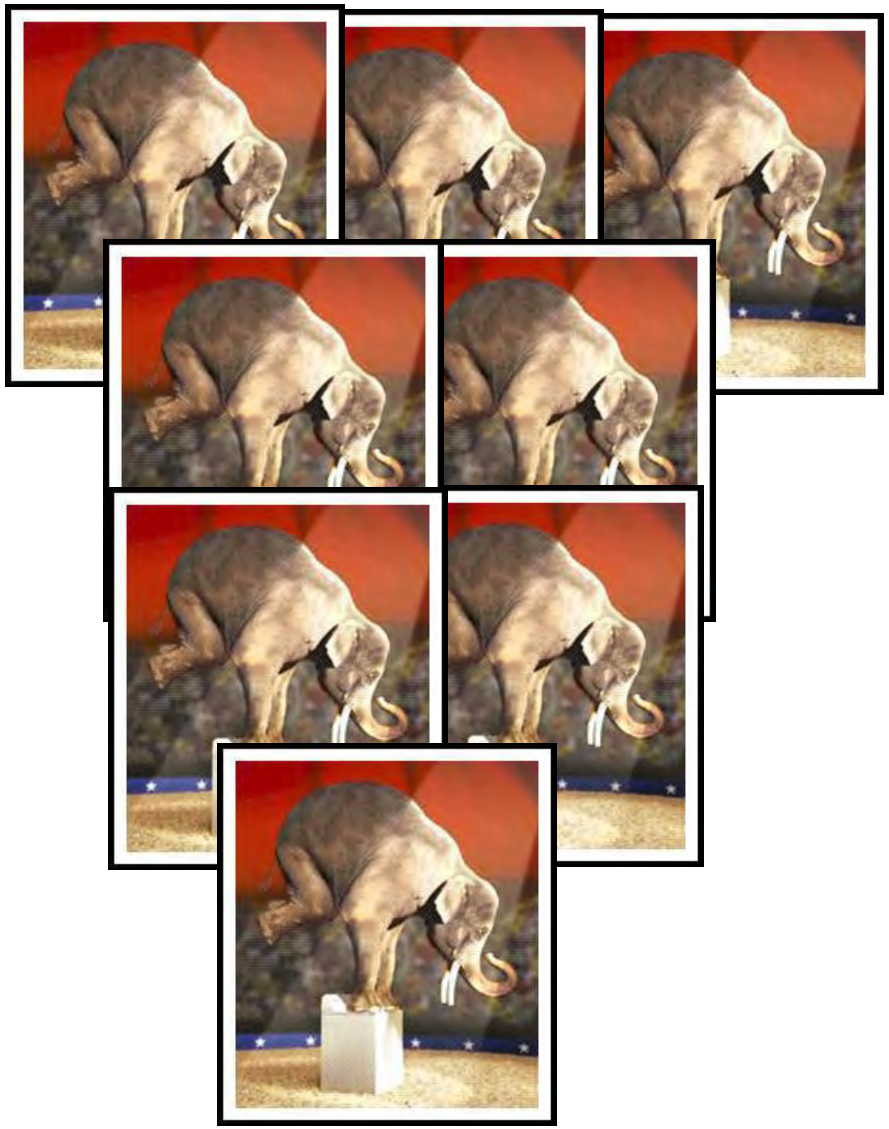
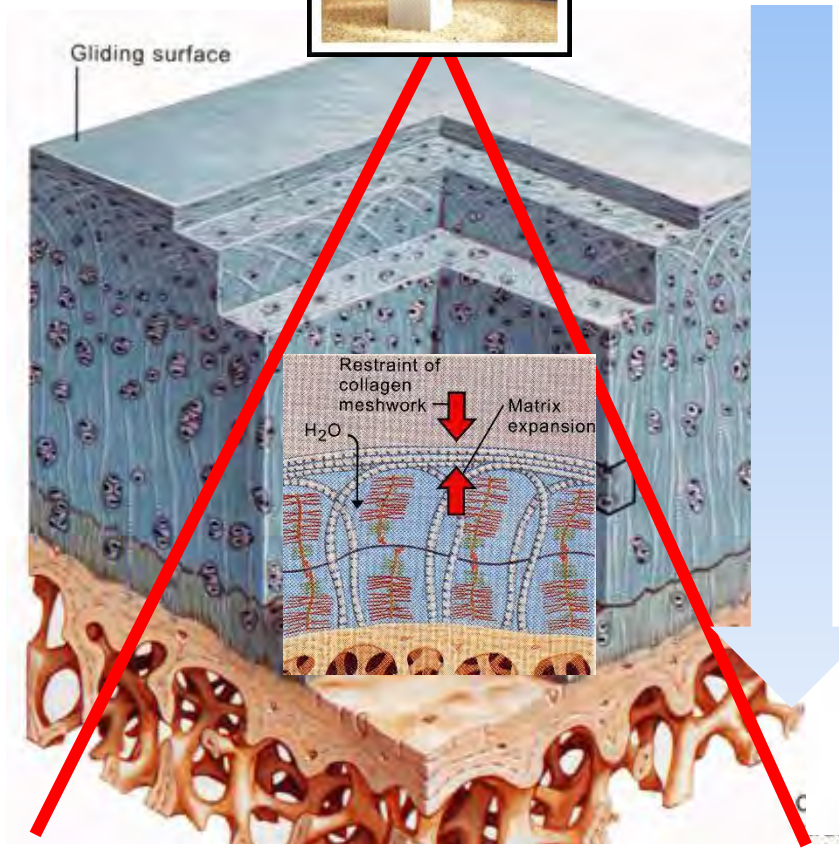
Kraakbeen

Pieter Emans

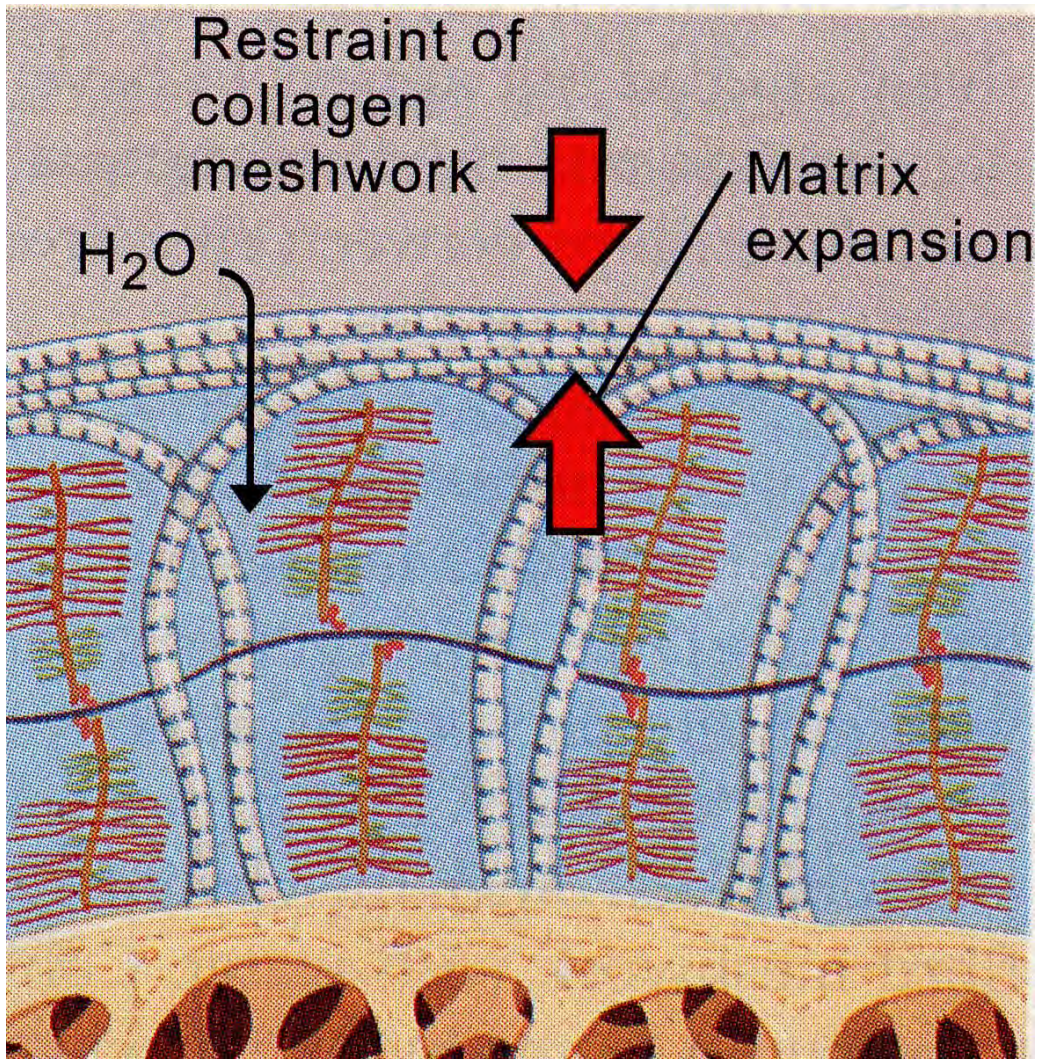


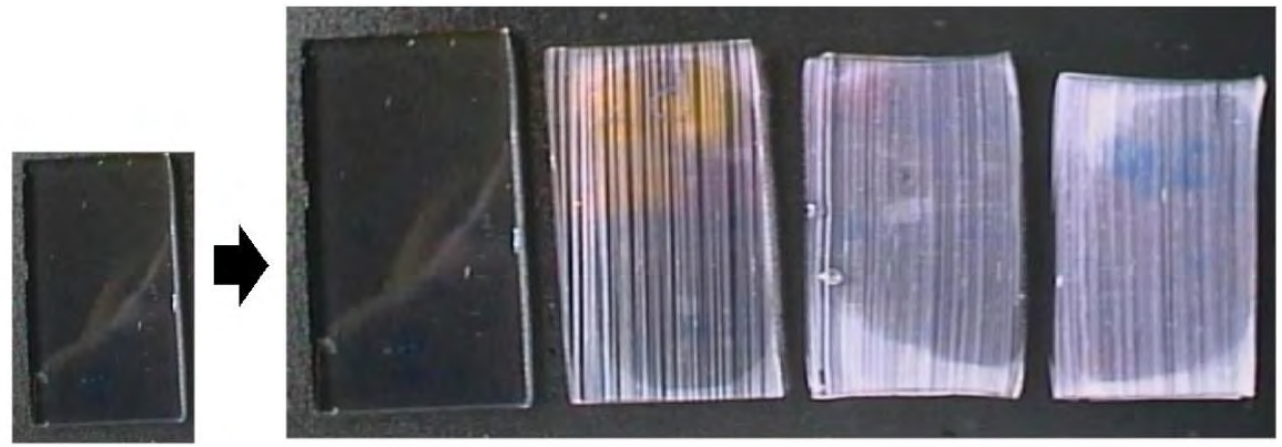
Water content

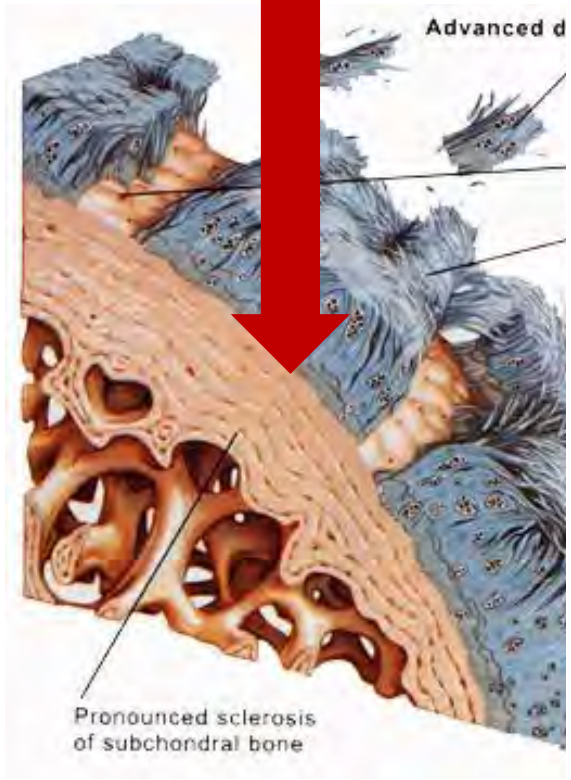


Stiffness

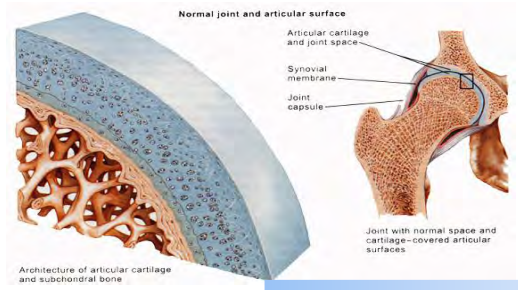
Load distribution

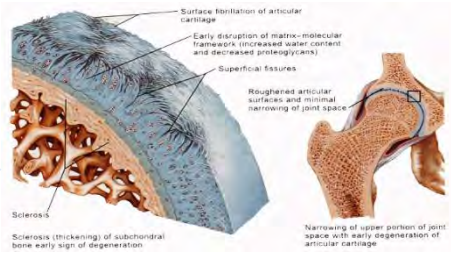

Restraint of collagen meshwork
Matrix expansion
H_2O

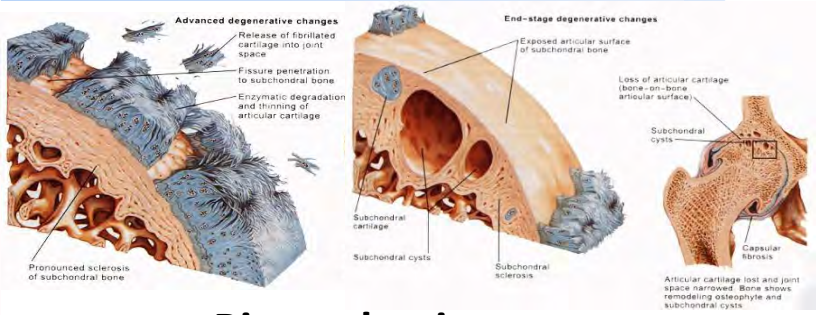



Advanced d
Pronounced sclerosis
of subchondral bone

Cartilage disorders and osteoartritis.





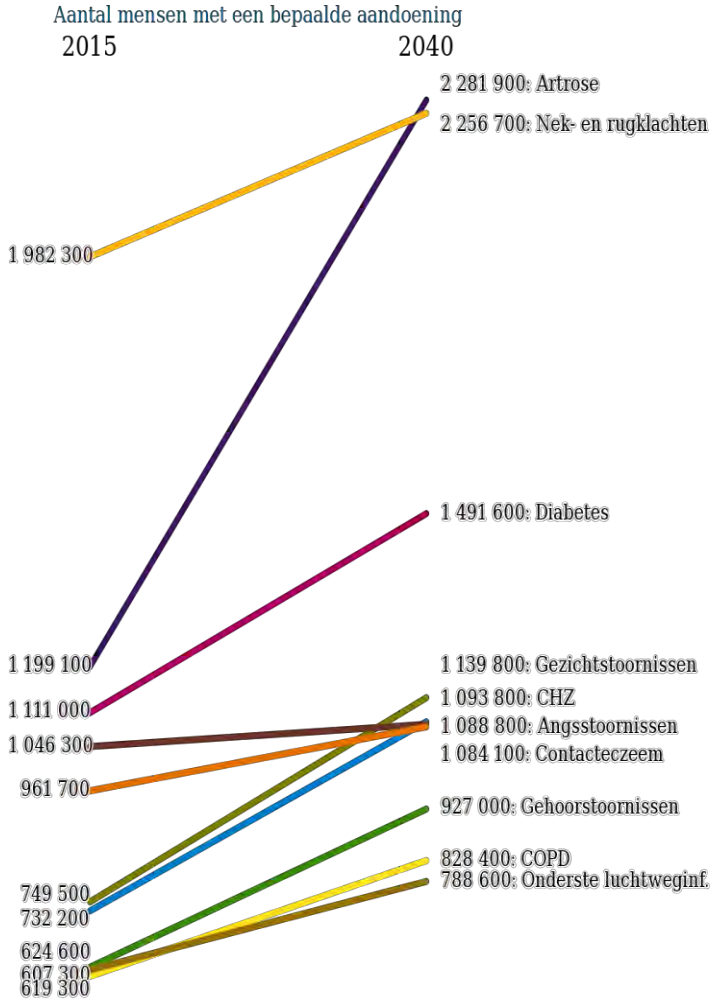


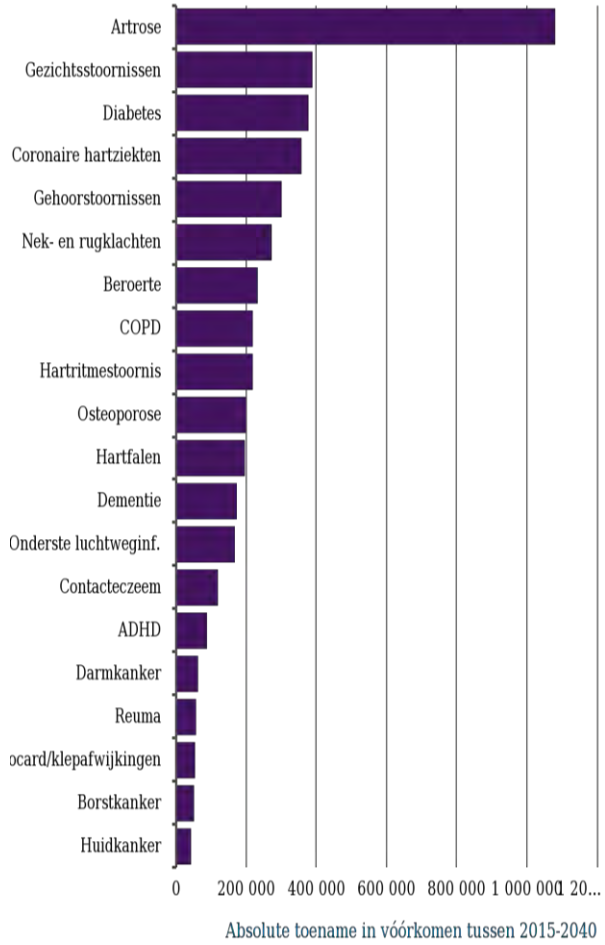
Biomechanica:

Biologie:

- Hereditary (poly)artritis
- Inflammation(disease)
- Race and sex
- Age

- Meniscus/ligaments
- Overweight/ level use
- Genetic shape
- Alignment
- Cartilage defect
- Age





Bron: NIVEL en andere bronnen, RIVM

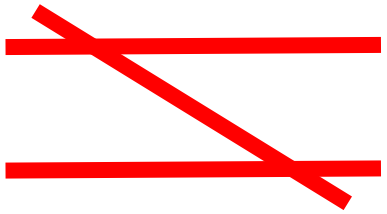
The 4 R's; The affected joint can be:

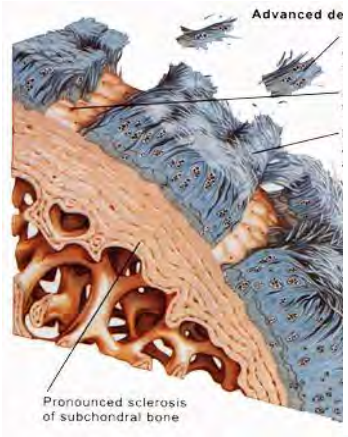
Resected = Arthrodesis

Relieved = Osteotomy

Replaced = Prothesis

Restored = Cartilage Repair





Goal short term: delay total joint prosthesis

50 years

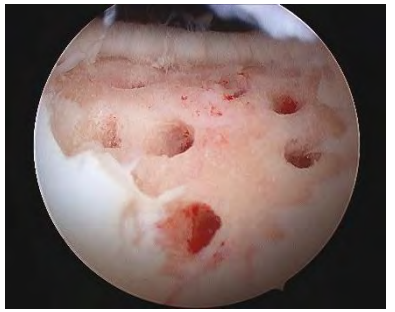
65 years

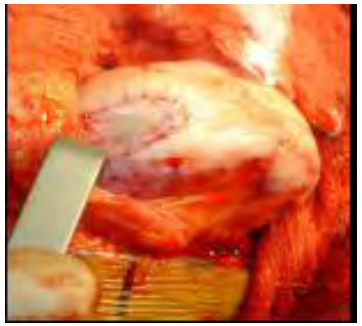
80 years

History and available treatments

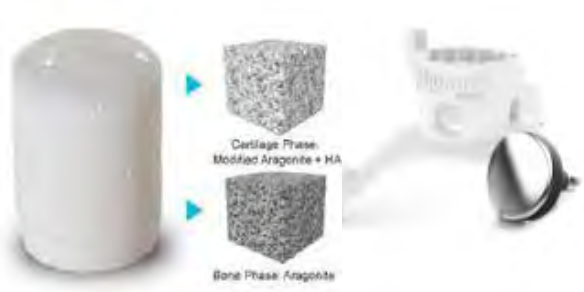
Microfracture +:
- Scaffolds:
  - collagen
  - hyaluronan
- Gels
  - Fibrogen/PEG
  - Chitosan/blood

Subchondral stimulation:
- Microfracture
- Drilling

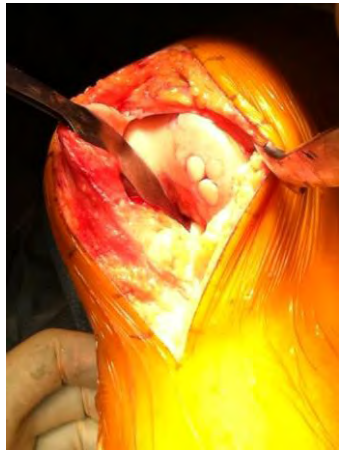




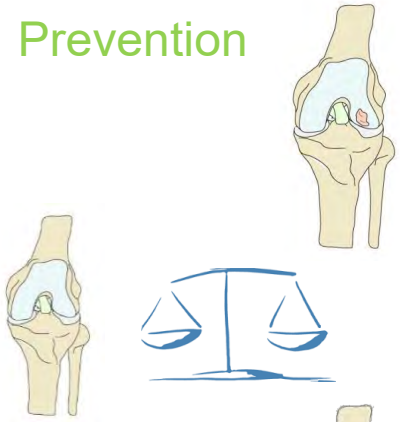
Cells:
- (M)ACT
- Micronized allogenic cartilage
- Mix stemcells with cartilage (cells)



Osteochondral:
- Autografs
- Allografts
- Implants:
  - ❖ Biomatrix
  - ❖ Agilli-C
  - ❖ Mayoregen
  - ❖ Metalic implant

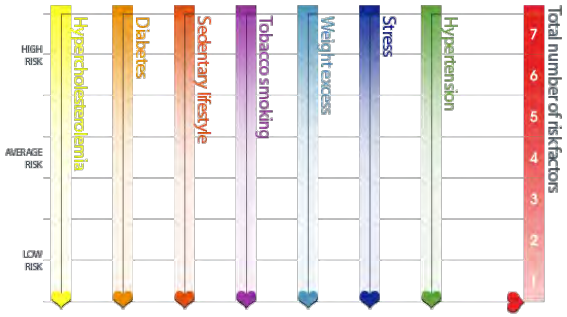


Prevention



Repair

Replace



Risk profile

Preventive measures

Injection therapies:

- **blocking/slow down OA**
- regenerate cartilage

Restore biomechanics:

- weightloss
- osteotomy
- sports/occupation advise
- patient specific small implants

Circle 1: defect characteristics

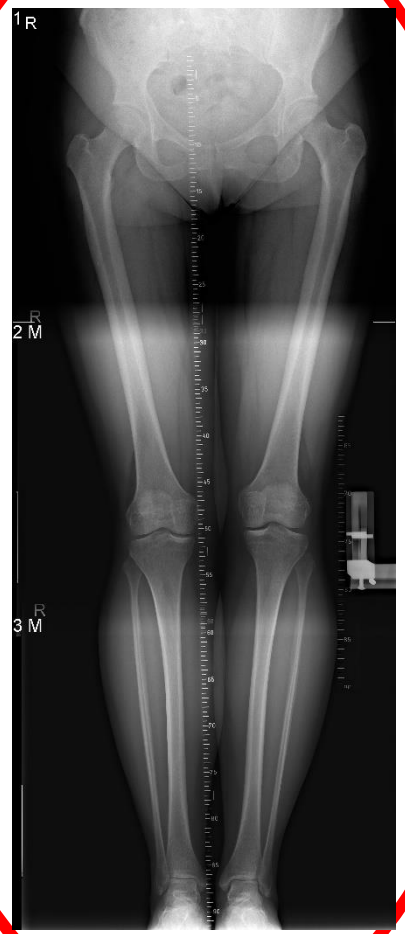
- Type of lesion; chondral, osteochondral, contained, uncontainded, shouldered, unshouldered, acute, chronic, failed precious treatement
- Location of lesion; condyles, trochlea, patella, tibia
- Size of lesion
- Age of the lesion

All different and no such thing as “a cartilage lesion”

Circle 2: the knee joint

- Concommitant injuries:
- Instability (e.g. MCL ACL, etc.)
- Meniscus lesion(s)
- Cartilage status adjacent and opposing cartilage
- Inflammotory diseases

Circle 3: the lower limb



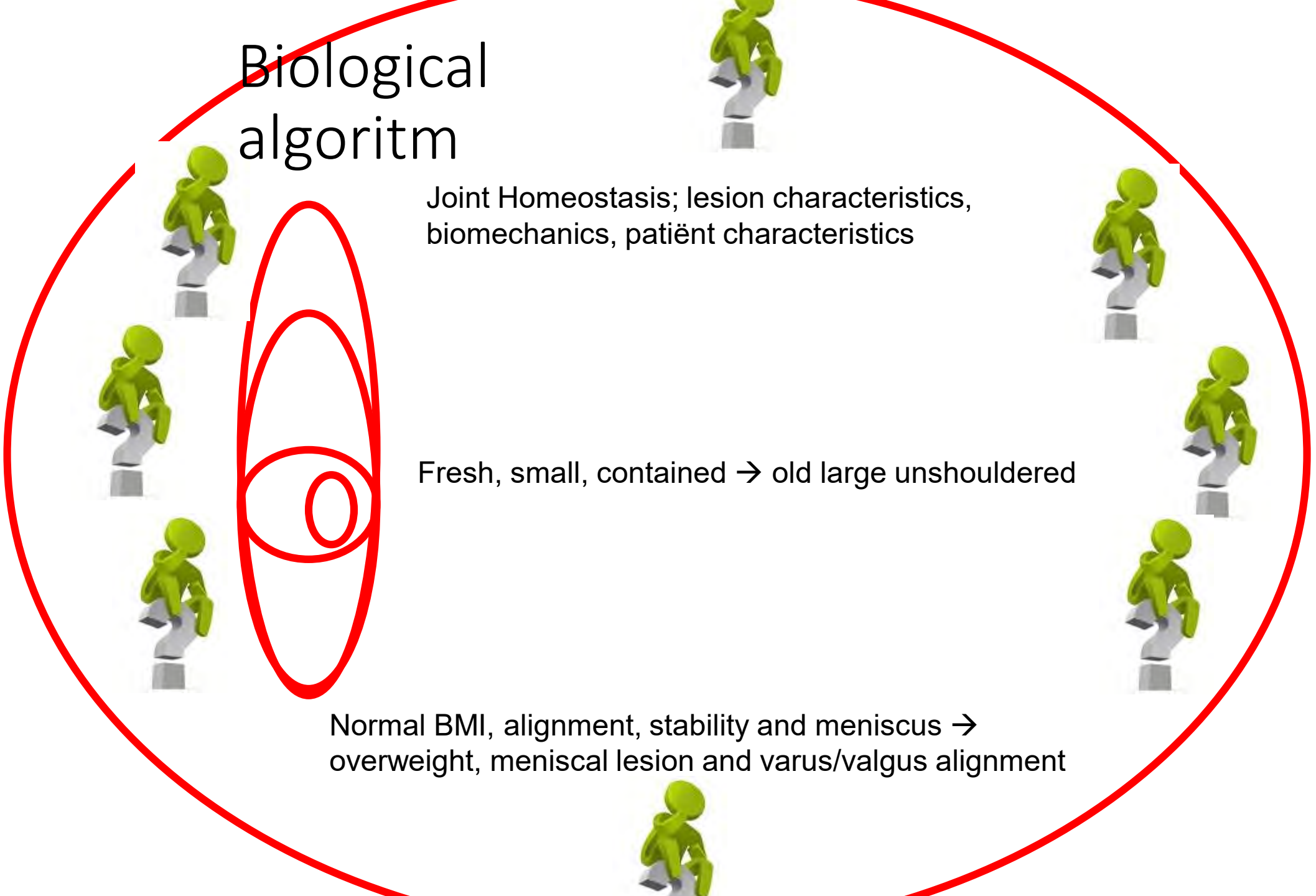
Leg alignment: varus, valgus

Patella tracking: TTD TTG, baja, alta, femoral rotation, leg alignment

Circle 4: patient

Age
Previous surgeries
Sports
BMI
Occupation
Commitment to physiotherapy

Biological algoritm



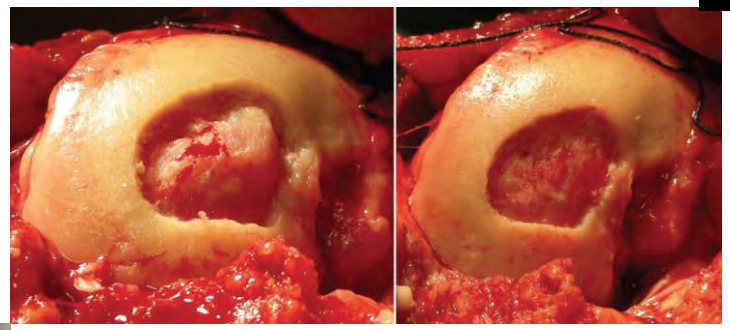
Joint Homeostasis; lesion characteristics, biomechanics, patiënt characteristics

Fresh, small, contained → old large unshouldered

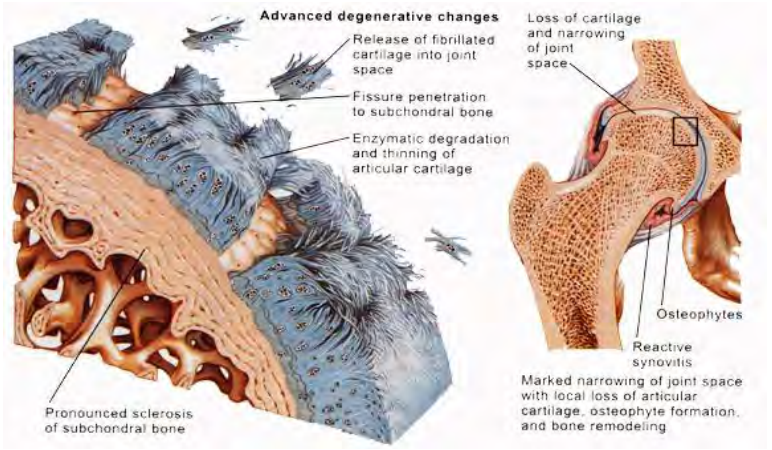
Normal BMI, alignment, stability and meniscus → overweight, meniscal lesion and varus/valgus alignment

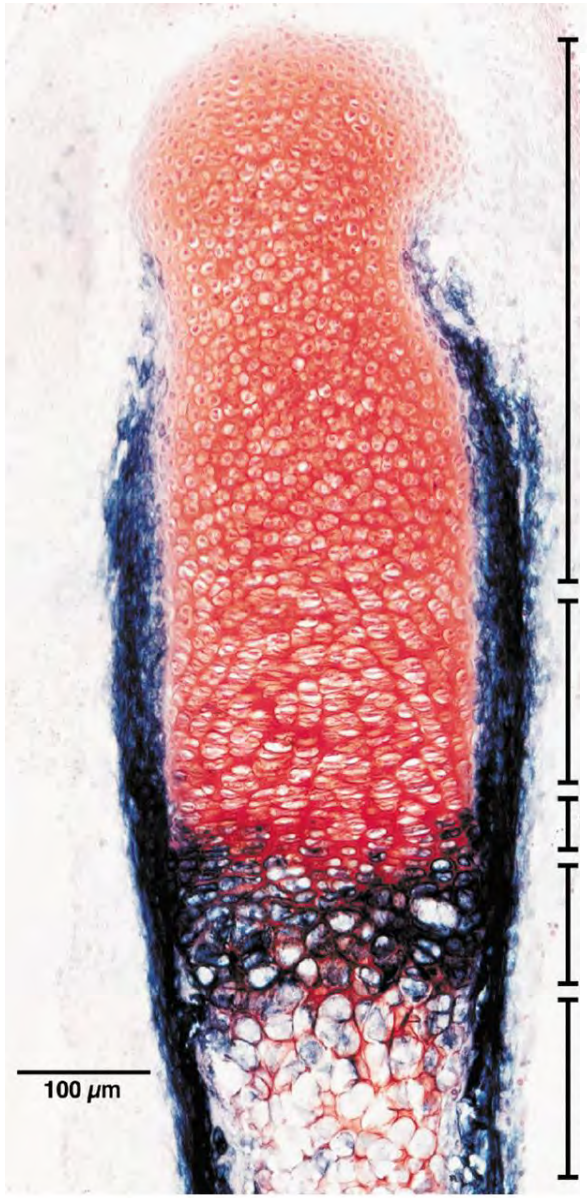
Our algoritm is often only considering circle 1.

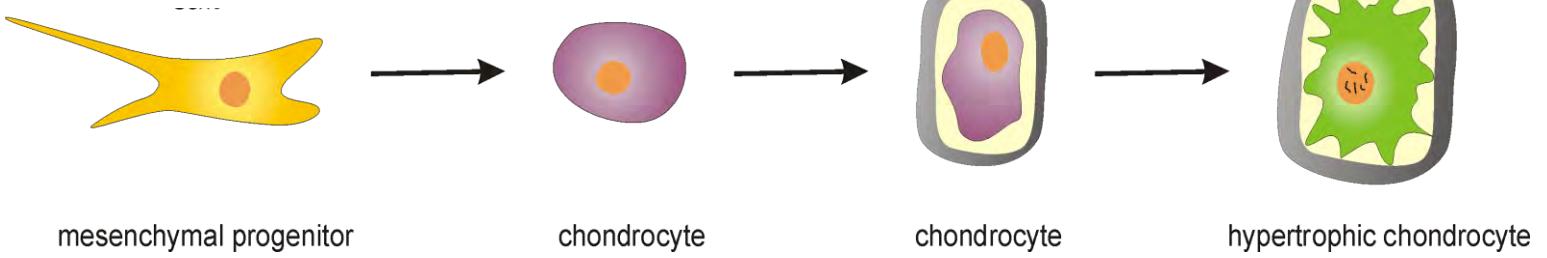
no bridges burned?



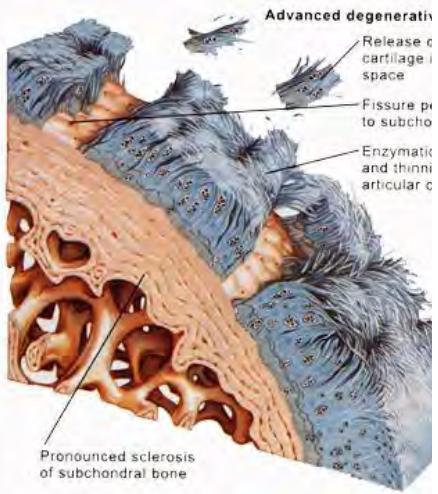
Age of defect and previous surgeries impact outcome of cartilage repair.



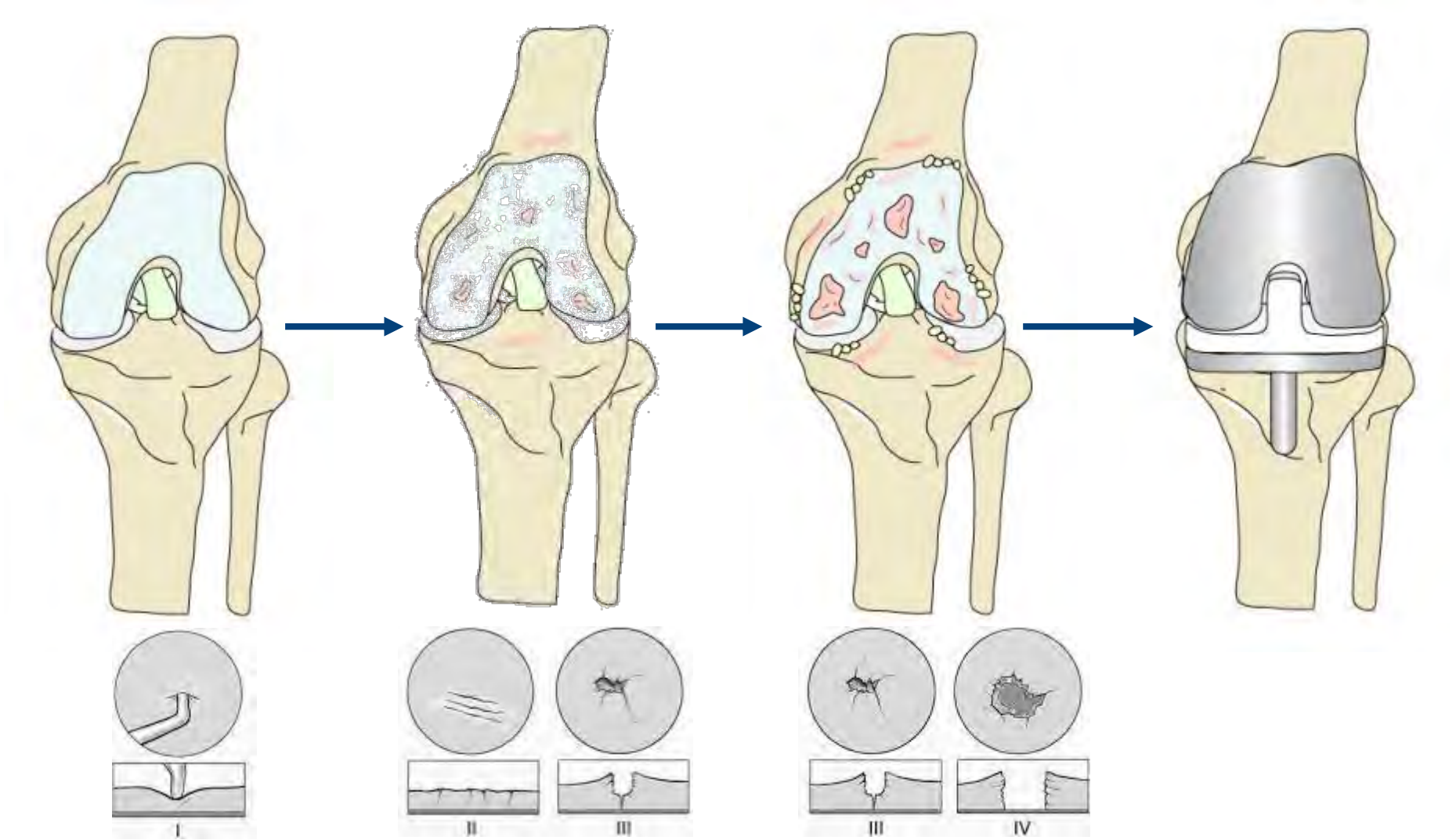

100 μm


mesenchymal progenitor
chondrocyte
chondrocyte
hypertrophic chondrocyte

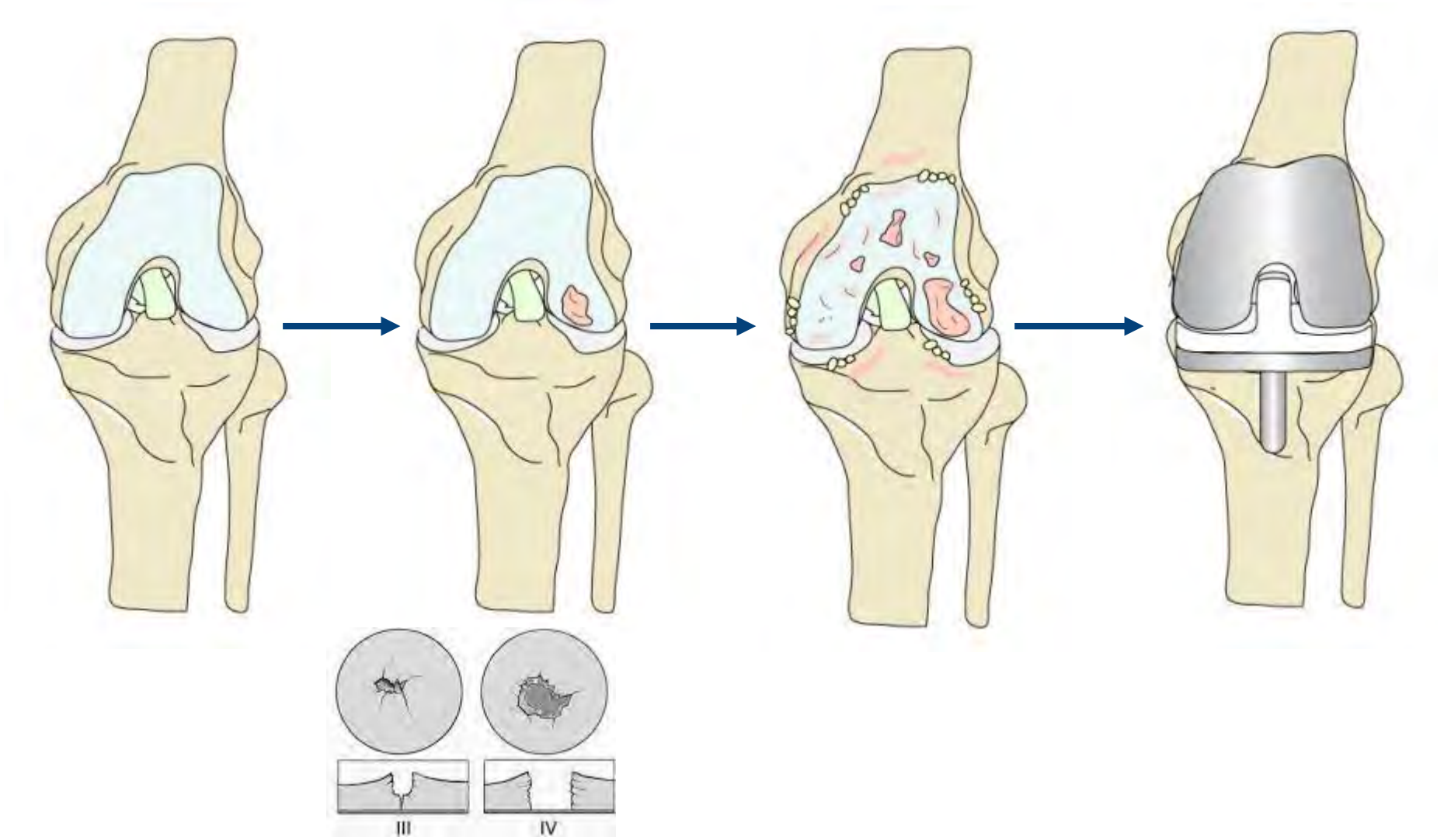

Gliding surface


Advanced degenerativ
Release
cartilage
space
Fissure
to subcho
Enzymatic
and thinni
articular
Pronounced sclerosis
of subchondral bone

Osteoarthritis of the Knee



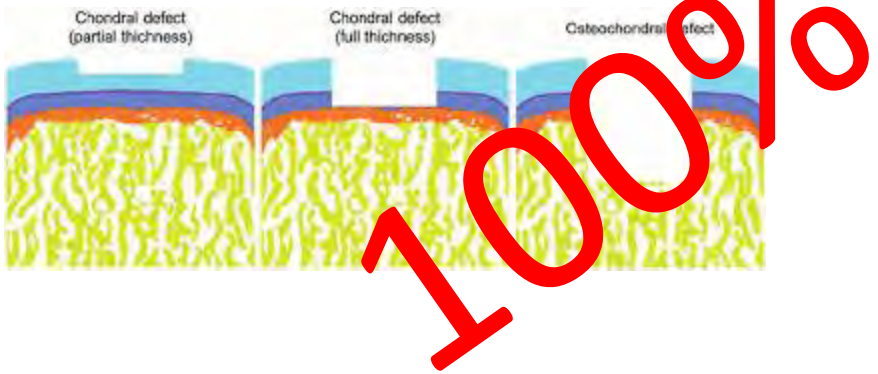
Focal Cartilage Defects



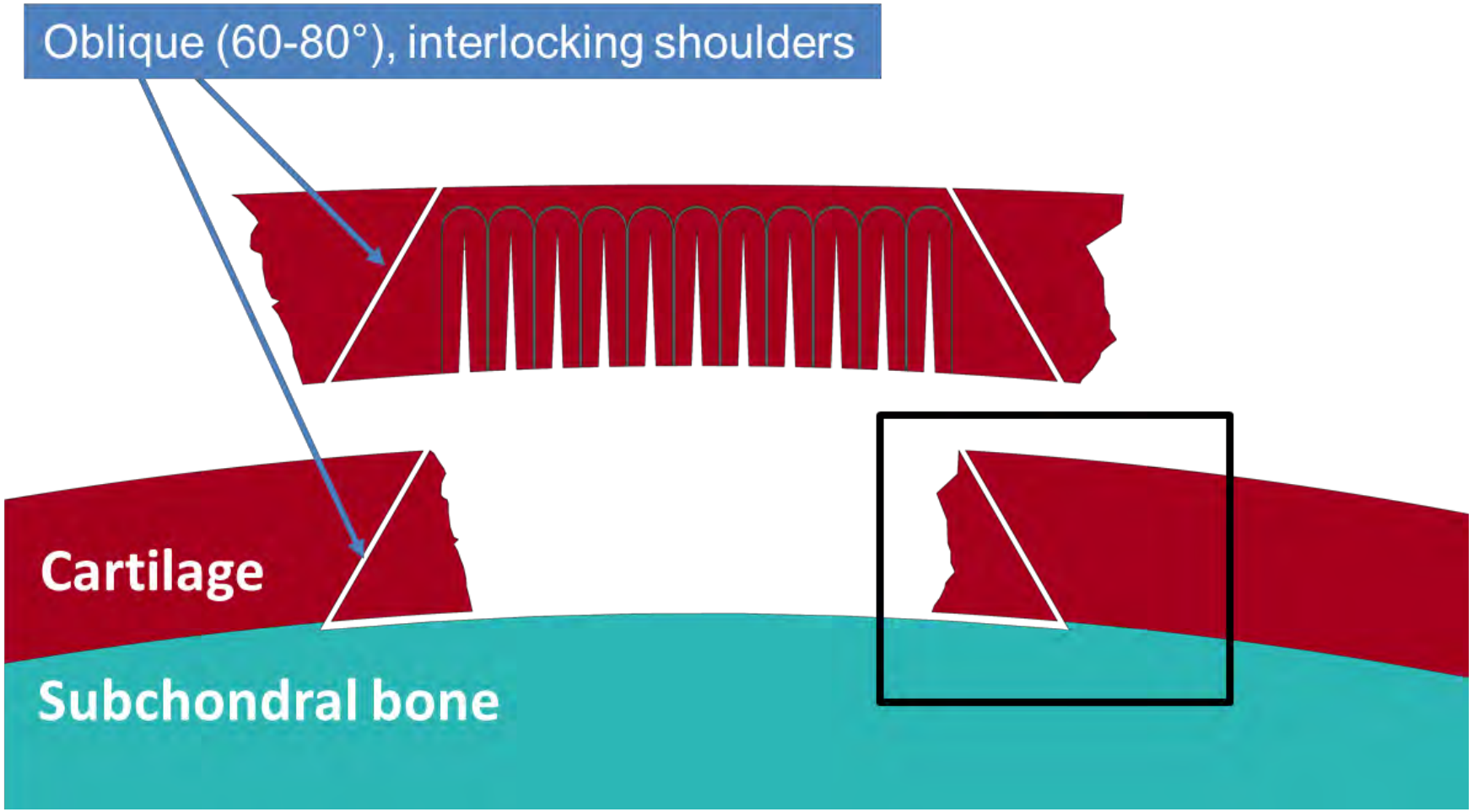
Circle 1: defect characteristics

- Type of lesion; chondral, osteochondral, contained, uncontainded, shouldered, unshouldered, acute, chronic, failed precious treatement
- Location of lesion; condyles, trochlea, patella, tibia
- Size of lesion
- Age of the lesion

All different and no such thing as “a cartilage lesion”

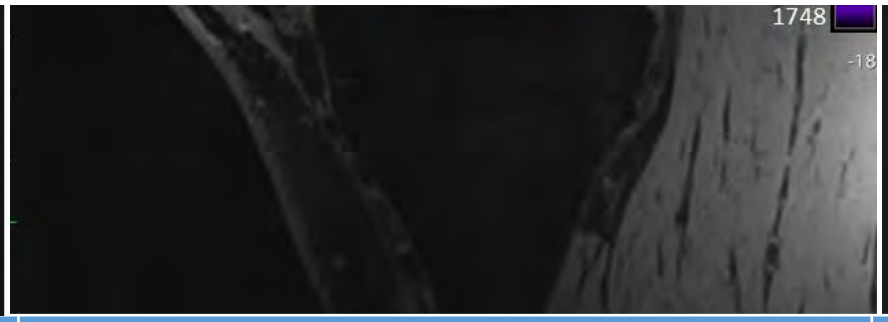


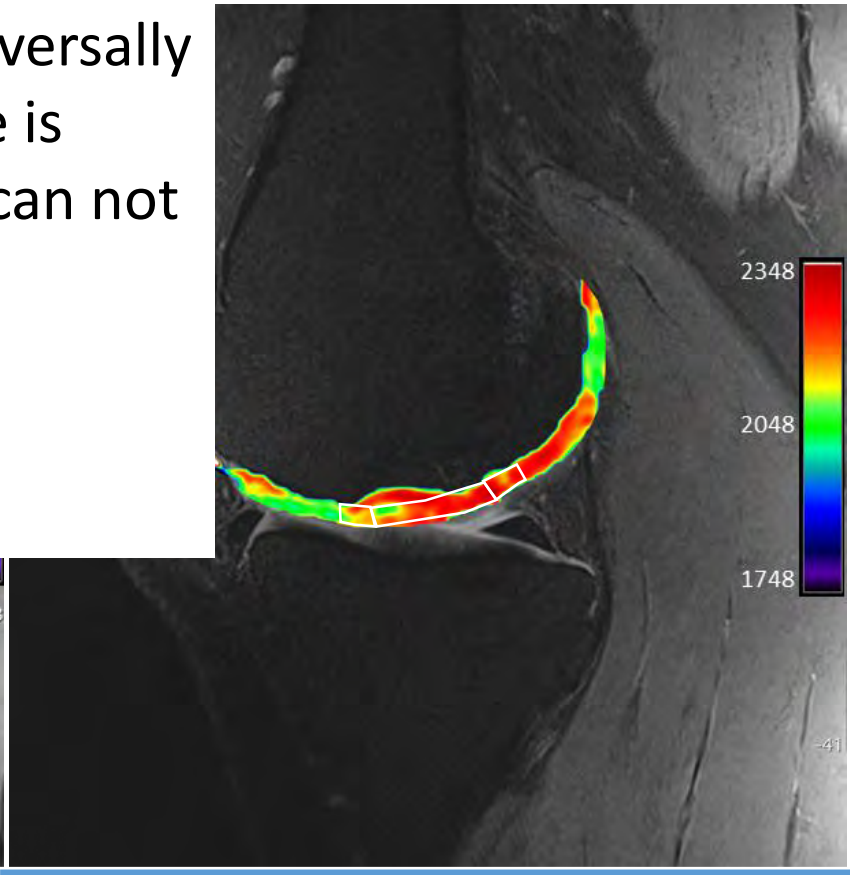
Surgical Procedure – Modified Hedgehog Technique



Jeuken et al. 2019

Follow-up by 7.0T MRI – biochemical composition





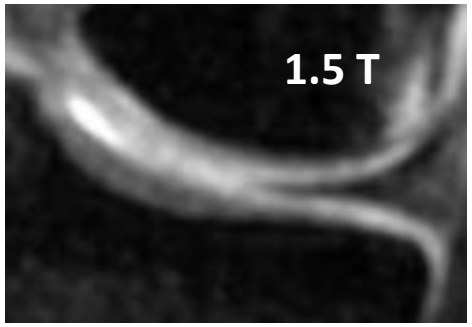
"Since Hippocrates and until now, it is universally accepted that the ulcerated cartilage is embarrassing and that, once destroyed, can not be repaired"

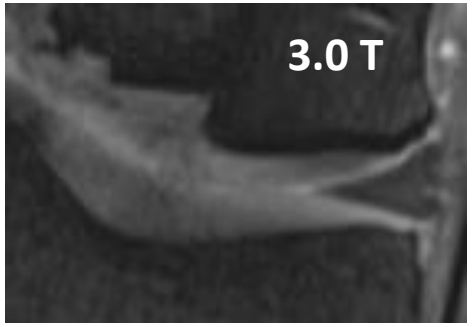
William Hunter

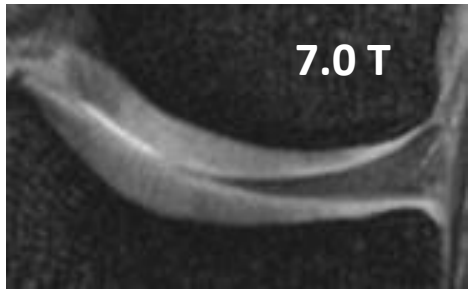
Dogma Challenged?

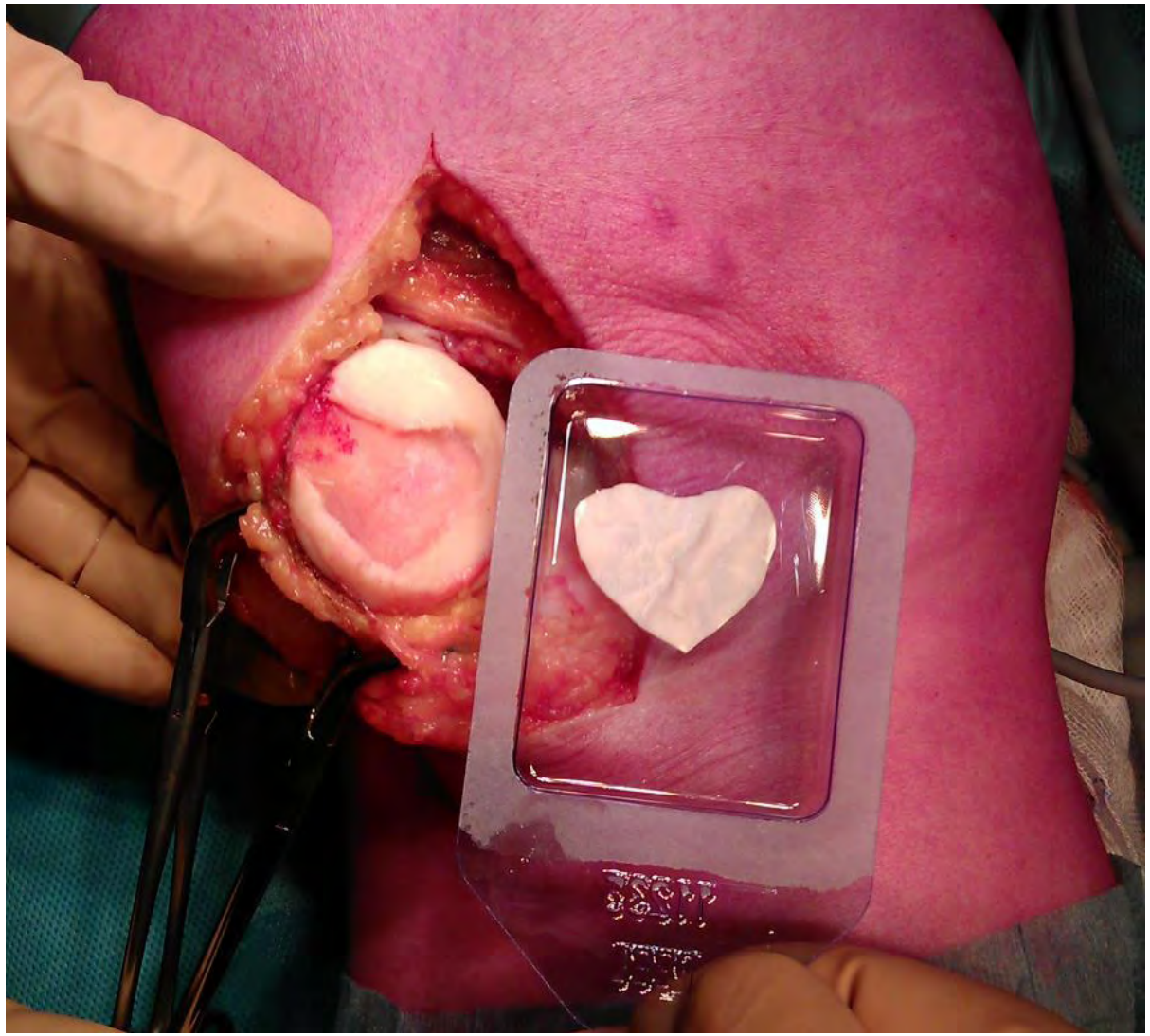
healthy knee	3 months after surgery			1 year after surgery		
control cartilage: 6.1 %	**adjacent: 1.5%**	**defect: 3.6%**	**adjacent: 1.9 %**	**adjacent: 4.9%**	**defect: 5.6%**	**adjacent: 5.4 %**

Questions









Courtesy of Daniel Saris