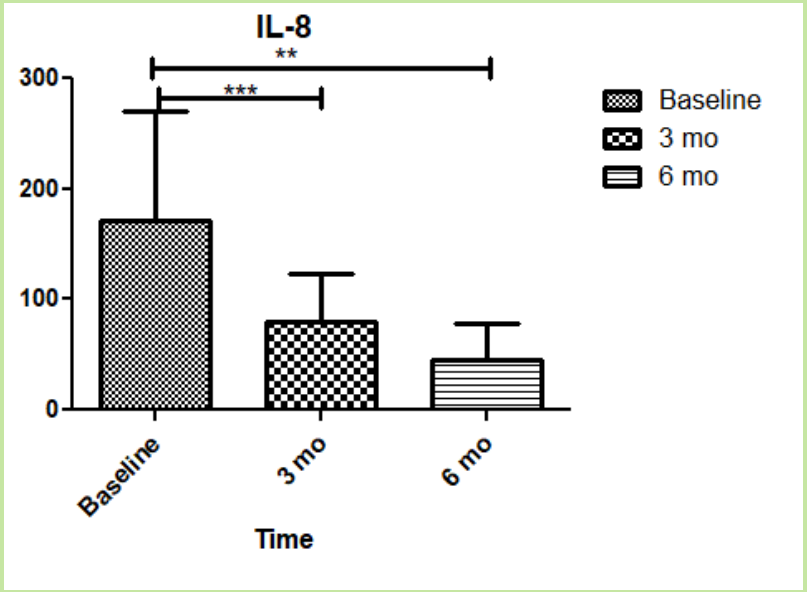
- Average dose of the total nucleated cells content delivered with MFAT was measured at 9 million per injection (mean 9±0.27).
- WOMAC composite score improved 35% at 3 month and further to total of 47% at 6 months (***p<0.05)
- 39% decrease observed in the VAS (1-50) score at 3 month, which decreased by 51% at 6 months (***p<0.05).

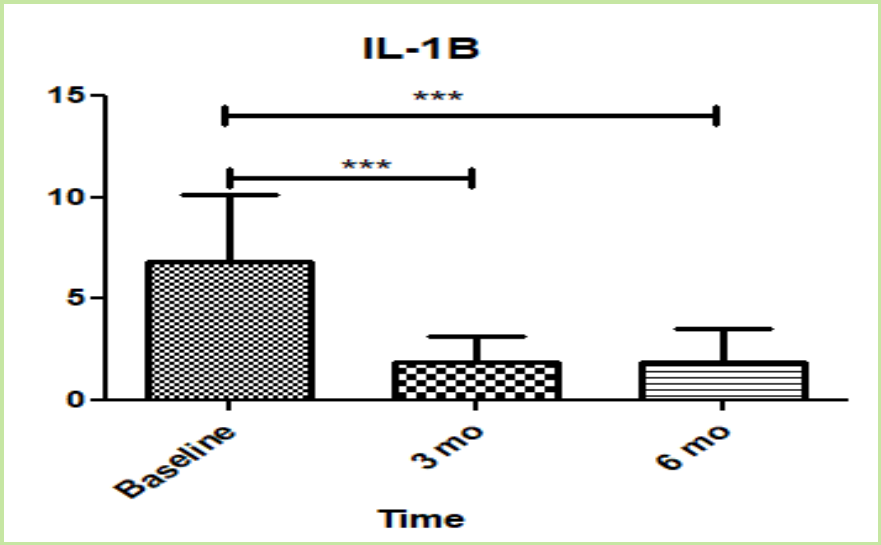


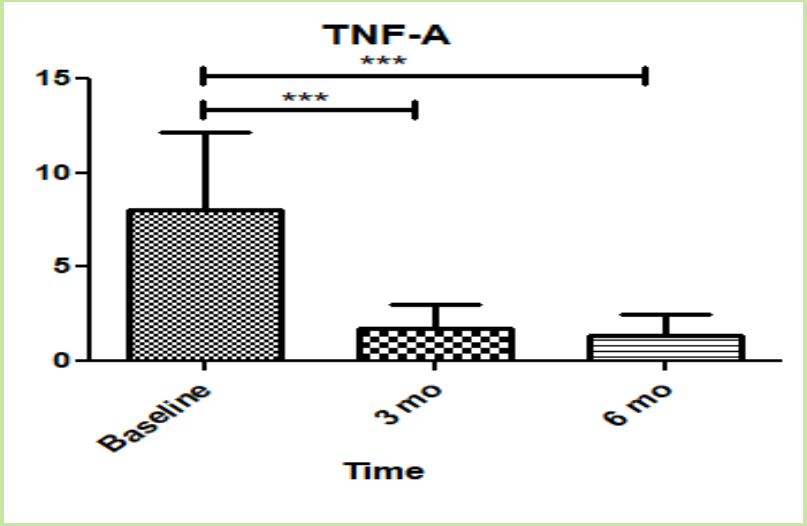


RESULTS: Synovial Fluid Cytokines –IL-6, IL-8, IL-1B, TNF-α (***p<.05)

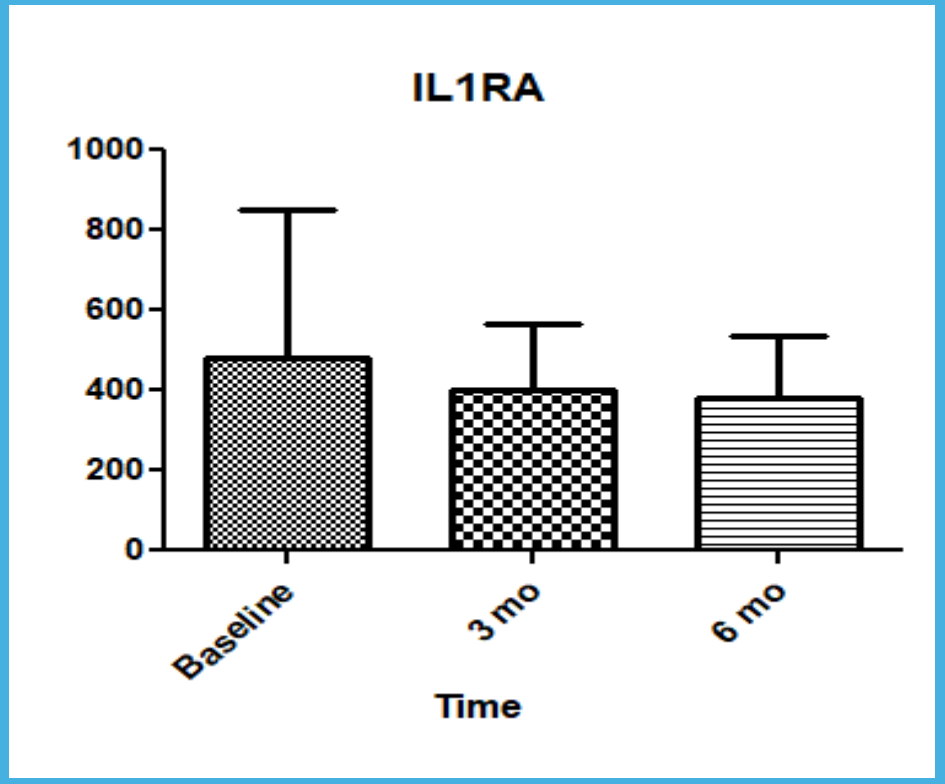


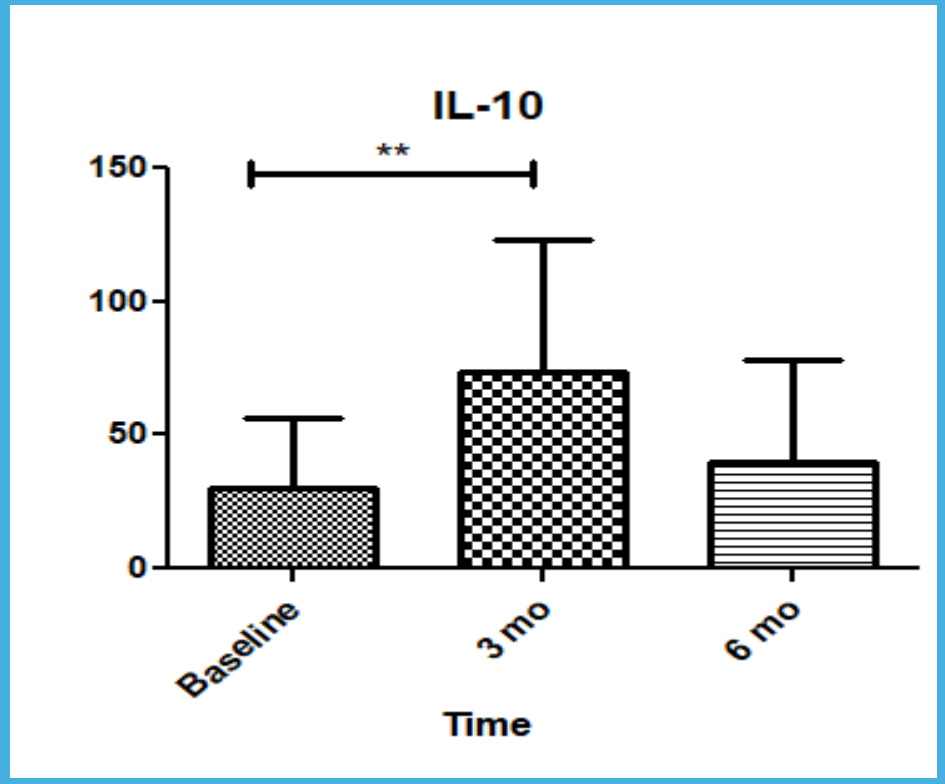






RESULTS: Synovial Fluid Cytokines*





***Anti-inflammatory IL1-ra and IL-10 didn't change significantly; We speculated it's due to decrease of inflammation.**

CONCLUSION

- The objective measurable inflammatory cytokines have significantly decreased at 3 months point and further at 6 months. Anti-inflammatory IL1-ra and IL-10 didn’t change significantly with the trend to decrease.
- The clinical efficacy has been achieved by all measured parameters at 3 months and increased or remained stable through 6 months of evaluation.
- MFAT delivered a quick and lasting anti-inflammatory response for knee OA within the first 3 -6 months.
- The study is ongoing and looking to establish the longevity of the clinical efficacy beyond 12 months of evaluation.