Introduction:

1. Characteristics of force that are related to injury risk: (1) magnitude, (2) cross-sectional area (pressure), (3) location, (4) rate, (5) direction, and (6) frequency of application

2. Other factors to consider
   - Frequency and magnitude of force application, related to recovery time
   - Intrinsic and extrinsic factors

Mechanical Force and Injury

Cross-sectional area

Tennis Shoe Surface Area = 97 cm²
Surface Area of 12 Golf Spikes = 0.36 cm²

Syd weighs ~156 N

The area of force application is as important than force magnitude

Mechanical Force and Injury

Application Location

http://www.youtube.com/user/NatureVideoChannel#p/a/f/0/7jrnj7YKZE

Mechanical Force and Injury

Loading Rate

ACL rupture, gymnastics padding, and osteogenesis

What biological tissue characteristic is this related to?
Mechanical Force and Injury
Load Direction
Shoulder impingement...
What biological tissue characteristic is this related to?

Mechanical Force and Injury
Load Direction
Shoulder impingement...
What biological tissue characteristic is this related to?

Frequency/Magnitude of Force
Controlling the frequency and the magnitude of the applied stress is important when training
– pitchers
– gymnasts
– football players
– runners

Frequency of Force
Often the time between training sessions determines whether a chronic injury is experienced

Intrinsic Factors in Injury
• Intrinsic factors that influence injury risk
  – Body mass
  – Skeletal: density, alignment, asymmetry
  – Muscular: strength, endurance, firing patterns, temperature
  – Previous history of injury
  – Psychological: motivation and tolerance for pain

Extrinsic Factors in Injury
• Extrinsic factors involve the nature of the load that will be imposed on the individual and influence injury risk
  – Nature of task: frequency, speed, intensity, and duration
  – Level of participation: opponent, recreation vs. competitive
  – Equipment: footwear, padding
  – Environment: playing surface condition, weather

Summary
• Force characteristics that are related to injury prevalence:
  – Magnitude, cross-sectional area, location, rate, direction, and frequency of force application
• Factors to consider in injury prevention
  – Frequency and magnitude of force application
  – Recovery time
  – Intrinsic and extrinsic factors