BioCartilage®
Cartilage Extracellular Matrix
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• What is BioCartilage?
  – Allograft cartilage extracellular matrix (ECM)
    • The cartilage is dehydrated and then processed in a way that results in a particle size of 100-300 microns
  – Contains key components of cartilage: type II collagen, proteoglycans, and additional cartilaginous growth factors
  – Aseptically packaged, ambient temperature storage, 5 year shelf-life

• How is BioCartilage intended to be used?
  – Provides a scaffold over microfractured defect
  – Signals autologous cellular interactions within the scaffold
  – Goal is to improve the tissue quality formed after utilizing a bone marrow stimulation technique
Does MFx “plus” work?

BST CarGel (Piramal Healthcare)
- Chitosan based scaffold mixed with blood
  - *Shrimp exoskeleton*
- Improved hyaline cartilage repair in sheep microfracture defects
- Prospective randomized trial: BST-CarGel vs. MFx (78 patients)
  - 12 month MRI:
    - % fill sig. increased
    - BST-CarGel closer to native cartilage by T2 MRI
  - 2nd look arthroscopy with biopsy for 39 patients
    - ICRS 2nd look score sig. improved
    - Polarized light microscopy scoring sig. improved
Does MFx “plus” work with allograft tissue? *In vitro* supportive evidence:

- Adipose stem cells seeded onto lyophilized cartilage scaffold
- Chondrogenesis of ASCs evident by PCR and immunohistochemistry
  - Abundant production of type II collagen
- Cellular morphology resembled native articular cartilage

Does MFx “plus” work with allograft tissue? *In vivo* supportive evidence:

- Medial femoral condyle defects created within a rabbit model
  - Control group = microfracture performed
  - Treatment group = MFx plus lyophilized cartilage fragments formed into a scaffold
- Treatment group had persistent upregulation of cartilage phenotypic markers: Type II Collagen and Aggrecan

• *In vivo* supportive evidence conducted by UMTB:
  - Baboon osteochondral defects filled with micronized cartilage particulate
    - 15 mm diameter, 10 mm depth
  - Gross appearance of hyaline like cartilage at early timepoints
  - Histo: Newly formed cartilage cells, normal appearing proteoglycan content
  - Control group remained open or contained uneven patches of tissue

Malinin T et al. Induction of regeneration of articular cartilage defects by freeze dried particulate cartilage allografts. ICRS 2009 Meeting; poster presentation.
BioCartilage Equine Study Update

- **Investigators:**
  - Lisa Fortier, DVM, PhD
  - Brian Cole, MD, MBA
  - James Cook, DVM, PhD

- **In vivo model:**
  - Five horses, two 10 mm defects in each knee
  - Proximal and distal defect in lateral trochlea
  - BioCartilage in one knee, Microfracture in the other

- **Outcomes:**
  - Arthroscopic scoring at 2, 6, and 13 months
  - MRI, Micro-CT, and Histologic scoring at 13 months
Arthroscopic Images of Proximal Defect

Microfracture

2 mo

6 mo

13 mo

BioCartilage

2 mo

6 mo

13 mo
Arthroscopic Video of Distal Defect

Microfracture

BioCartilage
Arthroscopic Scoring of Defects

Overall Repair Score (13 mo)

- **Proximal**
  - MicroFracture: 4.8
  - BioCartilage: 7.4

- **Distal**
  - MicroFracture: 2.6
  - BioCartilage: 5.6

(Higher = Better, both are significant)
• How is BioCartilage provided and what does it look like?
Mixing and Delivery System

ABS-1000 (Kit) + ABS-1003 (Funnel)
BioCartilage
Treatment of Medial Femoral Condyle Cartilage Defect

Clinical Case Video Courtesy of Brian Cole, MD, MBA
Arthrex BioCartilage
Cartilage Extracellular Matrix
Tips For Arthroscopic Implantation
BioCartilage
Treatment of Patellar Cartilage Defect

Clinical Case Pictures Courtesy of Brian Cole, MD, MBA
BioCartilage
Treatment of Patellar Cartilage Defect
Clinical Case Pictures Courtesy of Brian Cole, MD, MBA
Arthrex BioCartilage
Cartilage Extracellular Matrix

Arthroscopic Talus OLT
Microfracture with Arthrex BioCartilage Application

Eric Giza, M.D.
UC Davis Medical Center
Sacramento, California
Resurfacing of 1st Metatarsal Head
Case presentation courtesy of Windy Cole, DPM
Arthrex BioCartilage
Cartilage Extracellular Matrix

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Clinical Case MRI Courtesy of James Bradley, MD

Pre-Operative – Sag PD

1 Month Post-Op – Sag PD
Operative Patella Images

8 Week Second Look for LOA
Clinical Case Courtesy of Stephen Voto, MD

4 month second look of treated MFC due to patient having a new symptomatic patellar cartilage defect
BioCartilage

Clinical Case Courtesy of Jason Scopp, MD
6 Month Post-Op LFC

Perigraft edema can persist for many months

No large change in T2 values at subchondral bone plate or drastic change in collagen orientation

Compare subchondral signal to joint
BioCartilage

Clinical Cases Courtesy of Robert Reeves, MD – 6 Month Biopsies
BioCartilage

Clinical Case Courtesy of Pat Smith, MD
BioCartilage
Clinical Talus Case Courtesy of Eric Giza, MD

Pre-Op Talar Defect

18 Months Post-Op
BioCartilage Clinical Publications


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LTD, lateral talar dome; MTD, medial talar dome.
For additional information, please contact your local Arthrex Representative.