



Thinking About Tomorrow:

How Athletic Trainers can Impact a Patient's Long-Term Joint Health

Jeffrey B. Driban, PhD, ATC, CSCS
Division of Rheumatology




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Disclosures

I have no financial affiliations that would bias this presentation.



Learning Objectives

At the end of this talk you will be able to...

1. describe osteoarthritis and the risk of the developing osteoarthritis among physically active individuals.
2. educate patients about how the risk of developing knee osteoarthritis compares to the development of other chronic diseases among an athletic population.
3. identify patients with specific factors that may increase the risk of osteoarthritis in individual patients following joint injury.
4. explain to coaches, administrators, patients, and family members of a patient the importance of primary (injury) prevention programs and how they can be easily, efficiently, and effectively implemented.



Osteoarthritis

- A traditional view...



Link et al., 2003



Definition

- A complex **disease**
 - initiated by micro- or macro-injury
 - Abnormal joint tissue turnover
 - structural changes throughout the joint
- An **illness** defined by patient-reported symptoms
 - For example: pain, stiffness, crepitus

Lane NE et al. 2011; <http://oarsi.org/research/standardization-osteoarthritis-definitions>



Phenotypes

- A set of phenotypes (e.g., subsets, conditions, diseases) with a common endpoint
 - For example:
 - Post-traumatic OA after a meniscal injury
 - Repetitive overloading from malalignment or obesity

Zhang W et al. 2009, Driban et al. 2010, Felson DT 2010, Kapoor M et al. 2010, Kraus VB et al. 2010, Bijlsma J et al. 2011

Physical Activity and OA

- Physical activity and many sports are safe or even protective¹
- Men in soccer and certain high-level sports may be at risk for hip or knee OA²⁻⁴

1. *Urquhart DM et al., 2011*; 2. *Driban JB et al., 2015 (in press)*; 3. *Michaelsson K et al. 2011*; 4. *Tveit M et al. 2012.*

Physical Activity and OA

- High level long-distance skiers are at high risk for knee or hip OA²

Former athletes with more knee OA ¹	Increase in odds of having knee OA
Elite male competitive weightlifting	6.9 (3.3, 14.5)
Elite male wrestling	3.8 (1.8, 8.0)
Elite and nonelite male soccer	3.5 (2.5, 4.8)
Elite male long-distance running	3.3 (1.4, 7.5)

- Military personnel may be at greater risk for knee OA than some athletes¹

1. *Driban JB et al., 2015 (in press)*; 2. *Michaelsson K et al. 2011*

How does OA affect my practice?

- Is it the sport, the amount of training, or injuries?



- A lack of data among female athletes
- A lack of data among former college and HS athletes

Photos: <http://flickr.com/photos/10287726@N02/7798195634>, <http://flickr.com/photos/10287726@N02/7798195634>, <https://www.flickr.com/photos/joncandy/8048470875/>

Male Master-Level Track and Field

Self-Reported Complaint	Percent (number)
Knee Osteoarthritis	20% (17)
Knee Pain	24% (20)
Achilles Tendinopathy (pre 45 y/o)	16% (8)
Achilles Tendinopathy (post 45 y/o)	33% (14)
Achilles Tendon Rupture (post 45 y/o)	13% (5)
Shoulder Tendinopathy (pre 45 y/o)	2% (1)
Shoulder Tendinopathy (post 45 y/o)	30% (14)
Shoulder Tendon Rupture (post 45 y/o)	20% (9)
Hospitalization for Back Disease	15% (13)
Hypertension	41% (26)
Heart Attack	6% (4)

Kettunen JA et al., 2006

Retired NFL Players

Condition	Percent (number)
Physician-Diagnosed Osteoarthritis ⁴	38%
Physician-Diagnosed Arthritis ⁴	43%
- Among those under 60 y/o	41%
Lifetime History of Depression ¹	11% (269)
- Among those with 3+ concussions ¹	20%
Cognitive Impairment ²	35% (180)
Hypertension ³	38% (97)

1. *Guskiewicz KM et al., 2007*; 2. *Randolph C et al., 2013*; 3. *Albuquerque FN et al., 2010*; 4. *Golightly YM et al., 2009*

Retired NFL Players

- Most Commonly Reported Retirement Problems
 - Difficulty with pain (48%)
 - Loss of fitness and lack of exercise (29%)
 - Weight gain (28%)
 - Trouble sleeping (28%)
 - Difficulty with aging (27%)

Scwenk TL et al., 2007

Retired NFL Players

Los Angeles Times | ARTICLE COLLECTIONS

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Op-Ed

Limping through life after football -- and how doctors can help

A room full of former players usually means a room full of joint pain. But there is hope.

February 03, 2014 | By Richard Diana

- “...my teammates had suffered terribly from their years in...football. Several already had undergone knee and hip replacements... **Most had arthritis, and virtually everyone complained of joint pain...Yet most of them were younger than 55.**”

So What?

- OA is major problem for our retired athletes
- Athletic Training Practice Domain
 - Injury/Illness Prevention & Wellness Protection
- We are in a unique position to advocate and help with OA prevention
- We can help our older athletes (coaches)

Risk of OA & Joint Injury

- Knee injuries
 - 3 to 6 times more likely to have OA¹
 - 26% of knees with ACL injury have OA within 5 yrs²

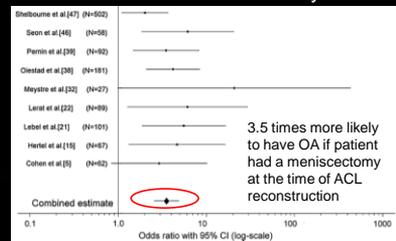


1. Muthuri SG et al., 2011; 2. Frobell R et al., 2013.

Image from: <https://www.flickr.com/photos/joncandy/8048470875/>

The Menisci are Important

- OA at 10-12 years after an injury
 - 16% w/ ACL reconstruction w/ no meniscectomy
 - 50% w/ ACL reconstruction w/ meniscectomy



Claes S et al. 2012

Severity of Injury is Important

- MCL Sprain
 - ~9-10 years post injury^{1,2,3}
 - Grade 2: 0-13% OA (n = 54 patients)
 - Grade 3: 63-68% OA (n = 27 patients)
 - MCL sprains with other injuries has more OA than isolated MCL sprains⁴
- Traumatic knee dislocations
 - 2-9 years post injury⁵: 87% vs 35% in the opposite knee



1. Kannus P 1988; 2. Kannus & Jarvinen M 1988; 3. Lundberg & Messner 1996; 4. Lundberg & Messner 1997; 5. Engbresten L et al., 2009

Repeated Injury is Problematic

- Recurrent patellar dislocations
 - Number of dislocations relate to OA



Vollnberg B et al., 2012

What about my athlete?*

- 20 years of age: injures ACL and meniscus
- 25-35 years: radiographic osteoarthritis
- 45-64 years: total knee replacement
- 90 years: death

* Mock Case Study

Impact on Quality of Life

- 20-55 year olds with hip or knee OA
 - 4x more likely to be highly psychologically distressed
 - 67% report OA-related work disability
 - 40-49 y/o: ~40% reduction in quality of life
 - Most were diagnosed in previous 5 years

Ackerman IN et al., 2015

This cannot be an acceptable outcome by clinicians that emphasize injury and illness prevention.

- We know this population is at risk for OA
- We know OA is a considerable burden, on par with other chronic conditions
- We often fail to address OA as we do with other chronic conditions

Injury Prevention

- 15-25% of symptomatic knee OA could be prevented by preventing knee injuries¹
 - We can prevent > 40% of lower extremity injuries²

1. Felton & Zhang 1998.
2. Pamphlet @ nata.org, Leppanen M et al., 2013; Lauenstein JB et al., 2013; Taylor JB et al., 2013; Myer G et al., 2013; Gagnier JJ et al., 2013, Sadoghi P et al., 2012



Injury Prevention: Key Aspects

- Strength training (lower extremity and core)
- Plyometrics
- Balance
- Maybe: stretching
- Feedback
- Compliance
- No need for fancy equipment



Injury Prevention Programs

- Success in Chicago public schools¹
- Cost effective (save ~\$100/player per season)²
- Coaches can lead these programs

1. Labella CR 2011; 2. Swart E 2014.

Other OA Risk Factors

- Limited range of motion and OA¹
 - Limited knee flexion at RTP: 60% more likely to have OA ~10.5 years post surgery
 - Limited extension at RTP: no related to OA



1. Shelbourne KD et al., 2012

Other OA Risk Factors

- Overweight: ~2x more likely to have knee pain/OA¹
- Obese: ~2.7x more likely to have knee pain¹
- > 15 lb weight gain within 5 years of ACL-R is a key predictor of poor outcomes²

1. Silverwood V et al., 2015; 2. Spindler KP et al., 2005

A Need to be Active

- ACL Reconstruction (1-8 years post-injury)
 - 50-79% return to pre-injury level of sports
 - Influenced by...
 - Quadriceps strength
 - Knee effusion
 - Knee pain
 - Kinesiophobia
 - Etc.

Czuppon S et al., 2014

What to look for

- Meniscal injuries
- Severe or repeated injuries
- Overweight/obesity
- Factors that may lead to lower physical activity

Thinking Long-Term

- Would you recommend...
 - Brushing teeth to prevent tooth decay?
 - Taking medication to manage high cholesterol or hypertension to reduce the risk of heart attacks?
- Why not also try to prevent OA?

What can we do?

*Injury
Prevention
Programs*

What we can do?

- Education
 - Defining OA and their risk
 - Behavior modification to reduce OA risk factors
 - Strength training
 - Stretching
 - Maintaining a healthy body weight
 - Regular check-ups

Things Patients Need to Know

1. Regular physical activity and individualized exercise programs can reduce their pain, prevent worsening of osteoarthritis, and improve their daily function
2. If they are overweight it will be beneficial to lose weight and maintain a healthy weight

French SD et al., 2015

Things Patients Need to Know

3. Living a sedentary life could worsen their risk of osteoarthritis, and also increase their risk of other lifestyle-related diseases such as diabetes and cardiovascular disease

French SD et al., 2015

NATA and ATs are Committed

- Thank you!!

