

## **Knee MR Imaging: Basics**

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### **Knee: Meniscus**

#### Meniscal Function

- Weight Bearing Stability, Rotatory mechanics
- Conversion axial load to tensile strain

#### Meniscal Tears

- Tensile stress > Capacity meniscal deformation

Clinical history and examination – variable accuracy in diagnosis of meniscal tears

MR Imaging Menisci – mainstay intermediate weighted imaging eg TR/TE 1000/20

- \*Sagittal, up to 10% only detectable on orthogonal imaging planes
- Diagnostic signs meniscal tearing; surfacing signal, morphologic abnorm
- ~90% accurate, >90% NPV

#### Description meniscal tear

- Location, Configuration, Length
- Stability \* Displacement (length >10mm, T2 signal, Complex)
- Common displacement patterns
- Posterior root tears Med. Meniscus: loss biomechanical function meniscus

### **Knee Anterior Cruciate Ligament**

#### Anterior Cruciate Ligament (ACL) Function

- Primary restraint; anterior tibial translation
- Secondary restraint; internal tibial rotation

2 Functional Bundles – Anteromedial bundle, Posterolateral bundle

- Terminology relative to tibial insertion points
- Reciprocal tightening; extension Anteromedial sl. Lax, Posterolateral taught

#### Anterior Cruciate Ligament Injury / Disruption

- Most common non-contact pivot-shift injury
- Higher incidence in females than males
- Significance; consequences knee instability (micro/macro-instability)

#### MR Imaging Anterior Cruciate Ligament Tearing

- Primary signs; nonvisualization, focal disruption of ligament
- Secondary signs; impact bone bruising, translational mal-alignment

- Tearing; Mid > Prox > Distal, ~5% avulsion fractures tibial footplate

### **Knee Posterior Cruciate Ligament**

#### Posterior Cruciate Ligament (PCL) Function

- Primary restraint; posterior tibial translation
- Secondary restraint; external tibial rotation

#### 2 Functional Bundles – Anterolateral bundle, Posteromedial bundle

- Terminology relative to femoral origin points
- Bundles less clearly distinct on MR imaging

#### Posterior Cruciate Ligament Injury / Disruption

- 10-20 times less common than ACL injuries
- Isolated injury in only 30% of cases \*other ligamentous injury
- Mechanism; Posterior force tibia (dashboard), Hyperextension
- Significance; Posterior instability – altered mechanics medial compartment

#### MR Imaging Posterior Cruciate Ligament Tearing

- Primary signs; nonvisualization, discontinuity of ligament, amorphous signal
- Secondary signs; impact bone bruising patterns – mechanism of injury
- Acute injury; MRI highly accurate, Clinical exam limited
- Chronic injury; MRI of limited value due to healing capacity of PCL, morphology not accurately reflective of function, Reliance on clinical exam