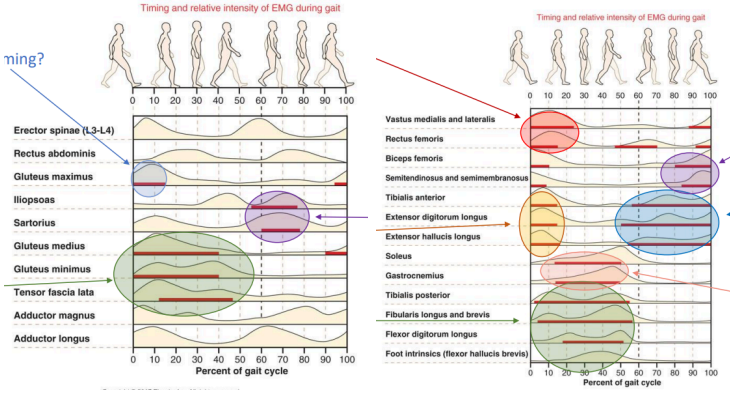
Between initial contact and loading response, which muscle is MOST active?

a. iliopsoas
b. Gastroc
c. Glute Max
d. Rectus abdominis

Correct answer: C



What are the 4 rockers in gait?

a. Hip, knee, ankle, toe
b. Heel, Ankle, Forefoot, Toe
c. Stability, progression, shock absorption, energy conservation
d. Pivot, “forward fall”, propulsion, progression

Correct answer: B

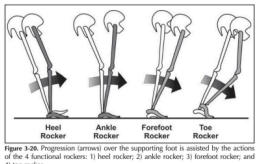
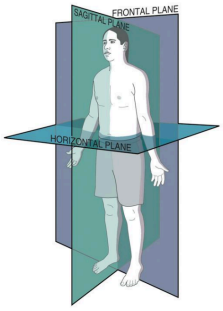


Figure 3-20. Progression (arrows) over the supporting foot is assisted by the actions of the 4 functional rockers: 1) heel rocker; 2) ankle rocker; 3) forefoot rocker; and 4) toe rocker.

What plane does gait occur in?

a. Frontal
b. Sagittal
c. Horizontal

Correct answer: B



Selected Common Osteokinematic Terms
(Note: some joints in the body use location-specific terminology that differs)

Plane	Common Terms
Sagittal	Flexion, extension Dorsiflexion, plantar flexion Forward bending, backward bending
Frontal (i.e., coronal)	Abduction, Adduction Lateral flexion Ulnar deviation, radial deviation Eversion, inversion
Horizontal (i.e., transverse)	Internal rotation, external rotation Medial rotation, lateral rotation Axial rotation

Sagittal Plane Kinematics

"Movements at the joints of the lower extremity therefore are described as a function of angular rotation. Although joint angular rotation occurs primarily in the **sagittal plane**, important motion, although smaller magnitude, also occurs in the frontal and horizontal planes." (p. 662)

Neumann: Kinesiology of the Musculoskeletal System, 3rd Edition - Videos (elsevier.com) (Videos 15-1, 15-3)

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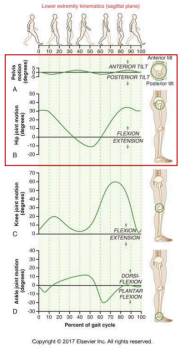


A 65 yo female with osteoporosis experienced a fall that resulted in shattering both patellas, what is a measure of prevention that helps to manage osteoporosis?

a. ROM of the hip & knee
b. weight-bearing activity
c. Rest
d. PEACE & LOVE

Correct answer: B
Wolff's Law: "bone is laid down in areas of high stress and reabsorbed in areas of low stress." Osteoporosis is the degeneration of bone, increasing fragility. Wolff's law supports weight-bearing activities to increase bone density and slow the impact of osteoporosis.

Foot/Ankle, Wrist/Hand questions

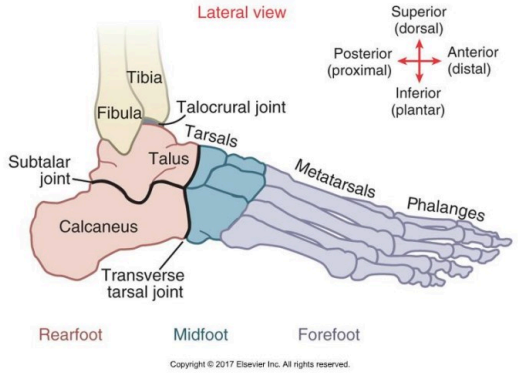
Which of the following bones make up the midfoot?

a. Metatarsals, cuboid, and cuneiforms
b. Talus, calcaneus and navicular
c. Navicular, cuboid and cuneiforms
d. Cuboid and cuneiforms

Answer: C

Overview

Where is 'the ankle'? Where is 'the foot'?



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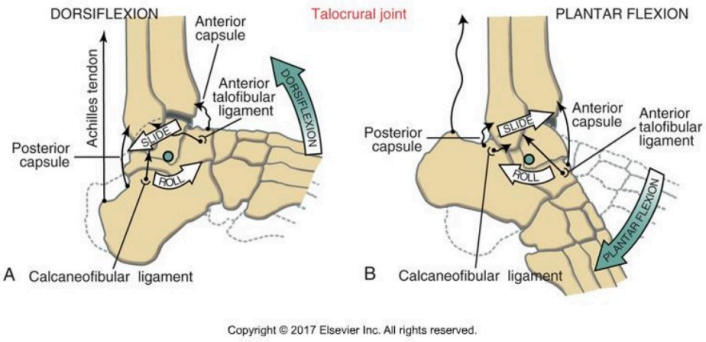
During closed chain dorsiflexion the tibia and fibula rolls _____ and slide _____ on the talus

a. Anterior, anterior
b. Posterior, posterior
c. Anterior, posterior
d. Posterior, anterior

Answer B

Arthrokinematics

Talocrural Joint



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Which of the following ligaments resist supination of the ankle?

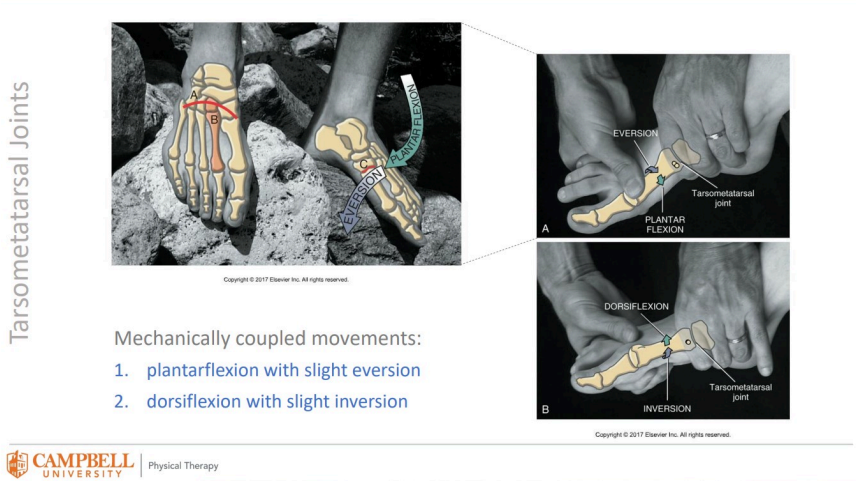
a. Anterior talofibular ligament
b. Deltoid ligament
c. Calcaneofibular ligament
d. Calcaneonavicular ligament

Answer A and C

Which of the following mechanically coupled movements are paired correctly?

a. Plantarflexion, inversion
b. Dorsiflexion, eversion
c. Dorsiflexion, inversion
d. Dorsiflexion, plantarflexion

Answer C



Which of the following ligaments does NOT bind the tibia and fibular together?

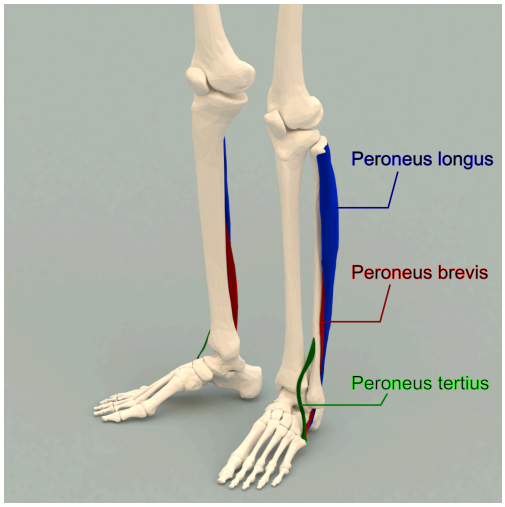
a. Anterior tibiofibular ligament
b. Posterior tibiofibular ligament
c. Interosseous membrane
d. Anterior talofibular ligament

D

The fibularis brevis and the fibularis tertius have different actions in the frontal plane

a. True
b. False

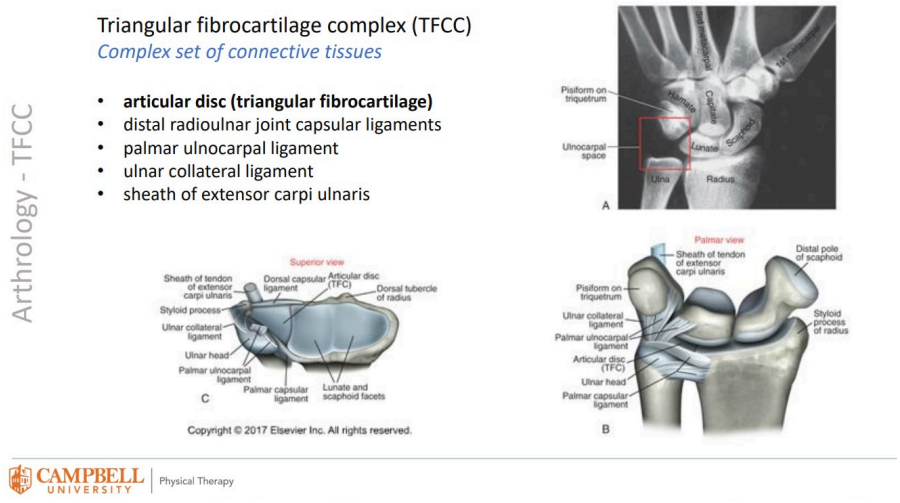
False



Which of the following structures is NOTpart of the triangular fibrocartilage complex?

a. Ulnar collateral ligament
b. Palmar ulnocarpal ligament
c. Articular disc
d. Transverse carpal ligament

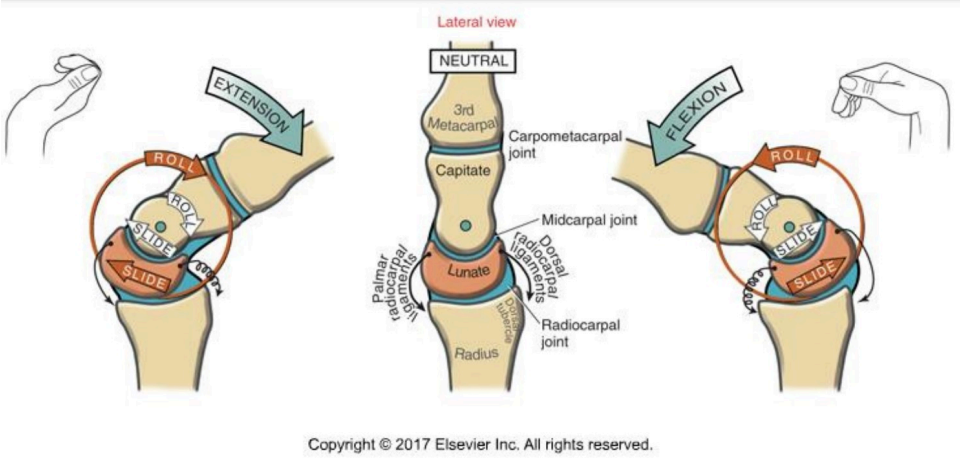
Answer D



During open chain wrist flexion the mid carpals roll anteriorly and slide posteriorly on which of the following

a. Radius and ulna
b. metacarpals
c. Proximal carpals
d. Proximal phalanges

Answer: C



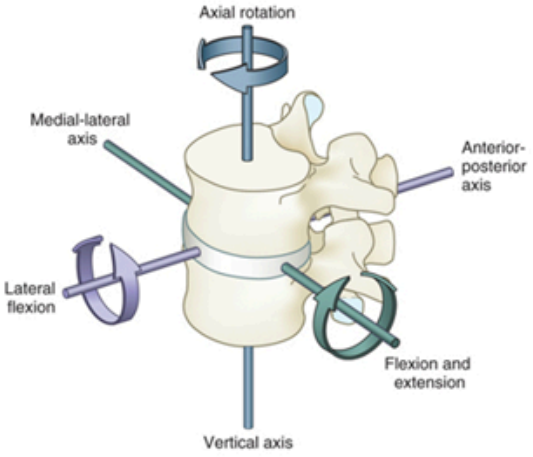
Choose the correct Paring for Axial Flexion and Extension:

Plane: Sagittal/ Axis of rotation: Vertical

Plane: Saggital/ Axis of rotation: Anterior-Posterior

Plane: Sagittal/ Axis of rotation: Medial-Lateral ***

Plane: Saggital/ Axis of rotation: Vertical – axis of yaw



Terminology Describing the Osteokinematics of the Axial Skeleton

Common Terminology	Plane of Movement	Axis of Rotation	Other Terminology
Flexion and extension	Sagittal	Medial-lateral	Forward and backward bending
Lateral flexion to the right or left	Frontal	Anterior-posterior	Side bending to the right or left
Axial rotation to the right or left*	Horizontal	Vertical	Rotation, torsion

*Axial rotation of the spine is defined by the direction of movement of a point on the *anterior side* of the vertebral body.

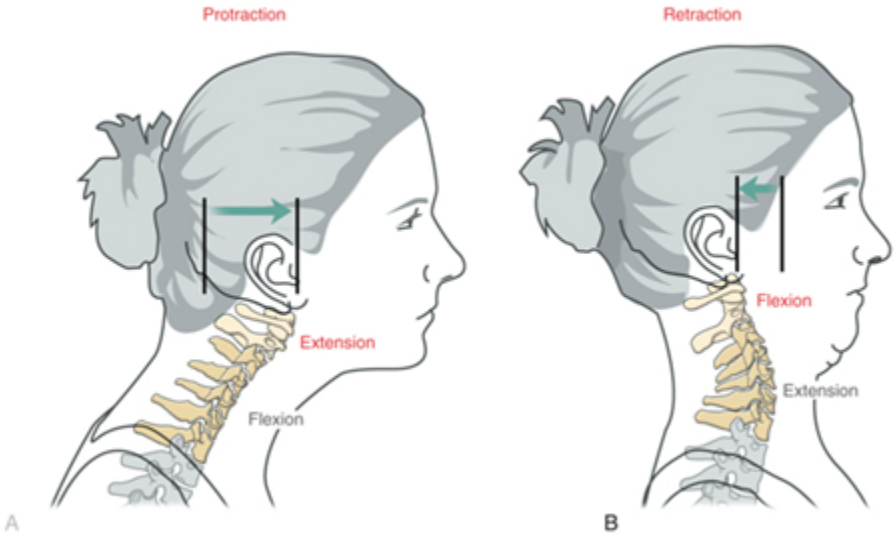
During cervical retraction:

Upper Cervical apophyseal joint extend, lower flex

Both upper and lower cervical apophyseal joints extend

Upper Cervical apophyseal joints flex, lower extend ***

Both upper and lower apophyseal joints flex



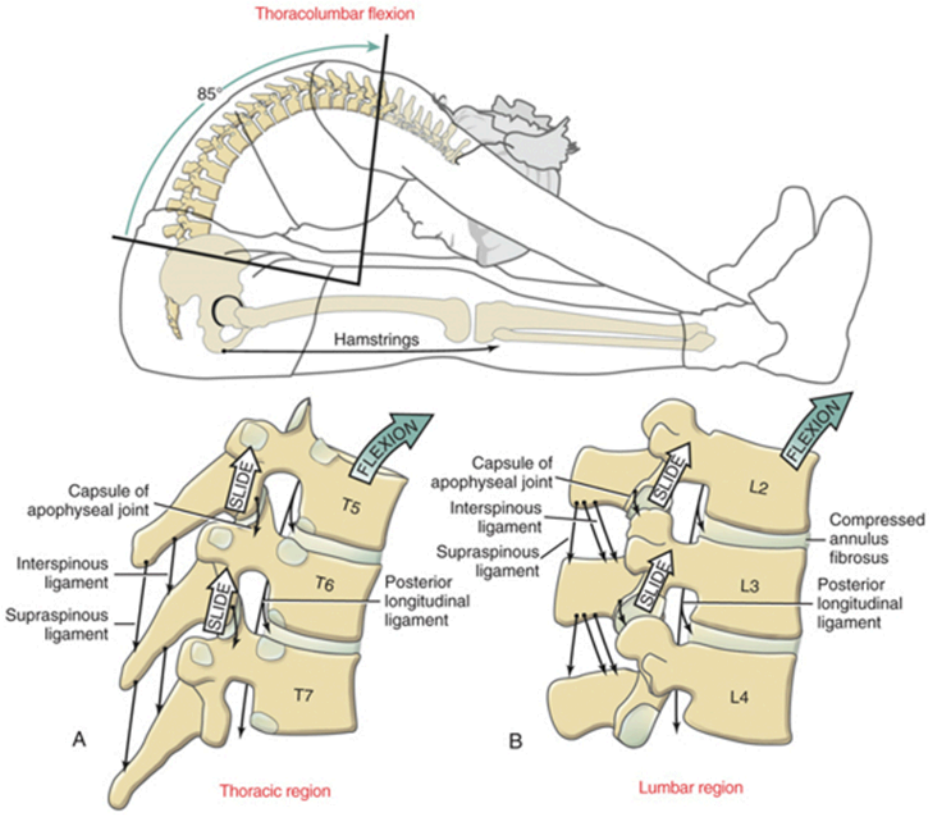
In thoracalumbar flexion apophyseal joints slide:

Superiorly ***

Inferiorly

Posteriorly

Anteriorly



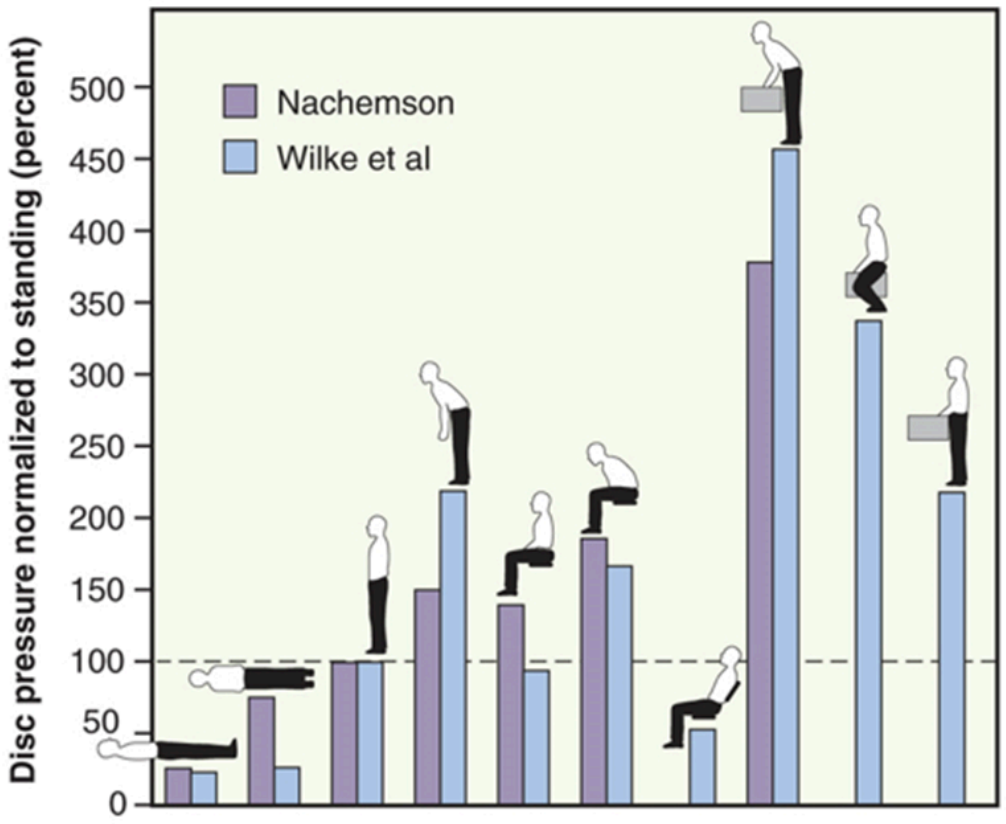
Choose the position that places the highest pressure on our spinal disks:

Slouched Sitting

Bending forward with a load **

Squatting with a load

Standing with a load



ingstone. Modified from Wilke H-J, Neef P, Caimi M, et al: New in vivo measurements of pressures in the intervertebral disc in daily life, *Spine* 24:755, 1999.

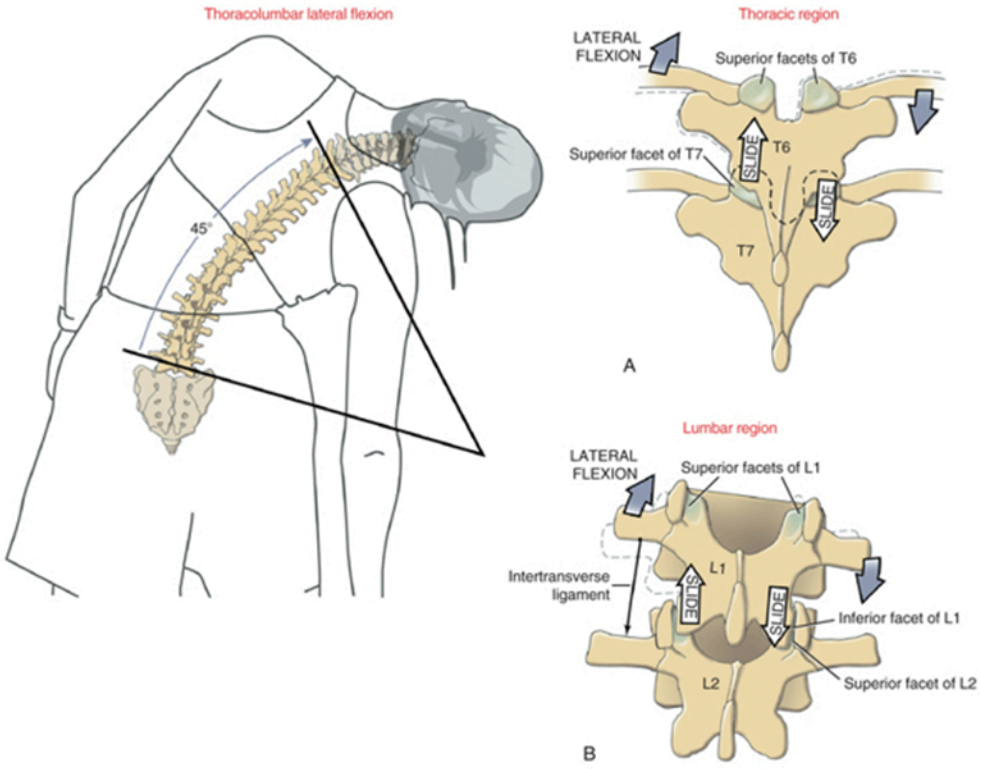
In LEFT thoracolumbar lateral flexion, the left facets slide _____ and the right facets slide _____

Superiorly, Inferiorly

Posteriorly, Inferiorly

Inferiorly, Superiorly ****

Posteriorly, Superiorly



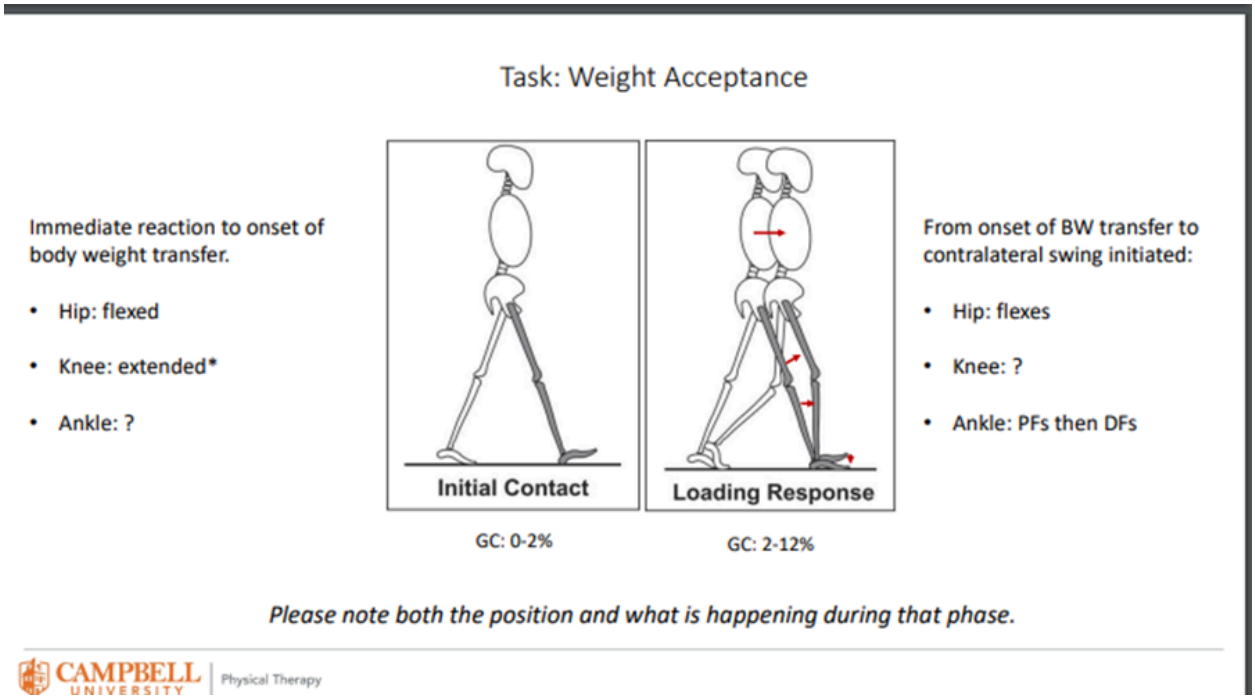
Which Phases in Gait are responsible for WEIGHT ACCEPTANCE:

Initial Contact + Loading Response ***

Loading Response +Pre-Swing

Terminal Stance+ Mid Stance

Initial Contact + Terminal Stance



In initial contact which muscle is PRIMARILY responsible for controlling plantarflexion:

Soleus + Gastroc

Tibialis Anterior ***

Tibialis Posterior

Bicep 😊

From LR to Mid Stance to Terminal Stance we see dorsiflexion of the ankle, the _____ is responsible for control of this dorsiflexion.

Calf Complex***

Anterior Tibialis

Quads

Hamstring

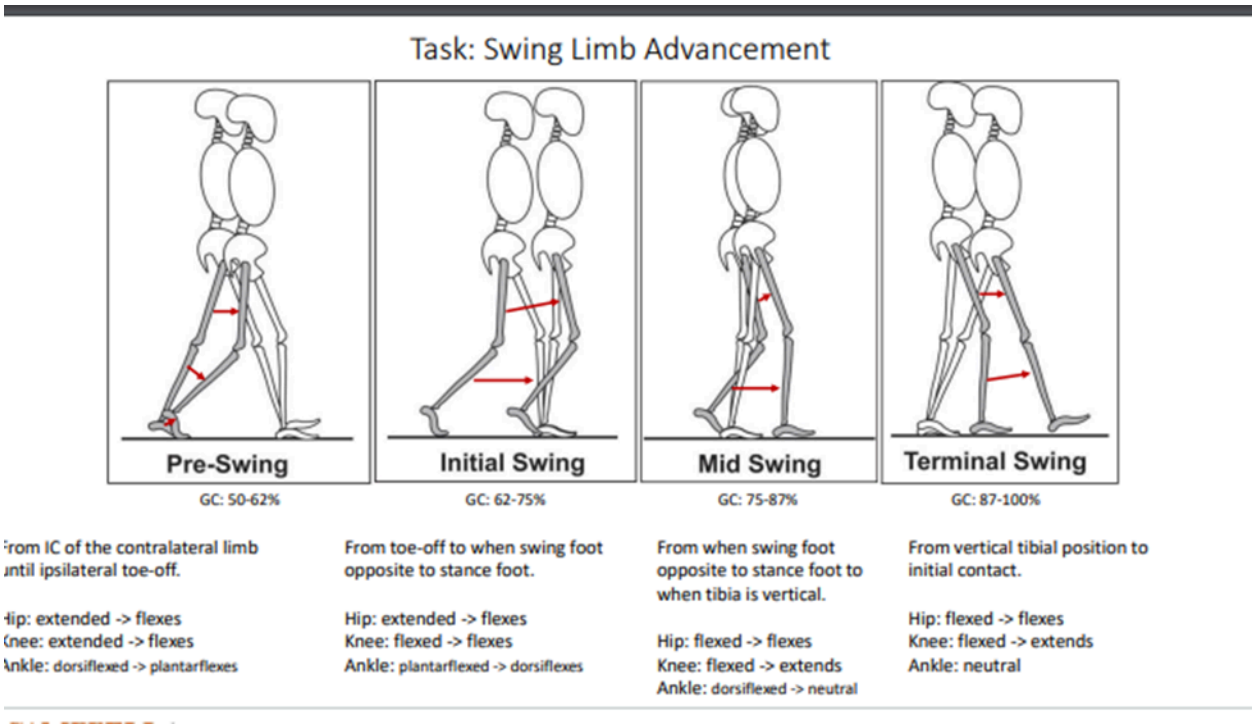
From Pre-Swing to initial swing the knee ____ then from initial swing to mid swing the knee _____

Flexes / extends*****

Extends / flexes

Internally Rotates/ externally rotates

Externally Rotates/ Flexes



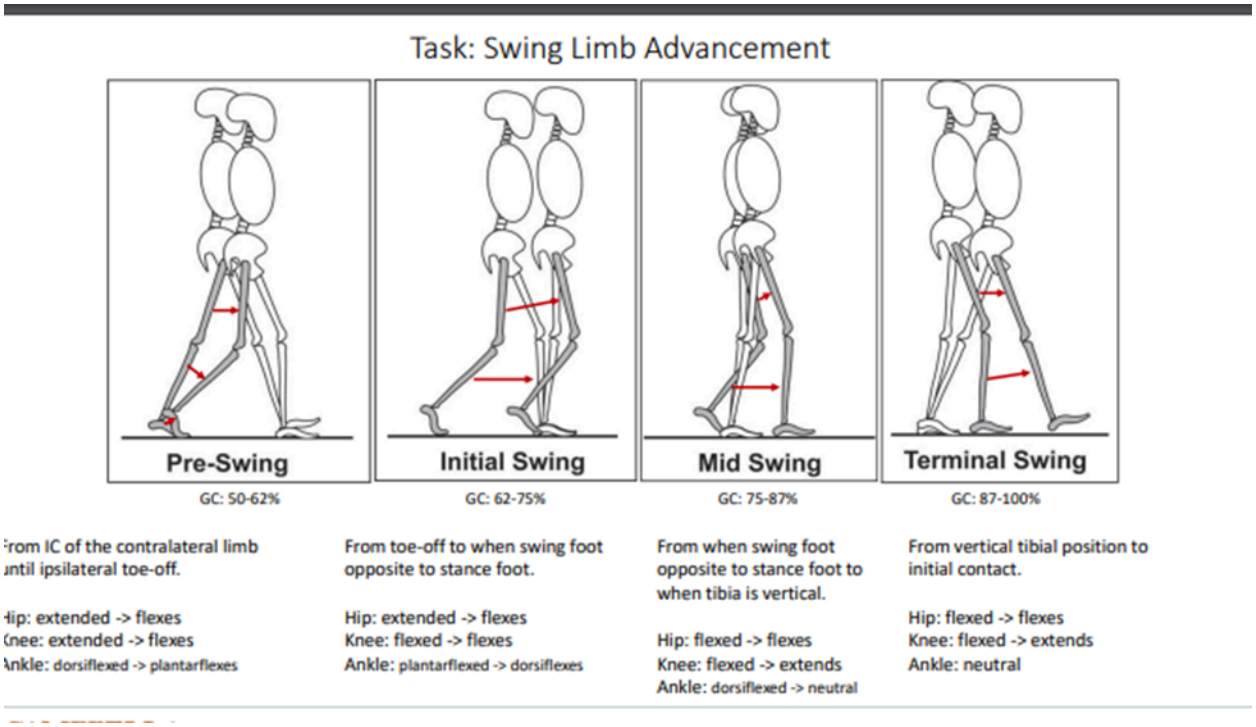
What phases of gait are responsible for Swing Limb Advancement:

Initial Swing, Mid Swing, Terminal Swing, Initial Contact

Pre-swing, initial swing, mid swing, terminal swing *****

Loading response, Midstance, Terminal Stance, Pre-swing

Terminal Stance, Pre-swing, Initial Swing, Mid Swing, Terminal Swing



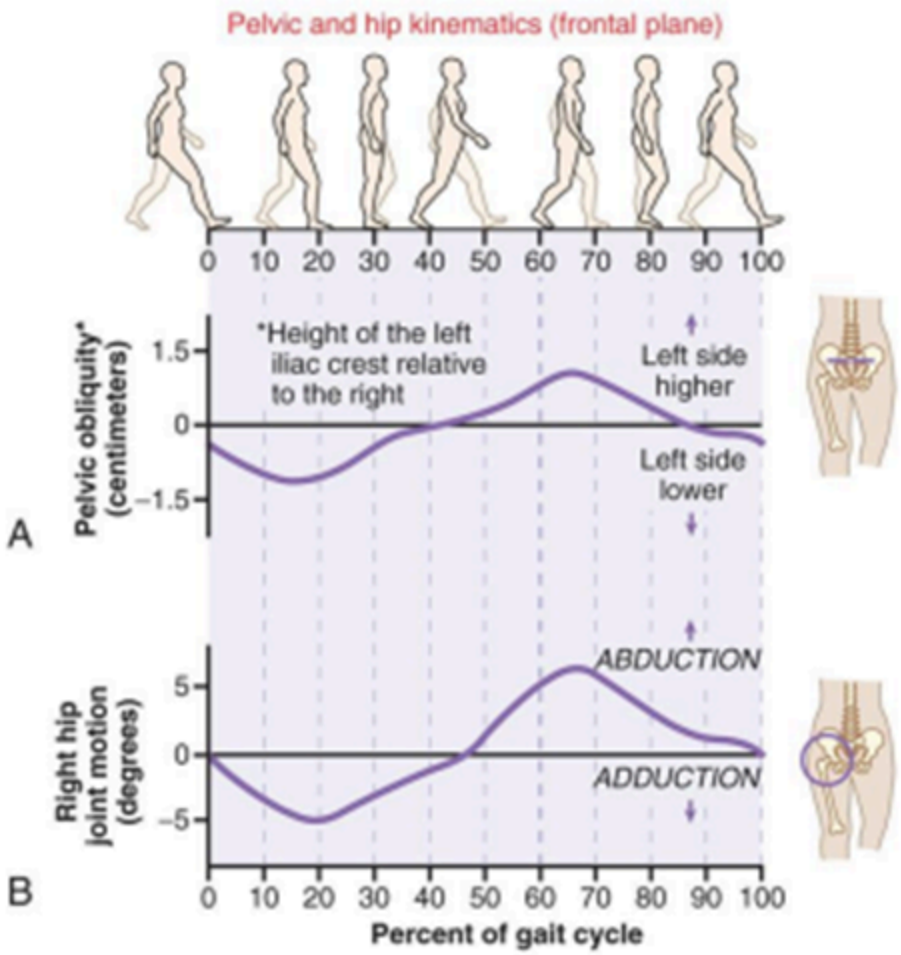
When looking at an individuals RIGHT LE during SWING phase of gait, we expect to see the LEFT iliac crest _____ in relation to the right iliac crest.

Higher ***

Lower

Equal

I hate the gait cycle



Data from Gurpou S: Clinical gait analysis. In Spivack BS, editor: *Evaluation and management of gait disorders*, New York, 1968, Marcel Dekker.

The ____ muscles _____ control knee flexion from IC to LR:

Quadriceps/ Eccentrically ****

Quadriceps/ concentrically

Hamstrings / Concentrically

Quadriceps/ Eccentrically ****

Graphical Representation

1st knee flexion 'wave':

- peak occurs at the transition of LR and MSt
- function of this flexion is to absorb shock (i.e., loading)
- the rate of loading during LR is highly influenced by gait speed
- eccentric control of loading
- following the peak, the knee *extends (relatively)* during MSt

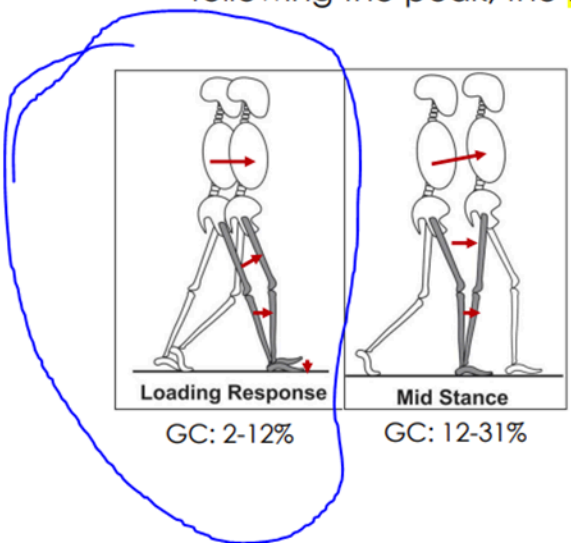
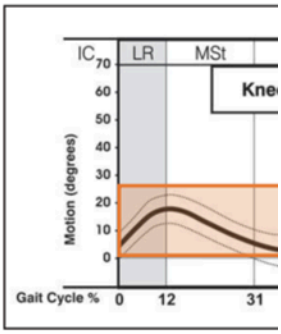


Figure 5-2. Sagittal plane knee motion. Normal range during a GC for free walking. Black line = the mean, dotted lines = one standard deviation. Vertical bars designate the gait phase divisions.



Jacquelin Perry and Judith M. Burnfield . 483. (2010). Gait Analysis. https://ebo

Choose the muscles in correct order of "number of crossed intervertebral junctions" from MOST TO LEAST:

Semispinalis, rotatores, multifidi

Semispinalis, Multifidus, Rotatores

Rotatores, Multifidi, Semispinalis

Multifidi, Semispinalis, Rotatores

Muscle group	Relative length and depth	Average number of crossed intervertebral junctions
Semispinalis	Long; superficial	6-8
Multifidi	Intermediate	2-4
Rotatores	Short; deep	1-2

The Role and activity of muscles that stabilize the trunk depend on **Task, _____, and _____**

Orientation, LengthLength, PCSA

Orientation, PCSA

Orientation, Tone

- How could these muscles work together to stabilize the trunk?
- What role would the transversus abdominis likely play?

The role and activity of muscles considered to be intrinsic and extrinsic stabilizers depends on the anatomical orientation, PCSA, and the **task**!

Place the following gait deviations in order of severity from least to greatest:

Foot Slap,Foot Flat , Forefoot Contact ******

Foot Flat ,Foot Slap ,Forefoot Contact

Forefoot Contact , Foot Flat, Foot Slap

Foot Flat , forefoot Contact , Foot Slap

TABLE 15.7 Gait Deviations at the Ankle and Foot Secondary to Specific Ankle and Foot Impairments

Observed Gait Deviation at the Ankle or Foot	Likely Impairment	Selected Pathologic Precursors	Mechanical Rationale and/or Associated Compensations
"Foot slap": rapid PF after heel contact.	Mild weakness of the ankle dorsiflexors	Common peroneal nerve palsy and distal peripheral neuropathy	Dorsiflexors can DF during swing but not after heel contact.
"Foot flat": entire plantar surface makes initial contact.	Marked weakness of the ankle dorsiflexors	Common peroneal nerve palsy and distal peripheral neuropathy	Strength for partial DF during swing.
Forefoot makes initial contact.	Severe weakness of the ankle dorsiflexors	Common peroneal nerve palsy and distal peripheral neuropathy	No active DF; likely increase hip/knee flexion during swing.
"Drop foot": ankle in PF during swing.	Weakness of the ankle dorsiflexors and/or pes equinus	Common peroneal nerve palsy	Hip hiking, circumduction, vaulting, and/or excess hip/knee flexion to prevent toe drag.

If the patient has a plantarflexion contracture, what gait compensation may we see in stance phase of gait?

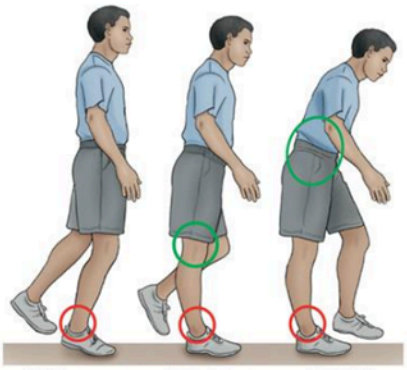
Excessive Ankle Dorsiflexion

Excessive Knee flexion

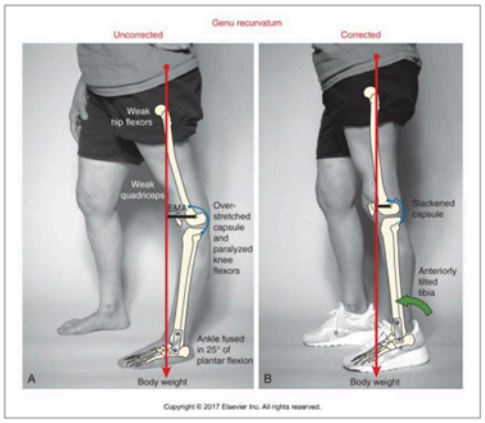
Excessive Forward Trunk Lean ***

Excessive Hip Extension

Ankle and Foot Deviations



Impairment: ankle plantar flexion contracture
Compensations: knee hyperextension (mid stance); forward trunk lean (terminal stance)



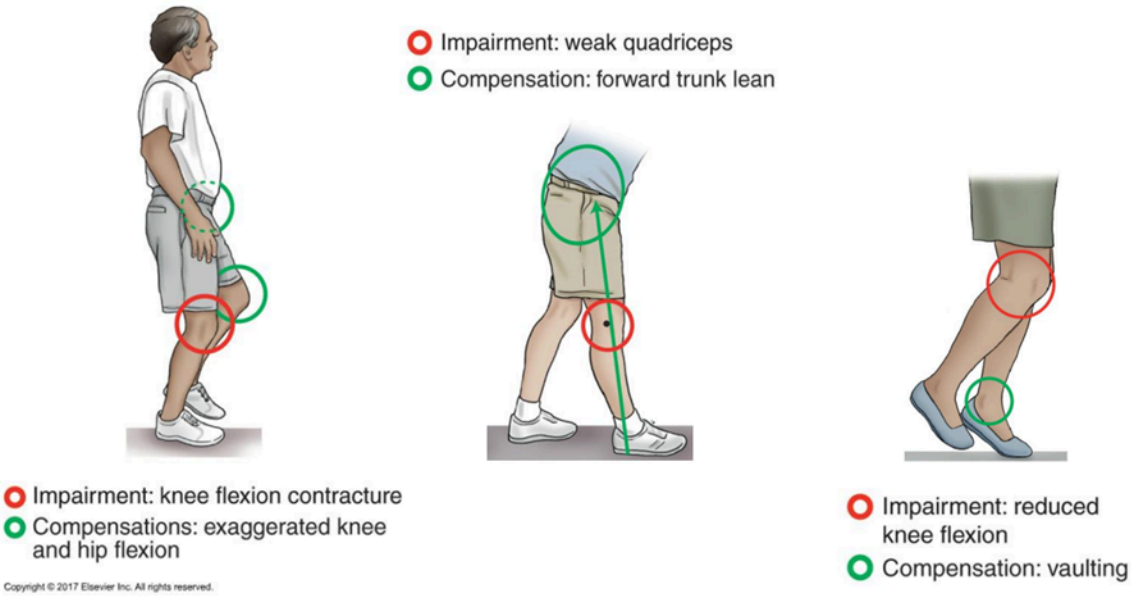
If a patient has excessive knee flexion during gait what muscle is likely WEAK?

Hamstrings

Quadriceps ***

Glutes

Gastrocnemius



A patient comes into clinic and you notice a contralateral hip drop during stance phase of gait, what is this called?

Vaulting Gait

Crouching Gait

Trendelenburg Gait

Antalgic Gait

Trendelenburg Gait

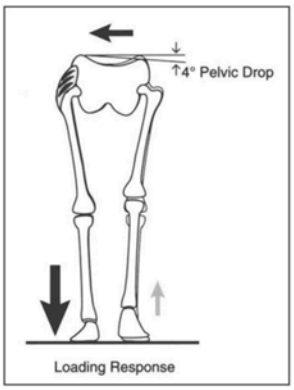
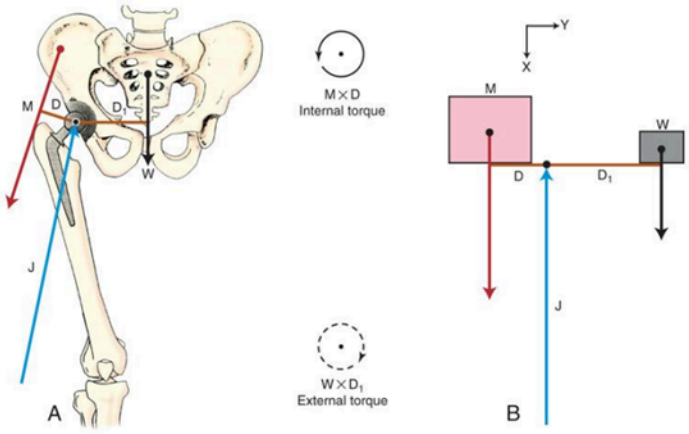


Figure 3-31. Contralateral pelvic drop decelerated by the hip abductors provides an additional shock-absorbing maneuver. This occurs as weight is rapidly dropped onto the loading limb (large arrow) as the other limb is being lifted (small arrow).



Modified from Neumann DA: Biomechanical analysis of selected principles of hip joint protection, *Arthritis Care Res* 2:146, 1989.

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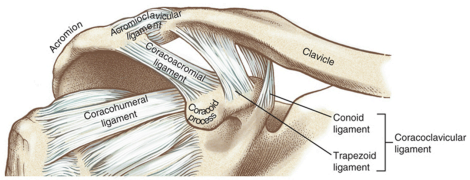
WEEK 4

Which of the following is NOT an AC joint ligamentous reinforcer:



A) Acromioclavicular
B) Coracohumeral
C) Coracoacromial
D) Coracoclavicular

Correct Answer: B (week 4, slide 20)

Which of the following is NOT a secondary dynamic stabilizer of the glenohumeral joint:

A) Biceps Brachii
B) Latissimus Dorsi
C) Pectoralis Major
D) Teres Major
E) Subscapularis
F) Deltoid

Correct Answer: E (Week 4, Slide 40)

A _____ pressure gradient exists within the glenohumeral joint:

A) Positive
B) Negative

Correct Answer: B (week 4, slide 38)

What are the arthrokinematics of the AC joint as the arm is abducted:

A) Rolls Inferior, Glides Inferior
B) Rolls Inferior, Glides Superior
C) Rolls Superior, Glides Inferior
D) Rolls Superior, Glides Superior

Correct Answer: C

The Glenohumeral Joint has _____ degrees of freedom:

A) 4
B) 2
C) 1
D) 3

Correct Answer: D

Lower trapezius, latissimus dorsi, pectoralis minor, and subclavius are all scapular:

A) Depressors
B) Retractors
C) Downward Rotators
D) Protractors

Correct Answer: A (Week 4, slide 52)

Hip/Pelvis & Knee Q's

What muscle has the greatest moment arm for hip abduction?

a. Glute max
b. Glute med
c. Glute min

Correct answer: B

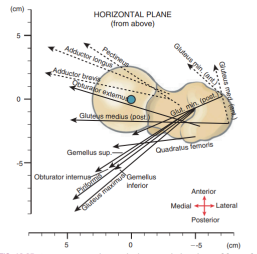
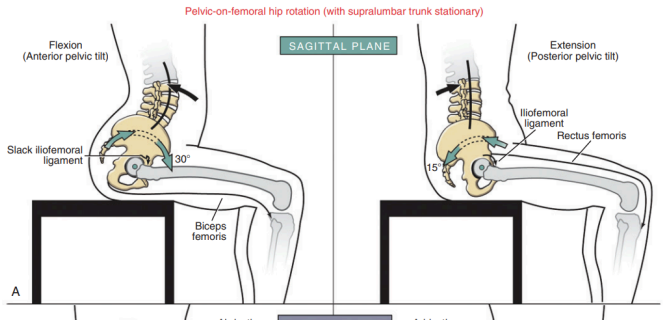


FIG. 12.35 A superior view depicts the horizontal plane lines of force of several muscles that cross the hip. The longitudinal axis of rotation is in the superior-inferior direction through the femoral head. For clarity, the tensor fasciae latae and sartorius muscles are not shown. The external rotators are indicated by solid lines and the internal rotators by dashed lines. (The actual scale of the image is indicated on the vertical and horizontal axes of the graph.)

In this image, what structure(s) could determine the end ROM for an anterior pelvic tilt? (what would keep it from going further)



a. Glute max and Adipose tissue
b. Hip flexion contracture and limited motion in lumbar spine
c. End range of flexion in the lumbar apophyseal joints
d. Glute med and weak hip flexors

Correct answer: A

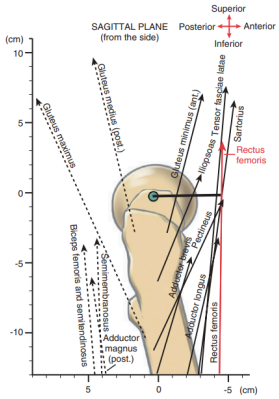


FIG. 12.25 A view from the side that depicts the sagittal plane lines of force of several muscles that cross the hip. The axis of rotation is directed in the medial-lateral direction through the femoral head. The flexors are indicated by solid lines and the extensors by dashed lines. The internal moment arm used by the rectus femoris is represented by the thick black line.

In a patient with a tight rectus femoris, what is the best way to stretch this muscle?

a. Hip flex, knee ext, hip abd
b. Hip ext, knee flx, hip abd
c. Hip add, IR, knee flex
d. Hip add, ER, knee flex

Correct answer: B

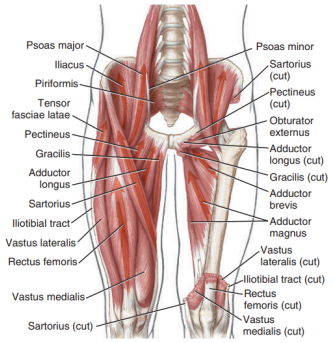


FIG. 12.26 Muscles of the anterior hip region. The right side of the body shows flexors and adductor muscles. Many muscles on the left side are cut away to expose the adductor brevis and adductor magnus.

In what knee position is the patella most susceptible to dislocation?

a. 30 flx
b. 50 flx
c. 90 flx
d. 110 flx

Correct answer: A because there is less engaged with the trochlear groove and the compression forces from quadriceps tendon are very low.

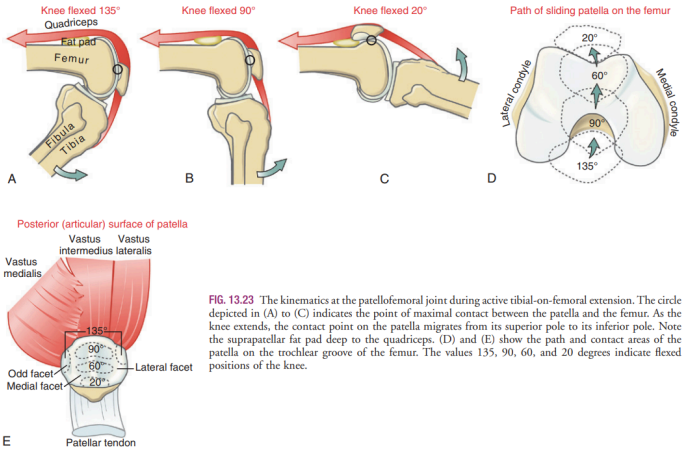
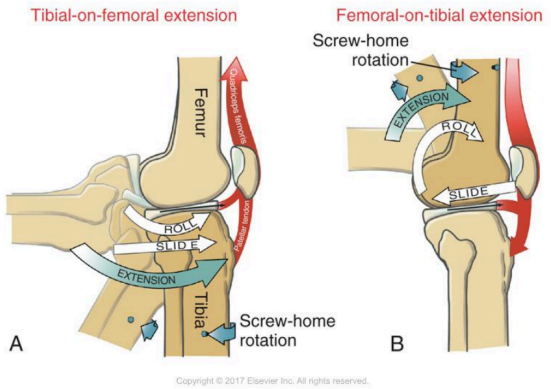


FIG. 13.23 The kinematics at the patellofemoral joint during active tibial-on-femoral extension. The circle depicted in (A) to (C) indicates the point of maximal contact between the patella and the femur. As the knee extends, the contact point on the patella migrates from its superior pole to its inferior pole. Note the suprapatellar fat pad deep to the quadriceps. (D) and (E) show the path and contact areas of the patella on the trochlear groove of the femur. The values 135, 90, 60, and 20 degrees indicate flexed positions of the knee.

During a closed chain extension, what are the arthrokinematics of the knee joint?

a. Roll anterior, slide posterior
b. Roll & slide anterior
c. Roll posterior, slide anterior
d. Roll & slide posterior

Correct answer: A.



Which of the following results in the most compressive force on the patellofemoral joint?

a. Mini squats with pulsing
b. Seated knee ext
c. Kicking a ball
d. Deep squat

Correct answer: D

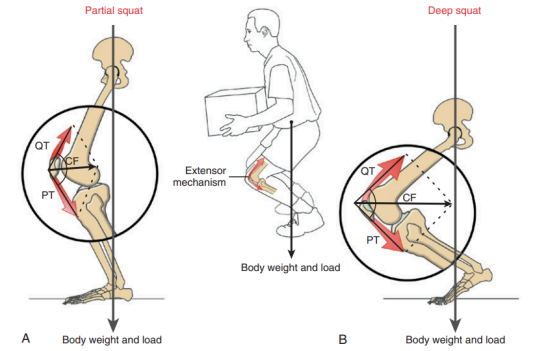


FIG. 13.28 The relationship between quadriceps activation, depth of a squat position, and the compression force within the patellofemoral joint is shown. (A) Maintaining a partial squat requires that the quadriceps transmit a force through the quadriceps tendon *(QT)* and the patellar tendon *(PT)*. The vector addition of QT and PT provides an estimation of the patellofemoral joint compression force *(CF)*. (B) A deeper squat requires greater force from the quadriceps because of the greater external (flexion) torque on the knee. Furthermore, the greater knee flexion (B) decreases the angle between QT and PT and consequently produces a greater joint force between the patella and femur.

A patient presents to the clinic after an MVA,they're having knee pain, trouble going down stairs, and feelings of instability in the knee. Which of the following is likely the culprit of their symptoms?

a. ACL
b. PCL
c. MCL
d. LCL

Correct answer: B. PCL injury is known as the "dashboard injury" because the MOI involves the tibia moving posterior to the femur, which is common in motor vehicle accidents.

A patient is having trouble controlling their descent while sitting down. What muscle activity may be impaired?

a. Concentric hamstring & quads
b. Concentric hamstring, eccentric quads
c. Eccentric hamstring & quads
d. Eccentric hamstring, concentric quads

Correct answer: C. to slowly descend into a seated position, your quads are working eccentrically to control knee flexion and hamstrings are working eccentrically to control hip flexion.

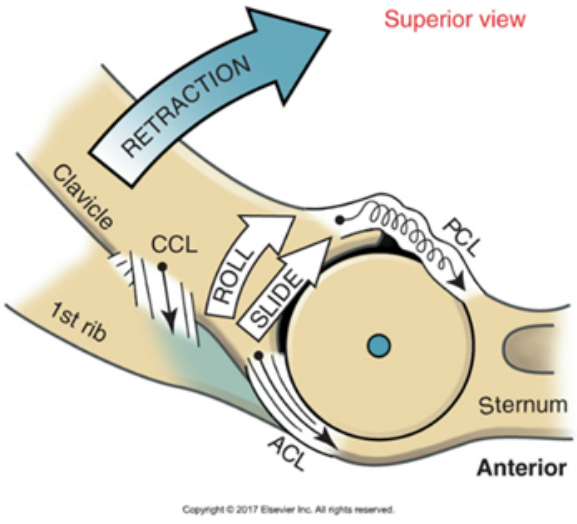
During retraction of the scapula, what are the arthrokinematics happening at the SC joint

A. Roll posterior, slide anterior

B. Roll superior, slide posterior

C. Roll posterior, slide posterior

D. Roll anterior, slide anterior



Week 4 pp

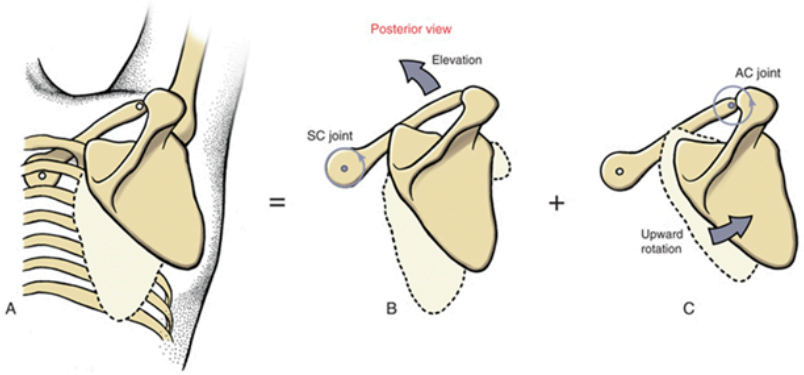
The AC joint is known as a “fine tuner” what movement is occurring at the AC joint during shoulder abduction?

A. Elevation

B. Retraction

C. Downward rotation

D. Upward rotation



Week 4 pp – note that the elevation is occurring at the SC joint

What is the purpose of the AC joint allowing movement of the scapula

A. To help increase mechanical advantage

B. To increase the bony congruency and stability of the shoulder joint

C. To keep the scapula from winging

D. Maintain proper mobility of the joint for future movements

Why does thoracic kyphosis cause shoulder impingement during shoulder flexion?

A. Joint capsule size is decrease

B. Muscular dynamization is not occurring properly

C. Decreased scapular upward rotation and increased anterior tilt

D. Deltoids are in position if passive insufficiency

TABLE 3 PROPOSED BIOMECHANICAL MECHANISMS OF SCAPULAR KINEMATIC DEVIATIONS

Mechanism	Associated Effects
Inadequate serratus activation	Lesser scapular upward rotation and posterior tilt
Excess upper trapezius activation	Greater clavicular elevation
Pectoralis minor tightness	Greater scapular internal rotation and anterior tilt
Posterior glenohumeral joint soft tissue tightness	Greater scapular anterior tilt
Thoracic kyphosis or flexed posture	Greater scapular internal rotation and anterior tilt, lesser scapular upward rotation

Week 5 pp

What ligament of the elbow resists valgus force

A. Medial collateral ligament

B. Radial collateral ligament

C. Lateral collateral ligament

D. Annular ligament

True/False

The interosseous membrane is transferring force from the radius to the ulna during distraction>

- False (this is true during compression)