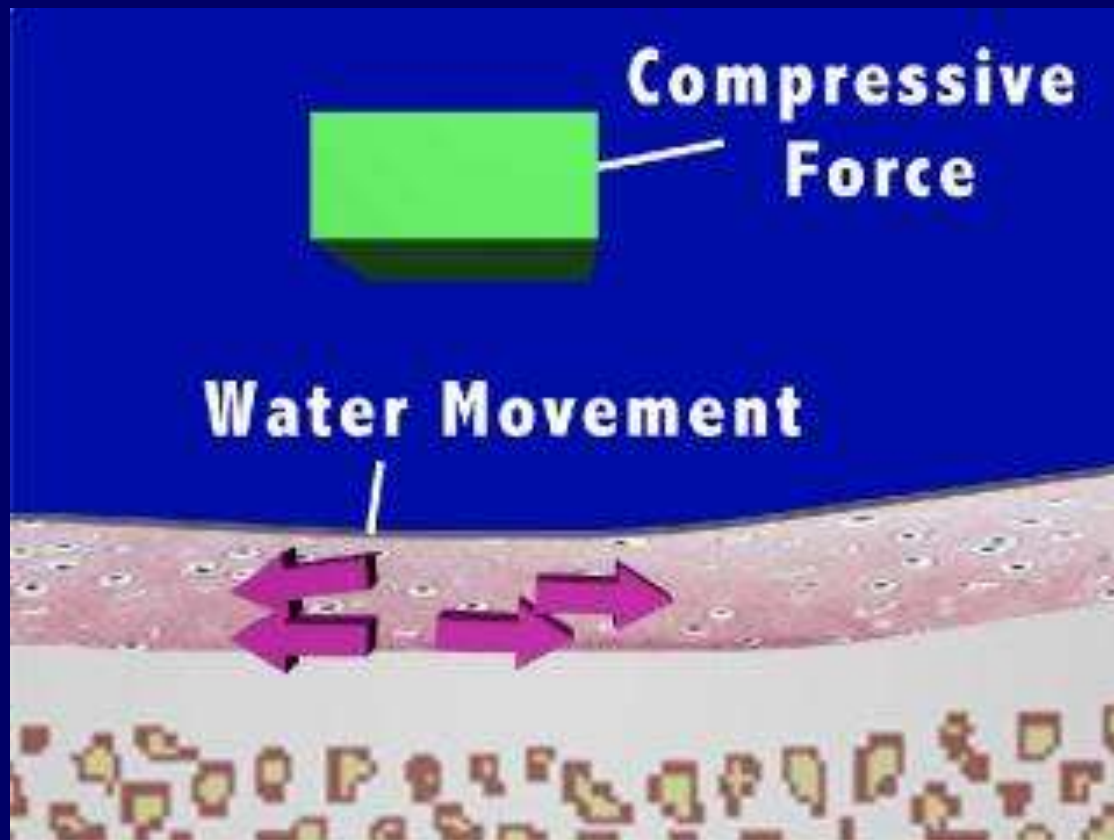



New options for an old problem – OA knee

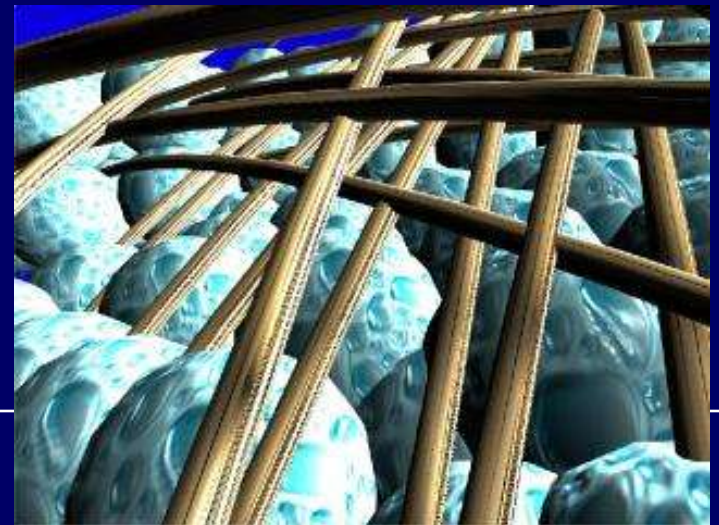
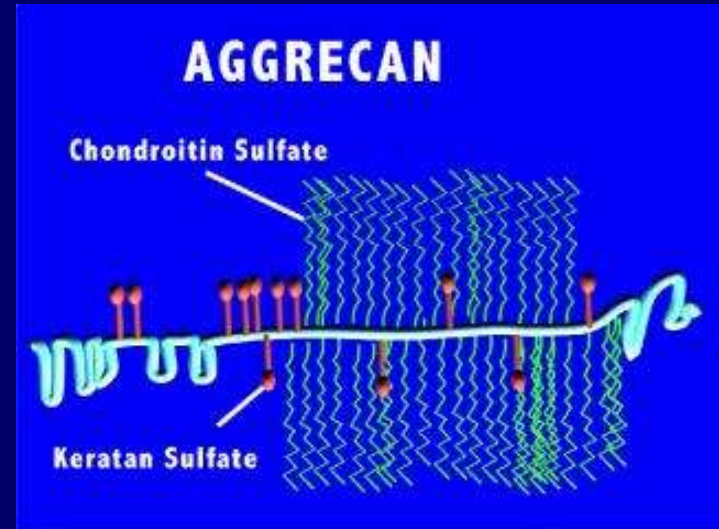
Gary Hooper
Christchurch

Normal articular cartilage



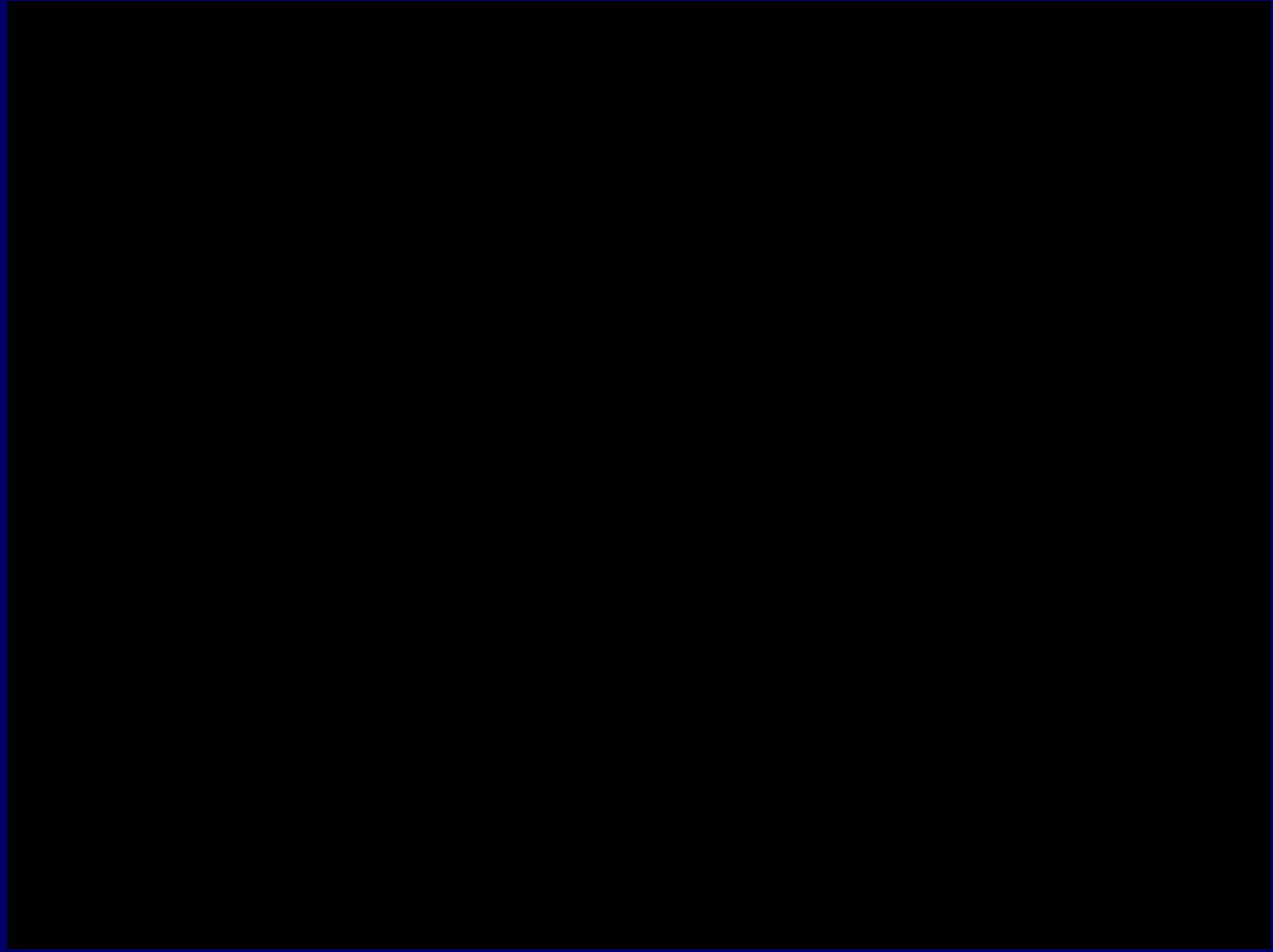
Normal articular cartilage

- Large proteoglygans attract water
- Collagen holds hydrated molecules together



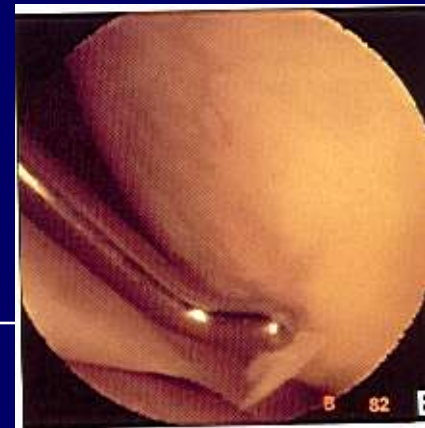
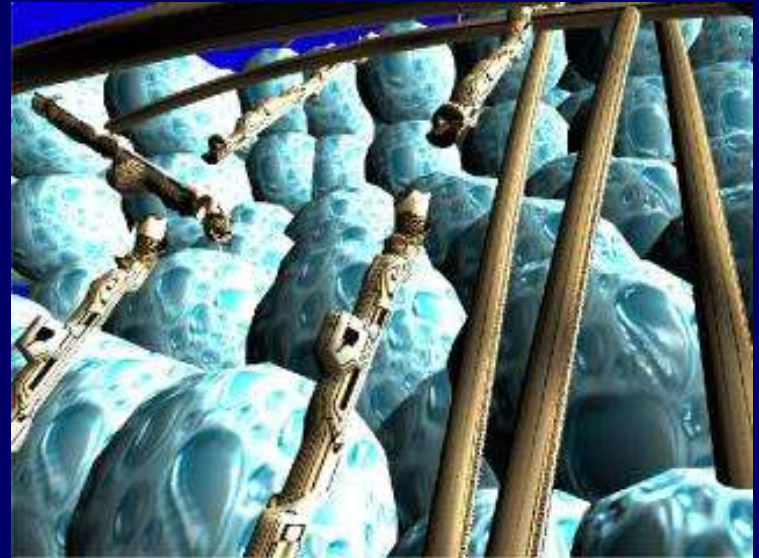


Normal articular cartilage



Early degeneration of articular cartilage

- Disrupted collagen causing water to escape

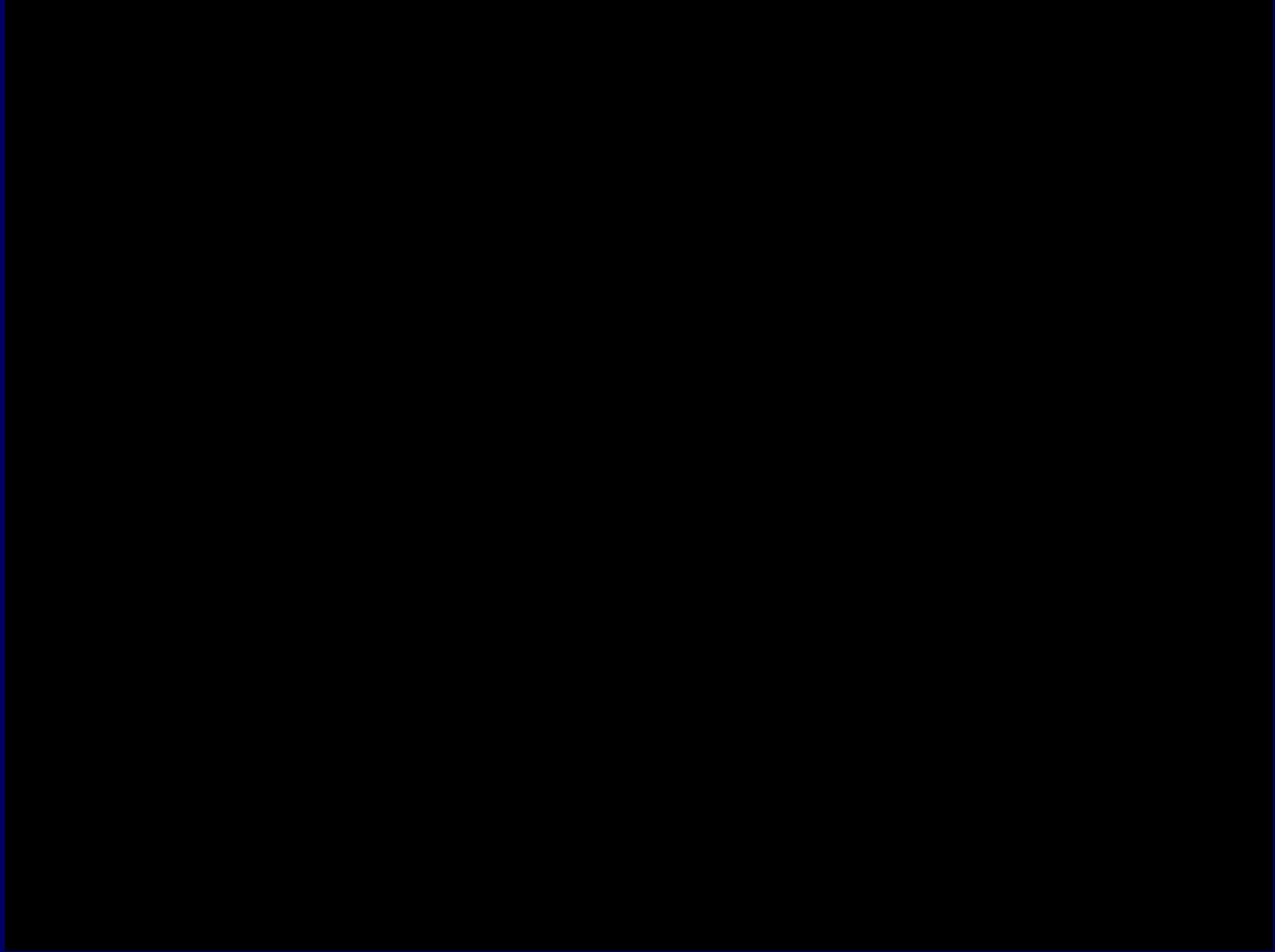
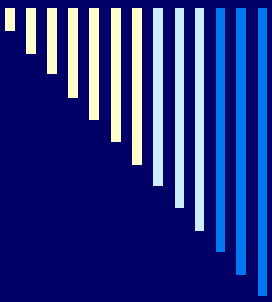




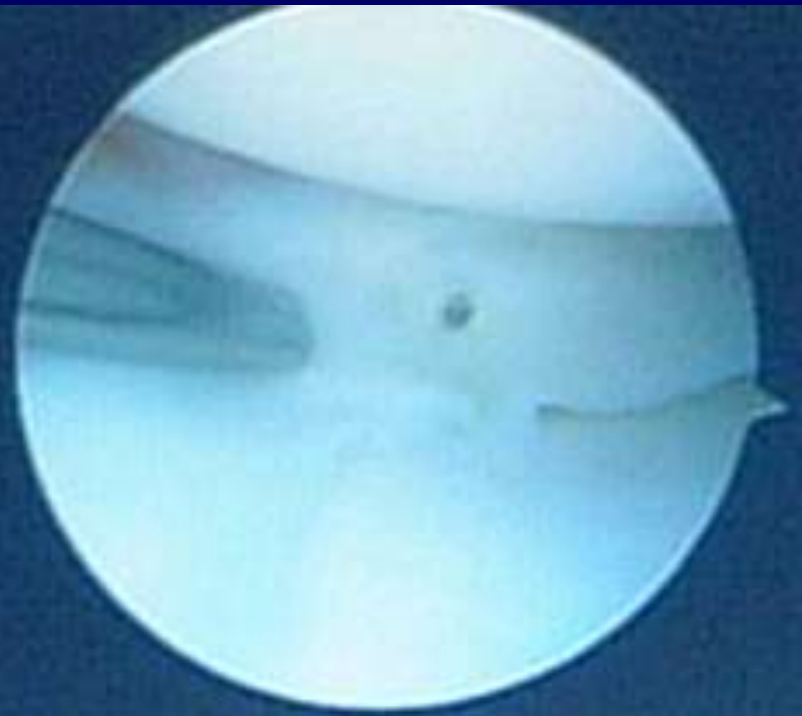
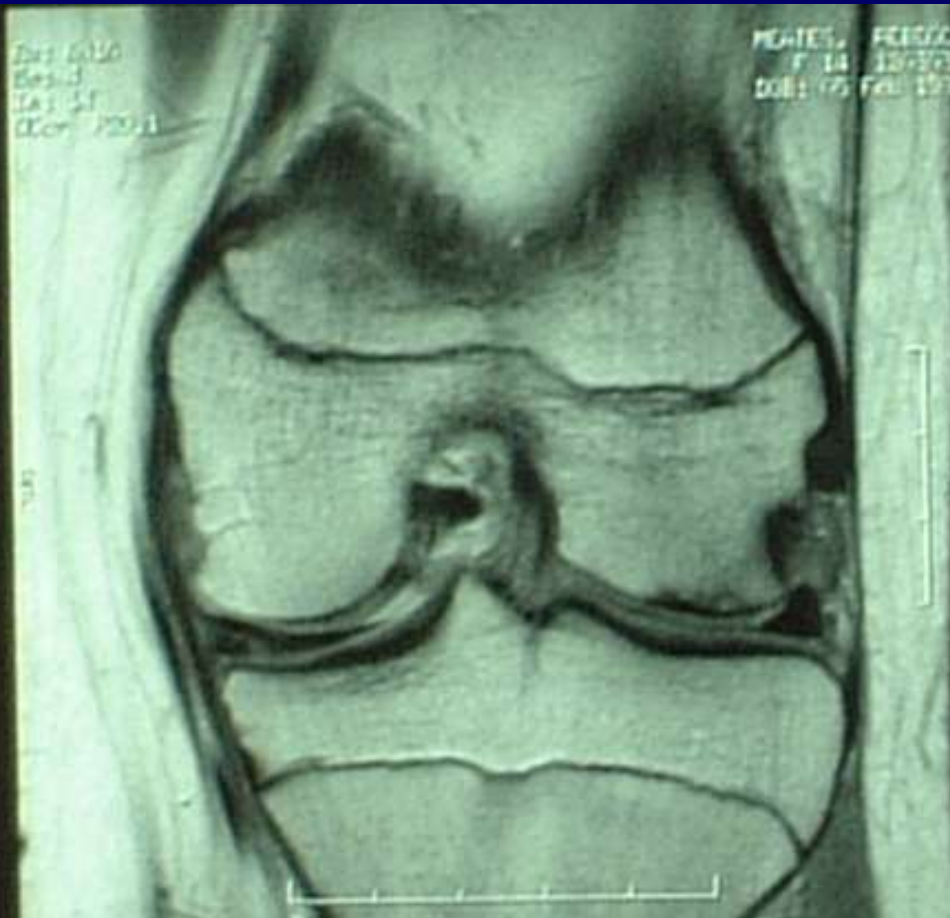
Prevention of articular damage

Meniscal function

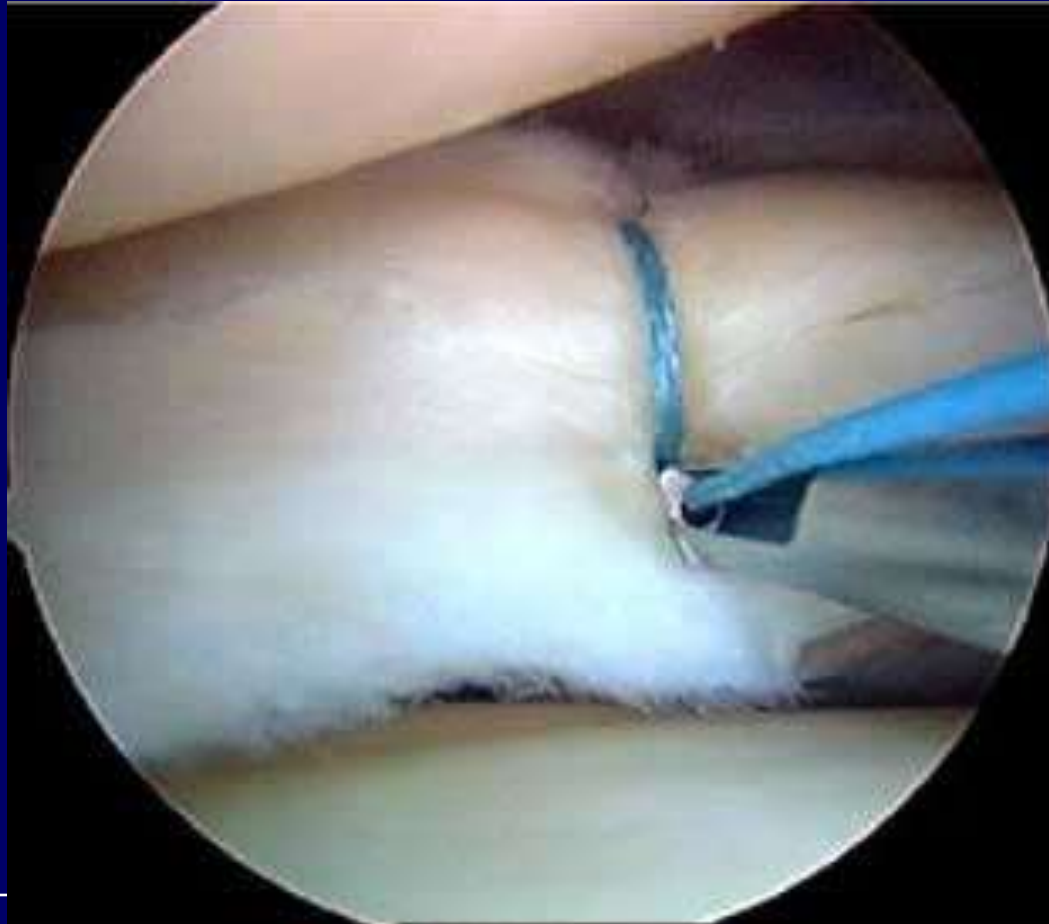




Meniscal repair



Meniscal repair



Meniscal transplantation

□ Allografts



□ Collagen implants





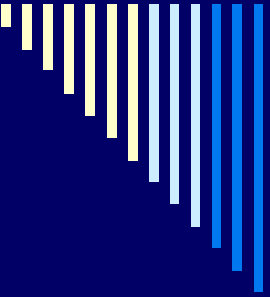
Meniscal transplantation





Protect articular cartilage

- Decreasing abnormal forces across articular cartilage = decreased wear and early degeneration
-

- 
- Abnormal biomechanics with excessive medial load

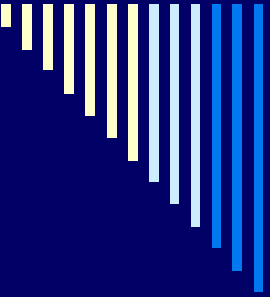


Abnormal load









Dealing with articular cartilage damage



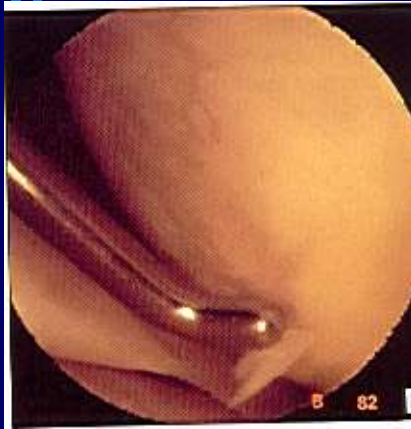
1 Debridement and microfracture

2 Grafting procedures

3 Replacement



Articular cartilage damage

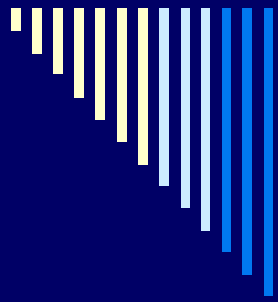


Grade 1 and 2

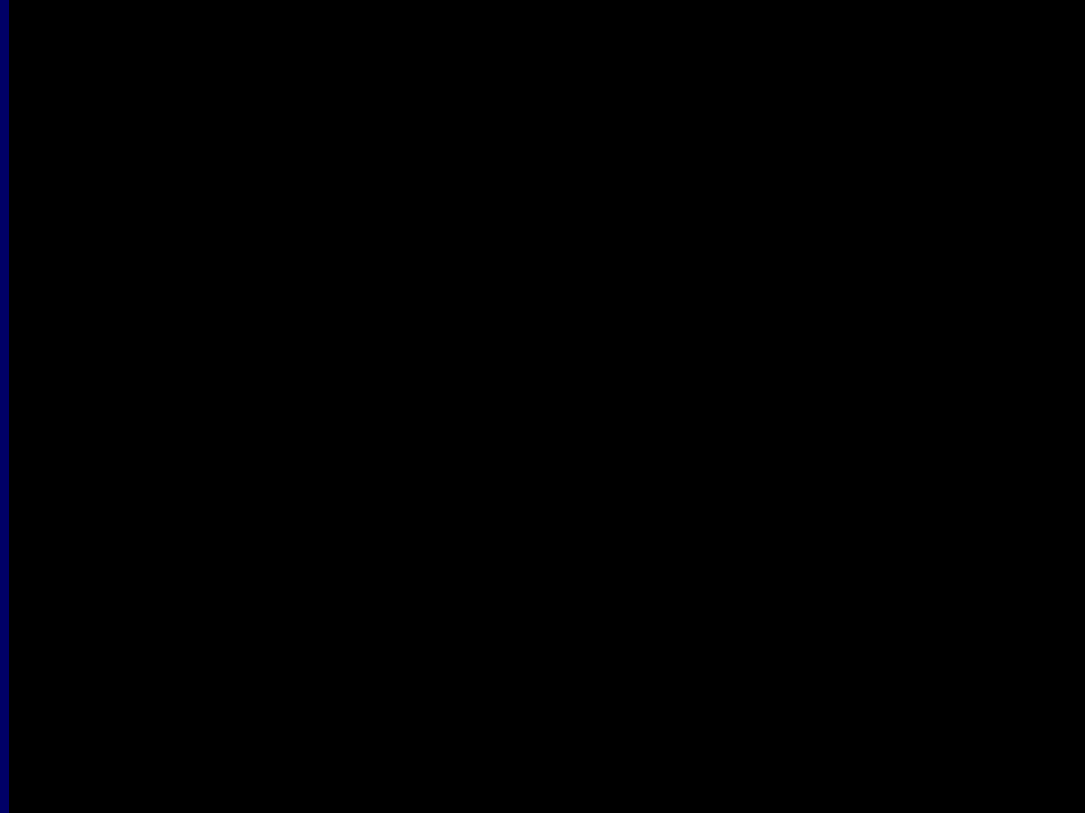


Grade 3





Debridement



Microfracture

- Multiple holes through subchondral bone to promote vascular response and formation of fibrocartilage

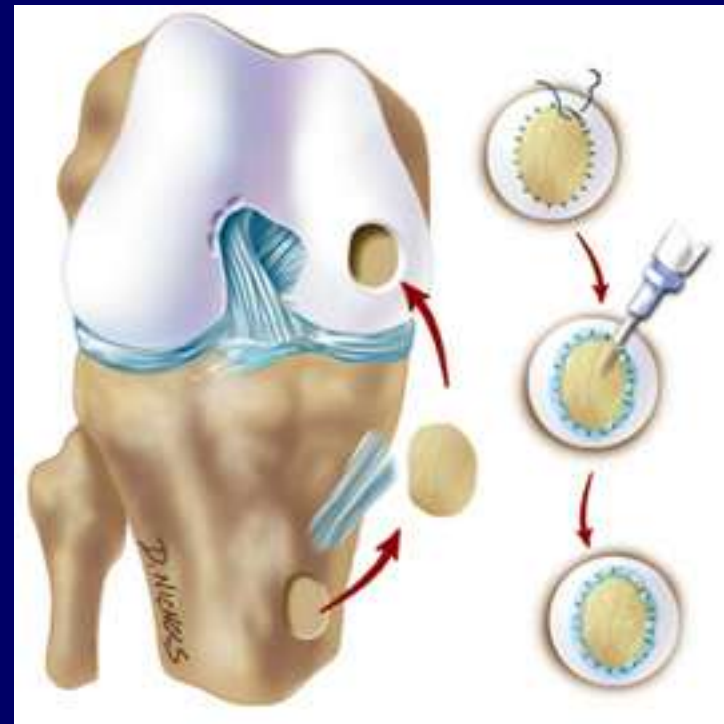


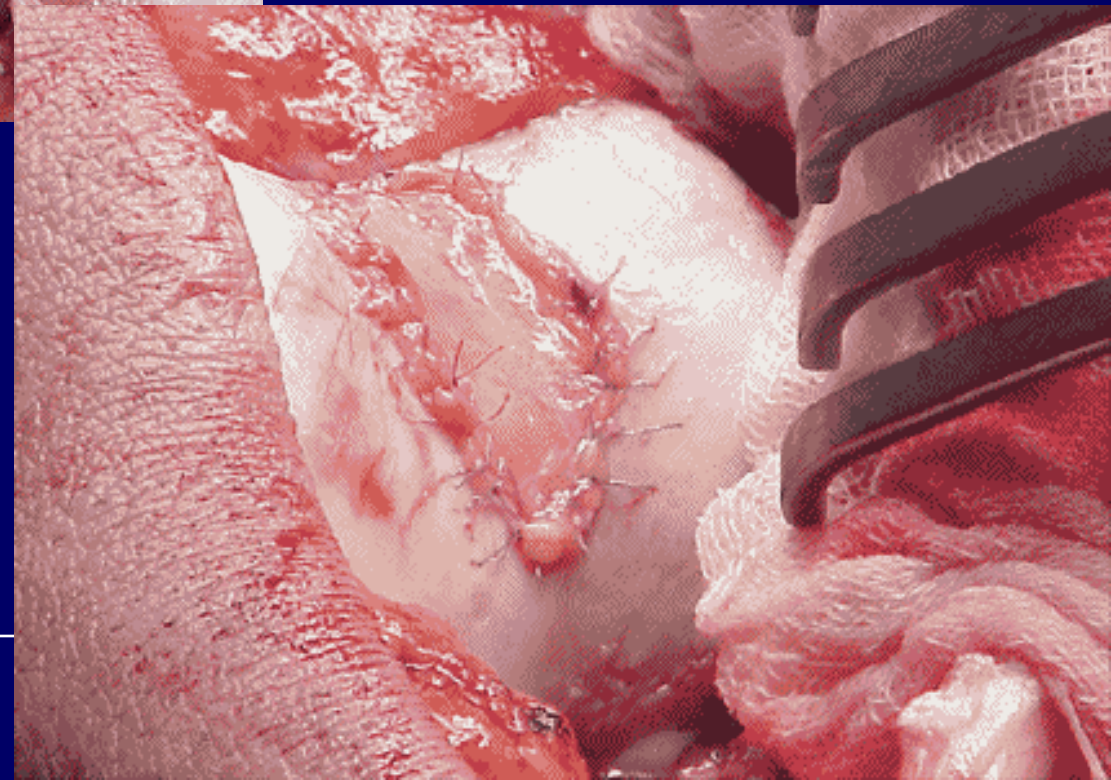
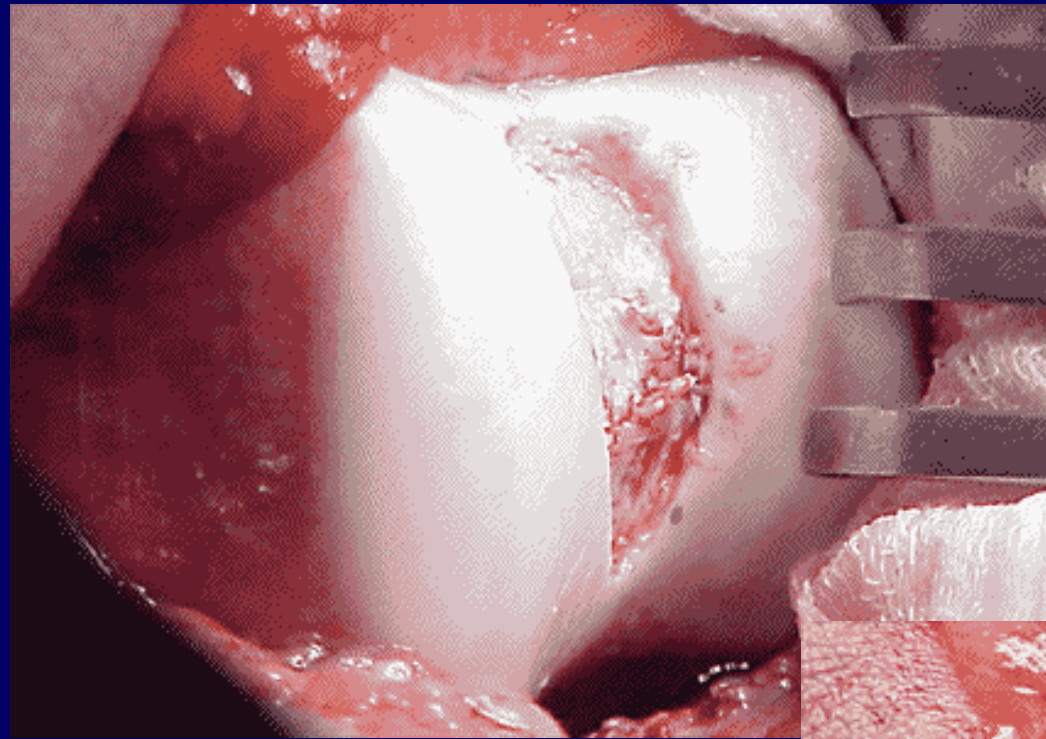


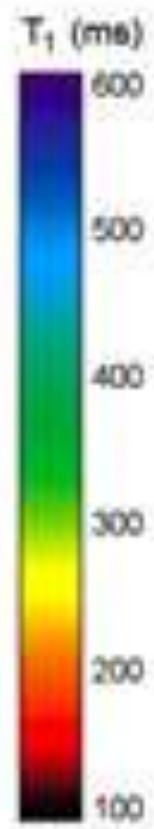
Chondral grafting

Regenerate articular cartilage

□ Autologous chondrocyte transplantation



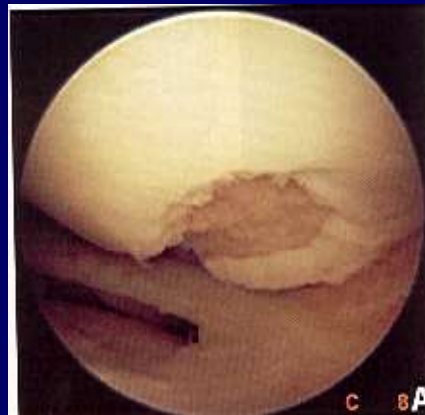




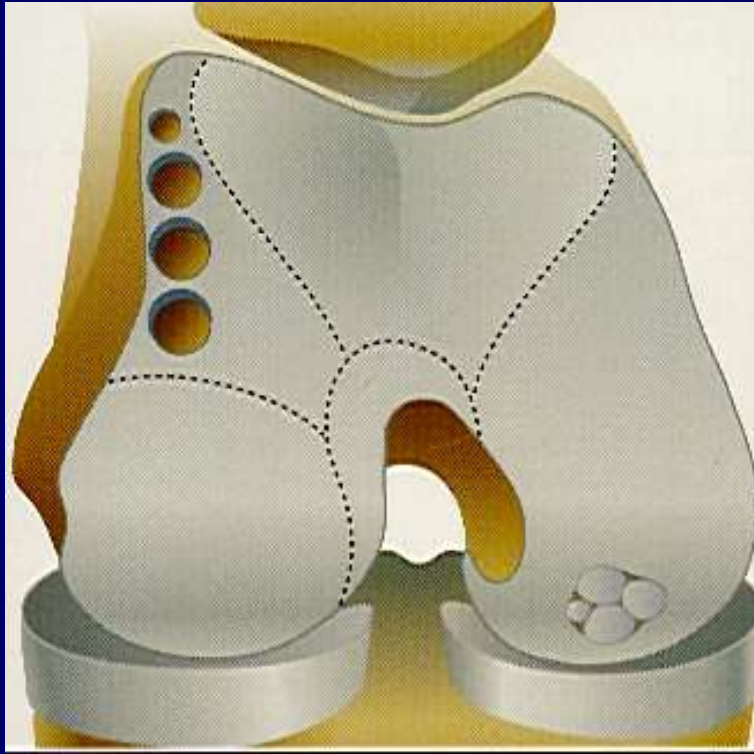
dGEMRIC MRI 1-year-FU



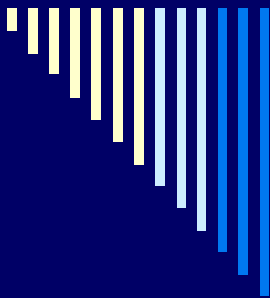
Osteochondral grafting



Repair – osteochondral grafts







MRI RIGHT KNEE
SAG PD
Se: Aug 6, 2006 10:07:31 AM
Acc #1709837-MR
Se: MR #5
Im: 7/28
ET: 8
TR: 3000.0ms
TE: 32.568ms

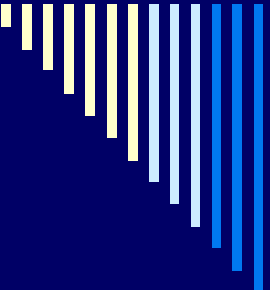
St Georges Radiology
[LOWE^JODENE^MAREE]
[Feb 12, 1970]
[F][036Y]
[ASR9995]



A

P

512x512
Zoom: 104 %
Compression: 8:1
W: 12825 L: 6412
3.5mm thk / 3.5mm sep



Tissue engineering CReATE – Dr Tim Woodfield

- Christchurch to the forefront studying scaffolds to deliver genetically engineered cells to tissues eg spinal injuries, articular cartilage defects
-

The Problem: tissue trauma, disease & repair



Articular cartilage degeneration and OA

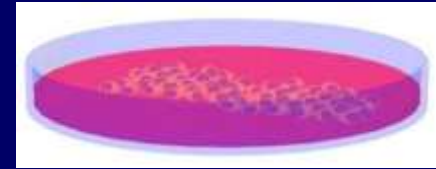
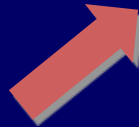
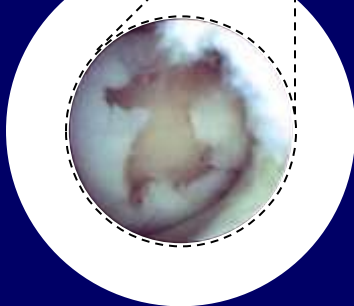
Tissue Engineering & Regenerative Medicine



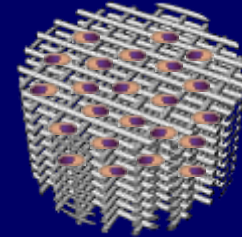
- Regenerative Medicine research is what happens when you mix biological science with engineering
 - This broad field encompasses a variety of research areas ...
 - ...cell therapy, tissue engineering, biomaterials engineering, growth factors and transplantation science.

2000 – *Time* magazine - career in tissue engineering one of the “10 Hottest Jobs of the Future.”

Tissue Engineering: the concept



Place cells on flat surface
⇒ NO TISSUE FORMS ❌



Place cells in porous 3D
scaffold ⇒ 3D TISSUE FORMS ✅



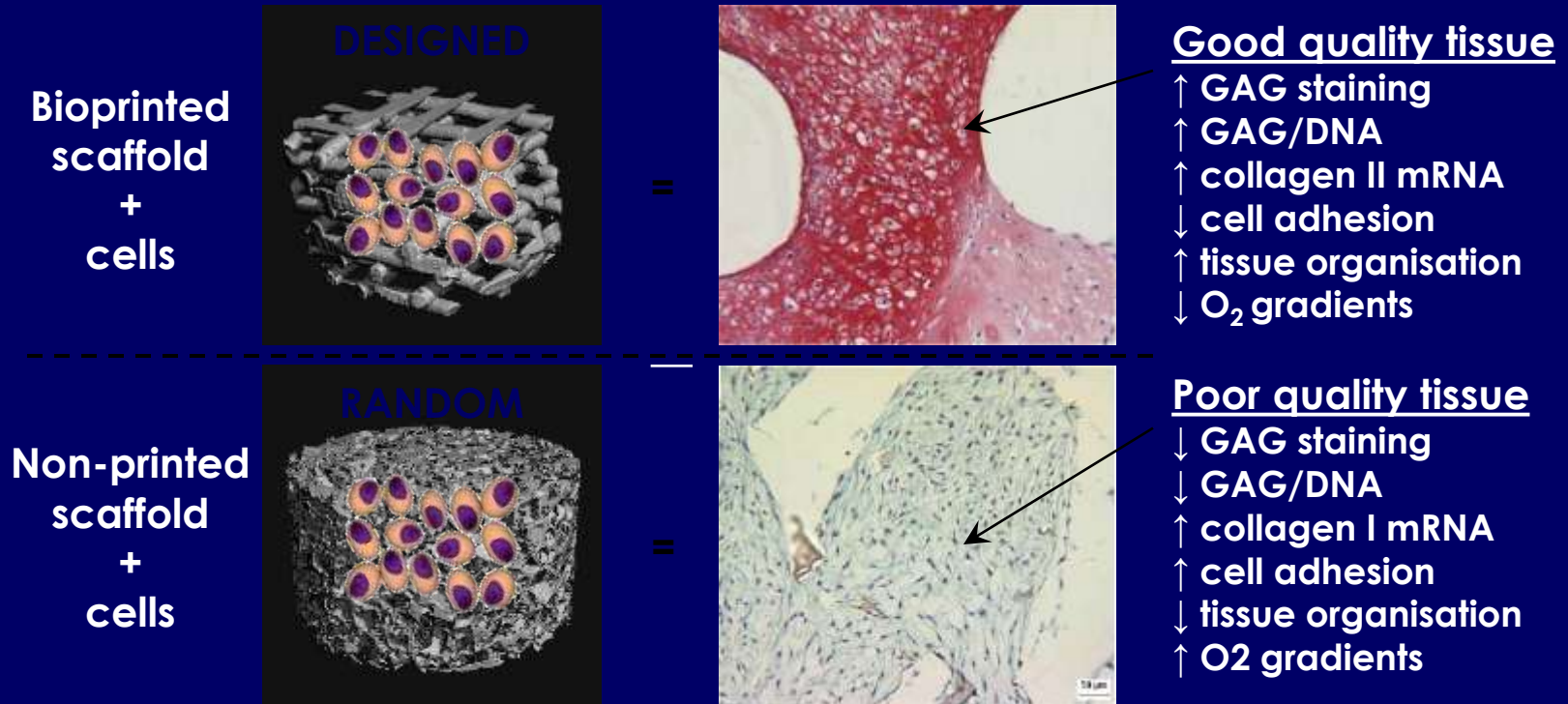
Patient's own repair tissue implanted back into the damaged knee. The cartilage layer heals completely as scaffold biodegrades over time

Cells CREATE new Tissue Engineered cartilage *in vitro*

In vitro culture & cell (re)differentiation

The Key Result:

NOT all scaffolds and engineered tissues are CReATEd equal !



SYNERGISTIC effect of both architecture & composition



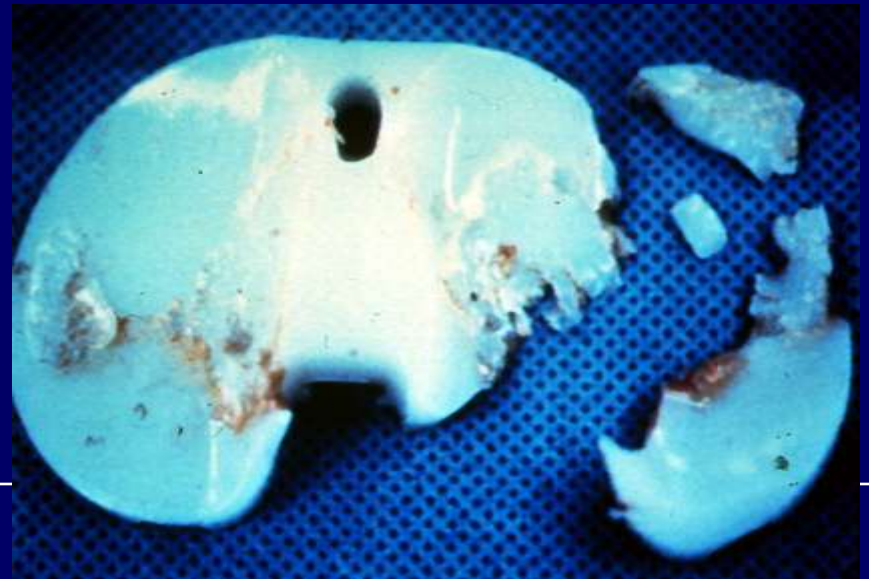
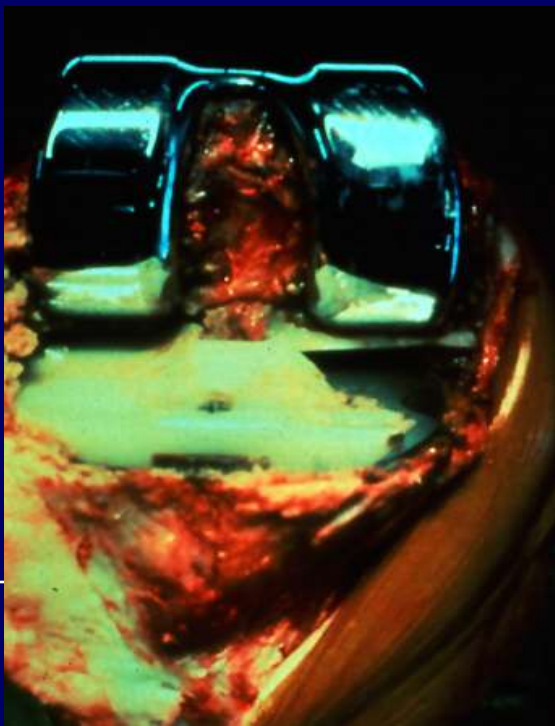
Joint replacement

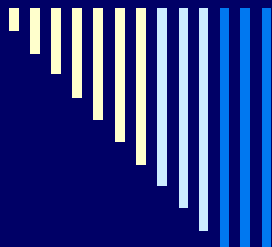
- ❑ Reliable in relieving pain
 - ❑ Major surgical procedure
 - ❑ Complications include infection, clots, dislocation
 - ❑ Long term problems are loosening and wear of the components
-



Experience with rigid bearing TKA

- Excessive wear of polyethylene (6mm)
- Fracture of medial tibial baseplate







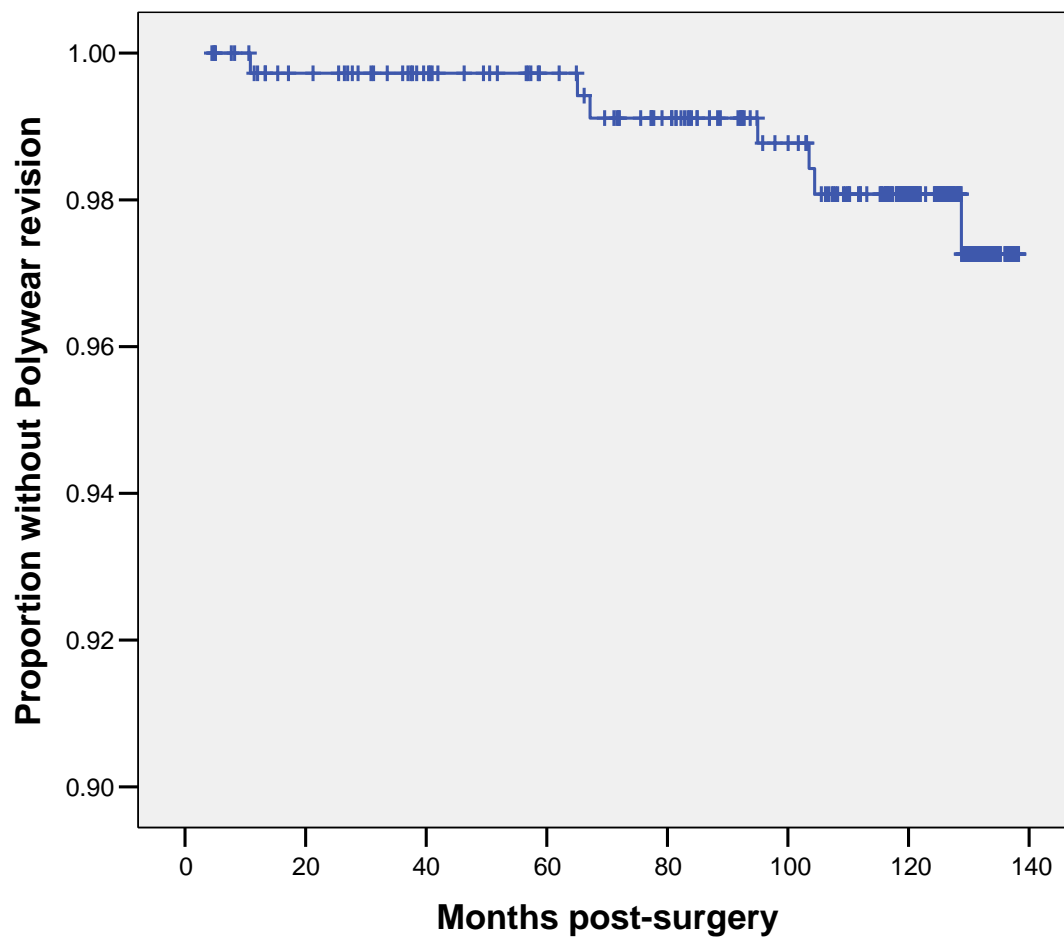
Results

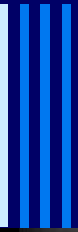
	KS P	KS F	NJKS	WOMAC
Preop	36.64	44.21	60.51	54.84
Year 1	82.47 *	62.81*	82.32*	19.26*
Year 3	87.45*	63.04*	84.22*	18.34*
Year 7	86.93*	59.79*	83.34*	25.55*
Year 10				27.56*

* p<0.001



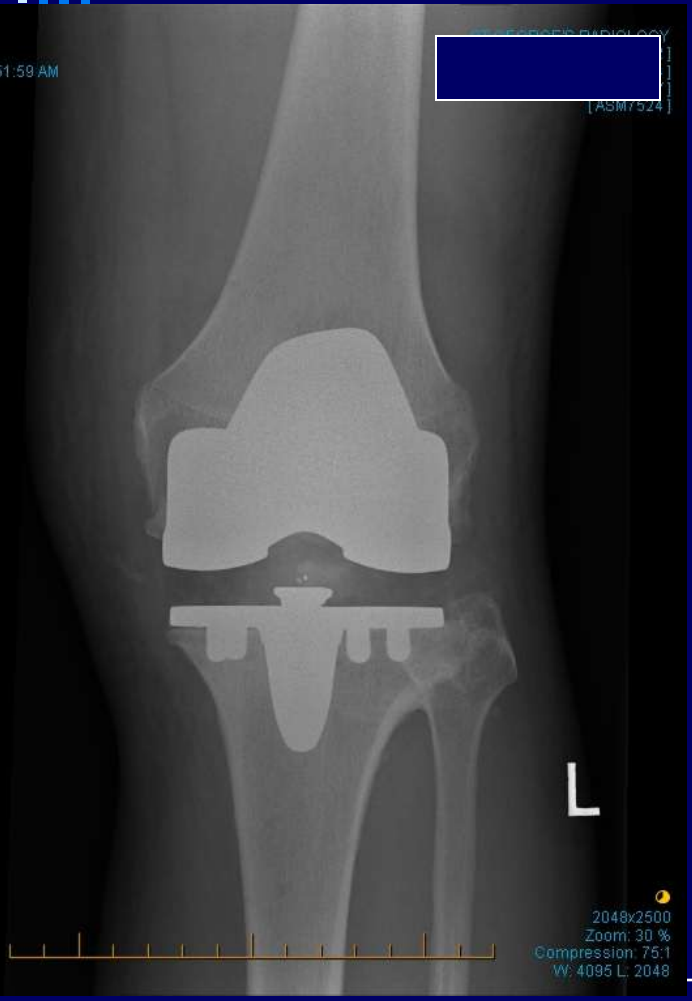
Survival - poly wear





LEFT KNEE
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 Acc #1714600-CR
 Se: CR #1
 Im: 1/1

ST GEORGE'S RADIOLOGY
 [Redacted]
 [ASM7524]



LEFT KNEE
 LATERAL
 Se: Aug 17, 2006 11:55:48 AM
 Acc #1714600-CR
 Se: CR #1
 Im: 1/1

ST GEORGE'S RADIOLOGY
 [Redacted]
 [ASM7524]



Polyethylene wear and osteolysis







Thank you



