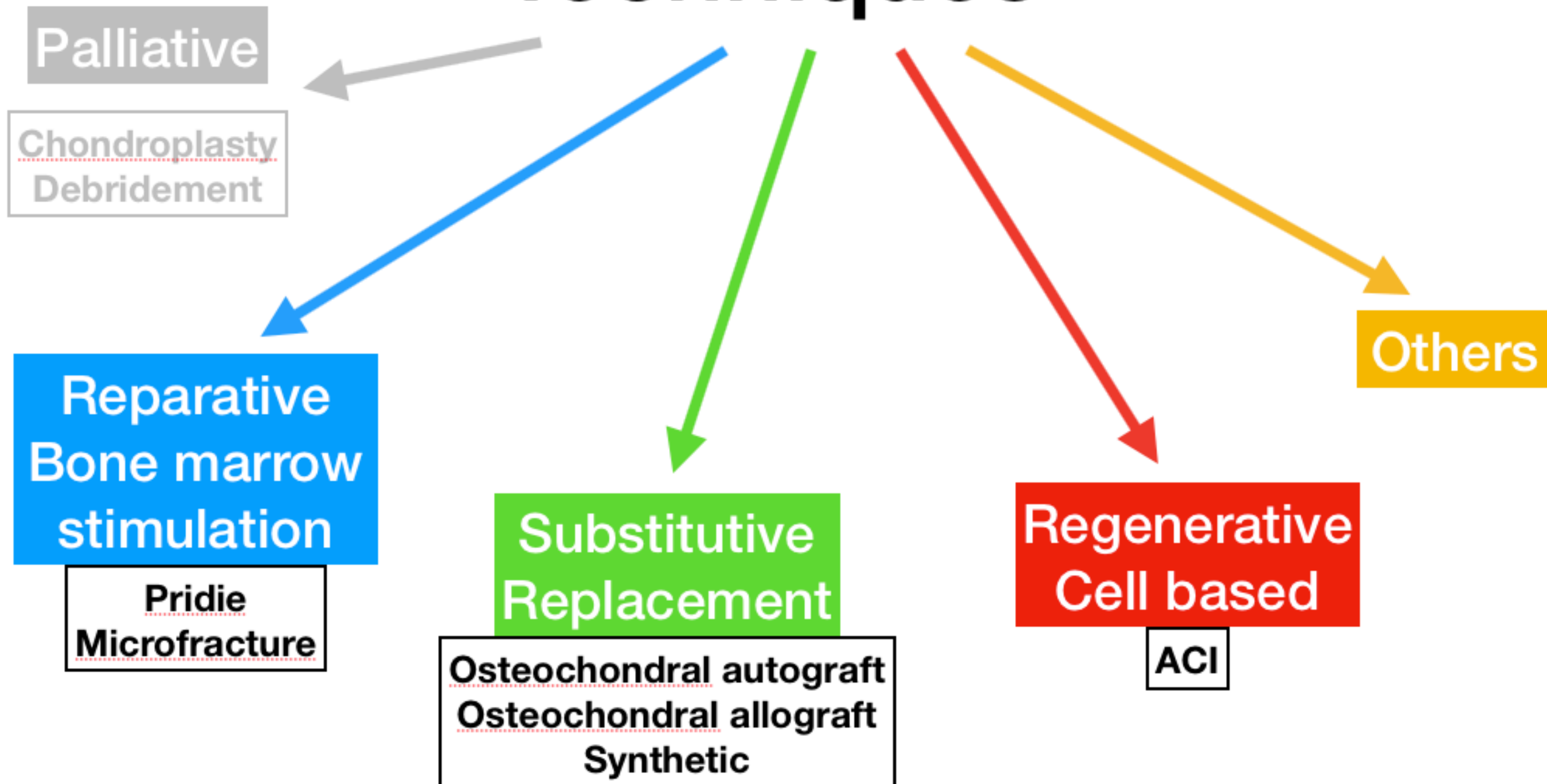


# How to deal with anatomical limits

P. Landreau, MD  
Chief of Surgery  
Aspetar, Orthopaedic and Sports Medicine Hospital  
Doha, Qatar

# Articular Cartilage Surgical Techniques





# **Evidence after more than 20 years?**

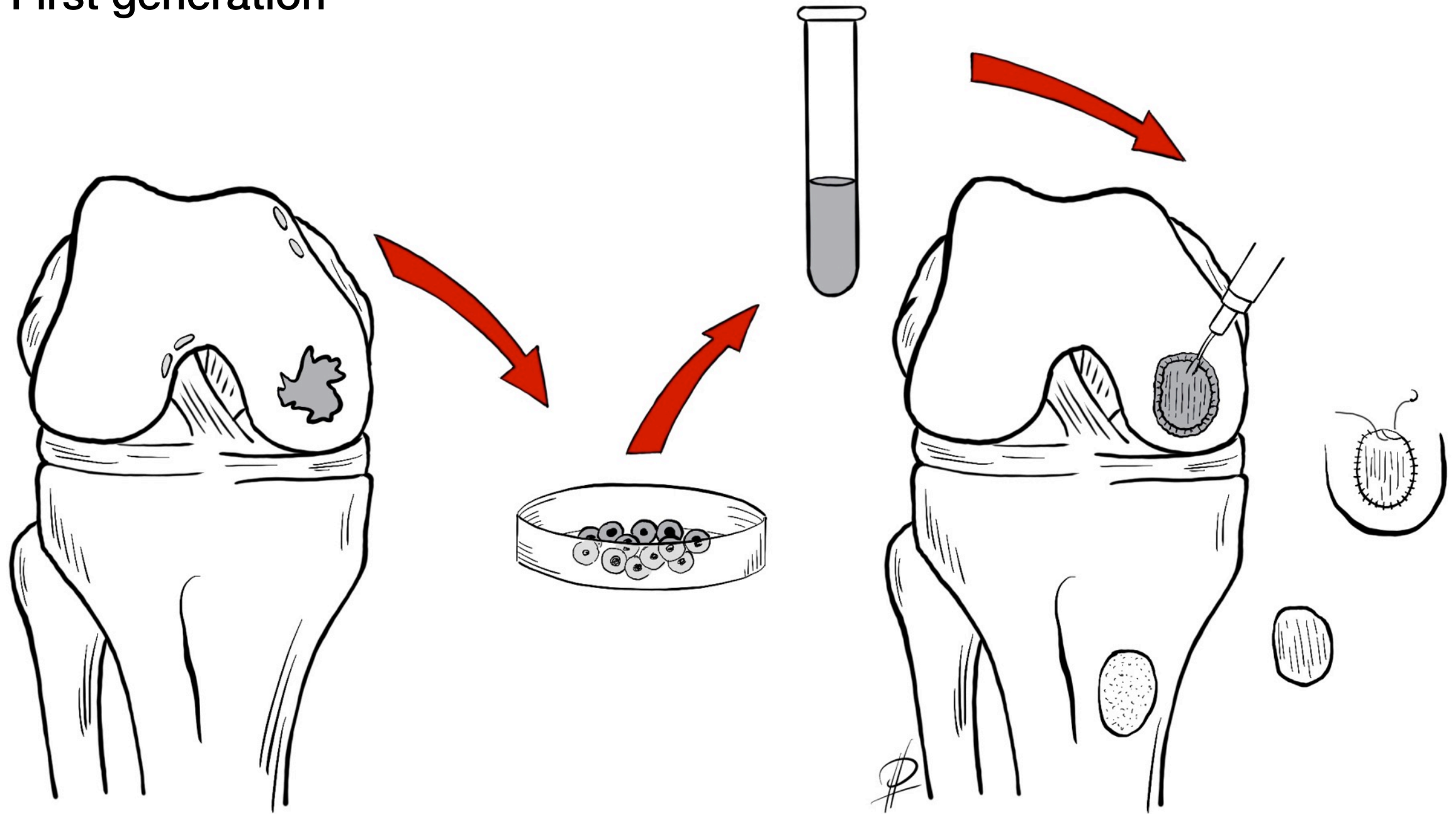
**Brittberg M, Lindahl A, Nilsson A, Ohlsson C, Isaksson O, Peterson L. Treatment of deep cartilage defects in the knee with autologous chondrocyte transplantation. N Engl J Med. 1994 Oct 6;331(14):889-95.**

# ICRS Grade 3 and 4

Size (cm <sup>2</sup> )	Procedure
< 2	Microfracture (+/- augmentation) Mosaicplasty (high demand)
2 - 4	Mosaicplasty (bone loss) ACI
> 4	ACI Osteochondral allograft (bone loss)

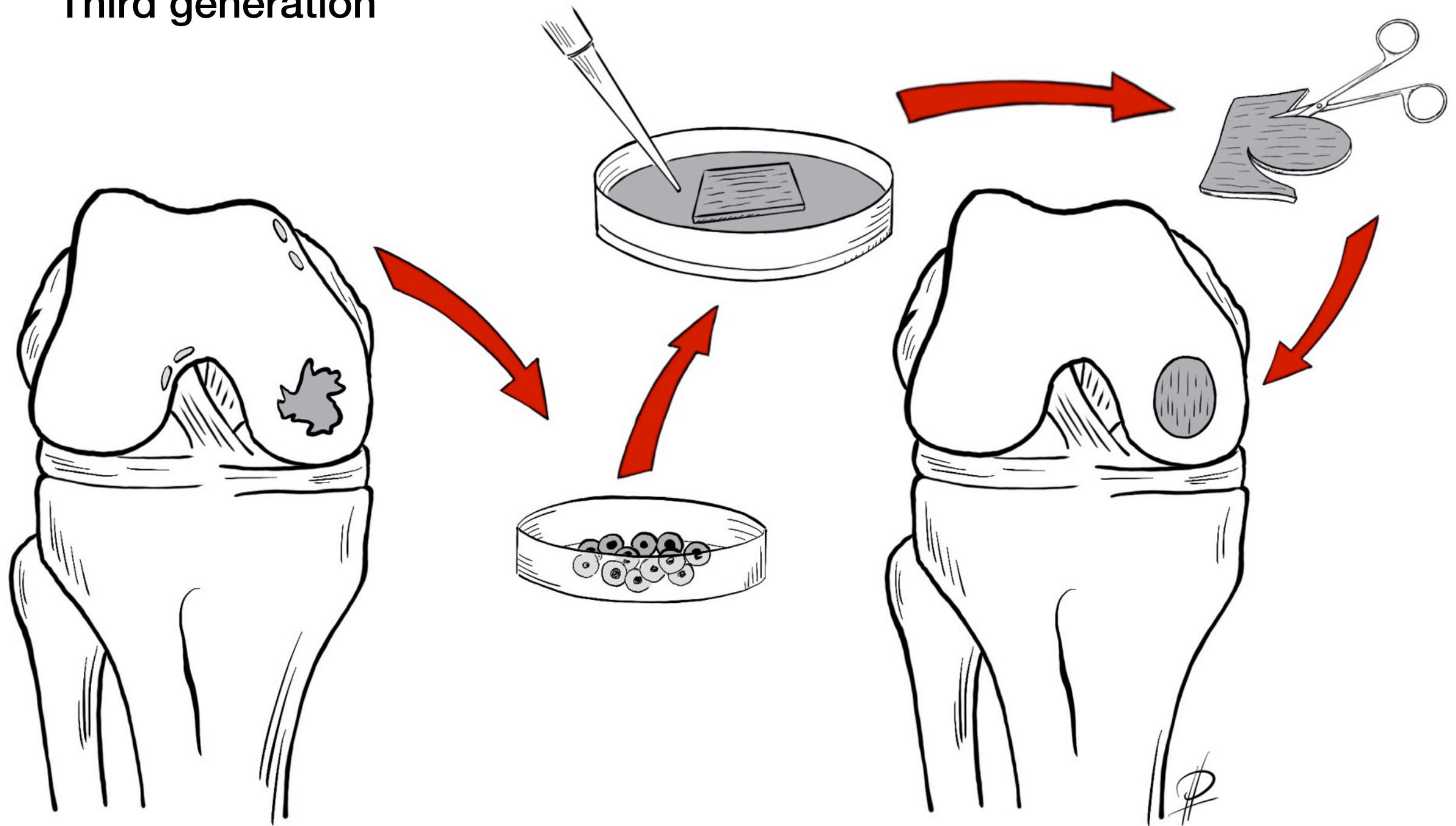


First generation



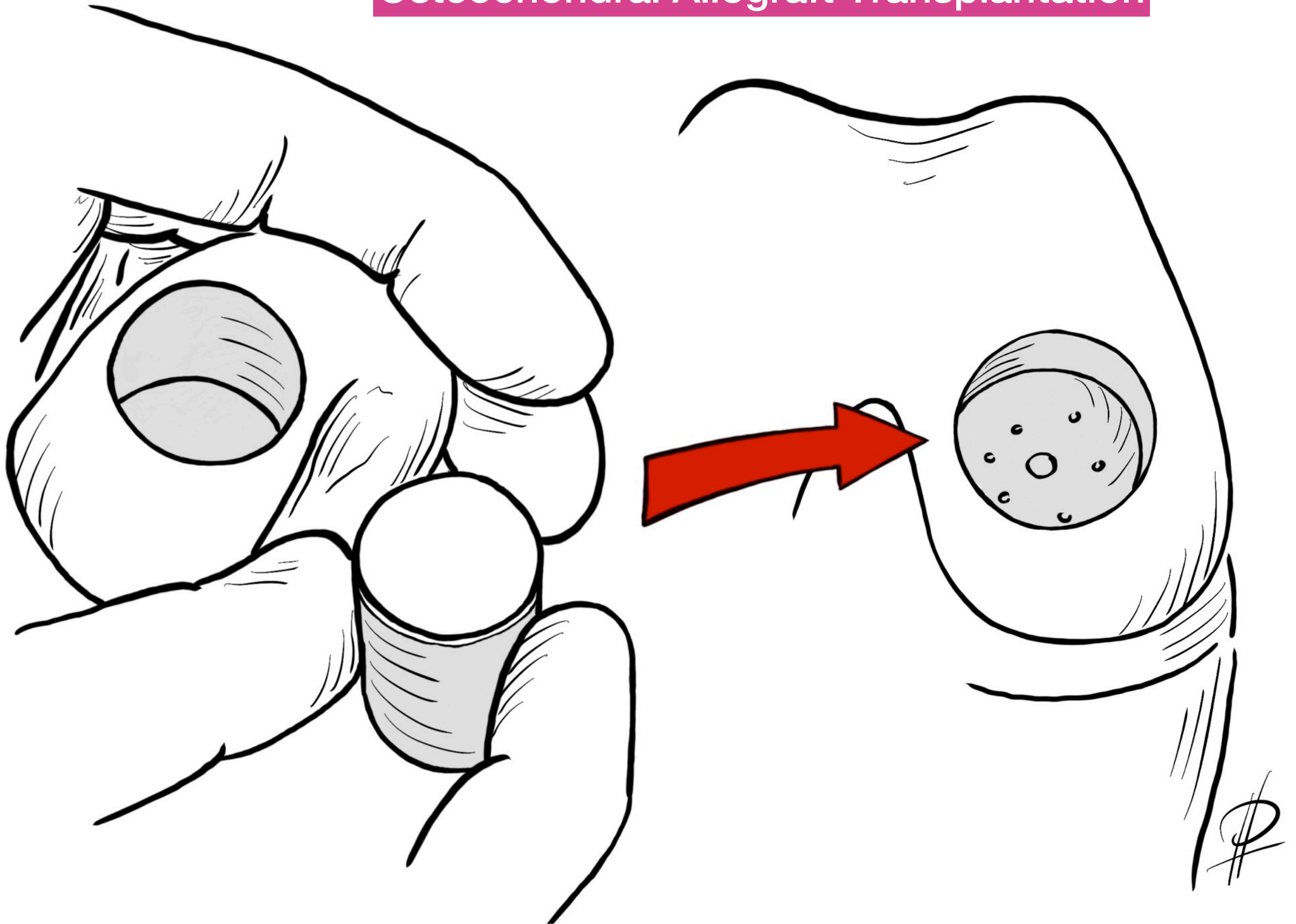
**Autologous chondrocyte implantation ACI**

Third generation



Matrix-induced ACI

# Osteochondral Allograft Transplantation



# Autologous chondrocyte implantation ACI

- Microfracture vs ACI: faster result with microfracture but more durable clinical results with ACI especially for large defects

Kon E, Filardo G, Berruto M, et al. Articular cartilage treatment in high-level male soccer players: a prospective comparative study of arthroscopic second generation autologous chondrocyte implantation versus microfracture. Am J Sports Med. 2011;39:2549-2557.

Harris JD, Siston RA, Pan X, Flanigan DC. Autologous chondrocyte implantation: a systematic review. J Bone Joint Surg Am. 2010;92:2220-2033.

# Osteochondral Allograft Transplantation

- Several studies have shown consistent good results with graft survivorship around 80% at 10 years and around 65% at 20 years

Familiari F, Cinque ME, Chahla J, Godin JA, Olesen ML, Moatshe G, LaPrade RF. Clinical Outcomes and Failure Rates of Osteochondral Allograft Transplantation in the Knee: A Systematic Review. Am J Sports Med. 2017 Oct 1:363546517732531.

Levy YD, Görtz S, Pulido PA, McCauley JC, Bugbee WD. Do fresh osteochondral allografts successfully treat femoral condyle lesions? Clin Orthop Relat Res. 2013 Jan;471(1):231-7.

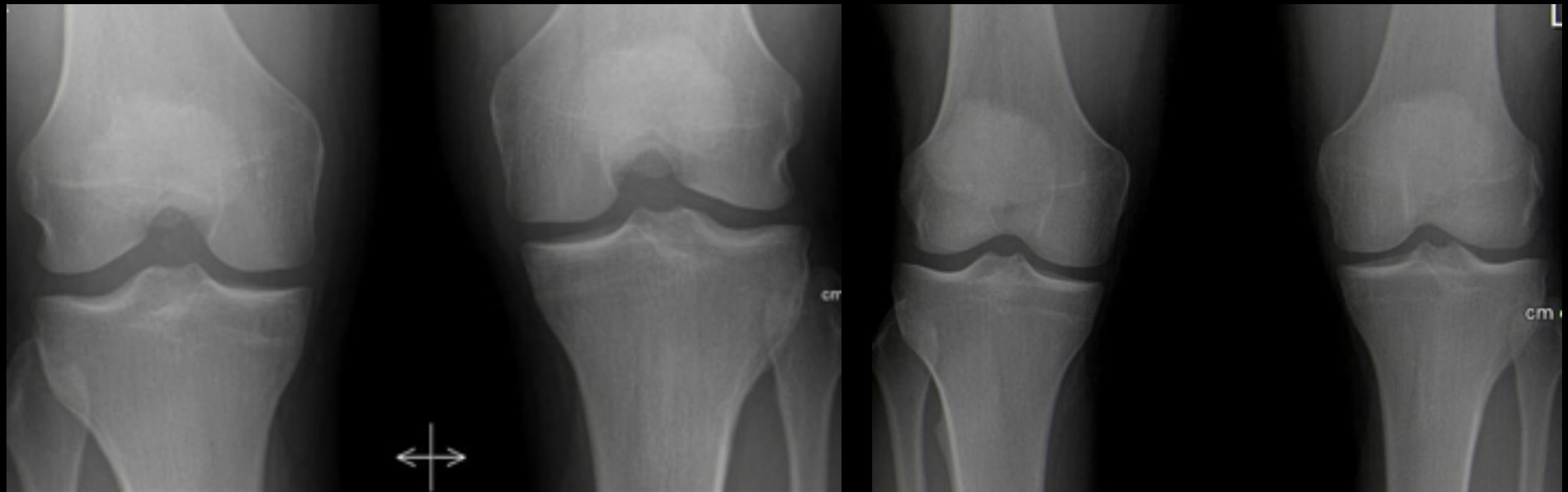


# Availability?

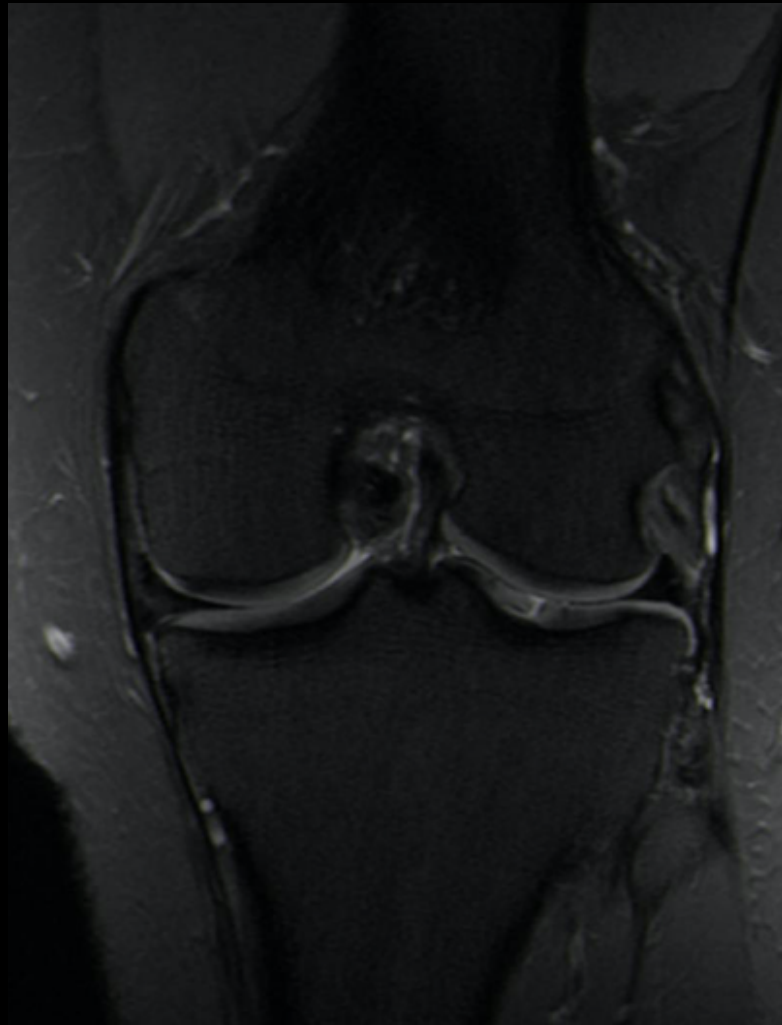
- Autologous chondrocyte implantation ACI
- Matrix-induced ACI
- Osteochondral Allograft Transplantation



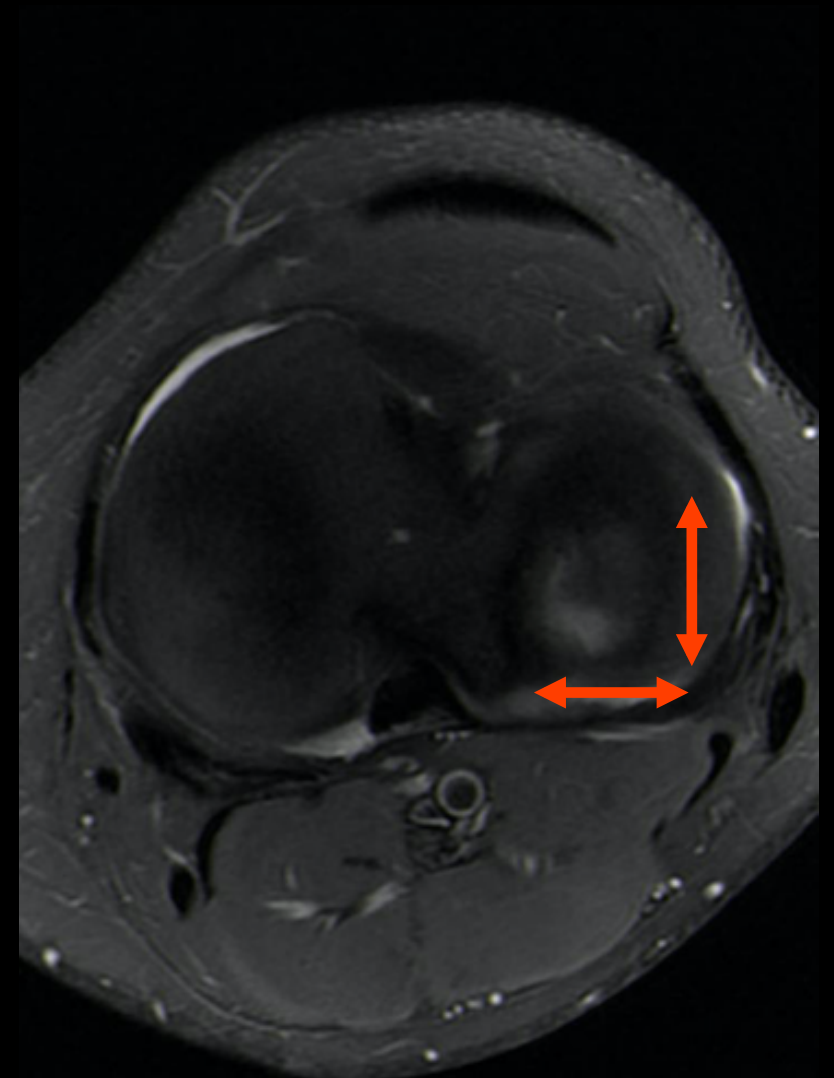
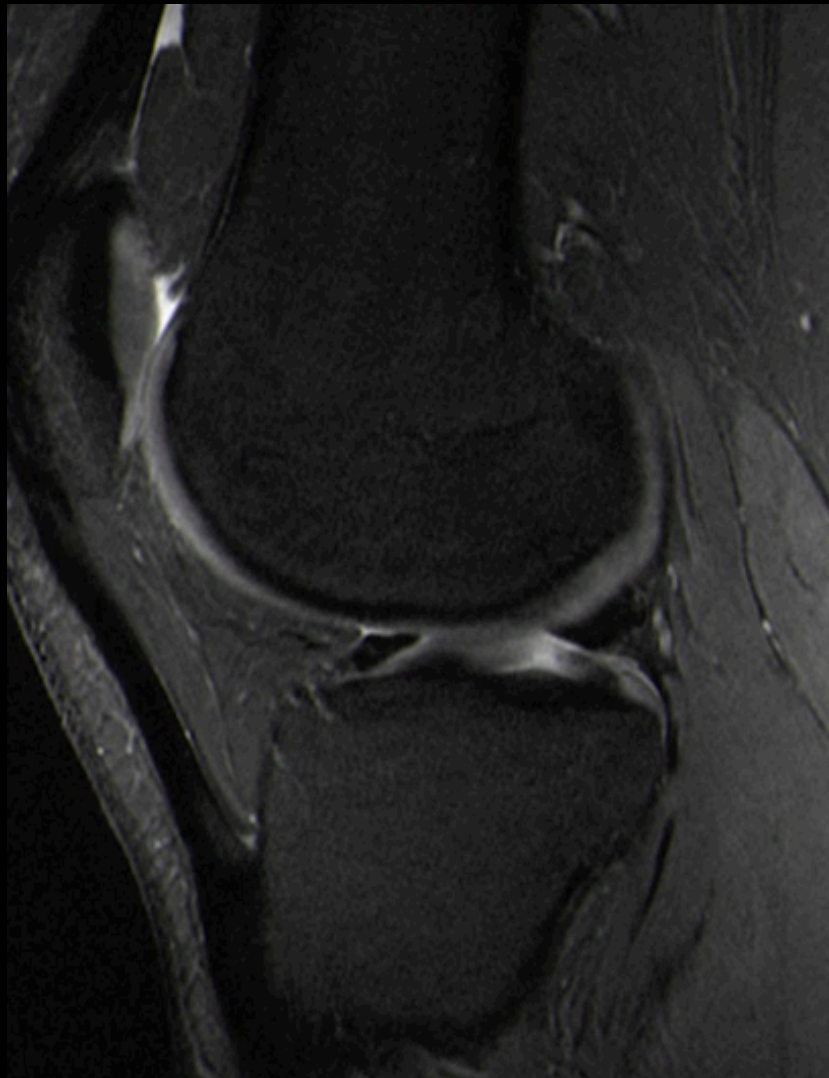
# 27 yo Recreational football



# 27 yo Recreational football

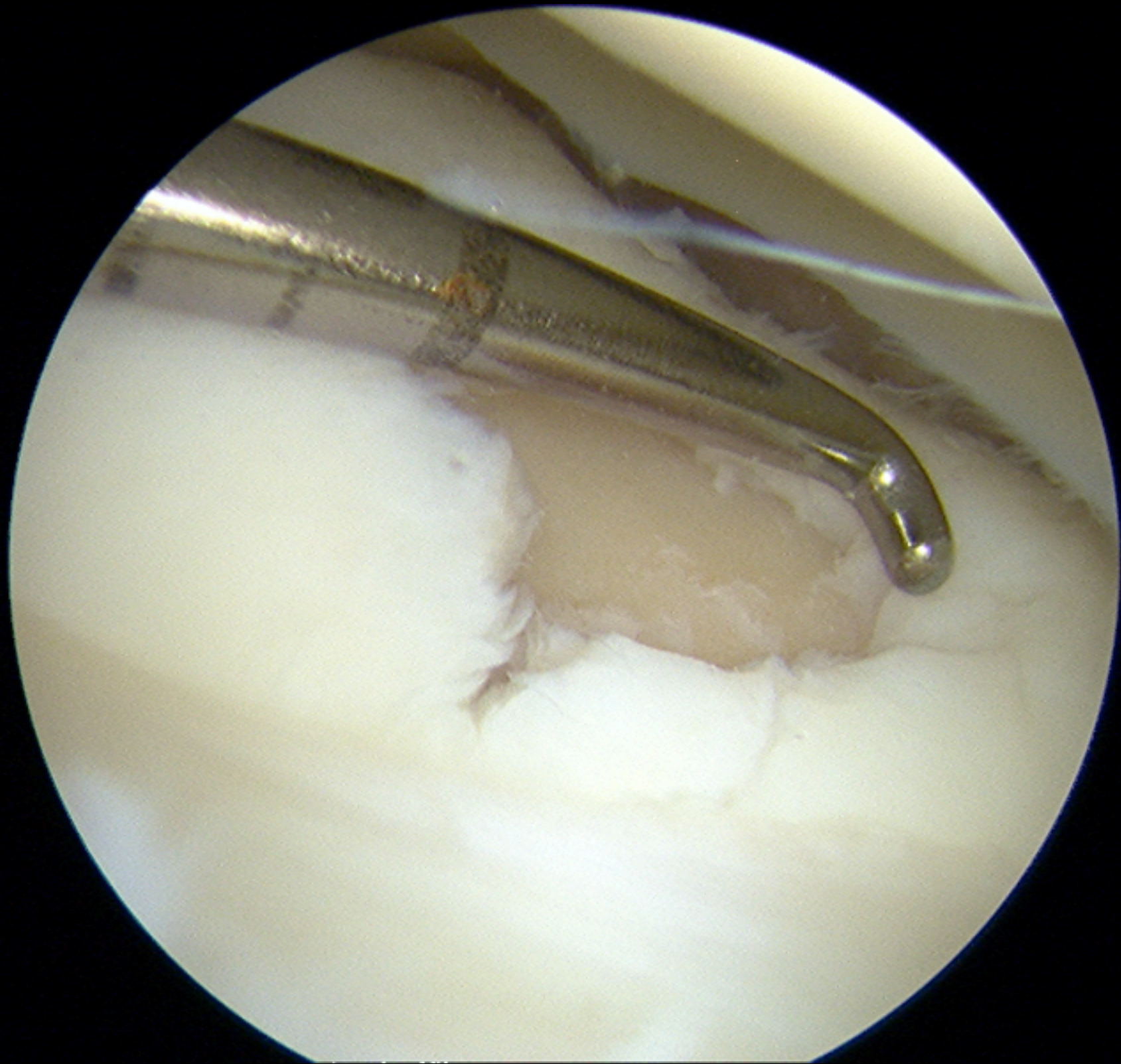


# 27 yo Recreational football



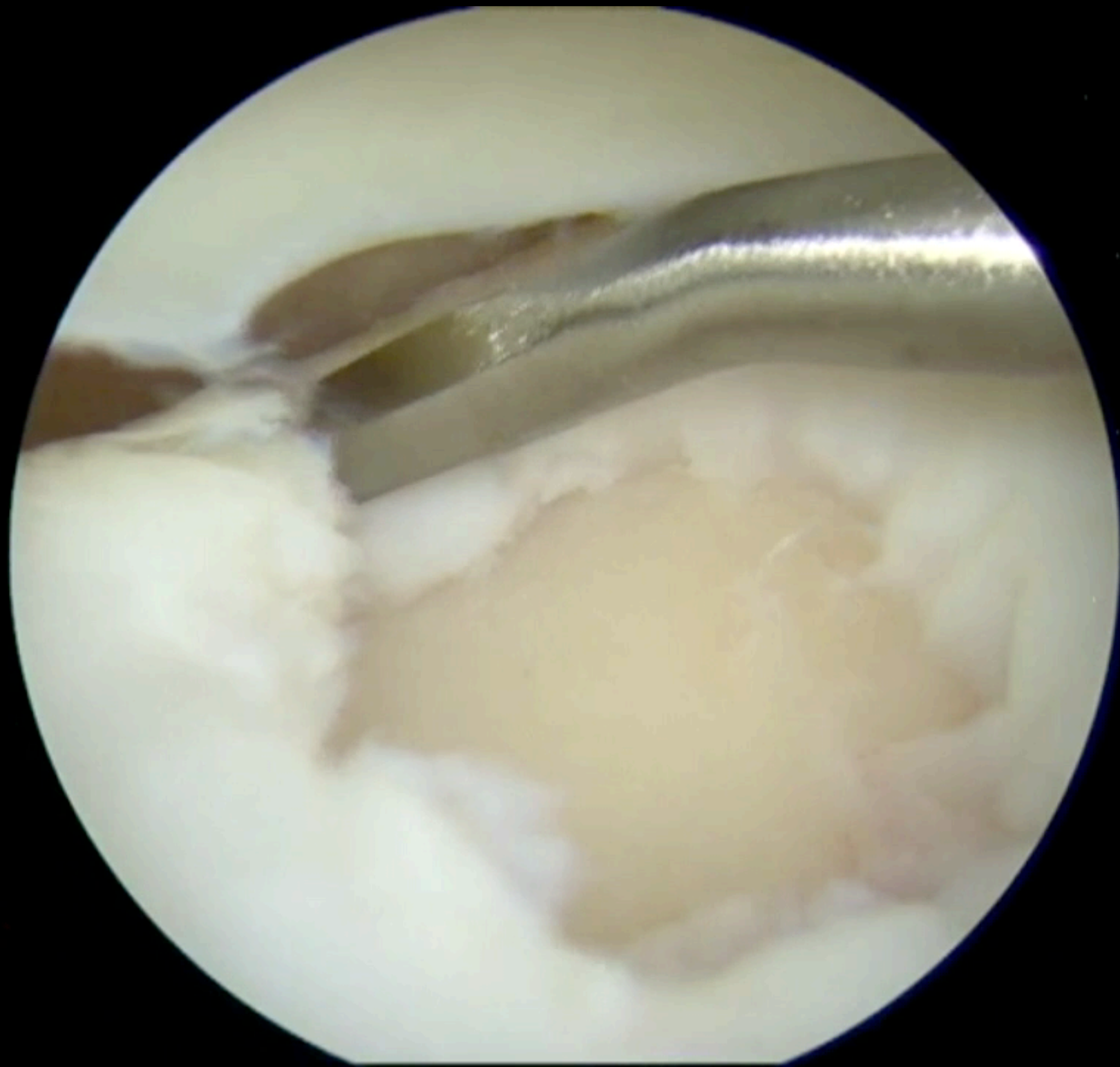


1 \*

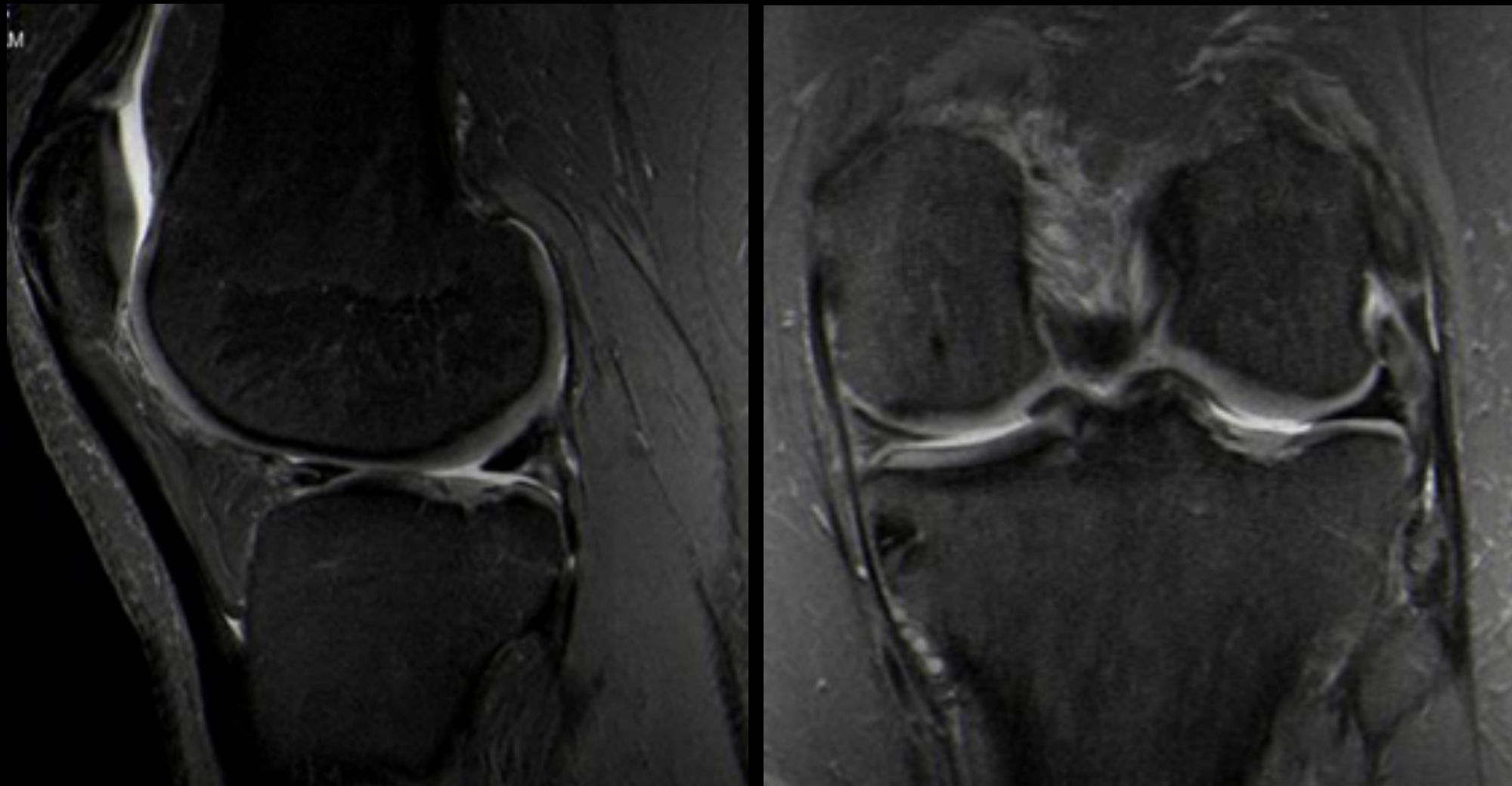




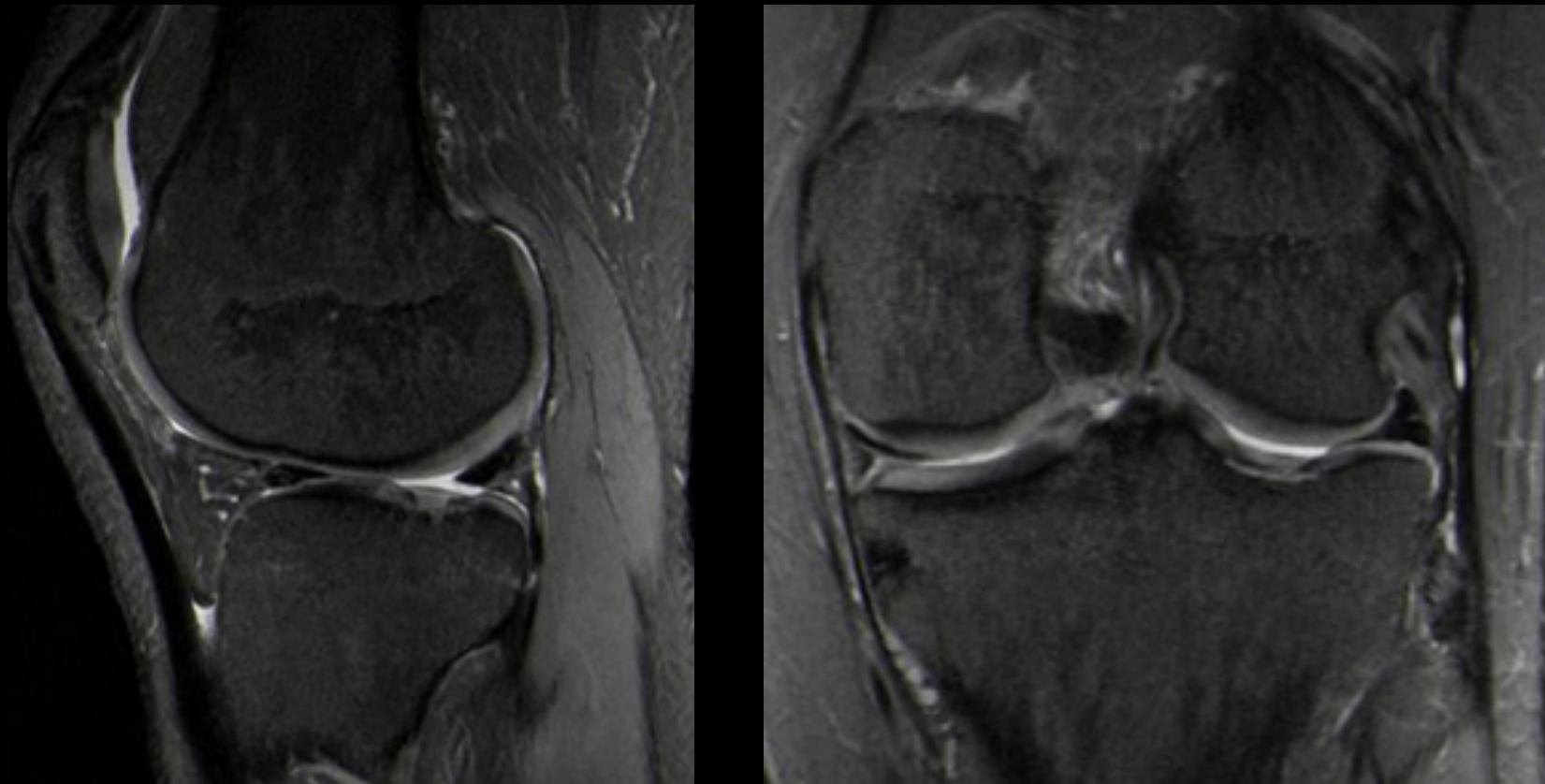
1 \*



# 3 months



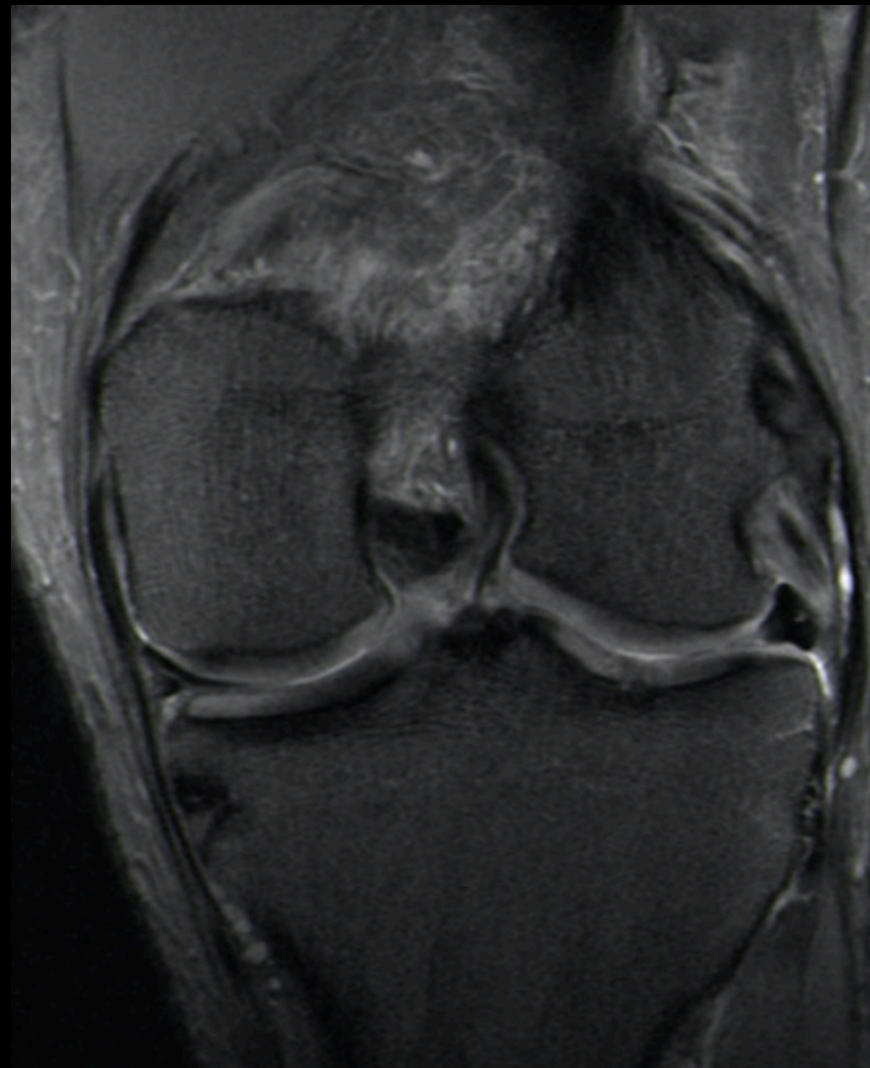
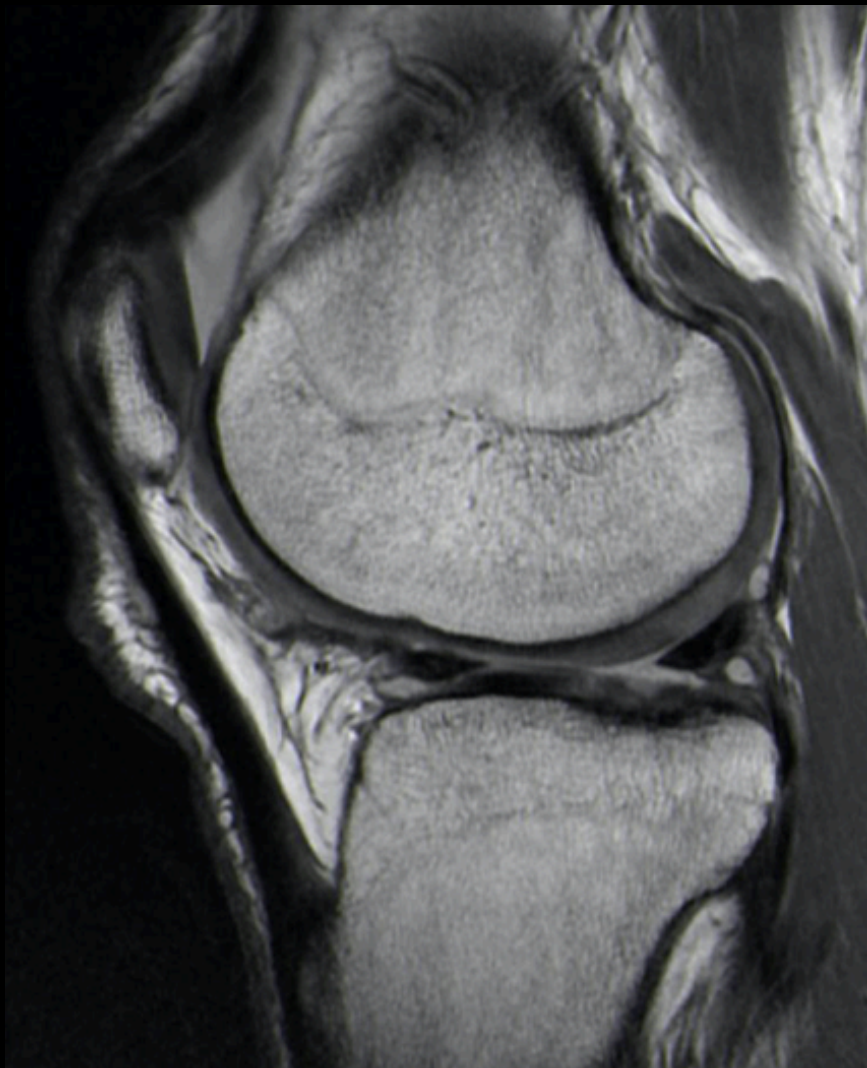
# 6 months



Return to play



# One year



Preop.



- Prepared by combining 2 components: A **chitosan** (Chitosan is derived from chitin, the second most abundant natural polymer on earth after cellulose) and a **buffer**.
- Acts as a **scaffold to physically stabilize the blood clot** in the cartilage lesion.
- **Impedes** blood clot retraction while allowing for normal clotting to occur.
- **Adheres** to the cartilage lesion surfaces.



# BST-CARGEL®

## BST-CarGel® Product Preparation



- 1 Draw exactly 0.3 mL from the ADD vial.



- 2 Inject the ADD solution in a drop-wise manner into the MIX vial.



- 3 Do not shake. Leave undisturbed for a minimum of 10 minutes.



- 4 Once the cartilage lesion is ready, draw 5 mL of fresh autologous blood.

Steps 1-3 can be done by a non-sterile nurse while the lesion is being surgically prepared.



- 5 Using a dispensing pin, slowly inject exactly 4.5 mL of blood into the MIX vial.



- 6 Immediately shake MIX vial vigorously for 10 seconds.



- 7 Using a second dispensing pin, draw 4 to 5 mL of the BST-CarGel®/blood mixture into a syringe.



- 8 Administer the BST-CarGel®/blood mixture to the lesion in a drop-wise manner without overfilling.

Wait 15 minutes to allow implant to clot and maintain its integrity.



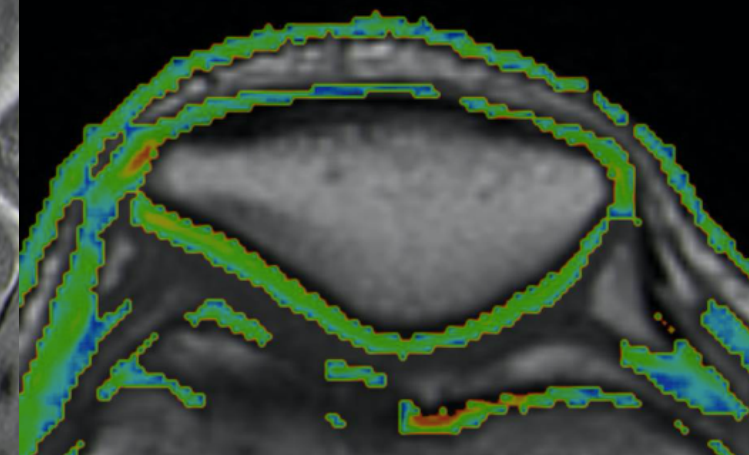
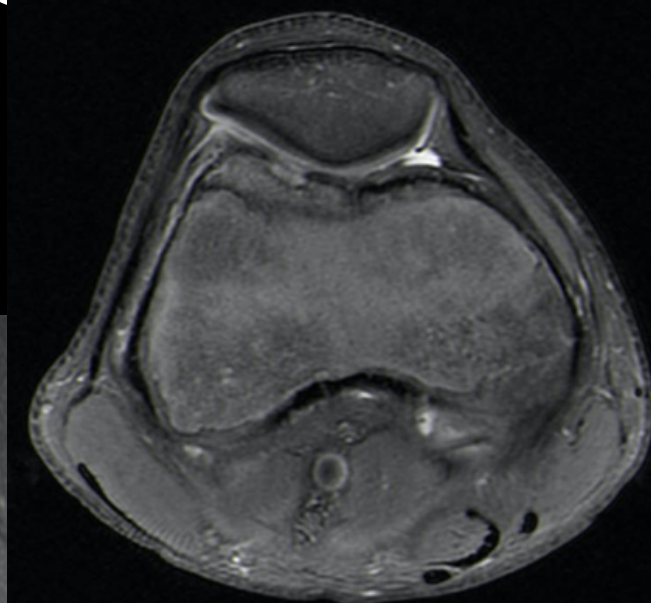
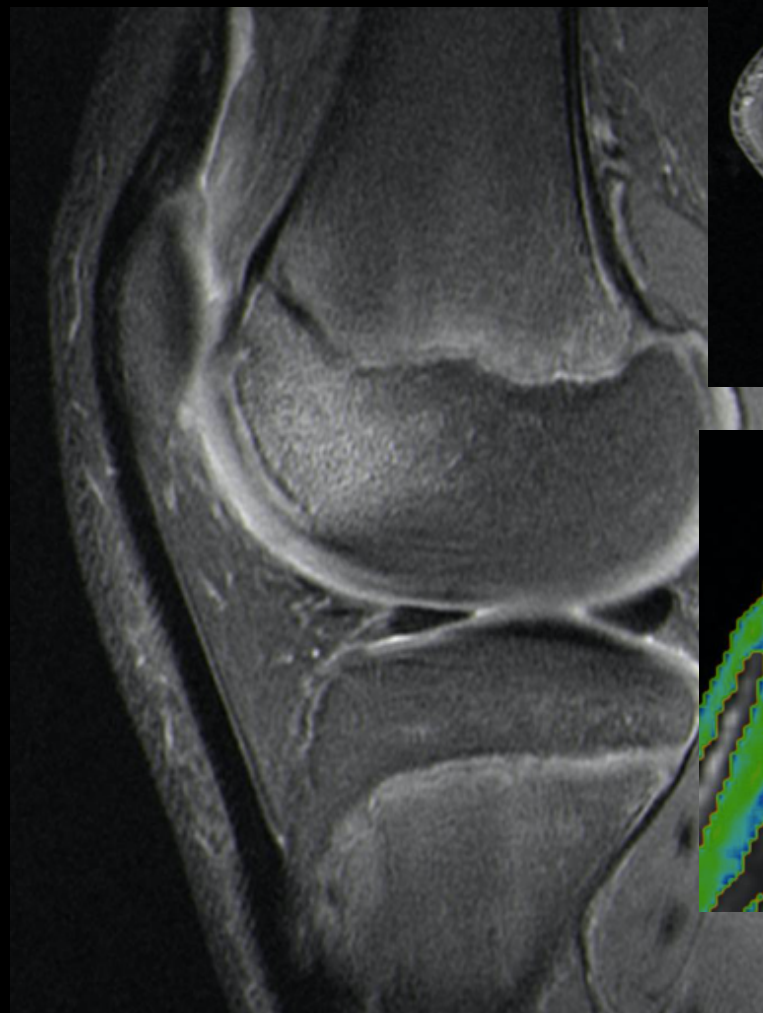
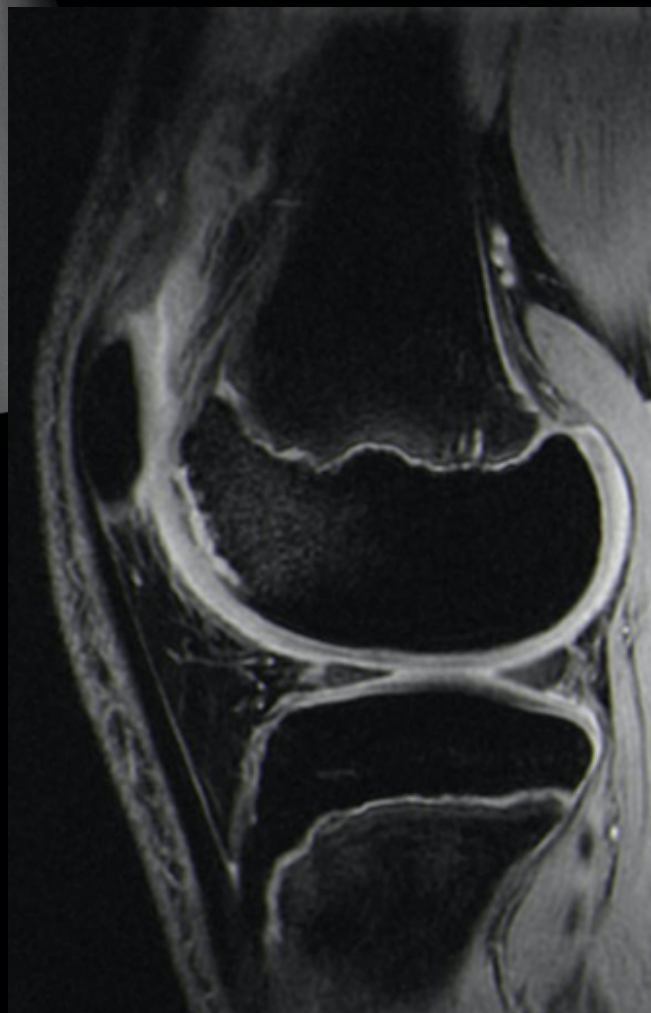
### Accessories Required but not Provided with BST-CarGel®

- one 1.0 mL sterile syringe with 0.1 mL graduations and a 26G sterile needle
- two 5.0 mL sterile syringes with 0.5 mL graduations
- one sterile phlebotomy needle
- two sterile dispensing pins vented with a 0.2 µm filter membrane
- one 18G sterile needle

# 14 yo

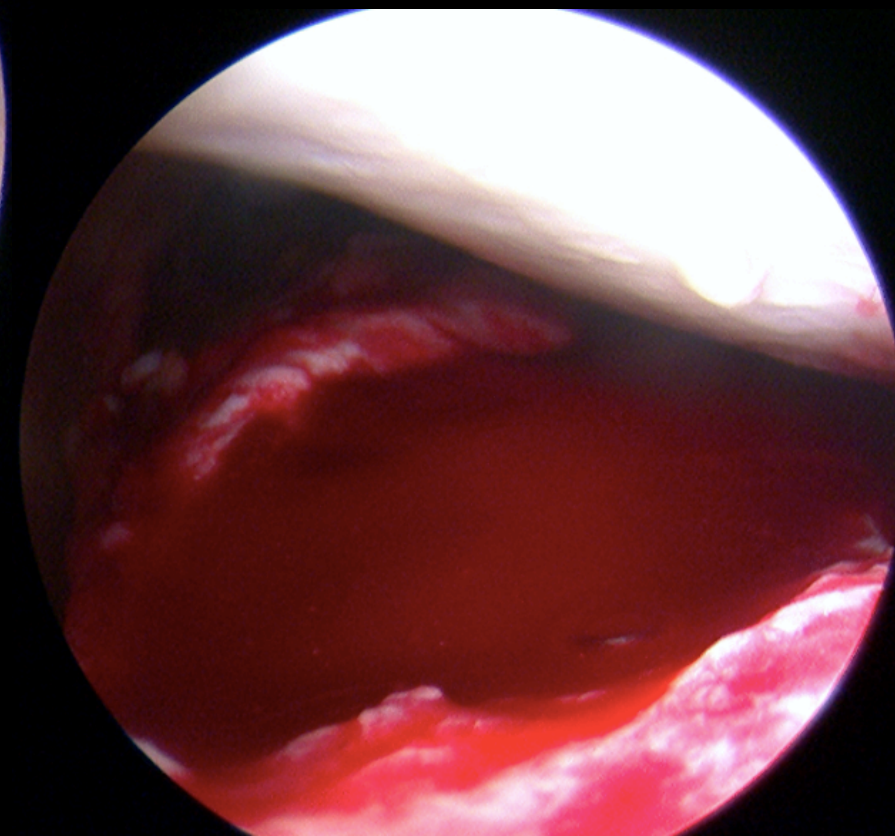
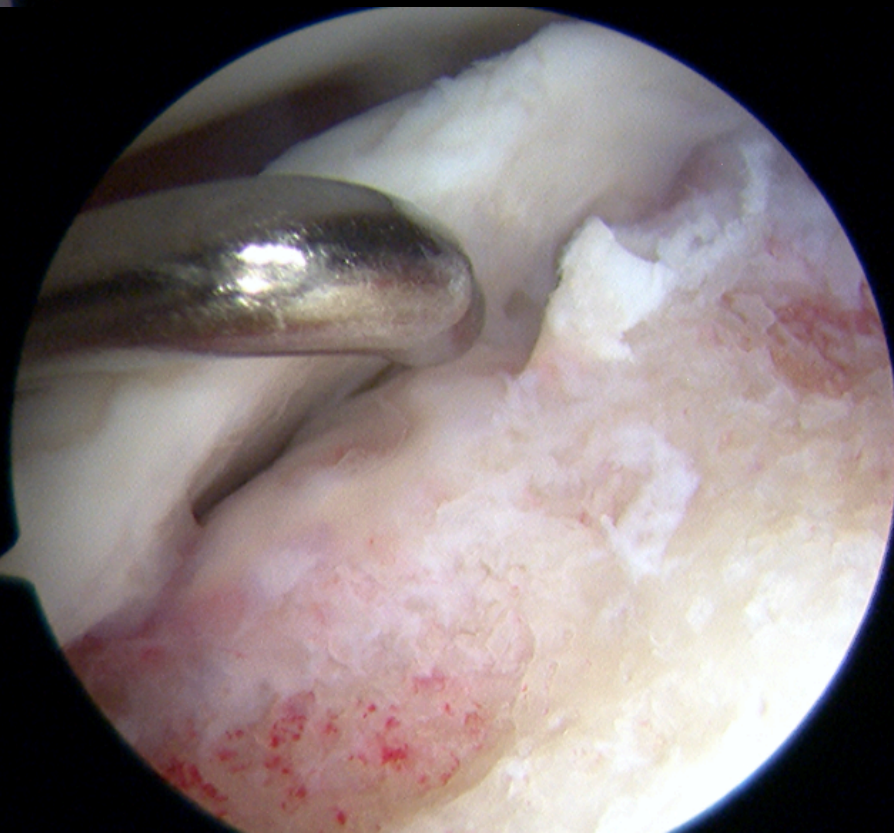
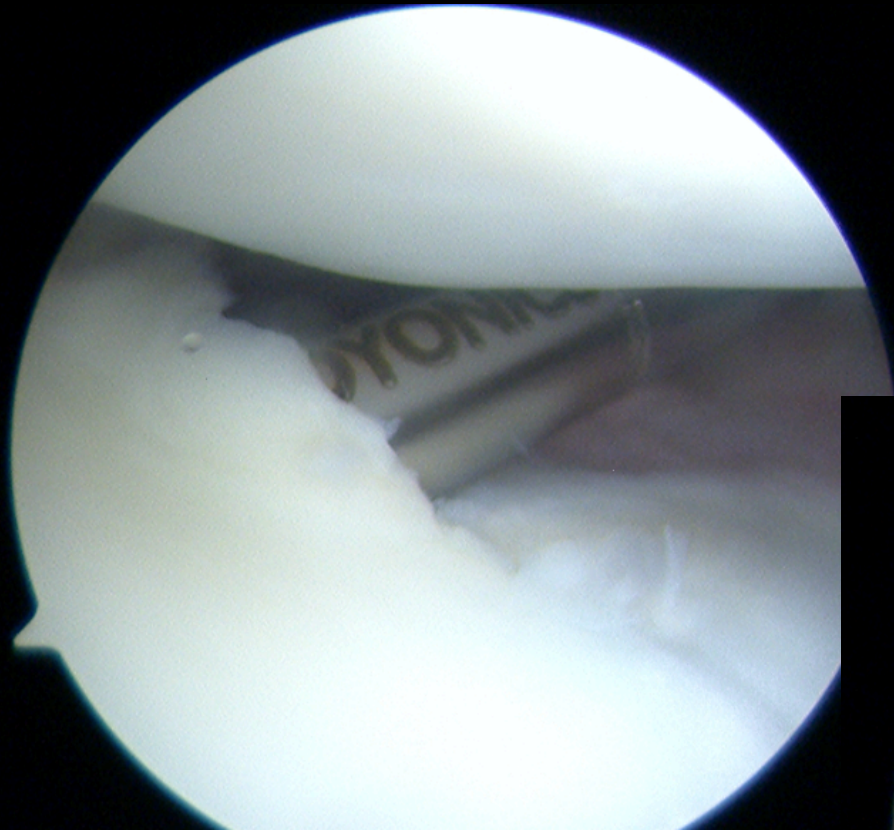
- Handball player
- Chronic anterior knee pain and swelling
- Partial improvement with physiotherapy
- FROM, no laxity, no signs of patella instability

# 14 yo: Preop

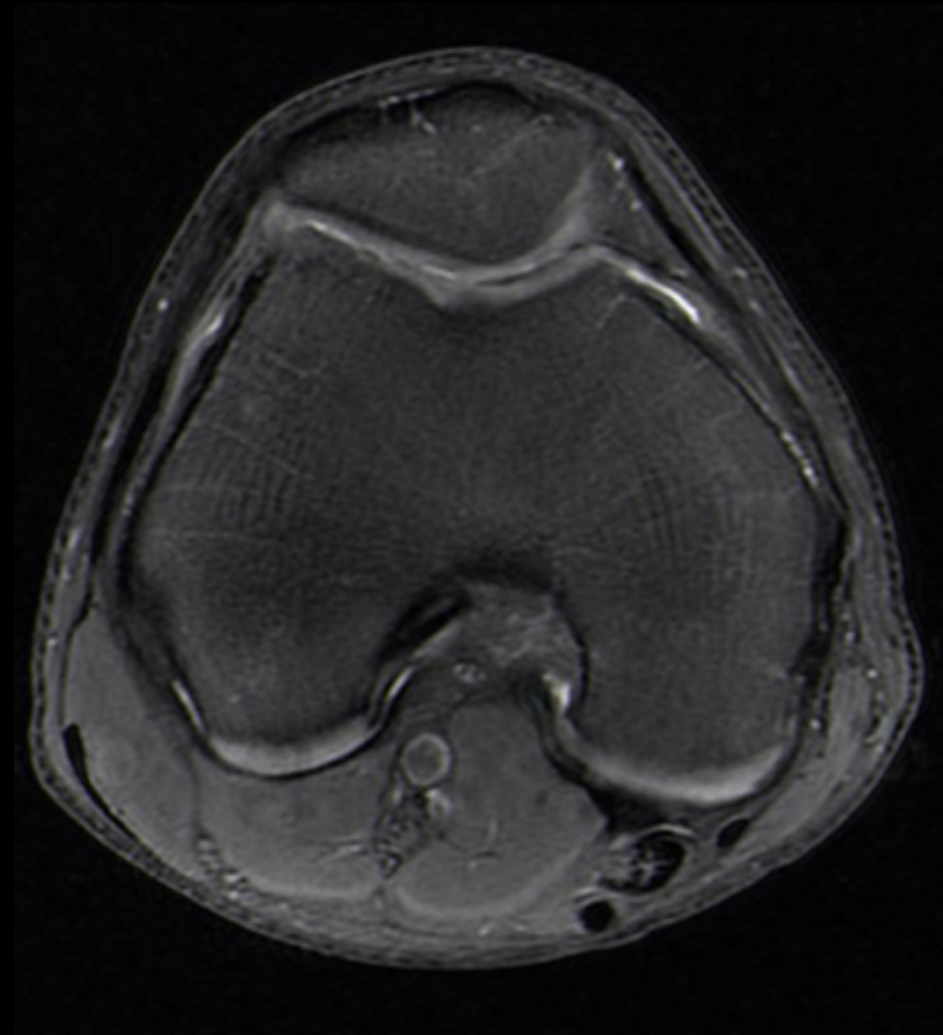




14 yo: Perop



**14 yo: 6 months**





# BST-Cargel

- At 5 years follow up, BST-CarGel treatment resulted in sustained and significantly **superior repair tissue quantity and quality over microfracture alone**. However, subjective outcomes were similar between the two groups

Stanish WD, McCormack R, Forriol F, et al. Novel scaffold-based BST-CarGel treatment results in superior cartilage repair compared with microfracture in a randomized controlled trial. J Bone Joint Surg Am 2013;95:1640–50.

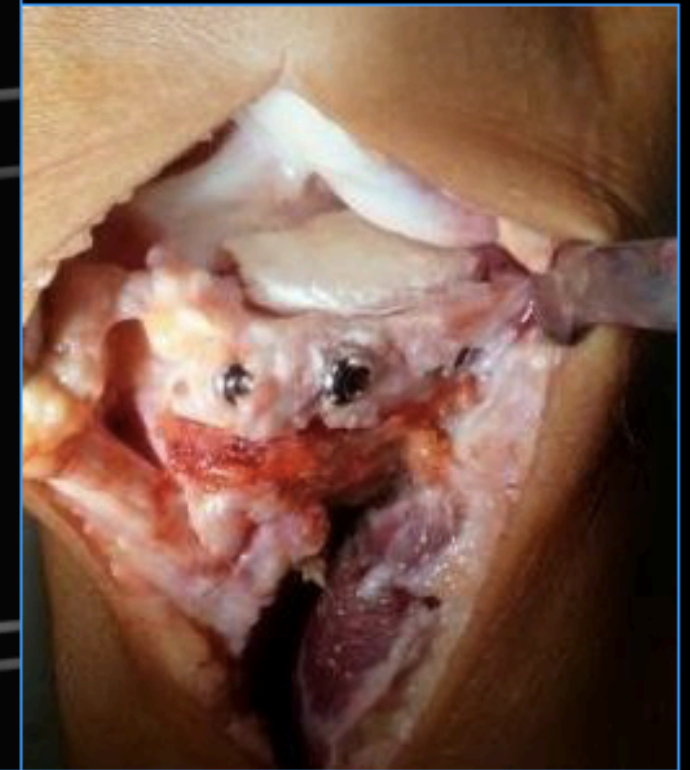
Pz ♀ 50 y: Tibial plateau lesion

## TIBIAL PLATEAU FRACTURE



**PRE-OP**

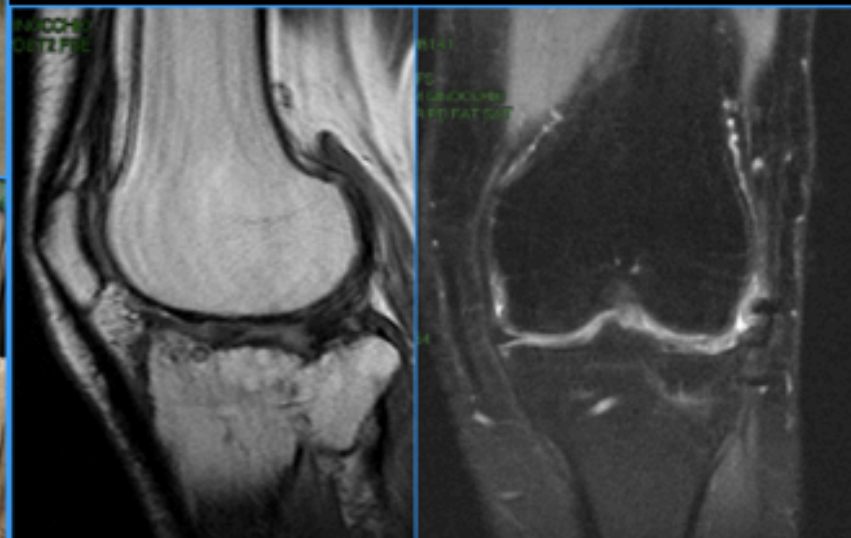
IKDC: 40.2  
KUJALA: 49



opening wedge HTO  
+ MaioRegen



**72 m**



IKDC: 88.5





# OSTEOCHONDRAL SCAFFOLD APPLICATION IN EARLY OA

46 years old  
former soccer player



Degenerative cartilage lesions of the  
Troclea and MFC

**OSTEOCHONDRAL SCAFFOLD** IMPLANTATION ON MFC,  
TROCHLEA AND PATELLA

+

**TIBIAL OSTEOTOMY**



**PRE-OP**



**INTRA-OP**

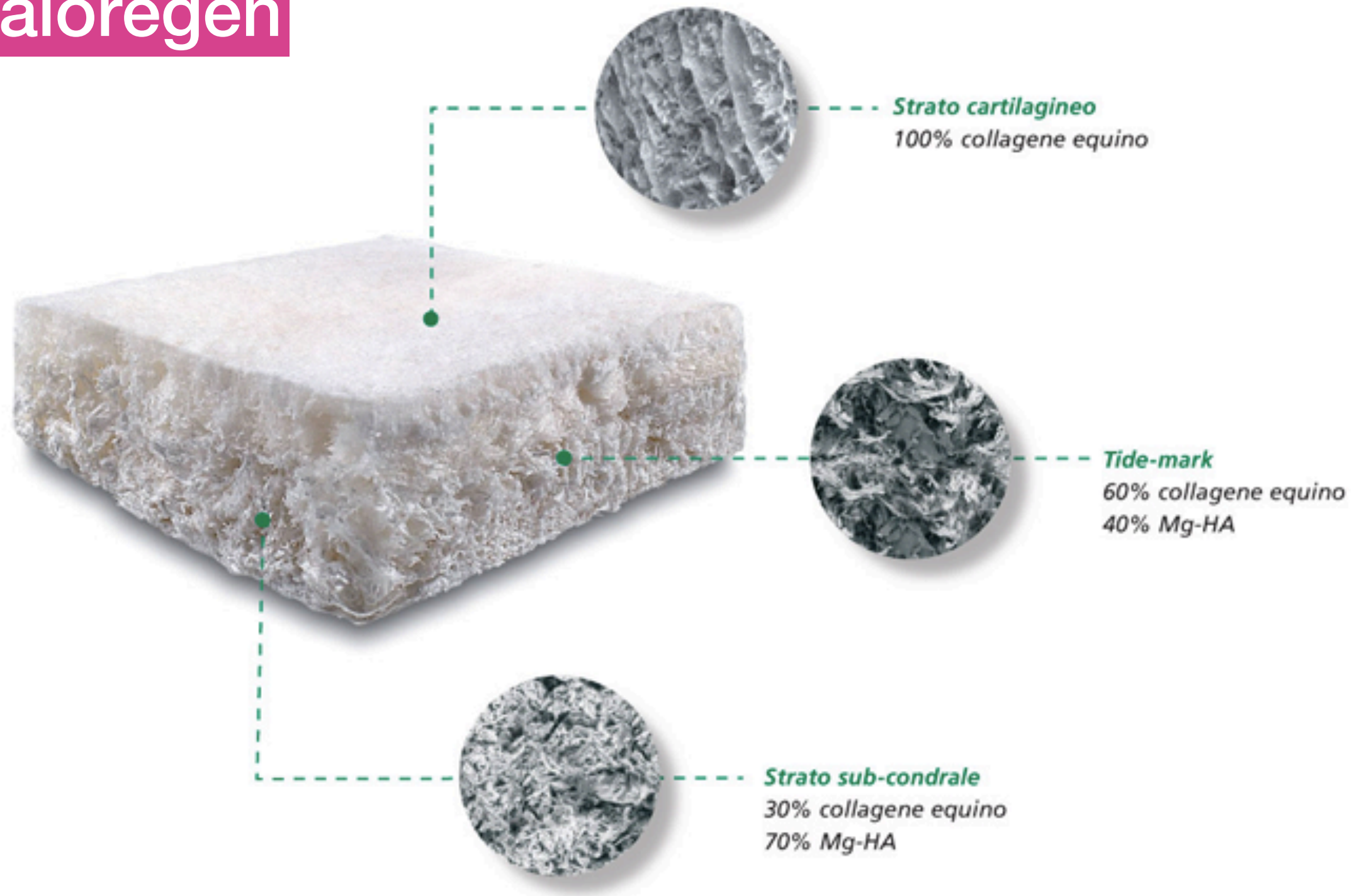


**6 m.**



**12 m.**

# Maioregen



**Multilayered nano-  
composite biomaterial**



# Maioregen

- Promising results have been shown at short and mid-term follow up. However, there were some failed cases and more studies are needed to further confirm these results in the future

Kon E, Filardo G, Di Martino A, et al. Clinical results and MRI evolution of a nano-composite multilayered biomaterial for osteochondral regeneration at 5 years. Am J Sports Med 2014;42:158–65.

# ICRS Grade 3 and 4

Size (cm <sup>2</sup> )	Procedure
< 2	<u>Microfracture (+/- augmentation)</u> Mosaicplasty (high demand)
2 - 4	Mosaicplasty (bone loss) ACI
> 4	<b>Synthetic Cell-Free Substitution?</b> ACI Osteochondral allograft (bone loss)

**Thank you**