



Meniscus Repair:
Techniques to Improve Healing

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Disclosures



- Consulting
 - Mitek
- Committee Member
 - AAOS, AOSSM,
- Journal Reviewer
 - AJSM, JSES, JBJS
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 - Zimmer
- Grant Support
 - DoD, OREF, Institutional funding
- Institutional Support
 - Zimmer, Stryker, Synthes, Smith & Nephew

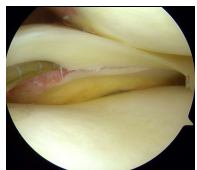


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Outline

- Background
- Current challenges
- Real life
- Pie in the sky
- What we are doing
- Summary





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“20 second TO”: What this talk is NOT

- *Comprehensive review of literature for treatment options for complex meniscal lesions*
- *Endorsement of any one treatment strategy*
- *Comprehensive review of biologics and the meniscus*



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Background

Clinical impact

- 2 million arthroscopies per year
- Most prevalent cause of surgery (ortho)
- Risk factor for OA development

Where are we now?

- Meniscal repair demonstrates unreliable results
- ~ 25% failure rate (Nepple et al JBJS 2012)



WE NEED TO DO BETTER AND WE NEED TO SAVE THE MENISCUS

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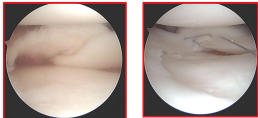
Arthroscopy 2019
J Knee Surg 2018

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Current Challenges

- Etiology multifactorial
 - Traumatic v. degenerative
- Orientation matters
 - Radial ? longitudinal ? both ?
- Medial & lateral not the same
- Tissue composition complex
- Milieu complex
 - IL-1, TNF-alpha, MMPs, etc

- ✓ Resection is hard (patient gets OA)
- ✓ Repair is hard (how do we get it to heal)
- ✓ Replacement is really hard (getting it right and selecting the right patient)



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One thing is clear... the more meniscus the better... so at all costs attempt to save the meniscus




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KSSTA 2015

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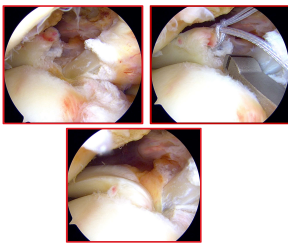
'20-second TO'

All inside is ok... but do what you need to do

- ✓ Reduces surgical times
 - AJSM 2007
- ✓ Ease of use
 - Arthroscopy 2016
- ✓ Lowers risk of NV injury
 - KSSTA 1999
- ✓ EQUIVALENT HEALING RATES
 - AJSM 2007, 2009; Arthroscopy 2005
 - Too many meta-analysis to list

Do not forget about the root!

- Avail yourself of technology



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Real Life Options


Inexpensive

- Fibrin clot
 - JBJS 1988
- Trephination
 - Arthroscopy 1993
- Rasping/Synovial abrasion
 - Arthroscopy 2003
- Vent the notch
 - Arthroscopy 2019

Expensive

- PRP
 - KSSTA 2015
- Collagen wrapping
 - Cartilage 2016
 - Not FDA approved
 - *I am excited about potential*

I do something w/ even less evidence behind it... BMAC... currently NOT a ethical debate for me




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Pie in the sky

- Gene therapy
 - Osteoarthritis and Cartilage 2016
- Tissue regrowth (GFs, etc)
 - AJSM 2015
- Allograft reliability
 - Tissue Engineering 2007
- Substitution reliability
 - KSSTA 2015
- *Sensible diets in the American population or at least Cincy*



*The answer currently does not exist... despite what the chiropractor down the street is selling

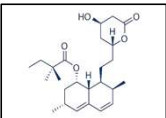
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What Are We Doing to Help?

Simvastatin as a novel approach

- Inhibits HMG-CoA
 - Lowers cholesterol
- Stimulates BMP-2
 - Promotes chondrogenesis
 - Slows progression of IVD disease
 - Stimulates osteogenic differentiation
 - *** animal models w/ local drug therapy
- Cheap, safe, and readily available





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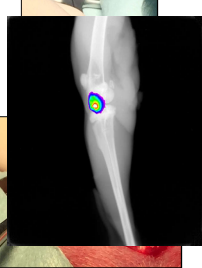
Animal Study

Critical defect model in rabbit menisci (Horie et al)

- Anterior horn medial side
- 1.4mm K-wire
- Bilateral hind limbs

Study Groups

- Group 1: Control + no injury
- Group 2: Injury + no therapy
- Group 3: Injury + hydrogel
- Group 4: Injury + hydrogel + simvastatin acid



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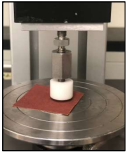
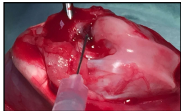
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Methods

❖ Animals sacrificed at 4 & 8 wks

Outcomes:

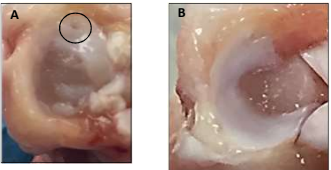
- Gross inspection (defect)
- Histology / Immunochemistry
 - H&E, Safranin O, COL1, & COL 2
- Biomechanics
 - Stress v strain graph via compressive loads in a MTS
 - Determine young modulus



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Results



Gross findings at eight weeks post repair

(A) tissue receiving injury and no repair

(B) tissue receiving the hydrogel-SVA repair

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