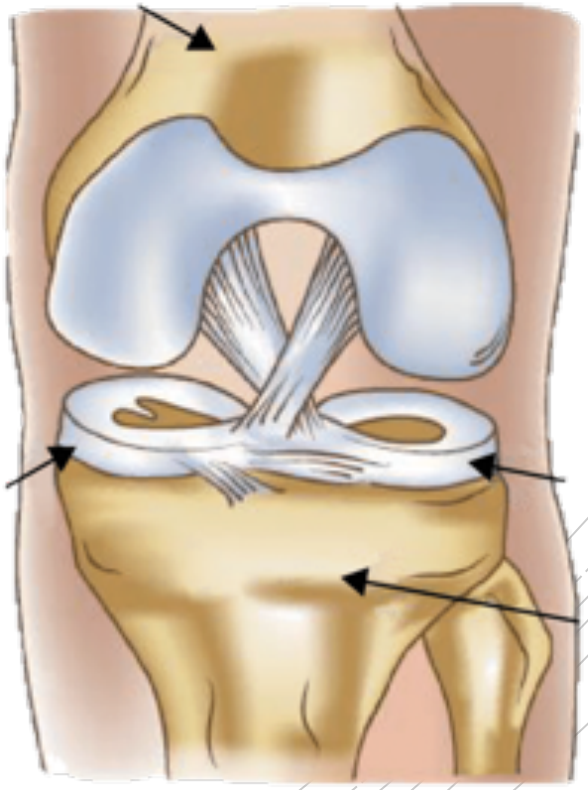
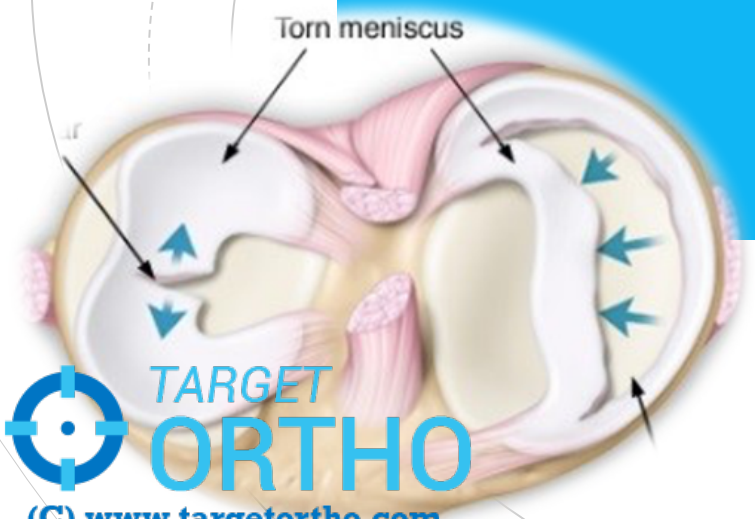
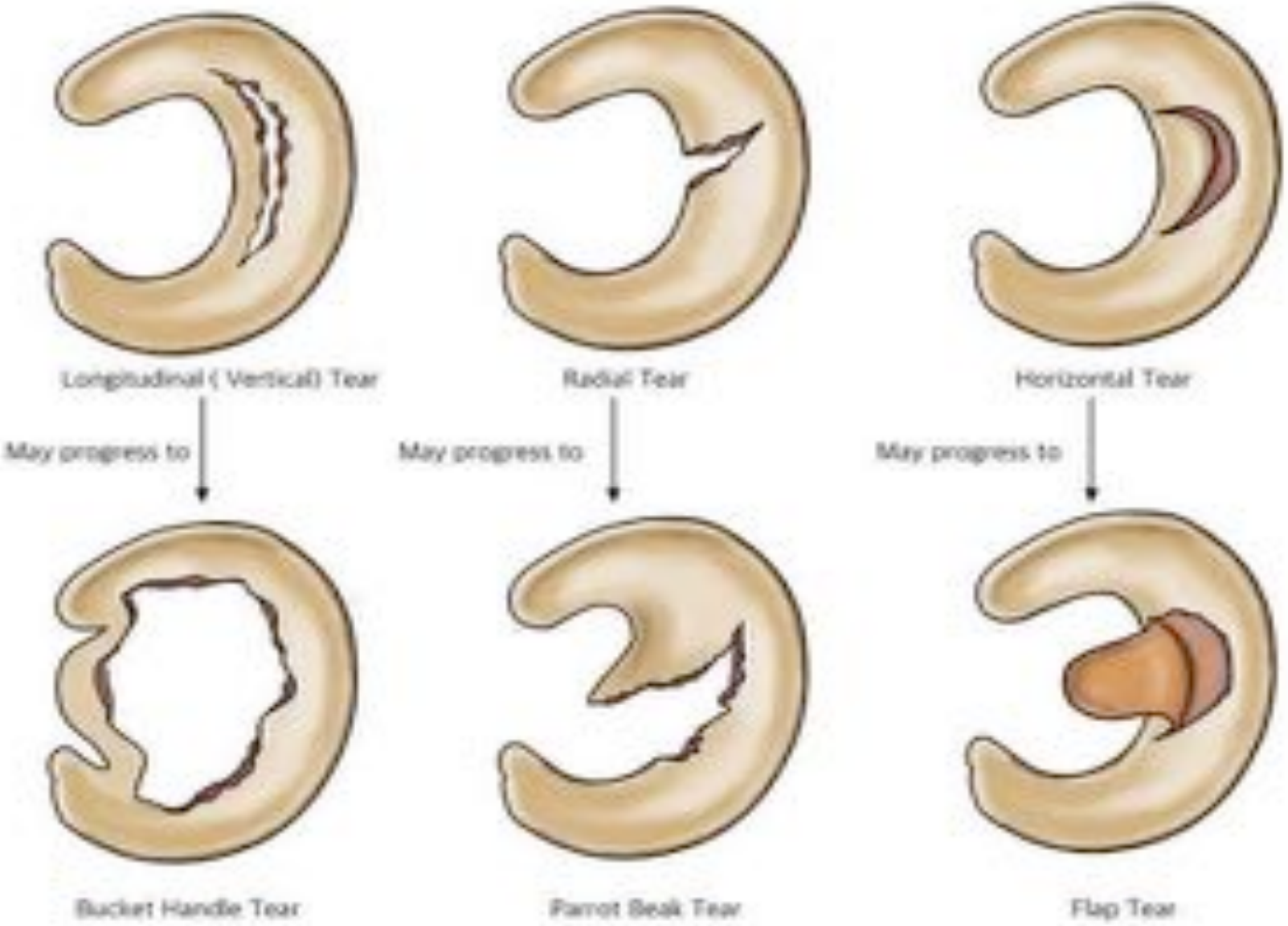
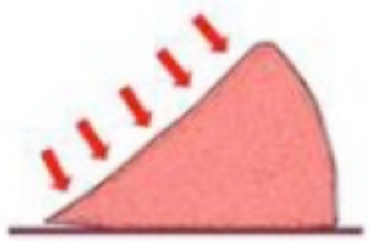
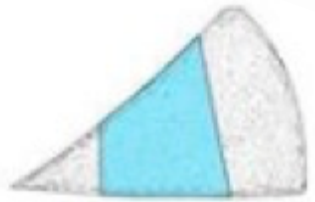


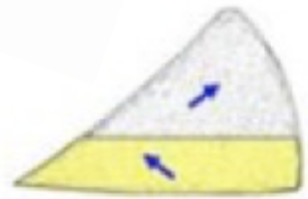
TEAR PATTERNS











FOCAL ARTICULAR CARTILAGE LESIONS

of Knee

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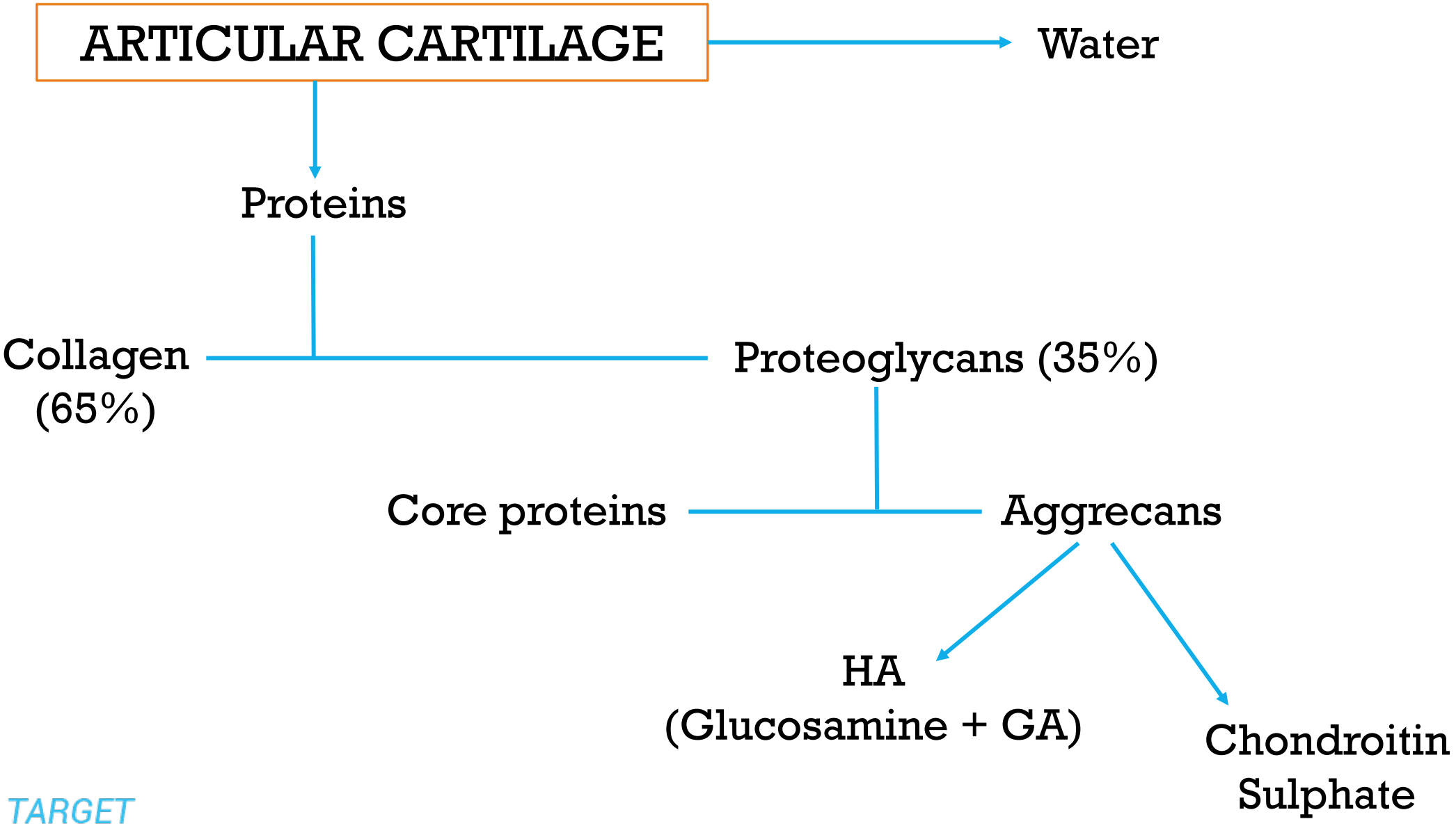


Q. The predominant collagen type present in Articular cartilage?

A. Type I
B. Type II
C. Type III
D. Type IV

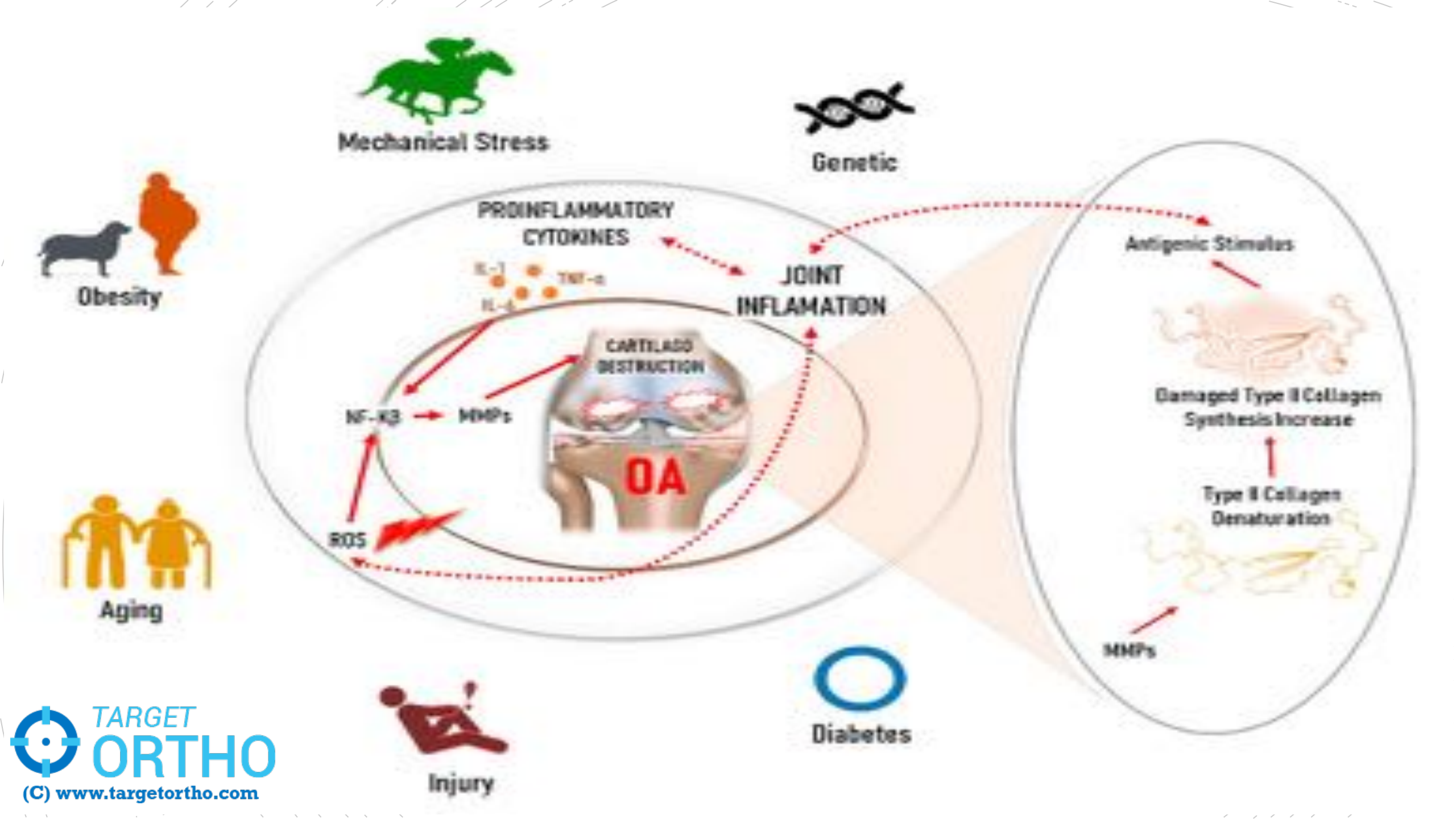
Q. The predominant collagen type present in Meniscus?

A. Type I
B. Type II
C. Type III
D. Type IV

PRE-DISPOSING FACTORS FOR CARTILAGE LESIONS

The primary factor in the development of a cartilage lesion is undoubtedly the relationship between the size of the lesion and the load surface, being adversely affected by:

- Obesity
- Age
- Axial misalignment
- Family history of osteoarthritis
- Overload activities



CLASSIFICATION OF ARTICULAR CARTILAGE DEFECTS

Several classifications : Outerbridge, ICRS etc

Outerbridge classification:

Grade 0 - Normal cartilage

Grade 1 - Cartilage softened and swollen

Grade 2 - Cracking not reaching the subchondral bone; less than 1.5 cm

Grade 3 - Cracking reaching the subchondral bone without exposure; greater than 1.5 cm

Grade 4 - subchondral bone exposure of any

ICRS Classification:

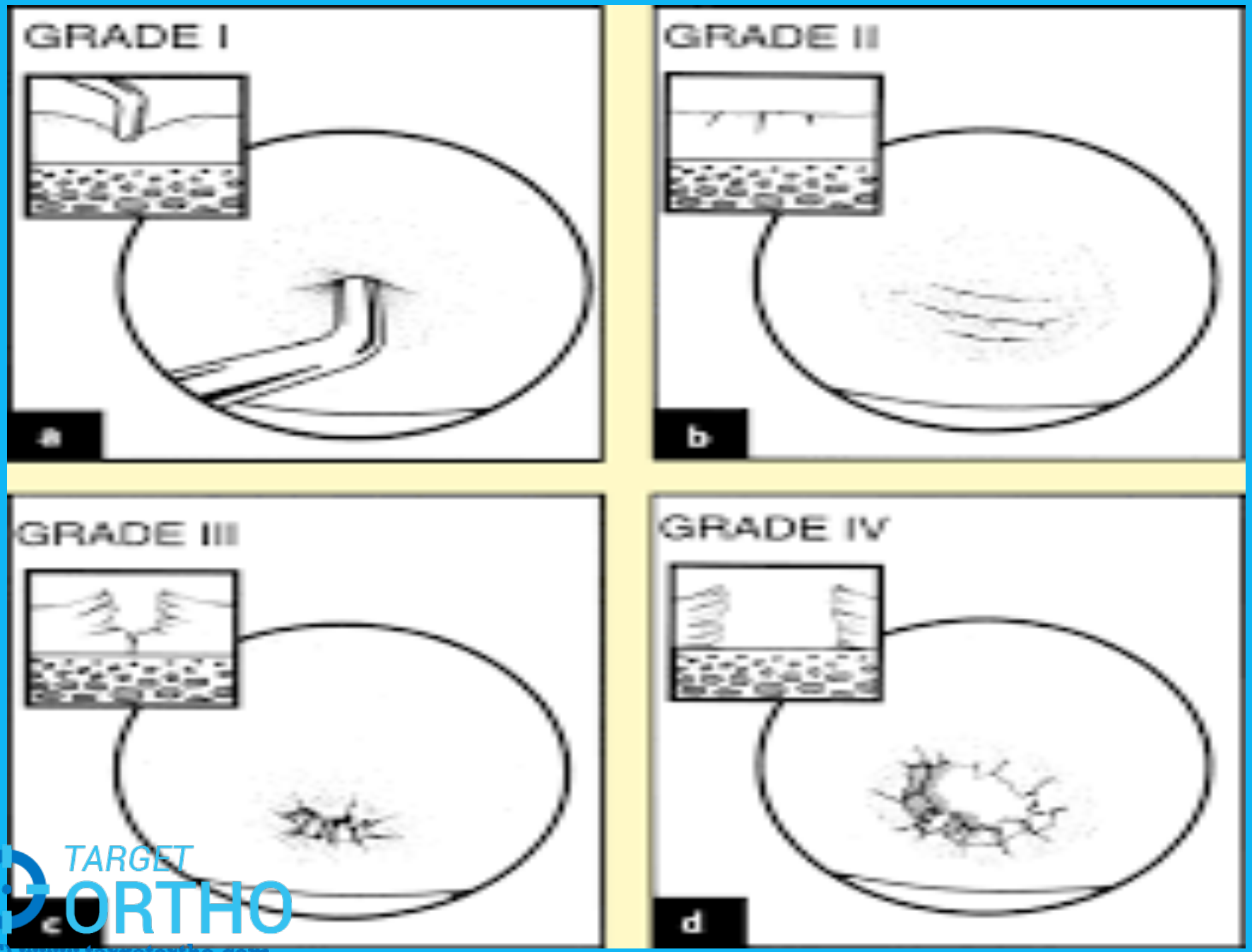
Normal: grade 0
Almost normal:
- Grade 1a- superficial lesions / softening
- Grade 1b - 1a and / or fissures or surface cracks

Abnormal:
- Grade 2 - length < 50% thickness

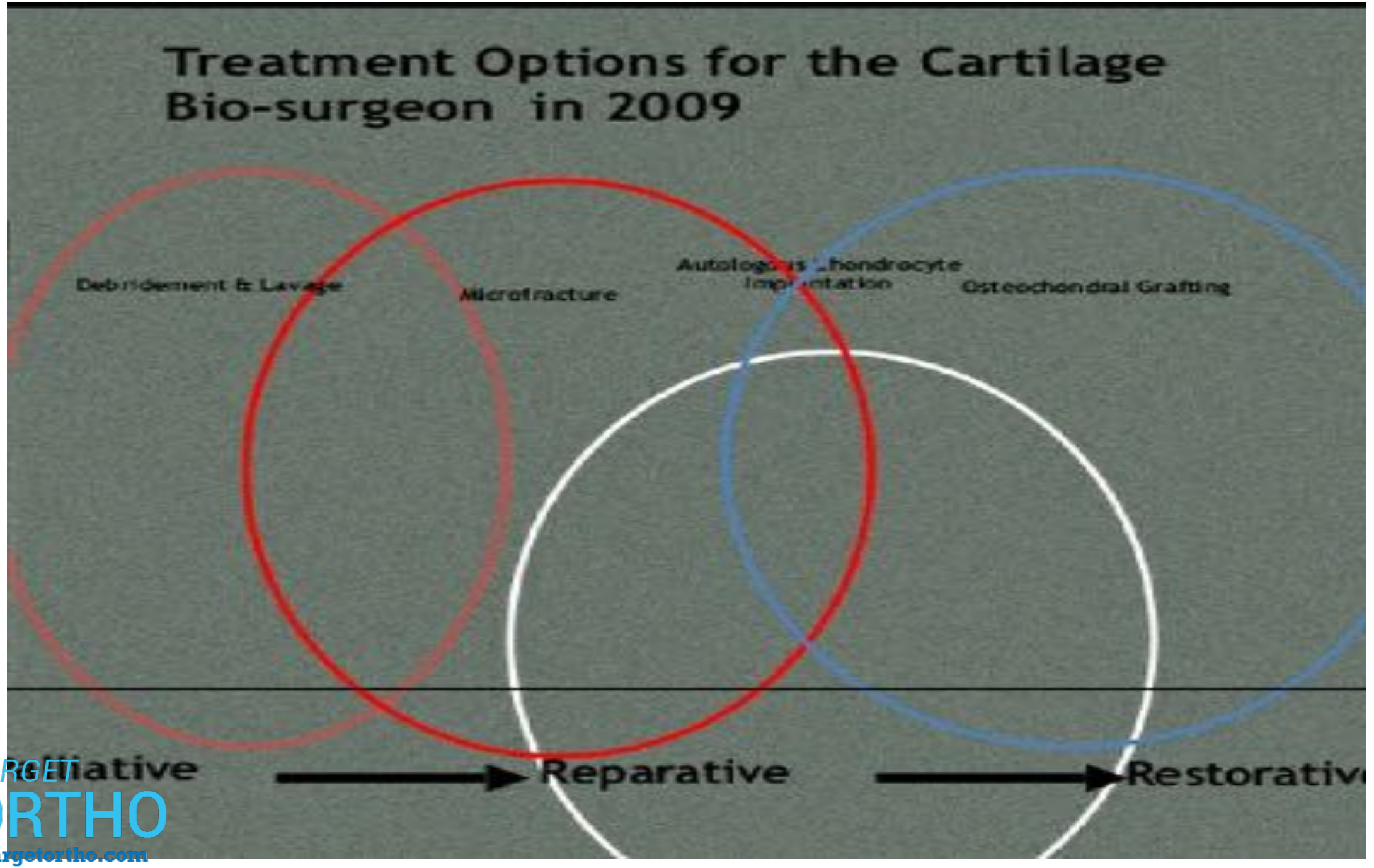
Serious injury:
- Grade 3 a – extension > 50%
- Grade 3 b - to the calcified layer
- Grade 3 c - to the surface of the subchondral bone (without entering)
- Grade 3 d - includes blisters

Very serious injury:
- Grade 4 a - penetration of the subchondral bone but not the full diameter of the defect
- Grade 4b - penetration across the diameter of the defect

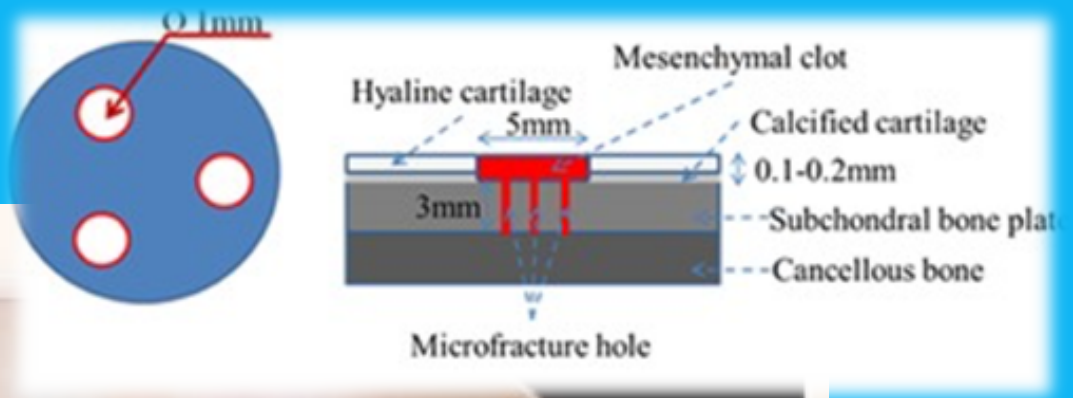
OUTBRIDGE CLASSIFICATION

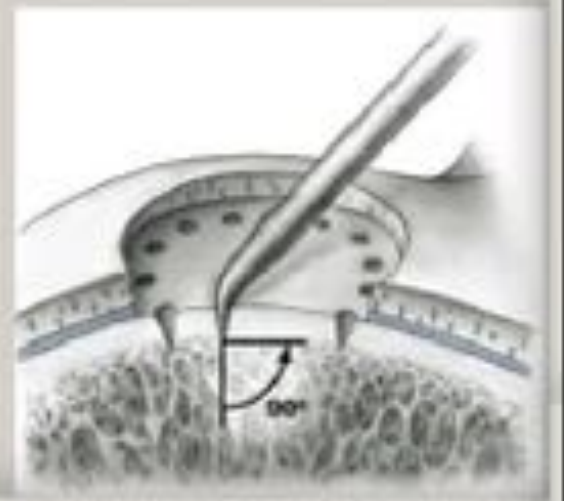


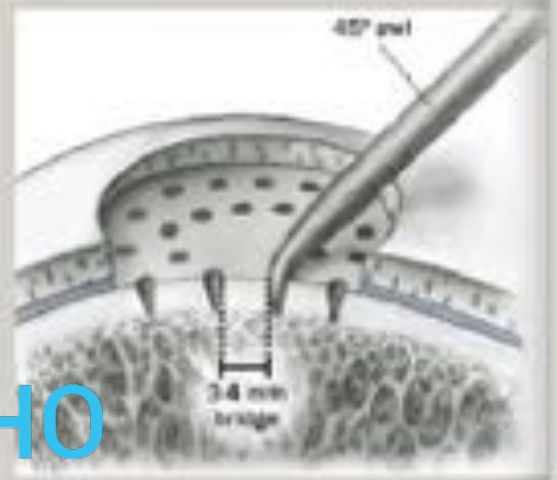
TREATMENT OPTIONS



MICROFRACTURE

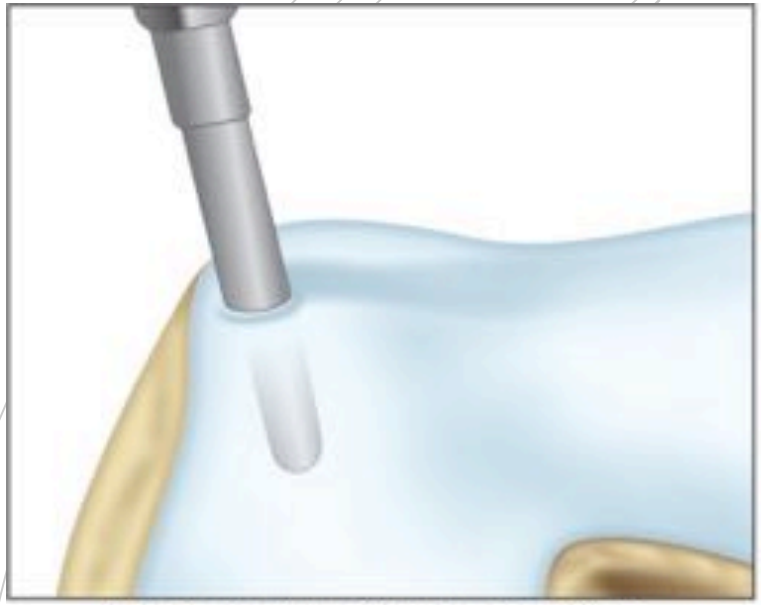




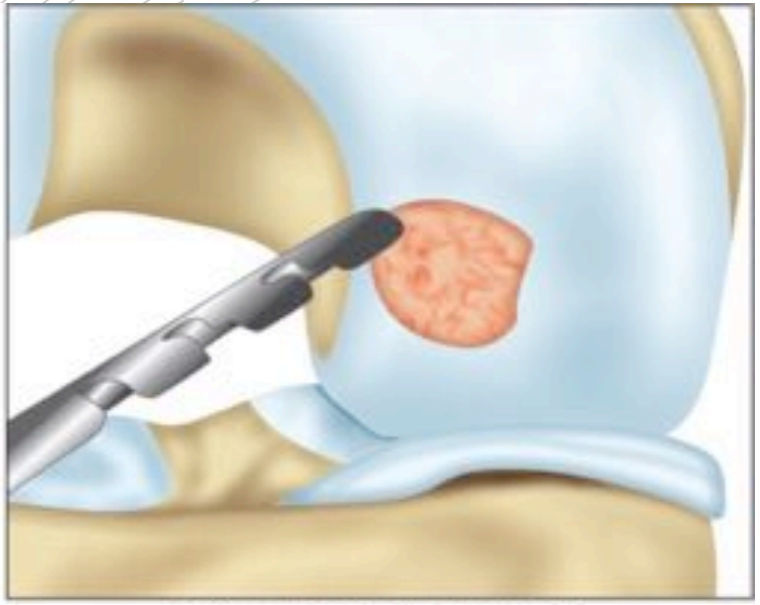


OATS

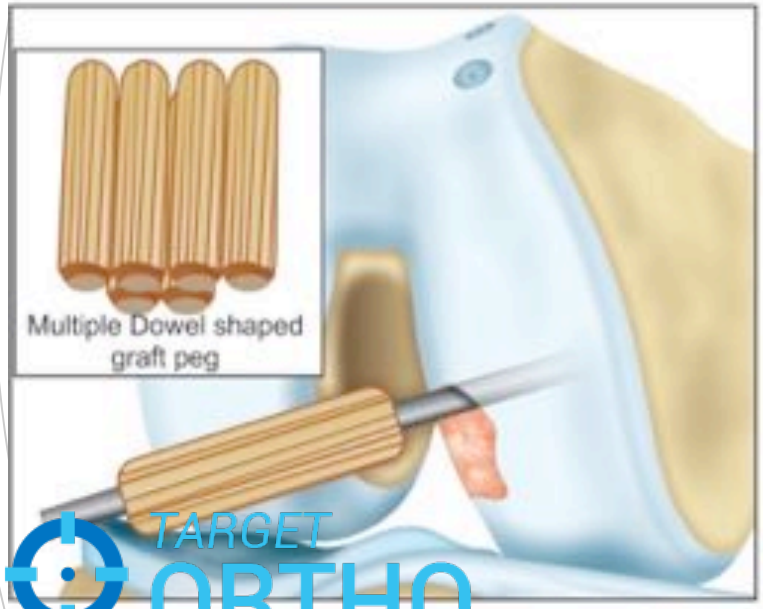
Osteochondral Autologous Chondrocyte Transplantation Surgery



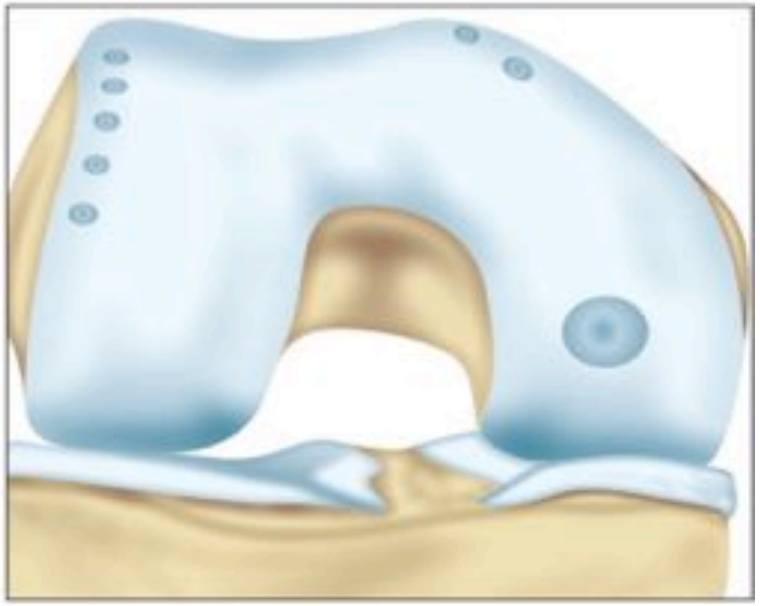
Graft are taken from a nonweight bearing part of the cartilage



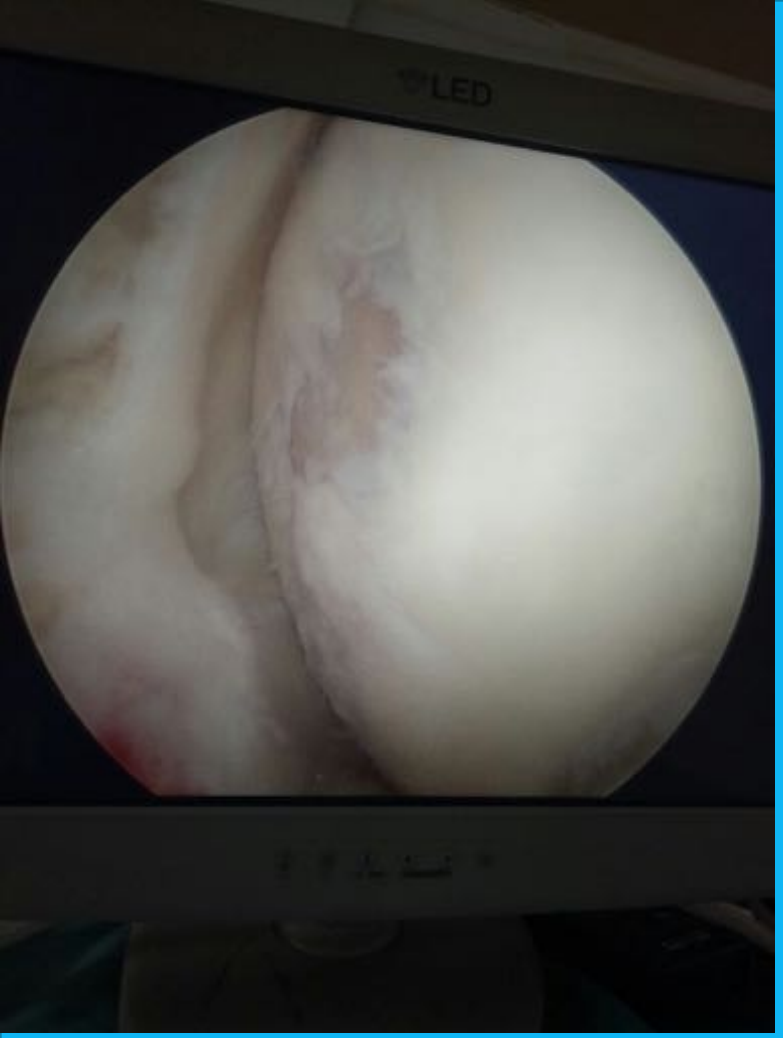
Holes drilled at defect site

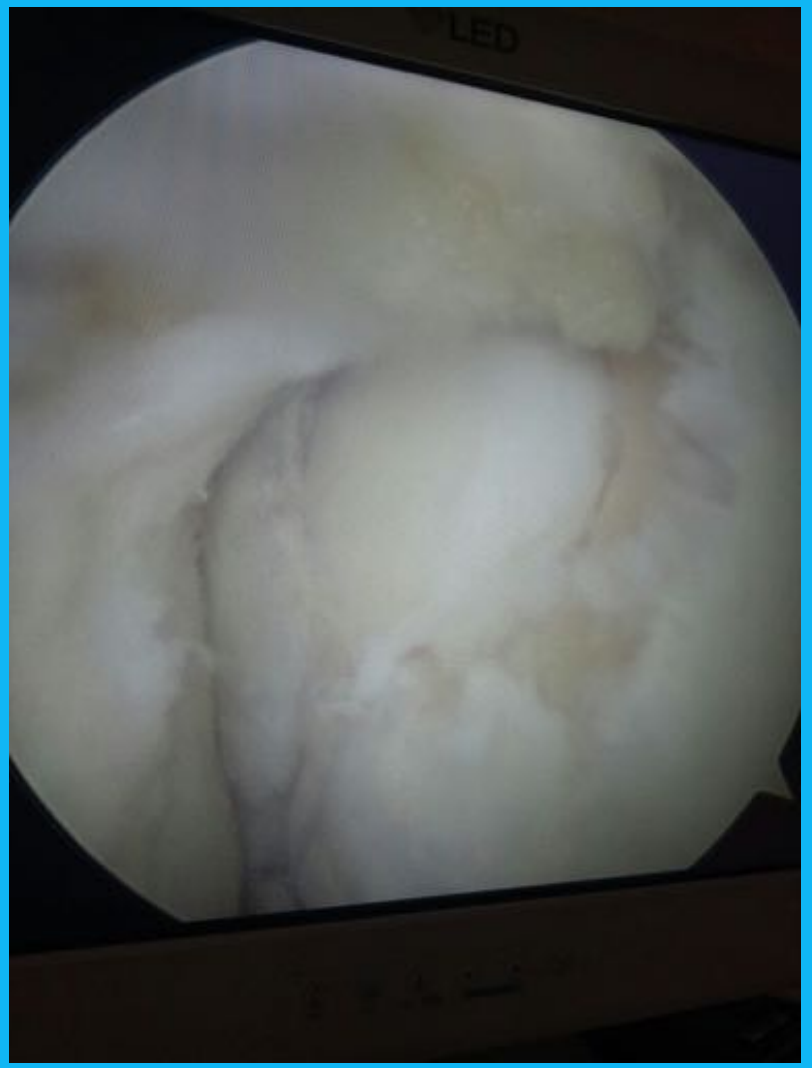


Dowel-shaped graft peg inserted at hole at chondral lesion site

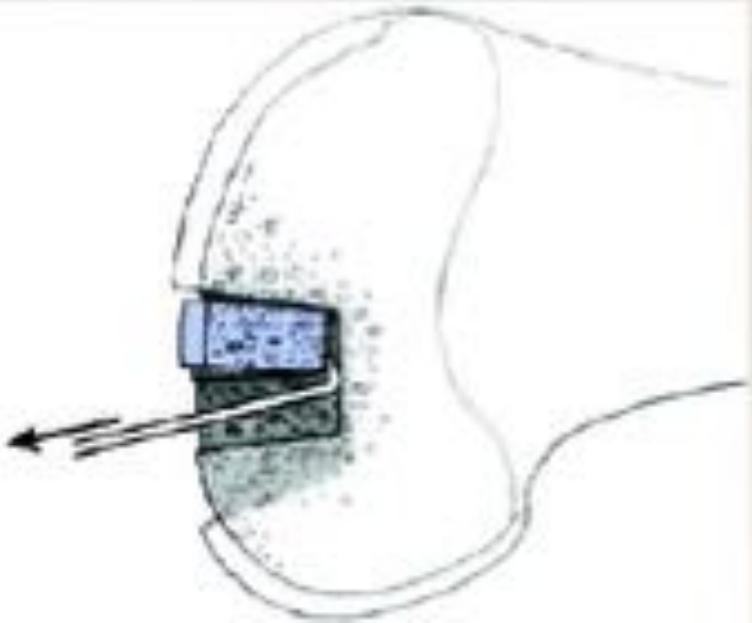


Lesion and donor sites





- Cylinder perpendicular to articular surface
- Avoid the cylinder sinking; 1 - 2 mm above the adjacent surface
- No load for 3 - 5 weeks



Osteochondral allograft

Restrictions

- Obtainment difficulties
- Rejection
- Difficulty in graft incorporation
- Diseases transmission
- Potential high cost
- Technical difficulty in graft conditioning

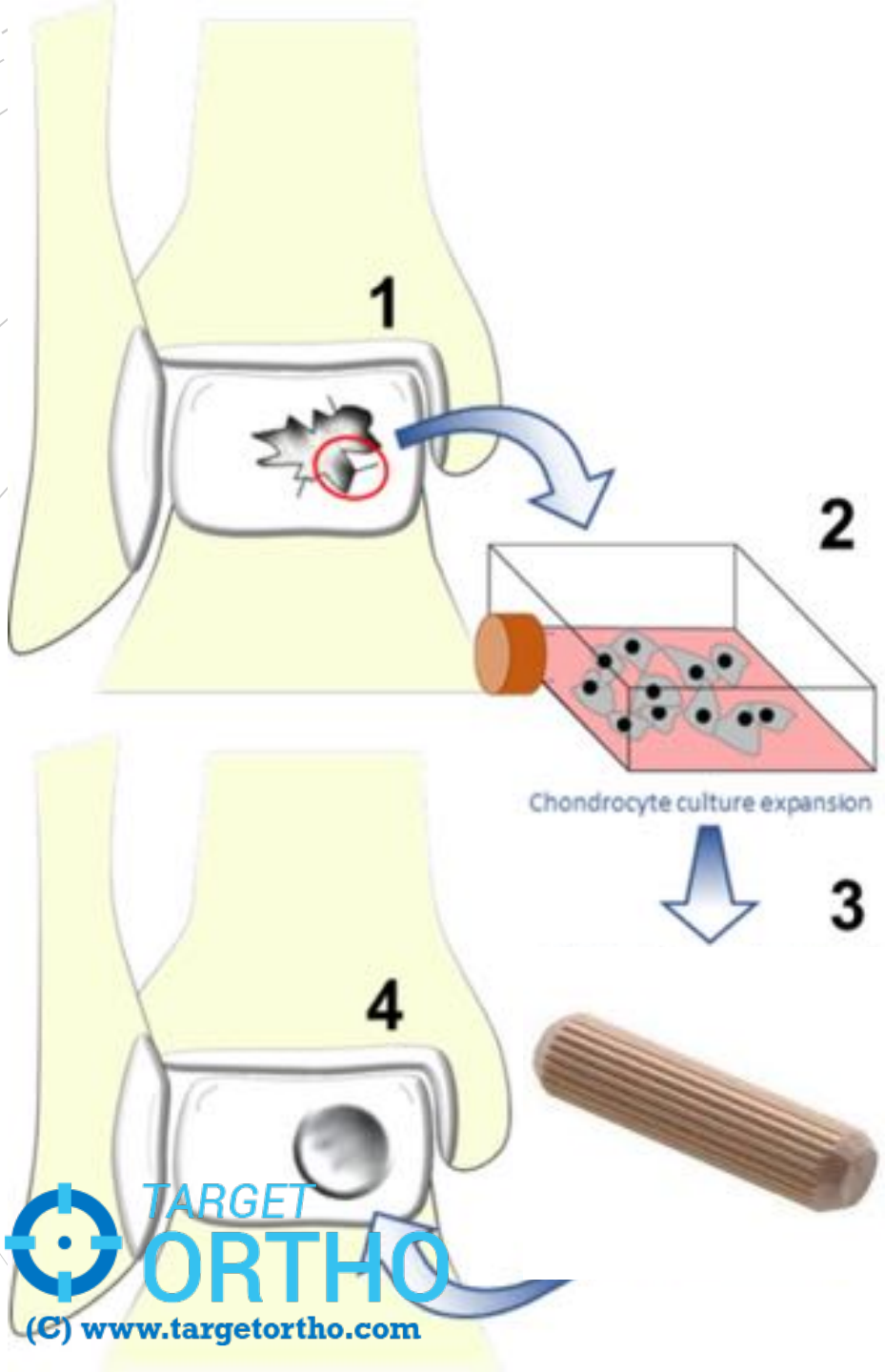
ACI

AUTOLOGOUS CHONDROCYTE IMPLANTATION

GENERATIONS OF ACI

First generation ACI

Autologous chondrocytes were grown in culture, made into paste which was then injected into the defect after 3-6 weeks beneath a “periosteal flap” or a “collagen membrane” e.g. MACI



Second generation ACI

Grown chondrocytes were mounted into a 3D SCAFFOLD and the scaffold was hammered press fit into the defect e.g. hyalograft C, bioseed- C

Third generation ACI

The matrix with chondrocytes is subjected to mechanical stimulation, with hydrostatic pressure to chondrocytes for a minimum of seven days which will increase the production of collagen type II, aggrecan and other norma components of hyaline cartilage

Easy application and adaptation to different sizes and shapes of defects

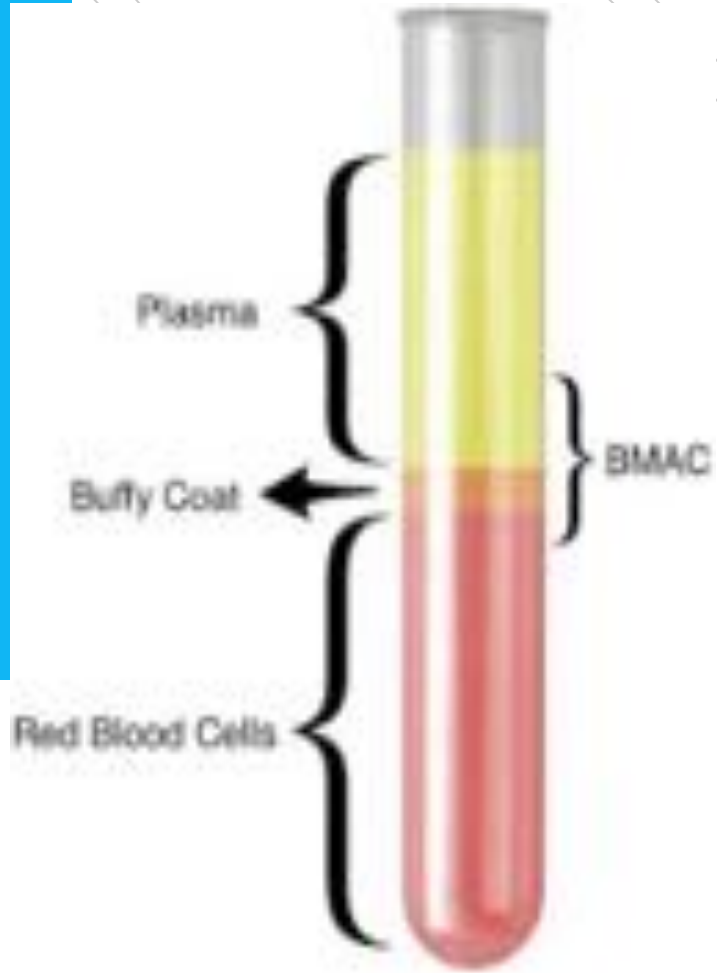
MODIFIED

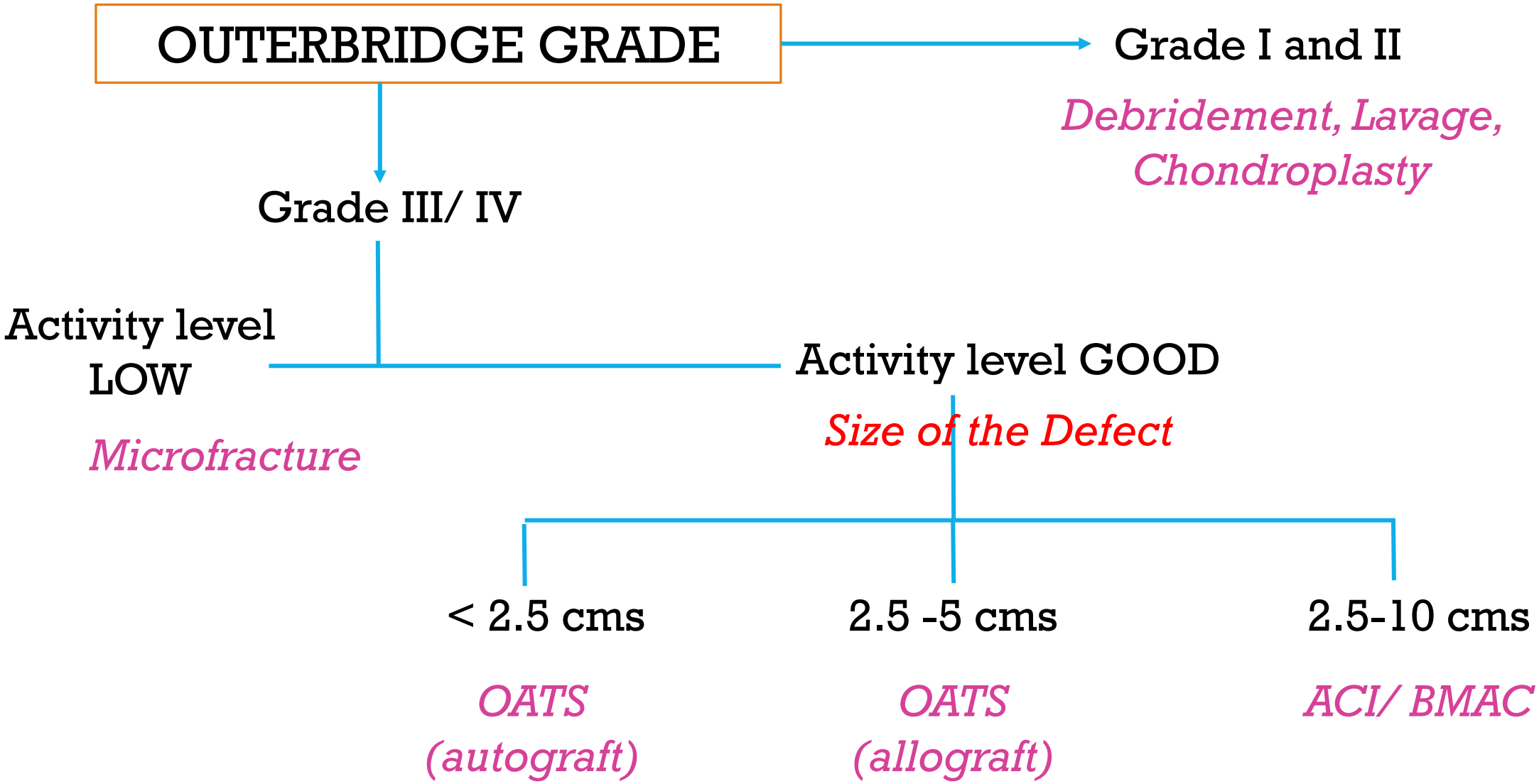
Third generation ACI

- Latest modification in 3rd generation ACI is CARTILAGE AUTOGRAFT IMPLATATION SYSTEM (CAIS).
- Articular cartilage after harvest is MINCED into small fragments encapsulated directly IMPLANTED into scaffold (w/o culture expansion).
- Chondrocytes from fragments migrate into scaffold (made of polycoprolactone+PGA +PDS) and produce ECM.
- A minimal amount of chondrocytes produce much of tissue for a relatively larger defect.

BMAC

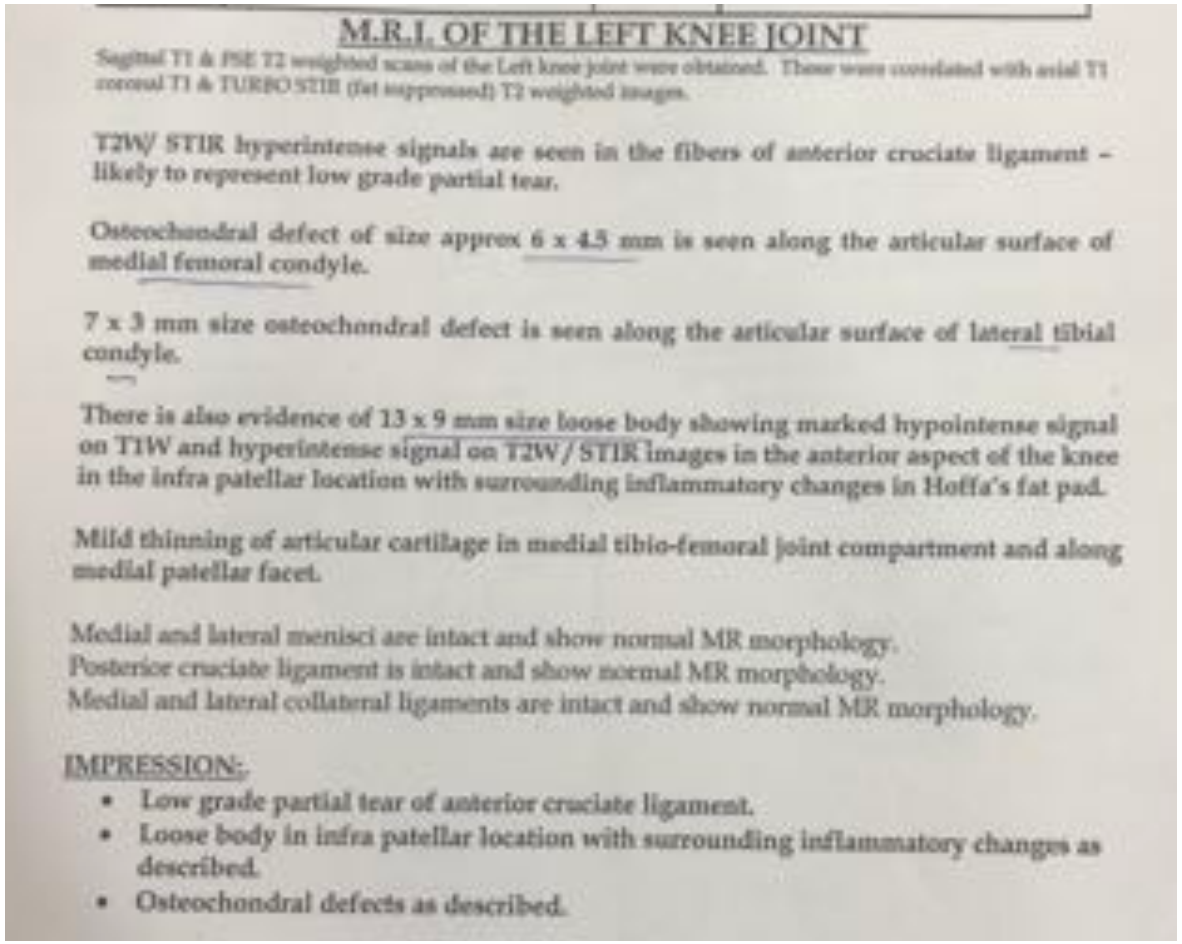
Bone marrow aspirate stem cell concentrate





Q. A 35 years female landed up with twisting injury to knee that was managed conservatively. 3 months post injury she started having multiple episodes of locking. MRI films and reports are shown. Surgical PLAN?

A. Loose body removal and VS
B. Microfracture and VS
C. OATS
D. ACI



M.R.I. OF THE LEFT KNEE JOINT

Sagittal T1 & PSE T2 weighted scans of the Left knee joint were obtained. These were correlated with axial T1 coronal T1 & TURBO STIR (fat suppressed) T2 weighted images.

T2W/ STIR hyperintense signals are seen in the fibers of anterior cruciate ligament – likely to represent low grade partial tear.

Osteochondral defect of size approx 6 x 4.5 mm is seen along the articular surface of medial femoral condyle.

7 x 3 mm size osteochondral defect is seen along the articular surface of lateral tibial condyle.

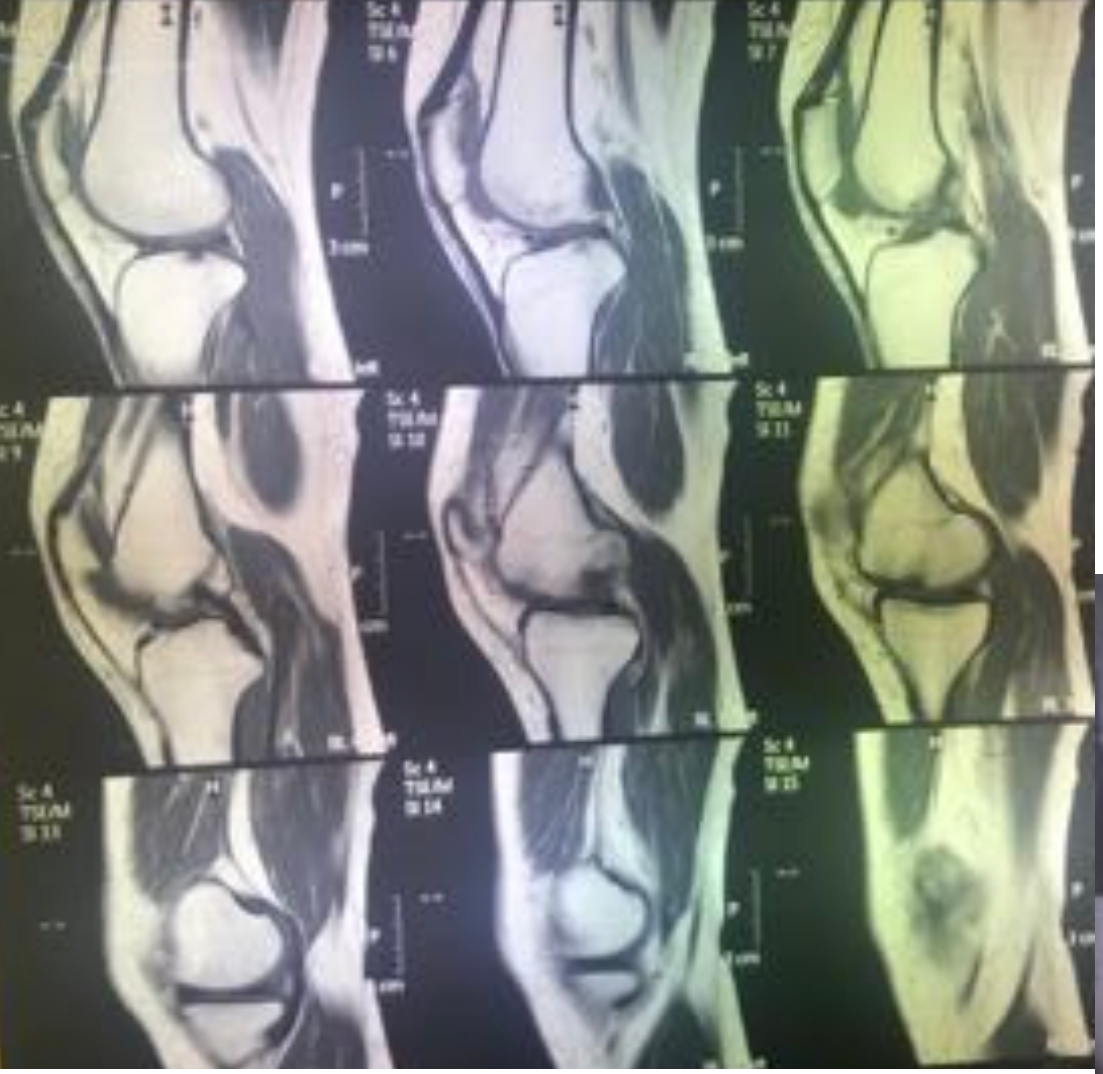
There is also evidence of 13 x 9 mm size loose body showing marked hypointense signal on T1W and hyperintense signal on T2W/ STIR images in the anterior aspect of the knee in the infra patellar location with surrounding inflammatory changes in Hoffa's fat pad.

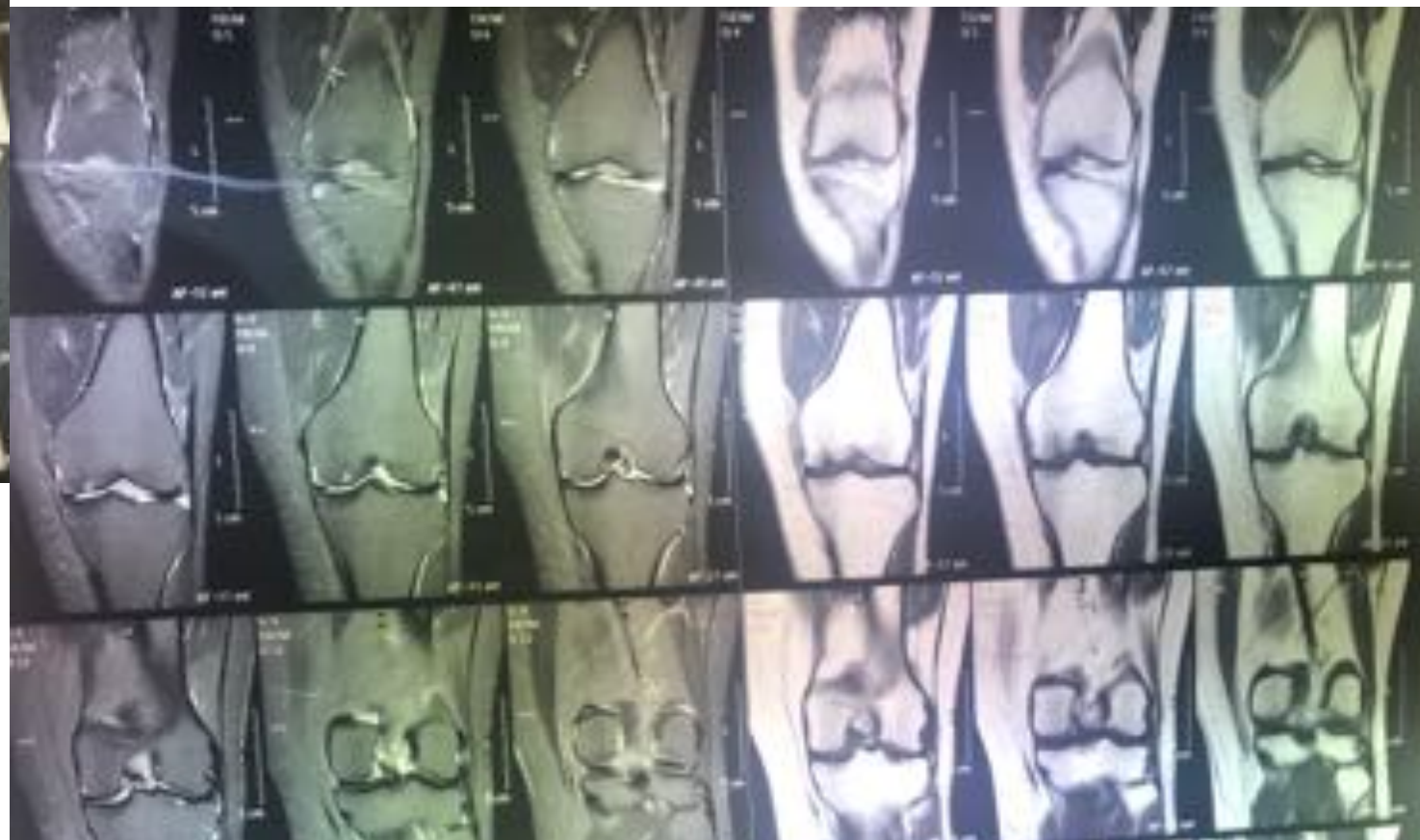
Mild thinning of articular cartilage in medial tibio-femoral joint compartment and along medial patellar facet.

Medial and lateral menisci are intact and show normal MR morphology.
Posterior cruciate ligament is intact and show normal MR morphology.
Medial and lateral collateral ligaments are intact and show normal MR morphology.

IMPRESSION:

- Low grade partial tear of anterior cruciate ligament.
- Loose body in infra patellar location with surrounding inflammatory changes as described.
- Osteochondral defects as described.





Mosaicplasty

Bobic (1996)

Mosaicplasty in 12 patients with ACL injury: with good or excellent results in 10/12 cases

Wang (2002)

Mosaicplasty in 16 patients with 2 to 4 years of follow-up: 80% good or excellent results

Sharp et al (2005)

Combined chondrocyte transplantation and mosaicplasty with follow up of 3 years in 13 patients with large lesions

excellent results in 10/13 patients

10 years of follow … oral condyle, 87% in ti…

In conclusion : Osteochondral autograft transfer is recommended for smaller lesions, lesions in high-demand athletes, and lesions with associated bone loss, while microfracture is suited for medium-size defects with little or no bone loss in lower- demand patients and they should therefore be reserved for revision situations.

…fornia

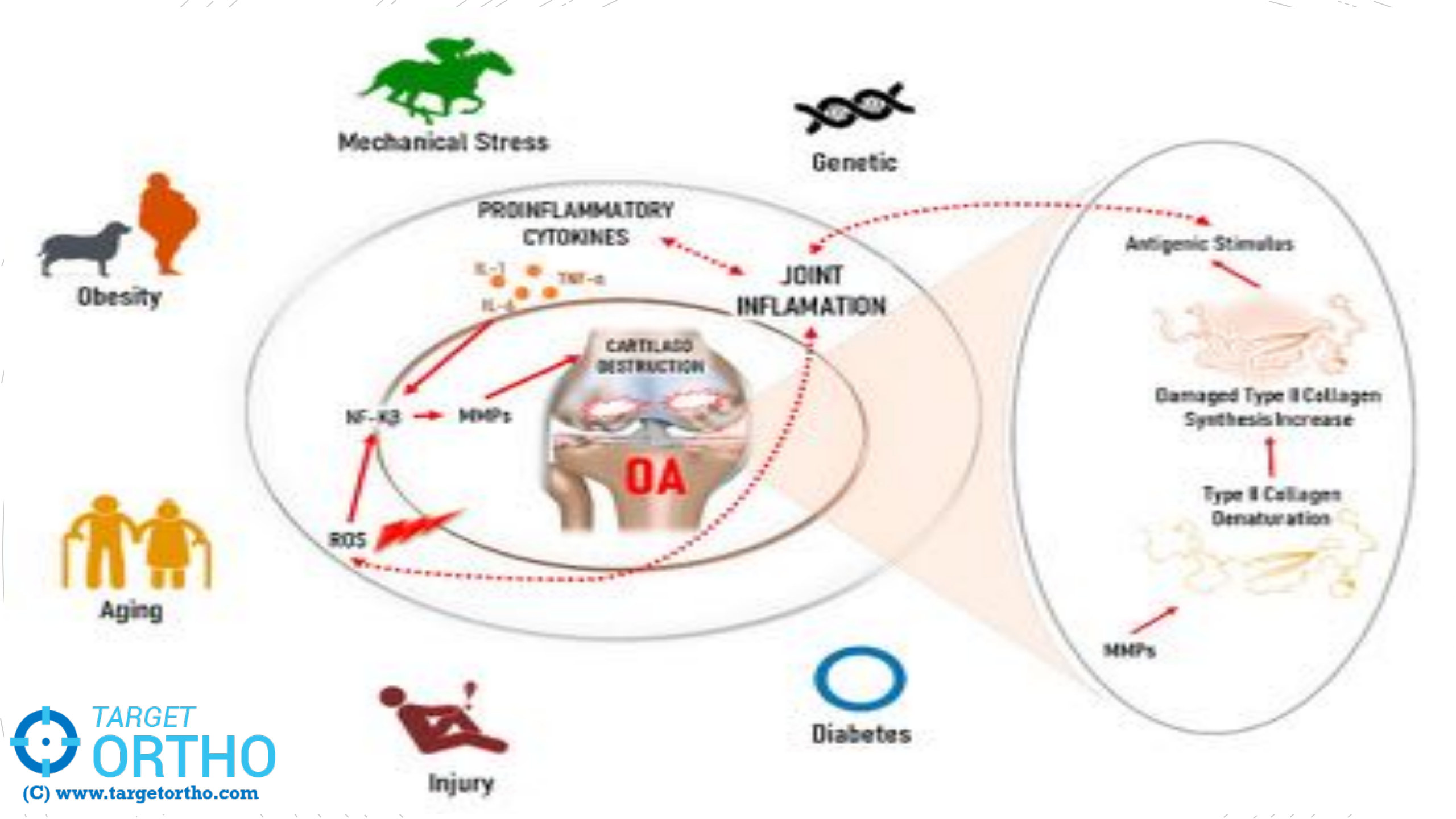
Conclusions: … loads that cause chondrocyte death, particularly in the superficial zone, mainly as a result of apoptosis mediated the activation of caspases.

…Clinical Relevance: Chondrocyte death that occurs during impact insertion of osteochondral grafts may lead to compromi… Understanding the mechanisms and consequences of such impact loading may provide insights into potentia… therapeutic interventions, or lead to changes in the insertion technique, to decrease the cell injury associated with impa… loading.

CHONDRO-PROTECTIVE AGENTS

- COLLAGEN TYPE II SUPPLEMENTS
- GLUCOSAMINE
- CHONDROITIN SULPHATE
- S-ADENOSYL METHIONINE
- DIACERIN

VISCOSUPPLEMENTATION



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