

An arthroscopic view of a joint, likely a knee, showing a large, circular, white, translucent osteochondral graft. The graft is surrounded by reddish, vascularized tissue. A small purple marker is visible on the graft. The background shows the joint's internal structures, including ligaments and cartilage.

Osteochondral Transplantation: Safety, Efficacy and Outcomes

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DISCLOSURE

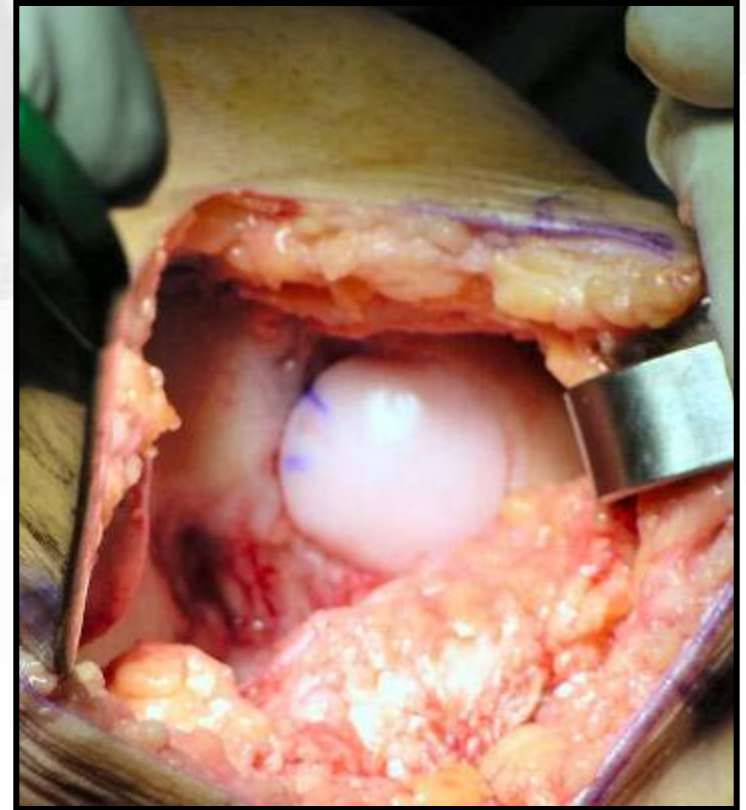
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Osteochondral Transplantation

Perspective.....

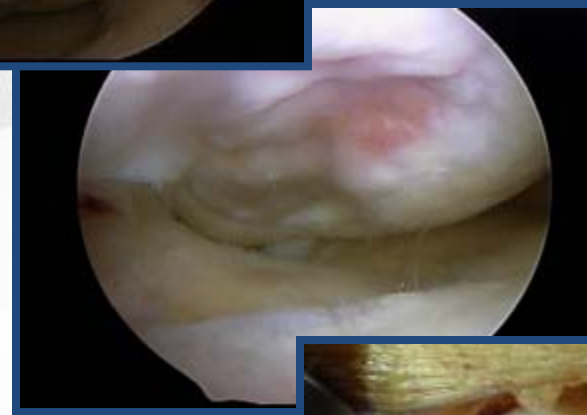
- Focus on Allografts
- Effective
- Increasingly Popular
- Broadening Indications
- Growing Demand
- BUT.....
 - Great safety concerns
 - Limited Supply



Allograft Safety

*...remember want **LIVING** cells for OCA*

- Living chondrocytes
 - Produce matrix
- Problem:
 - Pathogen contamination
- Infection:
 - Donor transmission
 - Processing contamination



ALLOGRAFT SAFETY – OA GRAFTS

- Sterilization processes all cytotoxic
- Want to maximize cellular viability...but must ensure safety
- KEYS:
 - Donor screening
 - Aseptic harvesting
 - Aseptic processing
 - Usage of antimicrobials



ALLOGRAFT ASSOCIATED INFECTION

- Bacterial:
 - Principally enteric
 - CDC analysis of AAI 2002
 - 37 infections
 - Gram negative rods; Clostridium; Enterococcus; Candida
- Viral:
 - Hepatitis; HIV; West Nile
 - Emerging: SARS; Monkey Pox; Chagas



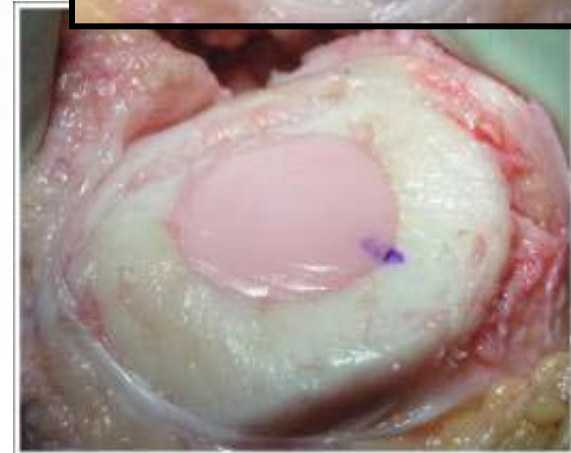
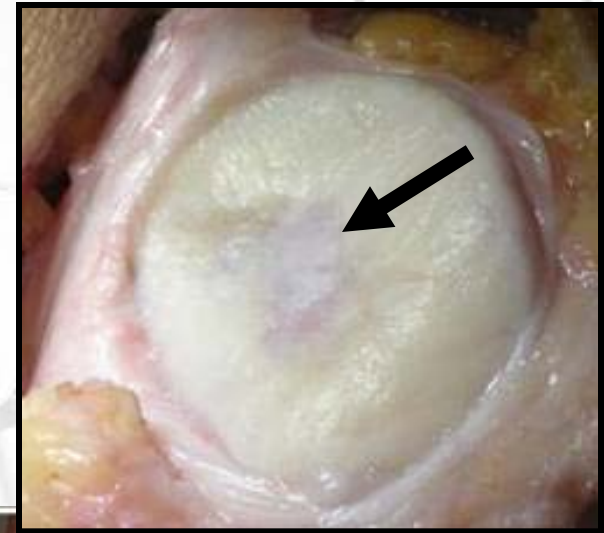
Government Oversight and Policy

- FDA:
 - Center for Biologics Evaluation and Research (CBER)
 - Current Good Tissue Practices (CGTP)
 - <http://www.fda.gov/cber/gdlns/cgtpmanuf.htm>
- AAOS: formally recommends only using tissue from AATB approved and FDA-CGTP compliant tissue banks and suppliers



Fresh OCA vs. Fresh Stored OCA

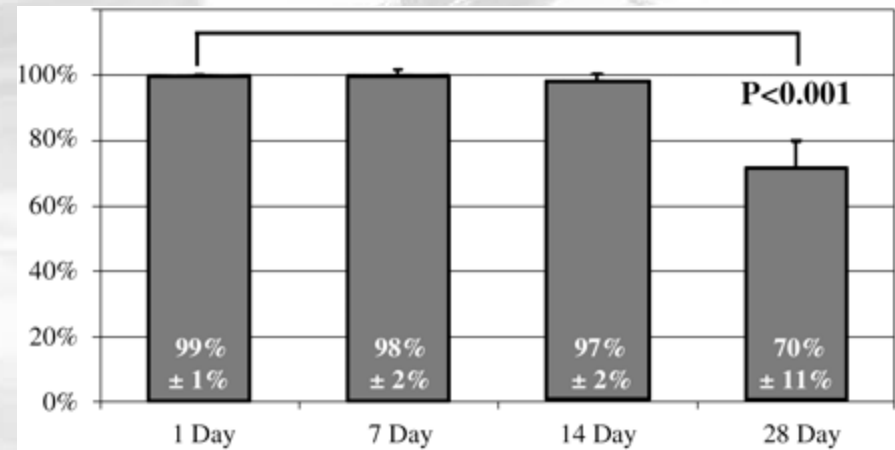
- Historically Grafts were implanted in the days immediately following donor death (1st week)
 - Gross, Toronto
 - Convery, UCSD
- Fresh OCA no longer performed in USA because of safety AND these issues:
 - Medical-Legal
 - Practical
 - Legislation



Fresh Stored Graft - Cellular Viability

- Viability is related principally to time between donor death and implantation
- Tissue maintained in controlled, nutrient environment before transplantation at 4°C
- Most commercial grafts in USA currently between 15 and 35 days

Chondrocyte viability vs. storage time

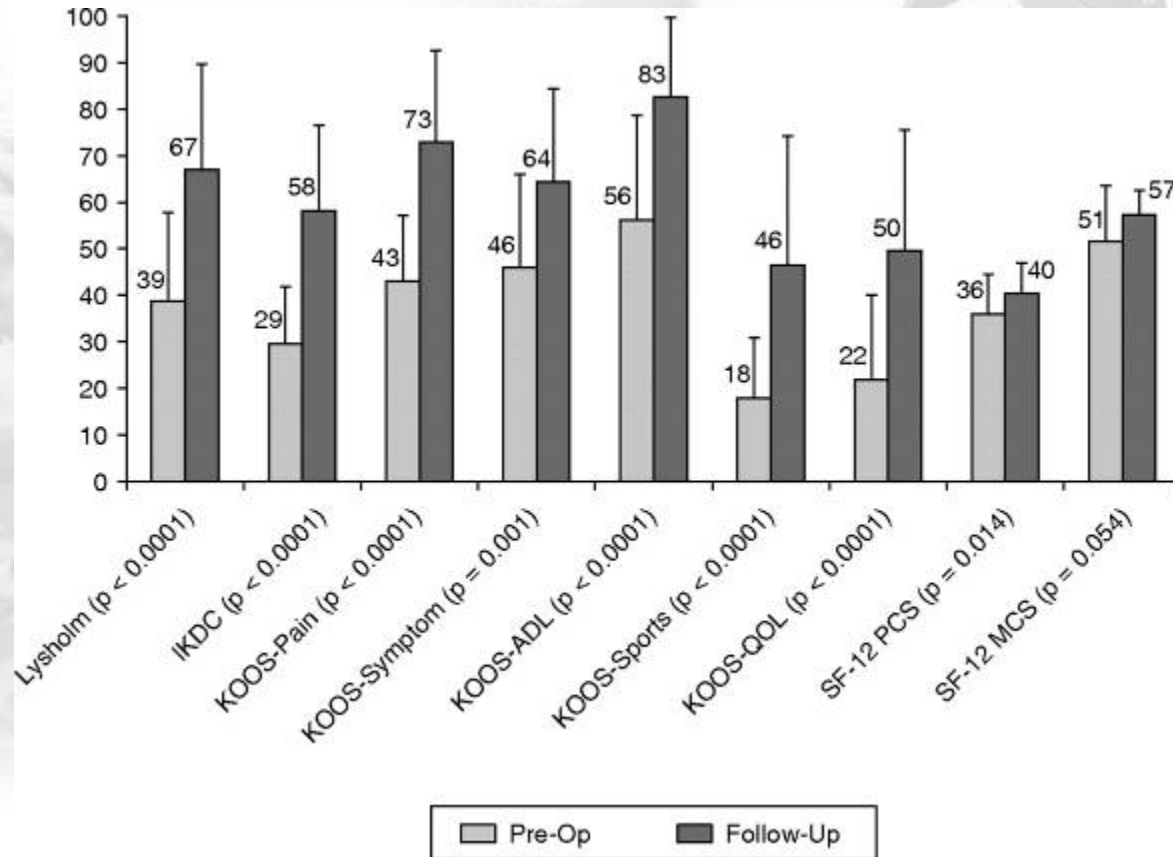


Williams S. K. et.al. J Bone Joint Surg 2003;85:2111-2120



Prospective Evaluation of Prolonged Fresh Osteochondral Allograft Transplantation of the Femoral Condyle - Minimum 2-Year Follow-Up

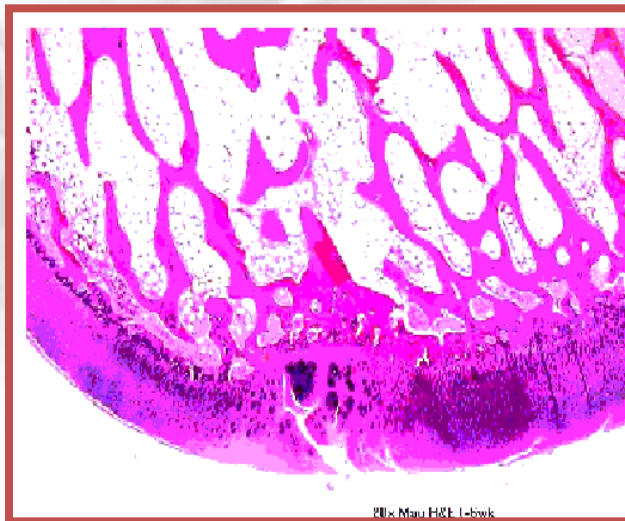
P. C. McCulloch, MD*, R.W. Kang , M. H. Sobhy, MD , J. K. Hayden, MS and B. J. Cole, MD, MBA
The American Journal of Sports Medicine 35:411-420 (2007)



Clinical, Histologic, and Radiographic Outcomes of Distal Femoral Resurfacing With Hypothermically Stored Osteoarticular Allografts

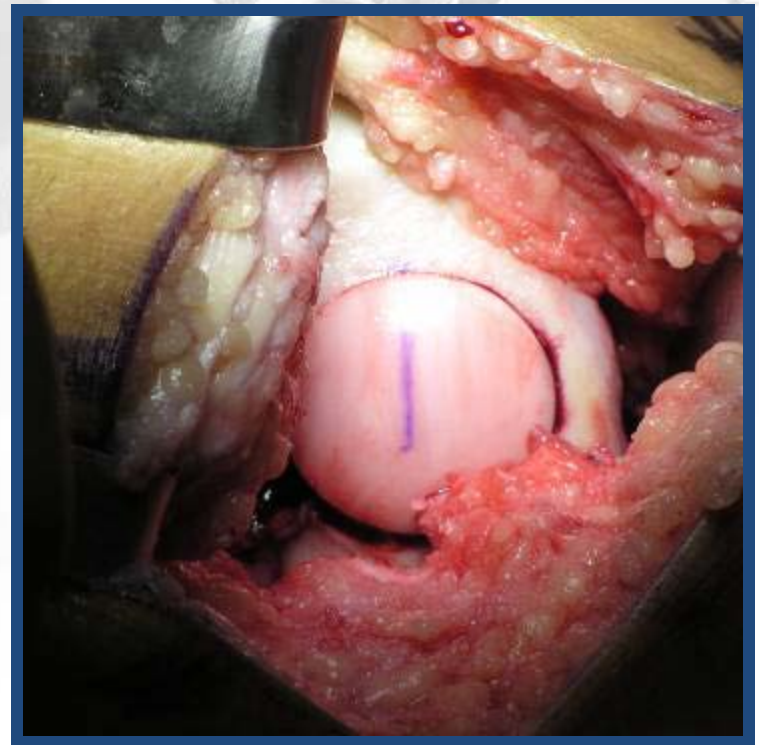
P. A. Davidson, D. W. Rivenburgh, P.E. Dawson, and R. Rozin

Am. J. Sports Med., Jul 2007; 35: 1082 - 1090.



OA Graft Clinical Biopsy Study

- 10 second look, biopsy evaluations of massive OA Allografts Distal Femur
- MRI, Histologic and Clinical Eval
- Fresh Stored OA grafts



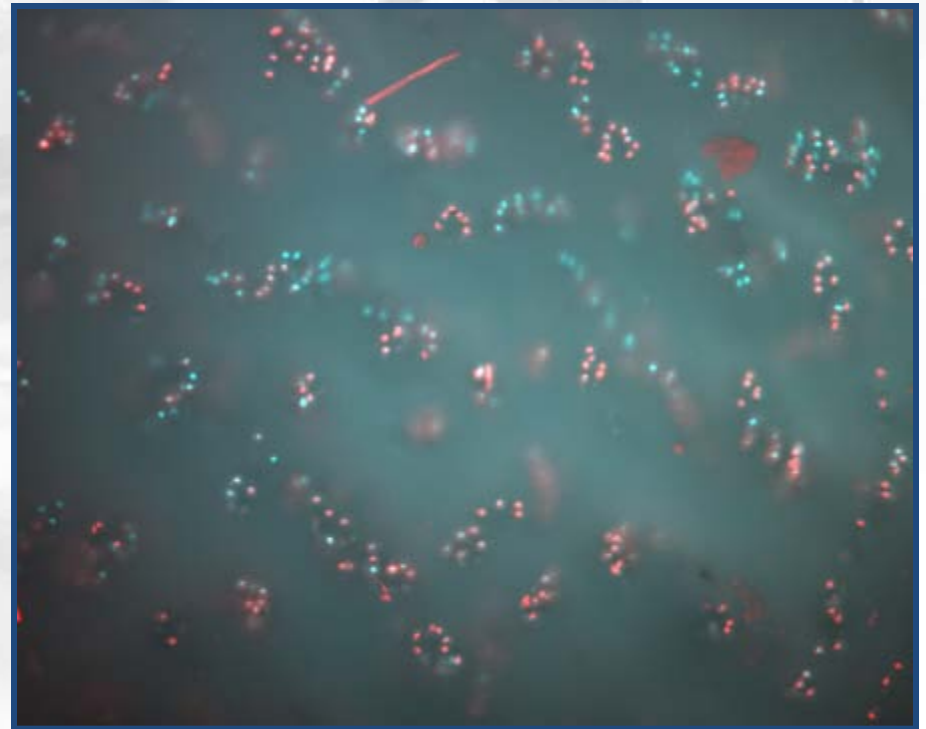
Demographics: Biopsy Study Group

- Primary diagnosis:
 - Trauma 4, Instability 2, OCD 4
- Mean recipient age : **33 yrs**
- Mean donor age: 25 yrs
- Mean days between asystole and implantation: **36** days (min 28 days)
- Mean interval between implant and biopsy: 40 mos.
- Mean graft size: **6.2 cm²**

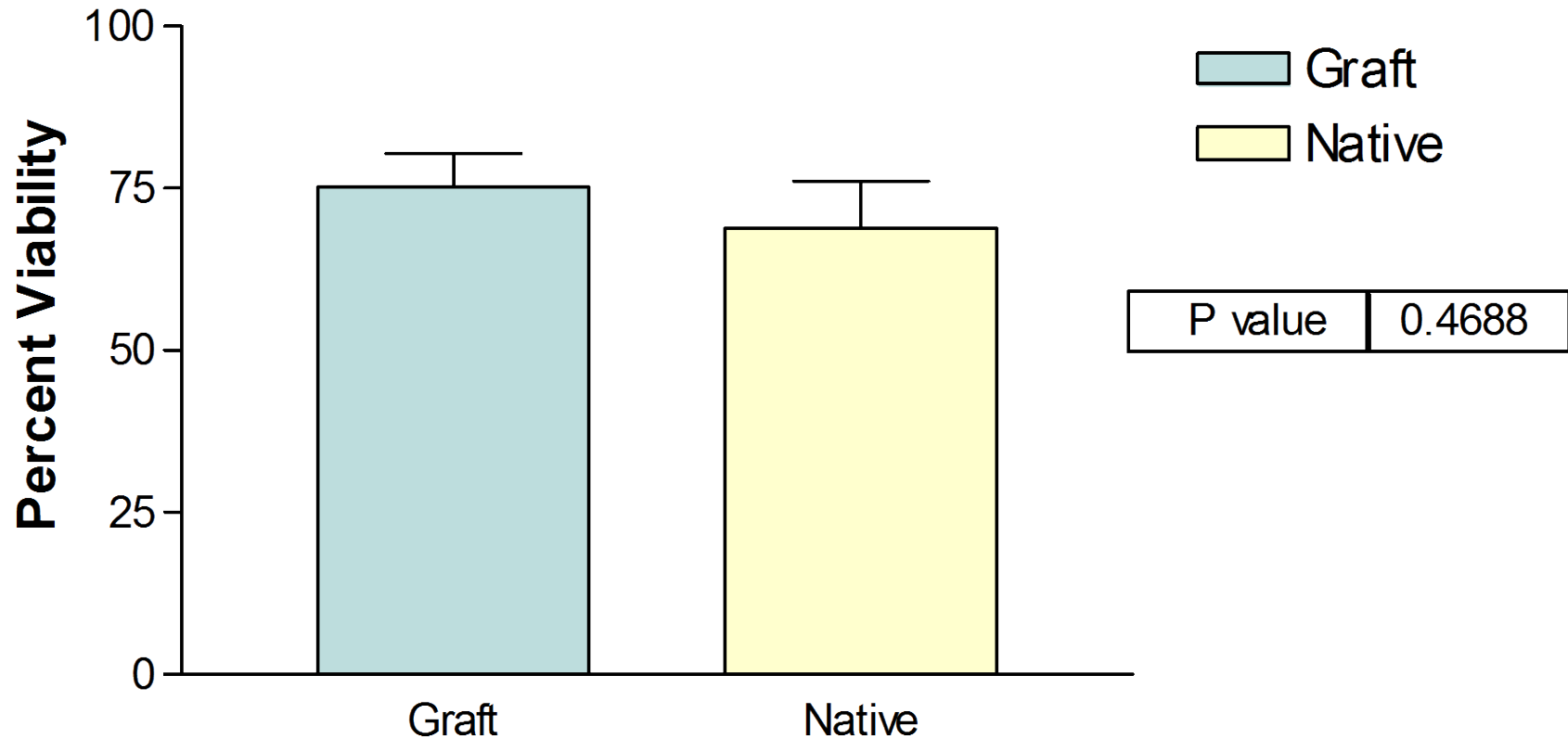


Histologic Analysis

- Fluorescent microscopy using a triple bandpass filter equipped with a high speed CCD camera
 - Red dead, green live
 - Ethidium homodimer and calcein
- H & E; Safranin O; mod. Trichrome stains
- Cellular viability and cellular density evaluated

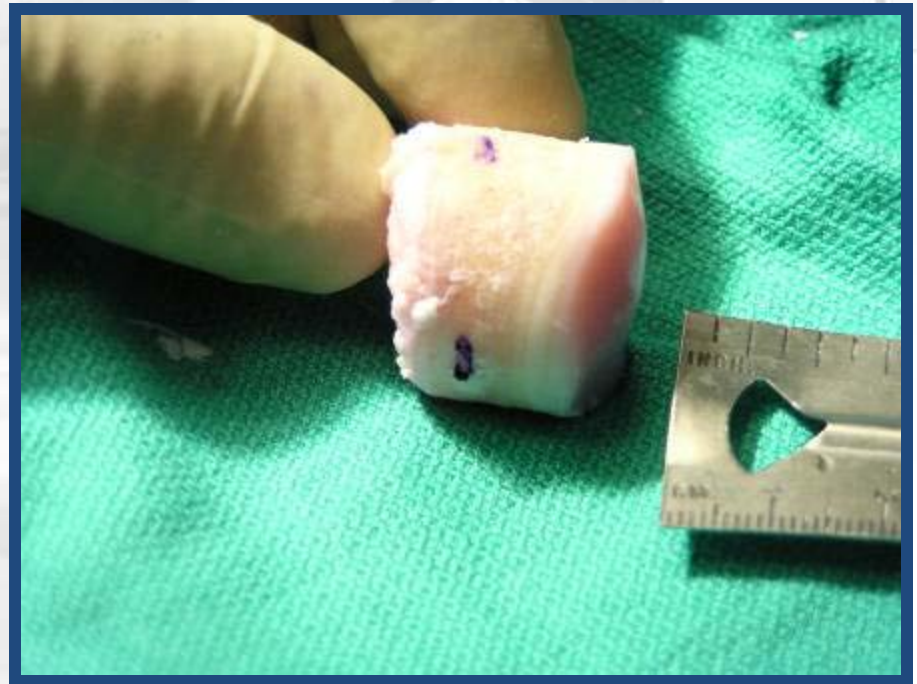


Comparison of Chondrocyte Viability 2-4 years post-implant: Graft versus Native Cartilage



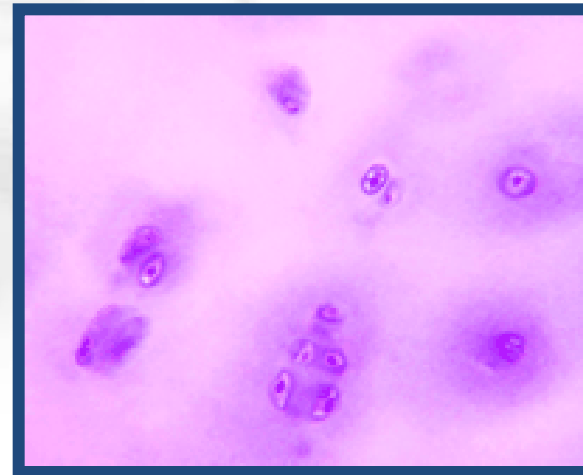
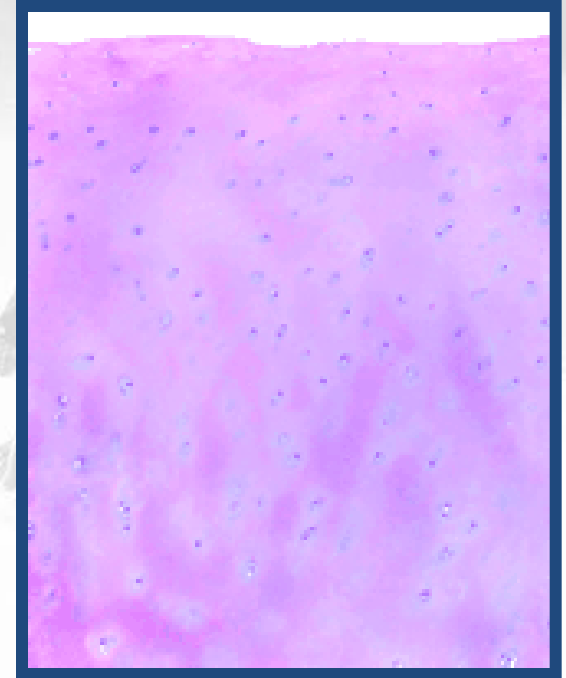
Results: IKDC Scores

- 0-100 point system
- Pre-op mean: 27
(range 9-55)
- Post-op mean: 79
(range 56-99)



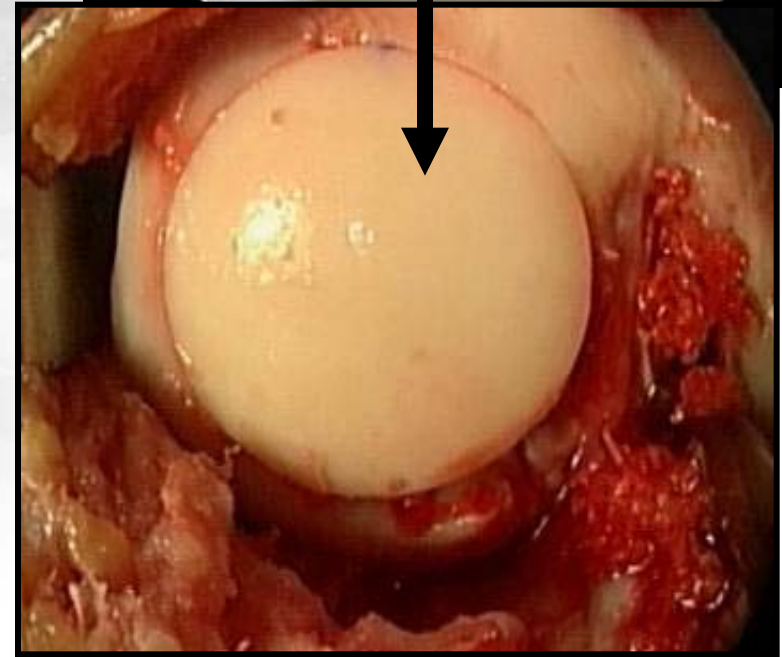
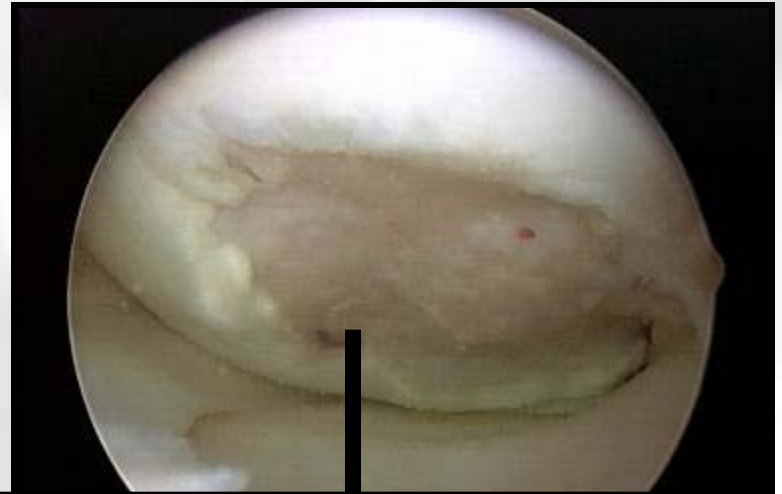
Discussion

- Clinically, patients and grafts in this series and others have objectively done very well.
- Few attractive options for these young patients with advanced osteochondral disease
- Grafts appear durable over a short and long term.
- Ref- Gross, et. al.
 - > 20 year data on graft survival



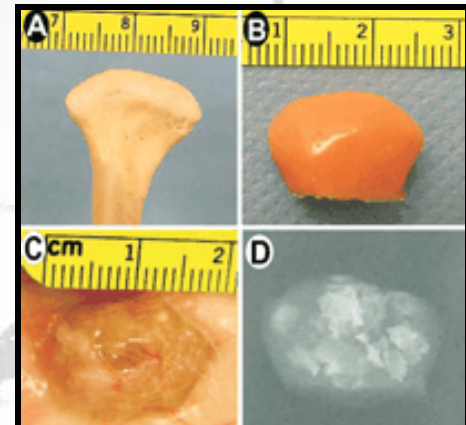
Allograft Safety – What can you do?

- AAOS guidelines
- Want tissue bank fully compliant with CGTP and AATB
- Pre, intra and post op antibiotic prophylaxis
- Understand important considerations in graft viability, processing and handling
- Approach OCA holistically, addressing full spectrum of knee pathology



Future of OCA (It's here!!)

- Juvenile OCA
 - Minced cartilage mixed with substrate
- Combination products involving bioengineered elements and OCA
- Allogeneic chondrocytes on scaffolds
- Enhanced storage and processing may increase viability in storage



Thank you
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