Female Athlete Injury Prevention
Startling Facts

• Huge rise in knee ligament injuries among young females engaging in sport and exercise

• Females athletes participating in jumping and pivoting sports are 2-10 times more likely to sustain a knee ligament injury than male athletes participating in the same sport
Growing Area of Concern
Focus: ACL

• Approximately **80%** of ACL tears occur **without contact** with another player.

• Cause is often associated with landing from a jump, decelerating suddenly, or quickly changing direction.

• Injury rates begin to **increase at 12-13yrs**.
What Does the ACL Do?

• Connects femur to Tibia (Big shin bone)

• Prevents Tibia from sliding Fwd from femur

• Main player in stabilization of knee structure
Sports Associated with Highest Rates of ACL Injuries
Short Term Consequences

- Pain and disability during treatment phase
- 6 – 9 months of rehabilitation
- Not able to participate in sports
- Movement Limitations
Long Term Consequences

• Osteoarthritis of the knee

• Chronic pain

• Weight Gain

• Depression

• Lost Opportunity (Sport, Academics, Leisure)
Why is this Happening?
Anatomy: Q - Angle

- **Female Q Angle**: 13°
- **Male Q Angle**: 18°

Women's increased Q-Angle causes pressure on the lower body.
Anatomy: Q - Angle

• The Q angle of the knee is a measurement of the angle between the quadriceps muscles and the patella tendon

• The larger Q-Angle in females often causes excessive medial knee dip (valgus)
Figure 3. Example of dynamic lower extremity valgus, a combination of motions and rotations at all 3 lower extremity joints, potentially including hip adduction and internal rotation, knee abduction, tibial external rotation and anterior translation, and ankle eversion.
Muscle Activation Sequencing

- Quad dominance greatly increases forces on knee ligaments
- Lack of proper development of Posterior Chain
- Improper motor patterns
Other Reasons

• Sport playing surfaces
• Contact
• Lack of biomechanics coaching
• No specific education
• Muscle asymmetries & imbalances
• Not enough S&C training
ACL Tear

ACL injuries
The anterior cruciate ligament connects the femur (thigh bone) to the tibia (shin bone), prevents the tibia from sliding forwards beneath the femur and provides stability to the knee.

Tearing of the ACL can occur when the bones twist in opposite directions during an impact, such as a landing from a jump.

Source: American Academy of Orthopedic Surgeons
Prevention

• Coaching on proper Movement Biomechanics
• Strengthening of the core & lower extremities
• Plyometrics
• Neuromuscular training
• Proper activation sequencing of muscles at appropriate times
• General education
Key Areas to Train

• Gluteus Medius (glutes in general)

• Quads (rectus femoris, vastus lateralis, vastus medialis)

• Core
Exercise Selection

• Mini band monster walks
• Mini Band Laterals
• Mini Band Squats
• SL Step-downs
• SL Bulgarians
• Box Step-ups
• Box Jumps
• Box Drops
• SL RDL’s
Key Note

Knees must track in line with toes at all times!
Questions??
Neutral Spine
What is Neutral Spine?

- Neutral spine is the natural position of the spine when all 3 curves of the spine -- cervical (neck), thoracic (middle) and lumbar (lower) -- are present and in good alignment.
- This is the strongest position for the spine when we are standing or sitting, and the one that we are made to move from.
Why is Neutral Spine Important?

• Puts the spine into its most strong and stable point

• Greatly reduces the chances for disk & vertebral damage

• Distributes forces evenly over the spinal column
Spine Conditions

Bulging and Herniated disks impact nerve roots causing pain and discomfort.
Exercises Often Associated With Failure to Maintain Neutral Spine

Bar Pick-up Ground (Incorrect)
- Rounded back (No Neutral Spine)
- Straight Legs

Bar Pick-up Ground (correct)
- Neutral Spine
- Bent Legs
Exercises Often Associated With Failure to Maintain Neutral Spine

Bar pick-up (elevated) (Incorrect)

Bar Pick-up (elevated) (Correct)

Rounded Back

Neutral Spine

Straight Legs

Bent Legs
Exercises Often Associated With Failure to Maintain Neutral Spine

**Barbell Back Squat**
- *(incorrect)*
- No Neutral Spine
- Weight on Toes

**Barbell Back Squat**
- *(Correct)*
- Neutral Spine
- Weight on Heels
Exercises Often Associated With Failure to Maintain Neutral Spine

**Barbell Bent-over Row**
- (incorrect)
  - No Neutral Spine
  - Fairly Hard Knee

**Barbell Bent-over row**
- (correct)
  - Neutral Spine
  - Soft Knee
Group: How to attain Neutral Spine

• Shoulder blade engagement
• Core stability
• Hip hinge
• Ribs stacked on pelvis
Long Term Consequences of Spinal Injury

- Movement limitations
- Chronic pain
- Decreased quality of life
- Missed opportunity
- Potential weight gain
- Depression
Preventative Measures

- Education
- Strict adherence to proper biomechanics
- Working within limits
- Good habits
- Strength & conditioning work
Questions?