I. Overview
   → Illustrates trade-off between mobility vs. strength

   → Body’s largest, most complex joint
      - actually 3 joints-in-one -- 2 modified hinge & 1 planar
      - 3 bones
      - 10 ligaments
      - 13 bursae
      - 2 discs
   KNOW Fig. 9.23a, b, c, d

II. Bones and cartilage
A. Femur and tibia
   1. ends are enlarged & covered with articular cartilage
      ↓                        ↓
      increases articular surface reduces friction, absorbs shock
   2. femoral condyles - very convex
   3. tibial condyles - slightly concave
B. Patella
   1. largest sesamoid bone
   2. posteriorly covered with articular cartilage
   3. forms planar joint with the femur
   4. Functions
      -- reduces wear on quadriceps tendon
      -- keeps tendon centered
      -- protects main joint
      -- increase leverage of quadriceps?
C. Fibula
   - not directly involved in joint, but site of c.t. attachment
   - lateral
D. Articular discs (menisci)
   1. wedge-shaped crescents of fibrocartilage
      ↓
      “semilunar” cartilage
   2. anchored only at ends, so mobile
   3. Functions?
      - improve “fit” of femur
      - absorb shock
      - spread synovial fluid
III. Ligaments and tendons
- no true fibrous capsule
A. Anteriorly
  - tendon of quadriceps femoris
    -- medial patellar retinaculum
    -- lateral patellar retinaculum
     \[\downarrow\] (prevent lateral/medial dislocation patella)
patella embedded
     \[\downarrow\] -- patellar ligament
attached to tibial tuberosity
B. Laterally
  1. tibial (medial) collateral ligament -- prevents abduction
  2. fibular (lateral) collateral ligament -- prevents adduction
  3. tendons of “hamstrings” also stabilize laterally
    -- insert sketch, lateral view

- In extension, both collaterals are taut
- this prevents you from hyperextension and from falling forward
  at the knee, with minimal muscular effort
C. Posteriorly
   2 membranous ligaments
   – insert sketch

   ➔ “knee-pit”
   - oblique popliteal ligament
   - arcuate popliteal ligament
   - hamstrings, popliteus and gastrocnemius muscles also help

   ➔ All help prevent hyperextension

D. Internally (intracapsular ligaments)
   1. named after attachment on tibia
   2. “cruciate” = “cross”
      anterior cruciate ligament - attached anteriorly, medially on tibia
      - prevents anterior gliding of tibia
      posterior cruciate ligament - more posterior and laterally
      - prevents posterior gliding of tibia
   3. Functions
      - hold bones together (always taut)
      - prevent tibia from sliding on the femur, both anterior/posterior & side-to-side

IV. Bursae and fat pads
A. Bursae - 13
   -- c.t. sacs lined with synovial membrane
   -- small amount of synovial fluid
   -- may communicate with the joint cavity
   -- reduce friction
      prepatellar bursa - patella/skin
      suprapatellar bursa - femur/quadriceps muscle
      infrapatellar bursa (superficial & deep) - tibia/patellar ligament

B. Tendon sheaths (Fig. 9.5)
   - tubular bursae around tendons
   - none at knee, but common at wrist & ankle, shoulder
   - contribute to carpal tunnel syndrome

C. Infrapatellar fat pad
   - additional cushion
   - one of several
V. Synovial cavity and membrane
   -- extensive and complex potential space: 1ml fluid
   -- injury → increase synovial fluid production = “water on the knee”

VI. Clinical applications
   A. Knee is most commonly injured joint
      -- long levers
      -- no socket
   B. Most common injury is lateral blow: “3 C’s” or “Unhappy Triad”
      - collateral - medial
      - cruciate - ACL
      - cartilage – medial meniscus (attached to medial collateral)
   C. Severe injuries can be repaired by arthroplasty – Fig. 9.28

SKETCHES

III. C

Lateral view - knee in extension

Oblique popliteal

Arcuate popliteal