Can We Prevent ACL Injuries?

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The Situation

- Female athletes are injuring knees at an alarming rate:
  - 1/100 high school athletes will have a significant knee injury;
    1/10 college athletes will have a significant knee injury
  - Females are statistically 4-8x more likely to suffer a significant knee injury than males
- We have been aware of the ACL issue for close to 20 years but have yet to make a big dent in the injury rate.
- Lack of “coach friendly” assessment tools in the field that could be used to potentially identify “at risk” athletes.
- Haven’t implemented a wide scale program for training female athletes to reduce ACL injury rate.
Why is this happening: The Etiological (Cause) Theories

- **Anatomical**
  - Q-angle
  - Narrow Inter-condylar Notch
  - Thigh Length

- **Hormonal**
  - Collagen Strength
  - Joint Laxity

- **Neuromuscular**
  - Ligament Dominance
  - Quadriceps Dominance
  - Leg Dominance
  - Trunk Dominance “Core” Dysfunction
Neuromuscular Issues

- **Ligament Dominance**
  - Imbalance between neuromuscular and ligamentous control of dynamic knee stability (lack of shock absorption)

- **Quadriceps Dominance**
  - Imbalance between quad and hamstring strength, recruitment and coordination

- **Leg Dominance**
  - Imbalance between the two legs with respect to strength, coordination and control (many times from previous injury)

- **Trunk Dominance “Core” Dysfunction**
  - Imbalance between the inertial demands of the trunk and control and coordination to resist it.

Our knee is a *dumb joint* stuck in the middle between the hip and ankle! (‘It’s not my fault!’)
The Future
ACL Prevention Program Must-Haves

- Prevention efforts should be included in overall performance enhancement training program
- Prevention efforts should be “user/coach friendly” and easily implemented within daily regimens
- All athletes should complete functional injury risk assessments
- “At Risk” athletes may need medical intervention followed by corrective exercise program
The Future
How Can We Impact ACL Injury Rates?

- Provide Education and Awareness efforts for parents, athletes, and coaches
- Appreciate the significance of previous ankle sprains, knee and back pain, and muscle injuries
- Realize that athletes can’t “power-through” skeletal or muscular dysfunction
  - Piling training on a dysfunction creates bigger injury risk
  - Athletes can create dysfunction with poor training
Decrease in Neuromuscular Control with Pubertal Growth Spurt (Hewett et al, JBJS 2004)
Core Stability Measures as Risk Factors for Lower Extremity Injury in Athletes (Leetun et al, MSSE 2004)
Deficits in Neuromuscular Control of the Trunk Predict Knee Injury Risk (Zazulak et al, AJSM 2007)
The Drop-Jump Video Screening Test: Retention of Improvement in Neuromuscular Control in Female Volleyball Players (Barber-Westin et al, JSCR 2010)
A Training Program to Improve Neuromuscular Indices in Female High School Volleyball Players (Noyes et al, JSCR 2011)
Risk Assessment Research Worth Reading

- Biomechanical Measures Predict ACL Risk in Female Athletes (Hewett et al, AJSM 2005)
- Two Dimensional Analysis Screening and Evaluation Tool (McLean et al, BJSM 2005)
- Correlation Between two-dimensional Video Analysis and Subjective Assessment in Evaluating Knee Control Among Elite Female Team Handball Players (Stensrud et al, BJSM 2010)
- Real-Time Assessment and Neuromuscular Training Feedback Techniques to Prevent Anterior Cruciate Ligament Injury in Female Athletes (Myer et al, Strength and Conditioning Journal 2011)