KNEE EVALUATIONS

The Knee Joint

- Knee joint proper (tibiofemoral joint)
  - Primarily classified as a ginglymus (hinge) joint
    - Sometimes referred to as trochoginglymus (pivotal, screw) joint internal & external rotation occur during flexion
    - Some argue for condyloid (ellipsoid, ovoid)classification
- Patellofemoral joint
  - arthrodial (gliding) classification (patella on femoral condyles)
- Femoral condyles articulate with tibial plateaus
- Tibia - bears most of the weight
- Fibula – attachment for muscles & ligaments

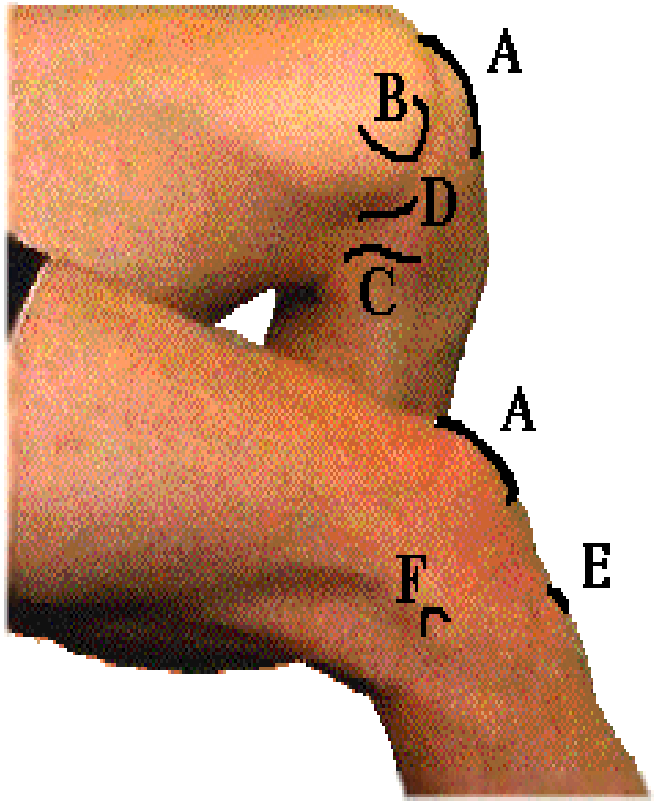
The Knee Joint

- Extends to 180°
  - Hyperextension normal
- Flexes to 140°
- With knee flexed 30° or >
  - internal rotation 30° occurs
  - external rotation 45° occurs

The Patella

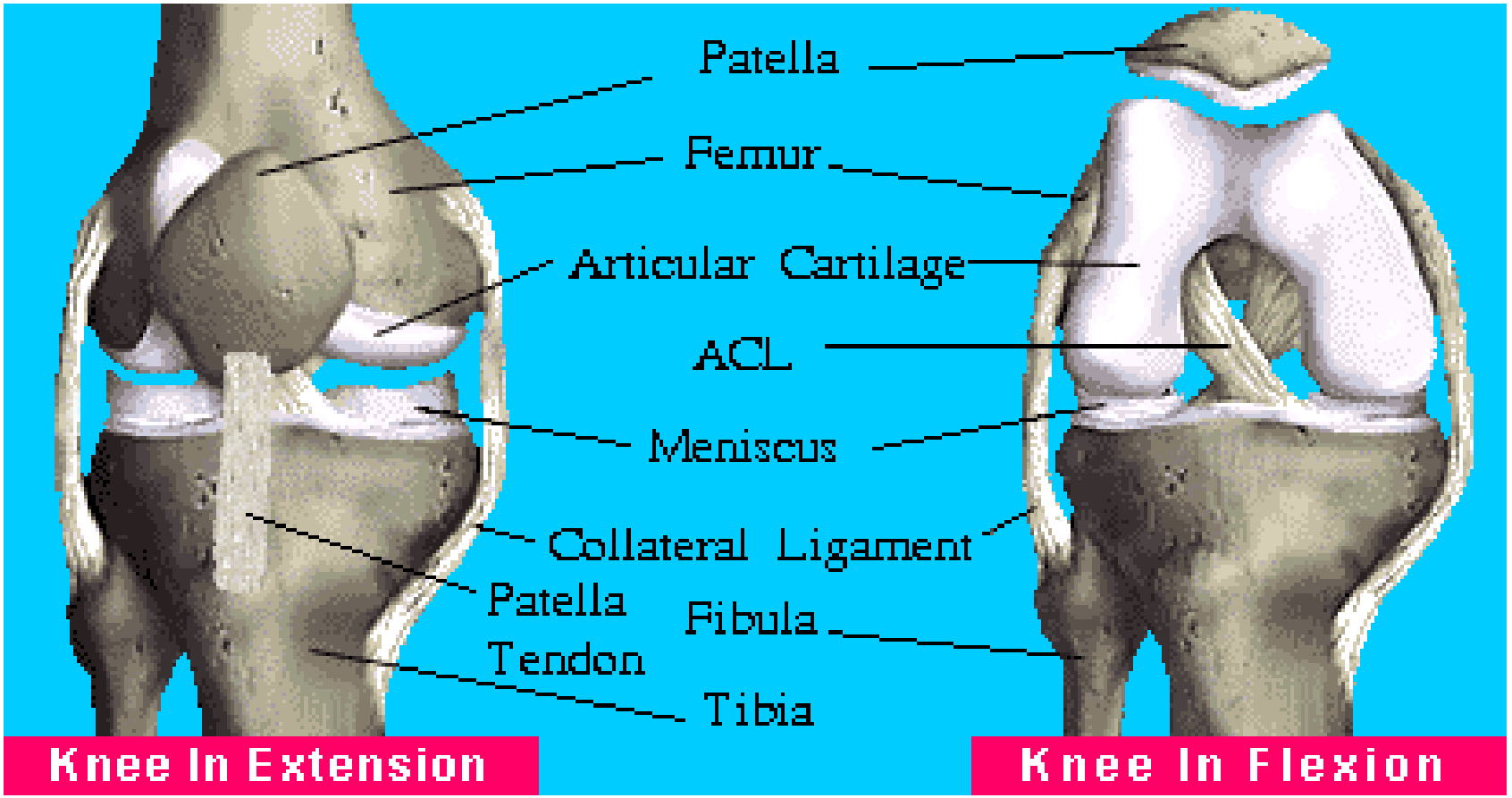
- Sesamoid bone
- Imbedded in quadriceps & patella tendon
- Serves similar to a pulley for improving angle of pull (results in greater mechanical advantage in knee extension)

Surface Anatomy

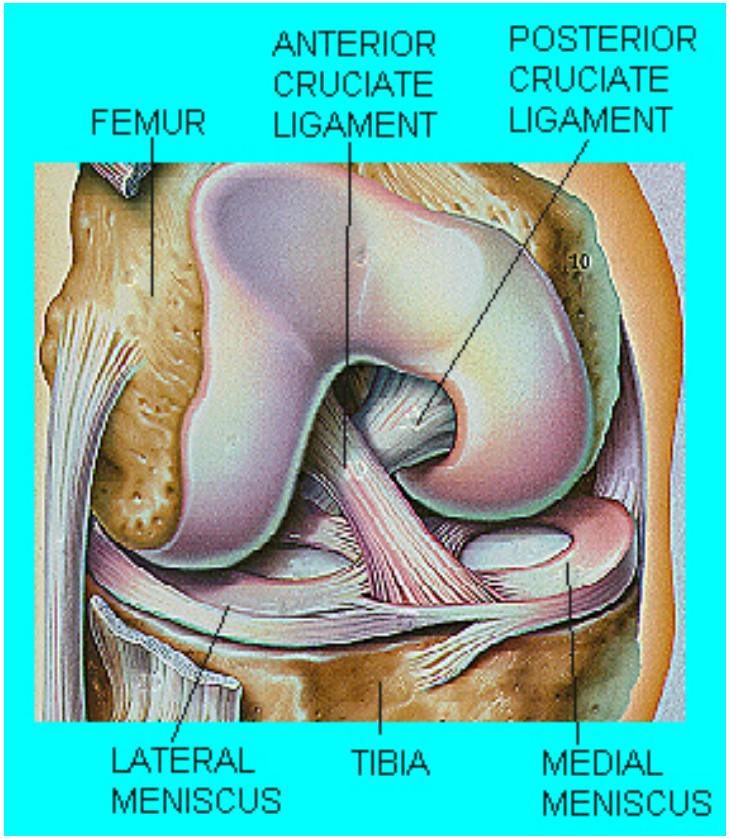


- Patella (A)
- Femur (B)
- Tibia (C, E – tuberosity)
- Joint Line (D)
- Fibula (F)
- Gerdy's Tubercle

Internal Knee Anatomy



Internal Knee Anatomy



- Medial Meniscus
- Lateral Meniscus
- Anterior Cruciate Ligament
- Posterior Cruciate Ligament
- Articular Cartilage

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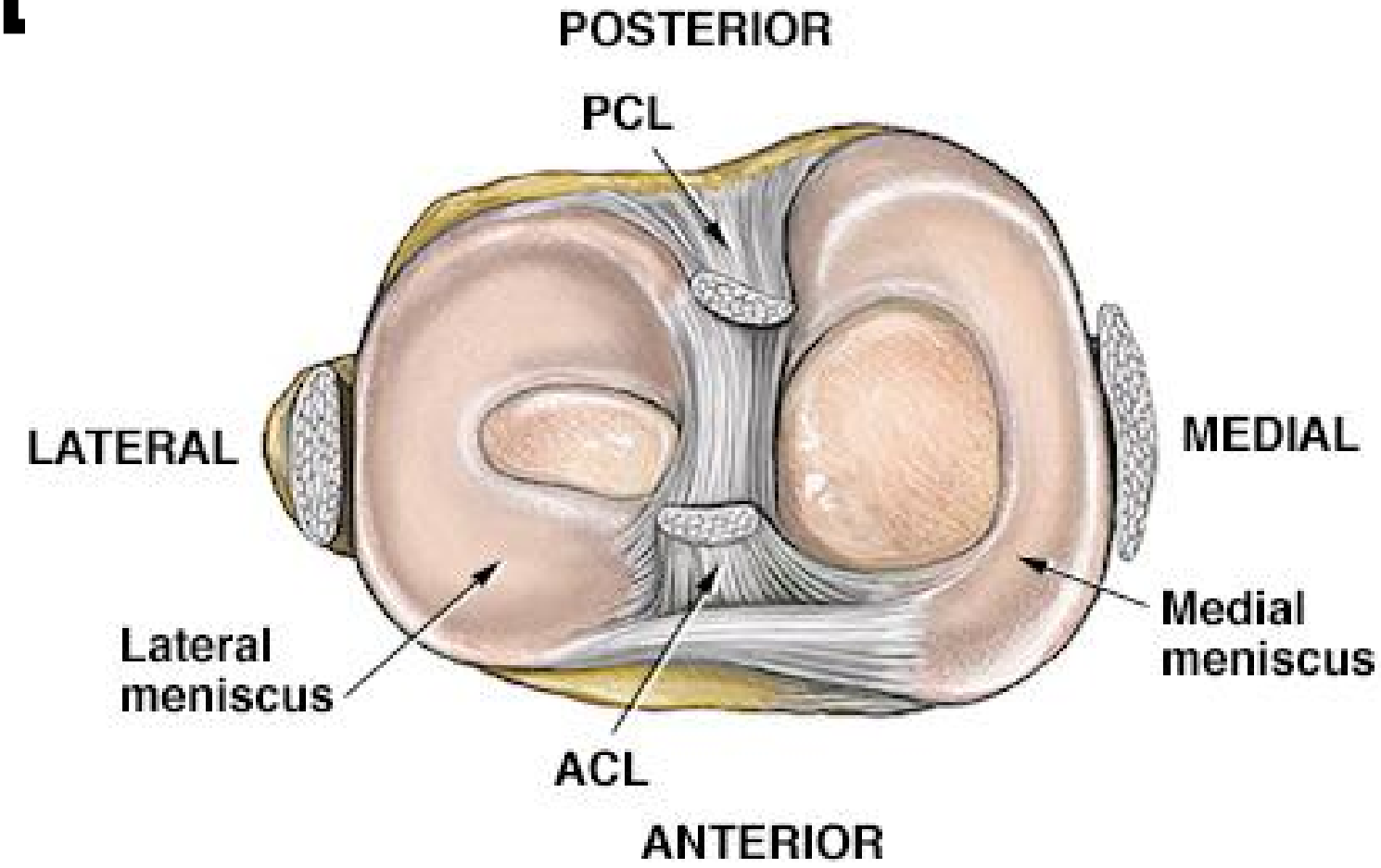
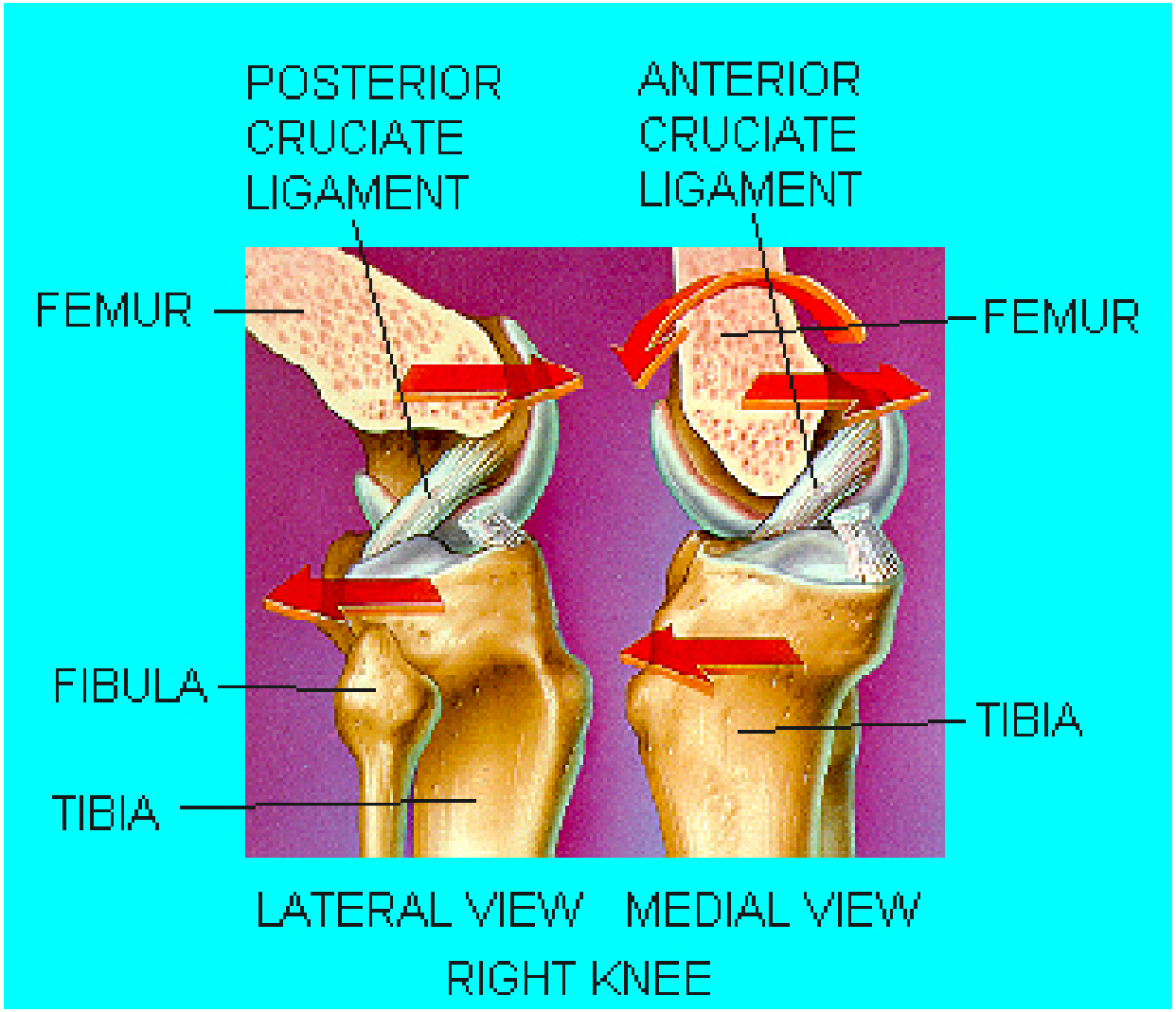
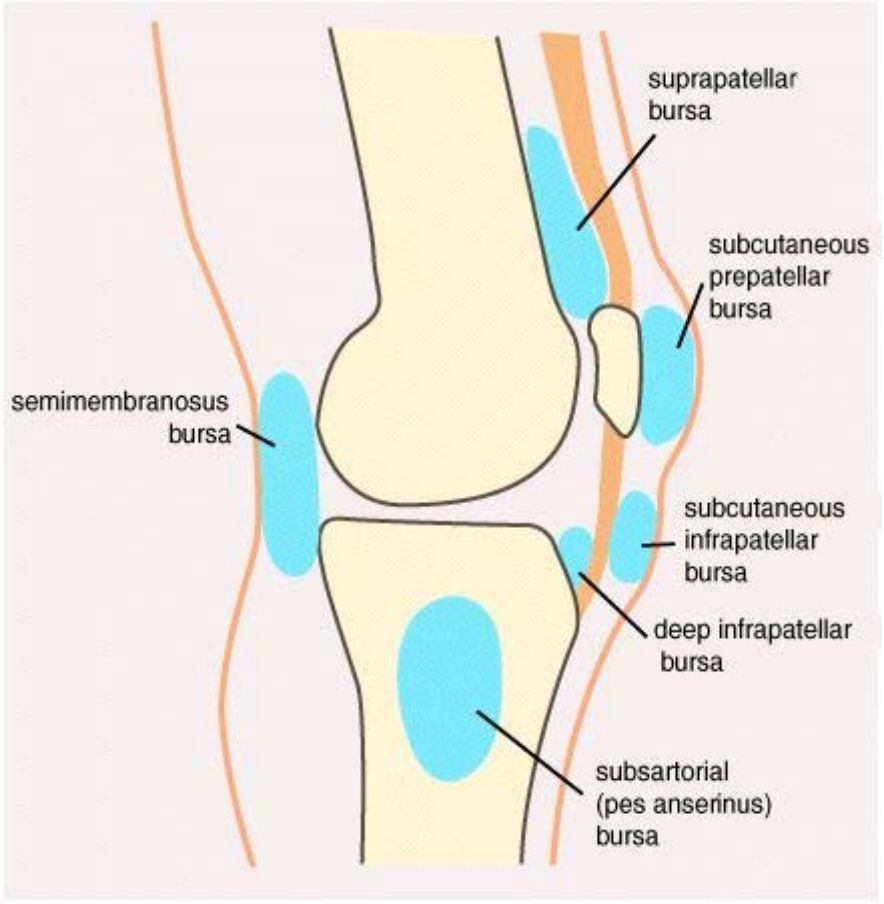
Menisci



Cruciate Ligament Movement



Bursae & Fat Pad of the Knee



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Anatomy – Soft Tissue

- Quadriceps –
  - Rectus femoris
  - Vastus lateralis
  - Vastus intermedius
  - Vastus medialis (& oblique - VMO)
- Hamstrings –
  - Biceps femoris
    - Inserts primarily on fibula head
  - Semitendinosus
  - Semimembranosus
    - Inserts posteromedially on medial tibial condyle
- Popliteal fossa

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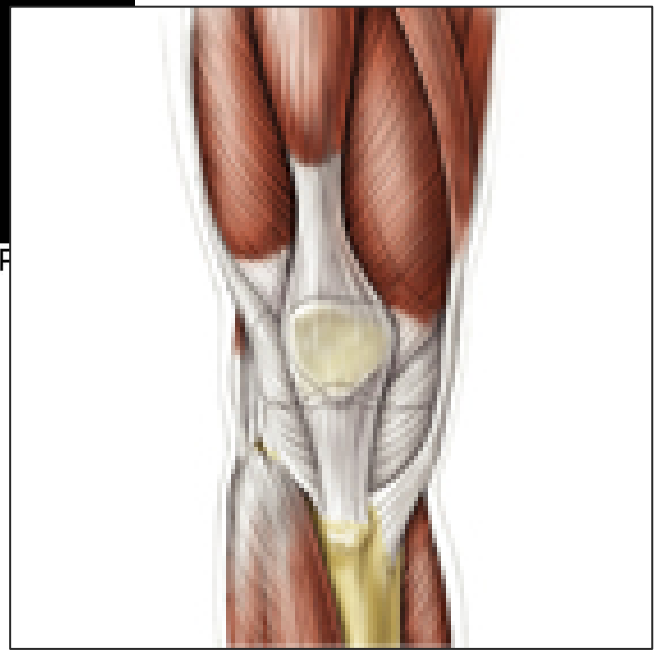

Muscles

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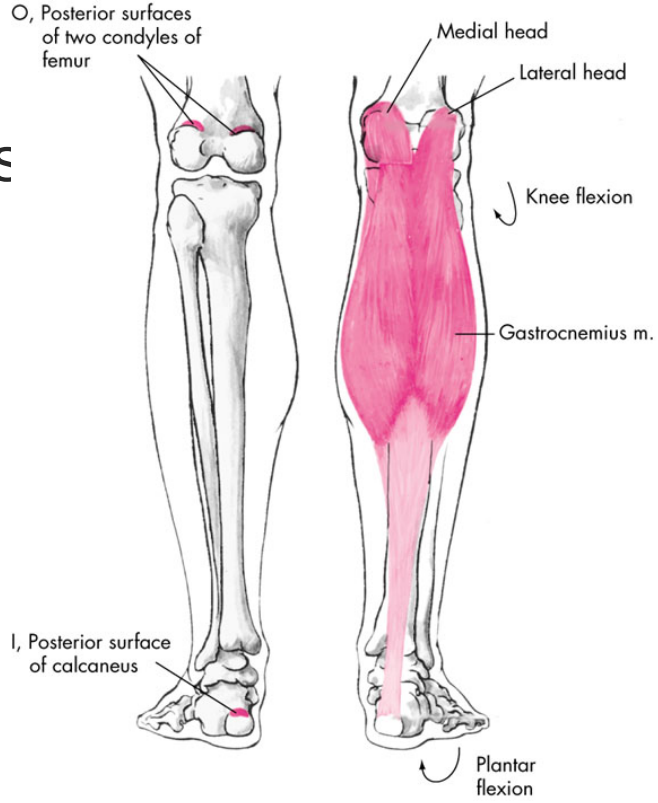
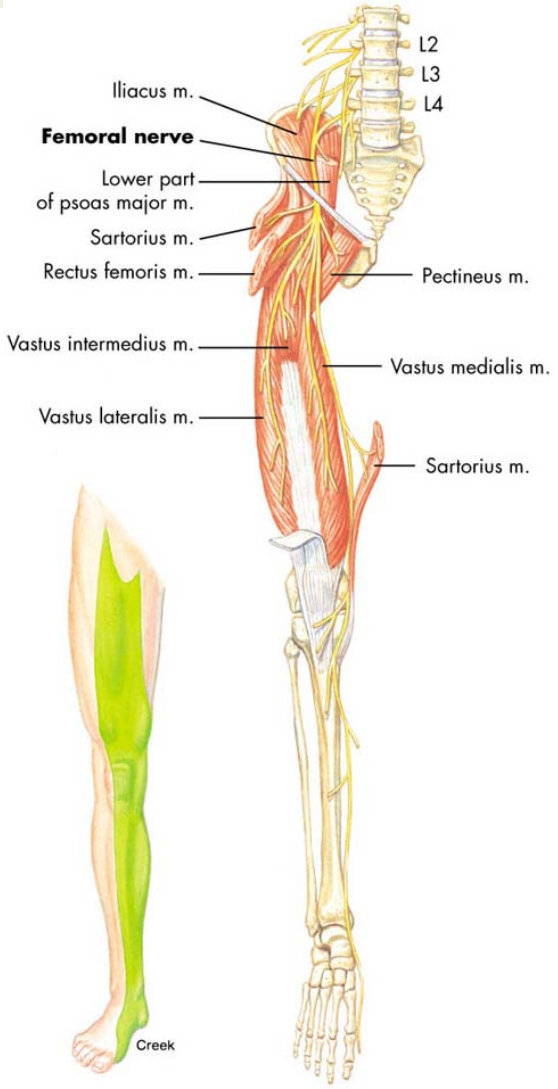
- Gracilis,
- Sartorius &
- Semitendinosus
  - Common attachment
    - Pes Anscerine
- Iliotibial Band
- Gastrocnemius heads – lateral & medial



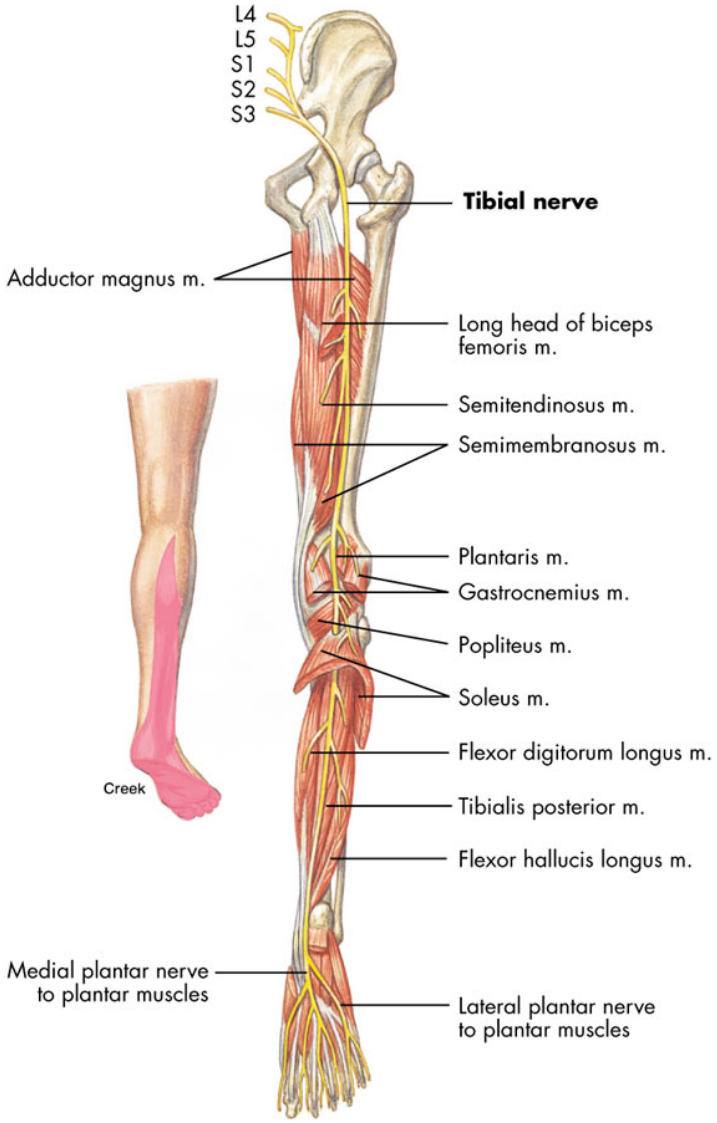
Nerves

- Femoral Nerve (L2, 3, 4)
  - innervates the knee extensors (quadriceps)
  - Anterior cutaneous branches of femoral n.
- Lateral femoral cutaneous N.
- Saphenous N. – infrapatellar branch



Nerves

- Sciatic
  - tibial division
    - semitendinosus, semimembranosus, biceps femoris (long head)
  - common peroneal (fibular) division
    - biceps femoris (short head)



Vascular Anatomy

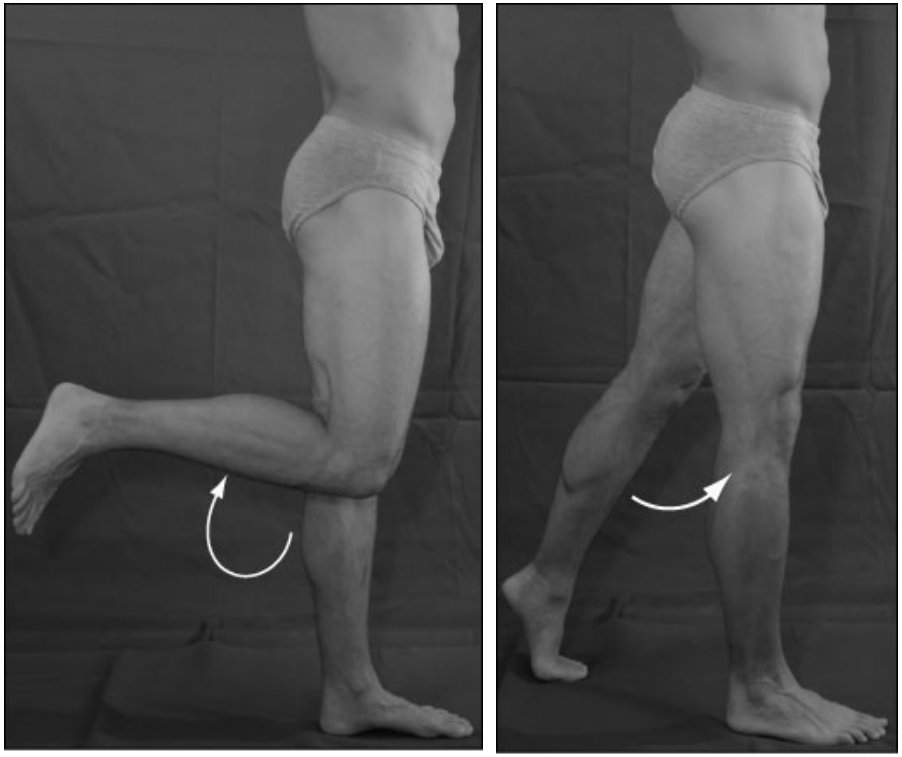
Femoral Artery & Vein

Great Saphenous Vein (medial)

Lesser Saphenous Vein (posterior)

Popliteal Artery & Vein

Knee Movements



Flexion

Extension

External rotation

nternal rotation

Screw Home Mechanism

- Locking mechanism as the knee nears its final extension degrees
  - Automatic rotation of the tibia externally (approx. 10 degrees) during the last 20 degrees of knee extension
- Femoral condyles are a different size
  - Medial has larger surface area
- The tibia glides anteriorly on the femur. As knee extends, the lateral femoral condyle expends its articular distance. The medial articulation continues to glide, resulting in external rotation of the tibia utilizing the *lateral meniscus as the pivot point.*
- ACL & PCL are rotary guides
- Forms a close-packed position for the knee joint

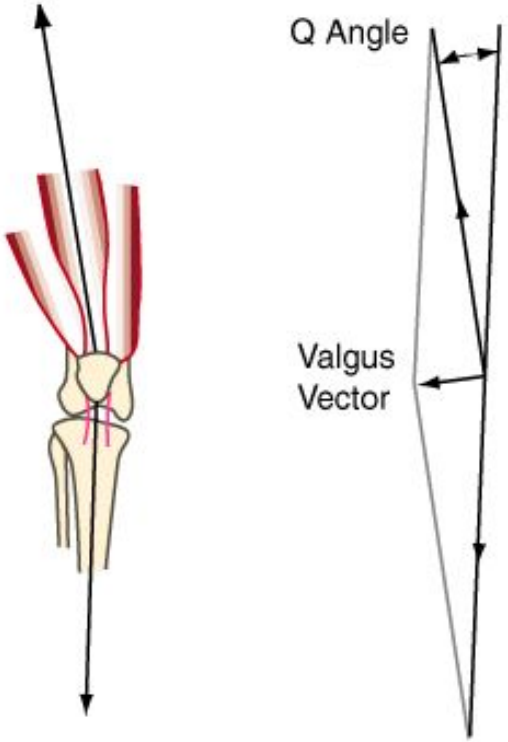
History

- MOI -
  - Position of lower extremity at time of injury (?foot planted, knee extended)
- Previous history
- Pain (levels, types, descriptors)
- Unusual sounds/sensations “pop, clicking, snapping”
- Chronic vs. acute
- Location of pain “inside the knee”
- Surface
- Shoes
- Type of activity at time of injury
- Painful to walk up/down stairs; any clicking, catching
- Did it swell immediately, slowly?
- Is the swelling located in the knee or in a pocket?

Observation

- Bilateral comparison
- Gait (limp, walking on toes, do they not want to extend knee, do they keep the knee stiff)
- Swelling (girth measurements)
- Discoloration
- Deformity (squinting patellae, “Frog-eyed” patellae, Patella alta, Patella baja)
- Genu valgum, genu varum, recurvatum
- Musculature – defined/mushy

Q-angle



The valgus angulation between the pull direction of the quadriceps muscle and patella tendon in the coronal plane. The Q-angle produces a lateral force component, valgus vector, tending to lateralise the patella with respect to the centre of the groove.

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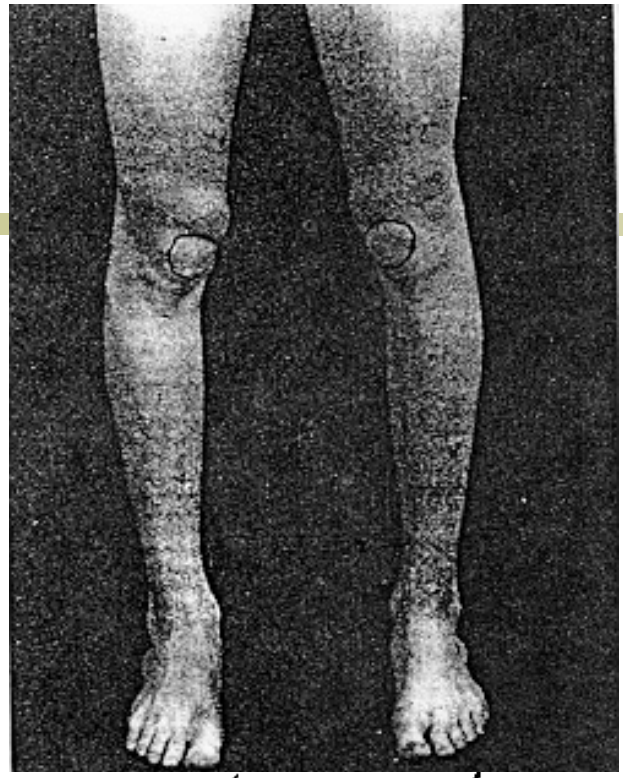
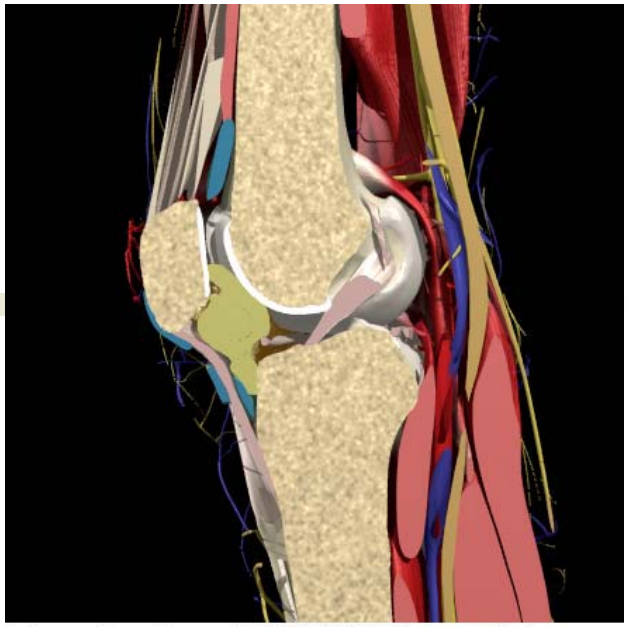
- The quadriceps angle (Q-angle) is the angle formed between a line drawn through the tibial tuberosity and the center of the patella and another line drawn from the anterior superior iliac spine (ASIS) of the pelvis through the center of the patella.

Q-angle

- Knee in extension
  - Normal – males 13 degrees
  - Normal - females – 18 degrees
- Knee in 90 degrees flexion
  - Both genders – 8 degrees





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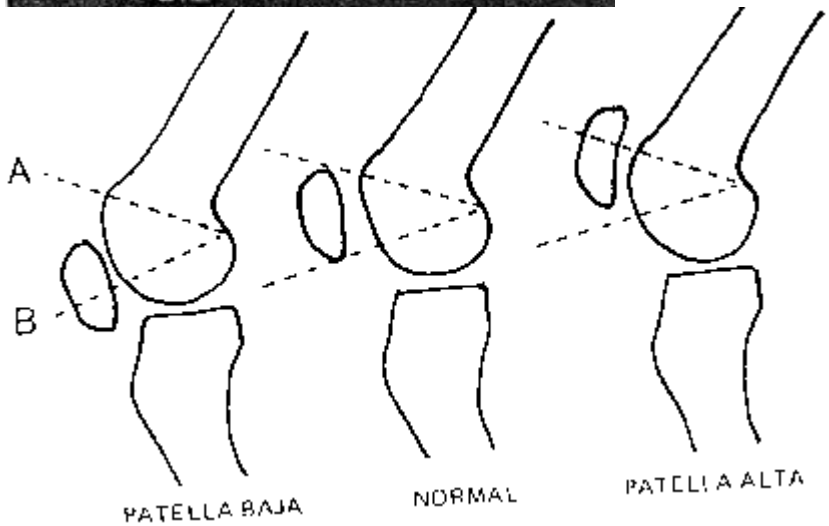
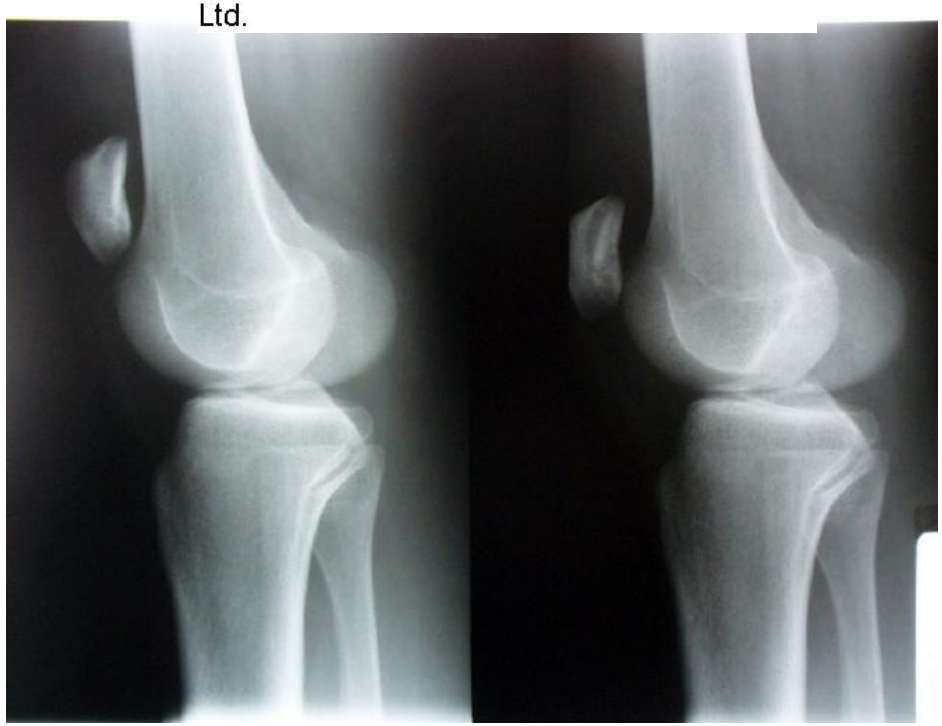




Palpation

- Tibia – tibial plateau, tibial tuberosity, Gerdy's Tubercle
- Fibula – head
- Medial joint line
- Medial collateral ligament
- Lateral joint line
- Lateral collateral ligament
- "Windows"
- Medial & Lateral femoral condyles & epicondyles
- Pes anserine tendon
- Semitendinosus tendon
- Patella – inferior pole
- Patellar tendon
- Quadriceps muscle group
- Biceps femoris tendon
- Iliotibial band
- Popliteal fossa
- Gastrocnemius heads

Stress/Special Tests

- On-field vs. Off-field eval
  - Check for fractures, blood, deformities, neurological
  - Valgus Stress Test – MCL
  - Varus Stress Test - LCL
  - Lachman’s – ACL
  - Anterior Drawer – ACL
  - McMurray’s - meniscus

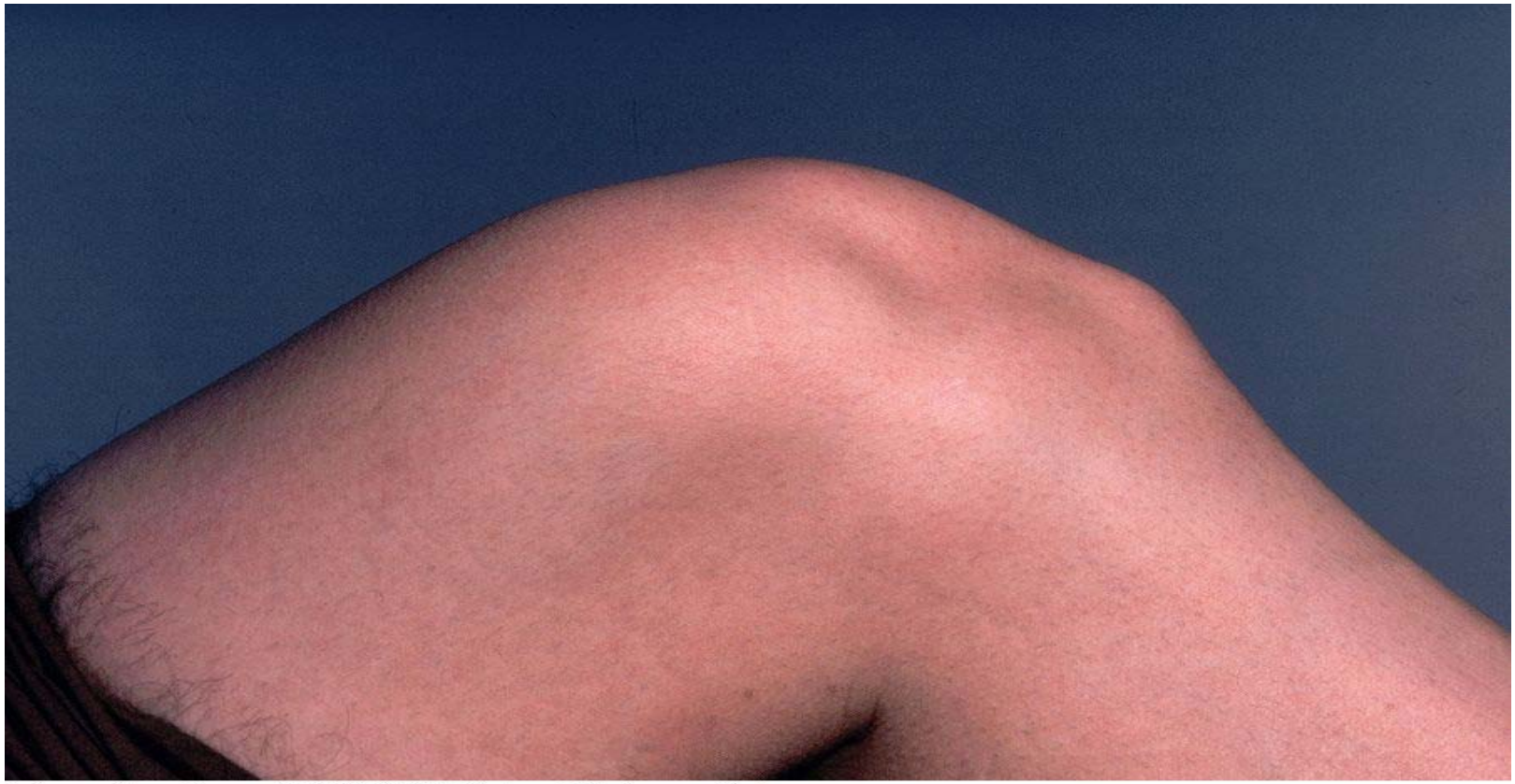
Stress/Special Tests

- Check for swelling
  - Sweep Test, Ballotable Patella
- Check ROM Ely's Test
- Check integrity of ligaments & joint stability
  - Valgus, Varus, Lachman's, Anterior/Posterior Drawer, Godfrey's 90-90 Test, Posterior Sag Test, Crossover Test, Slocum Drawer Test, External Rotation Test, Pivot Shift
- Check integrity of meniscus
  - McMurray's, Apley's Compression/Distraction, Duck Walk, Bounce home
- Check integrity of patella
  - Patellar Apprehension, Q Angle, Clarke's Sign, Patellar glide, tilt, rotation
- Check integrity of Iliotibial Band
  - Ober's Test, Noble's Compression Test

Now What?

- ? Crutches
- ? Referral
- ? RICE

Osgood-Schlatter's Disease



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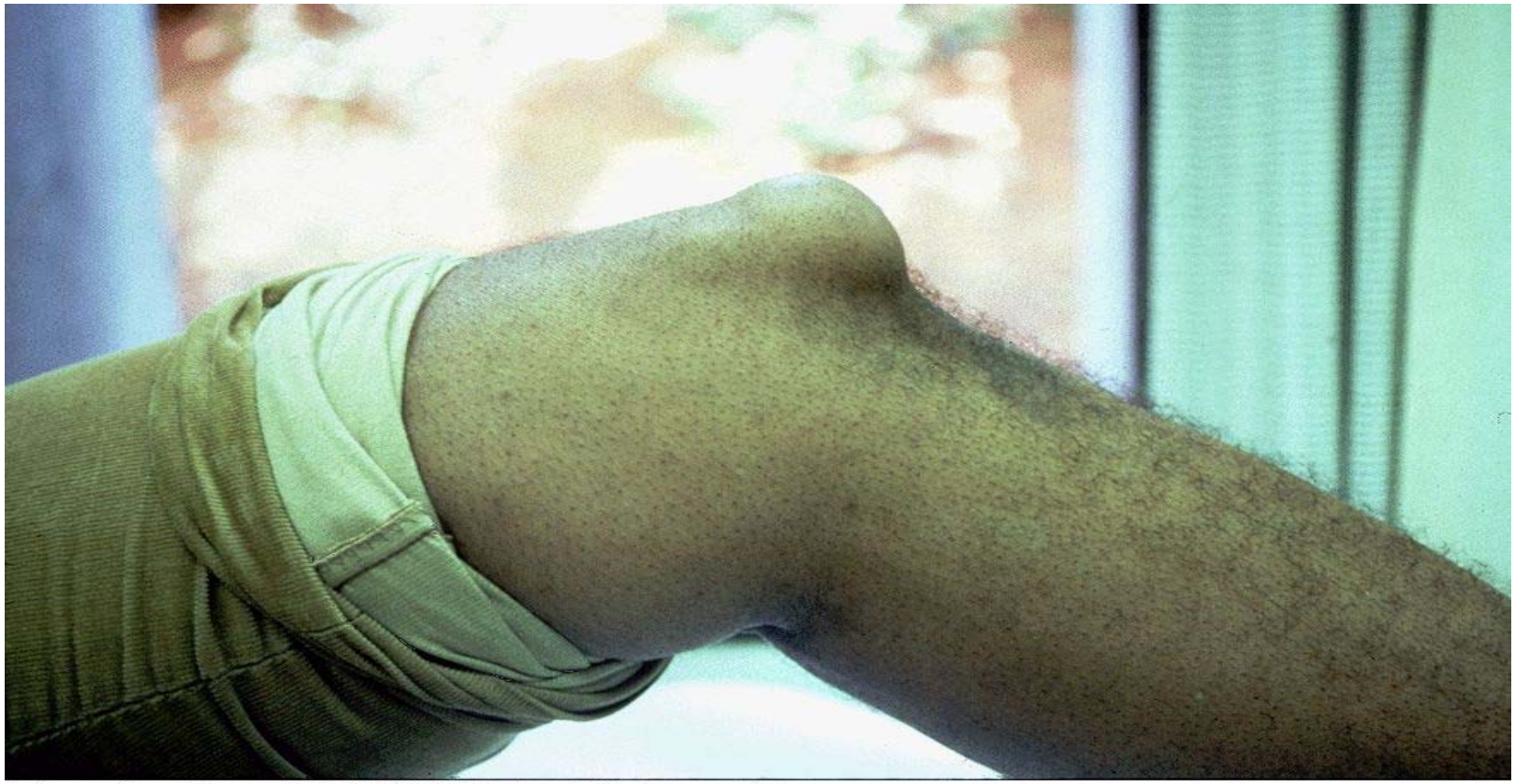
Housemaid’s knee



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