

#ideaworld



LIMITLESS

Anatomy in Three Dimensions™: The Hip

PRESENTED BY

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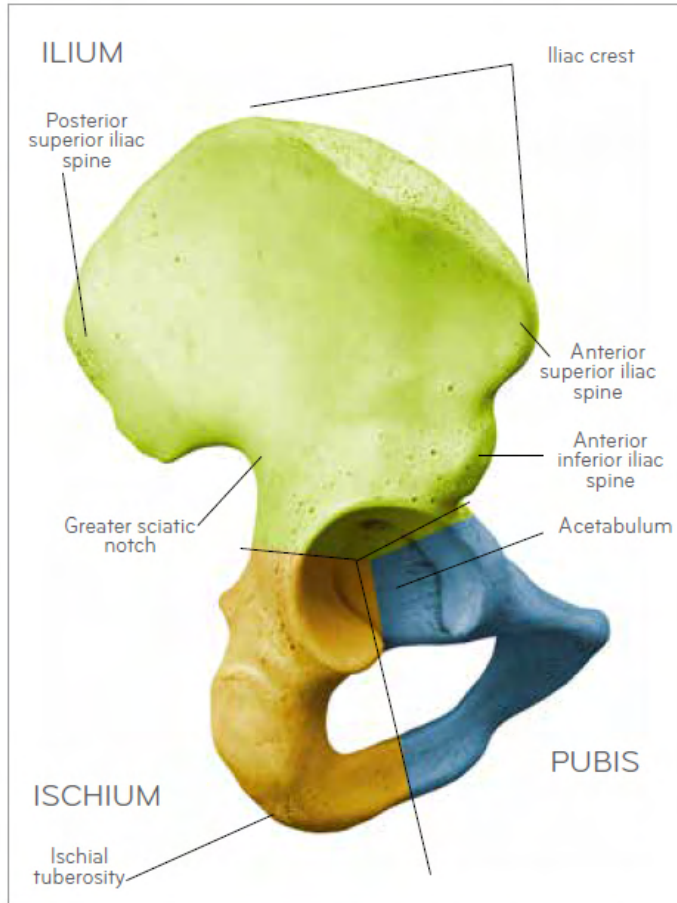
The Hip

The Hip is a remarkable structure in its ability to:

- Create and absorb large amounts of force.
- Incredible mobility in all directions.
- It is the gateway connecting the core with the lower body.



The Pelvic Half



The ilium, ischium and pubis, three islands of bones which fuse together to form the hemi pelvis or hip bone.

The pelvic bone is also called

- Innominate
- Os coxa
- Hip Bone
- Hemi-pelvis

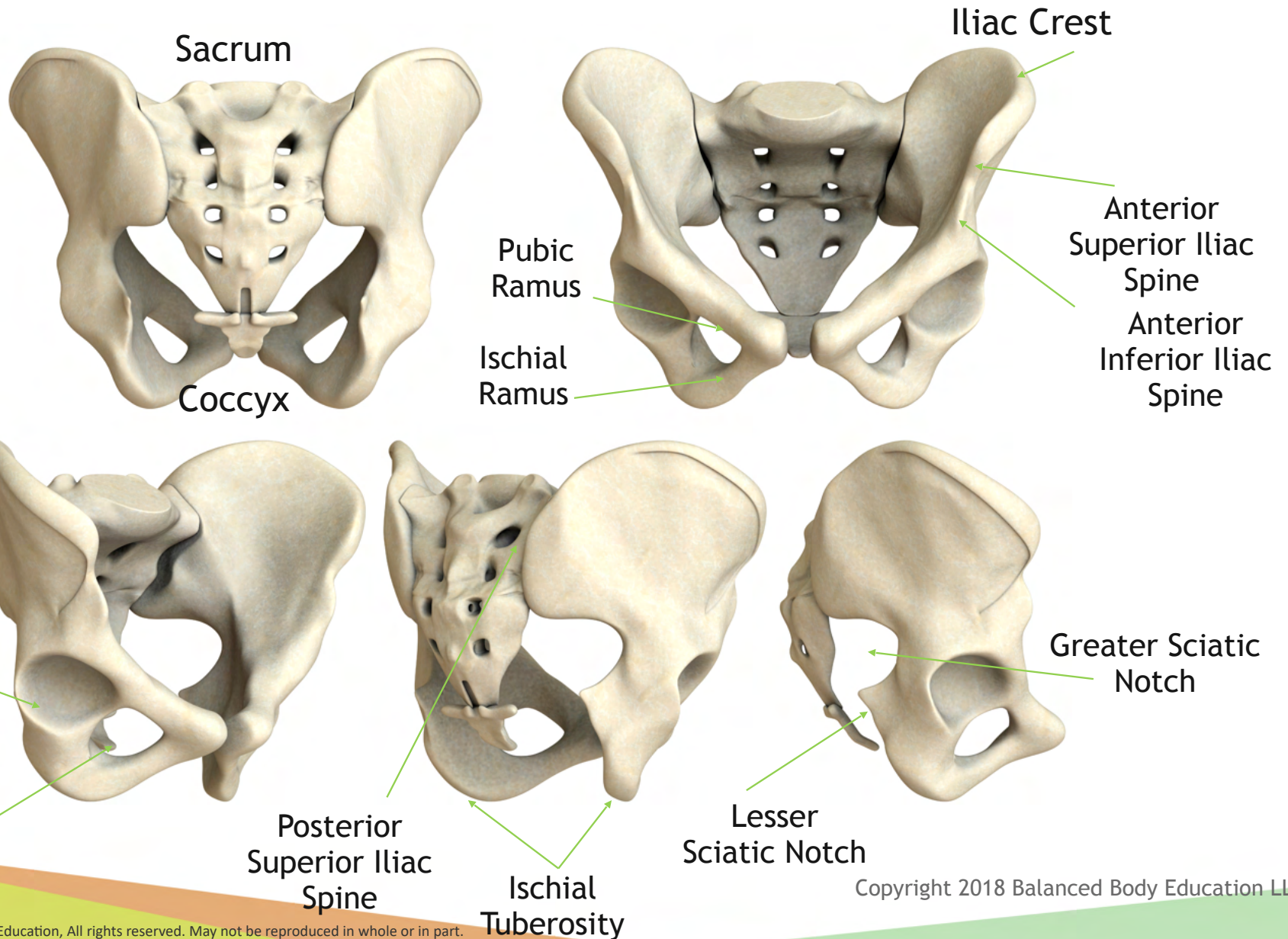
The pelvic half is made up of three fused bones

- Ilium
- Ischium
- Pubis

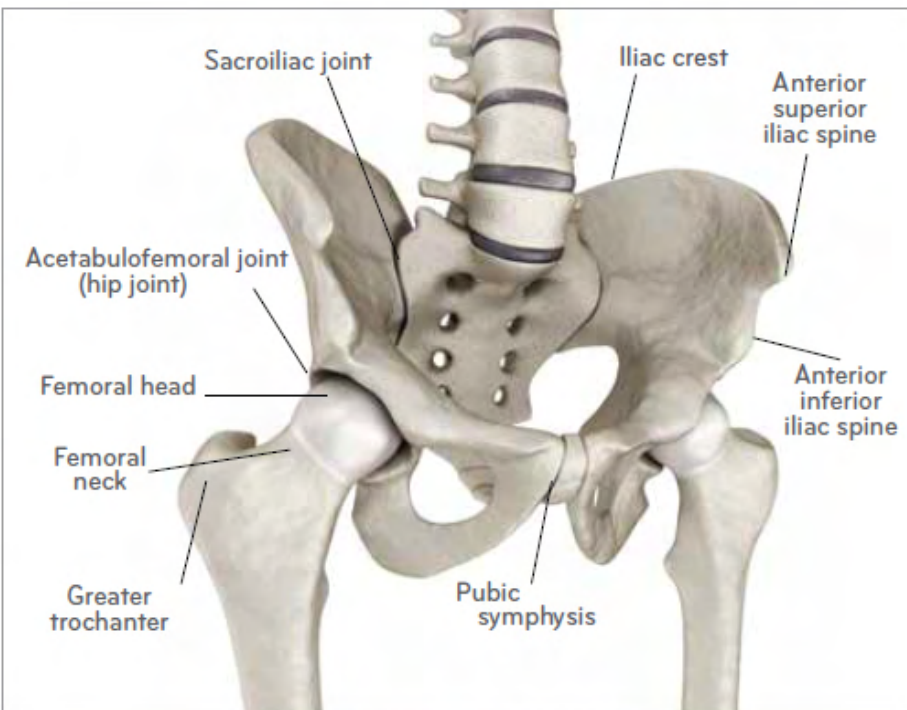
The acetabulum is the cup that holds the head of femur forming the hip joint.

By the end of puberty these three bones fuse together and ossify by around 25 years of age.

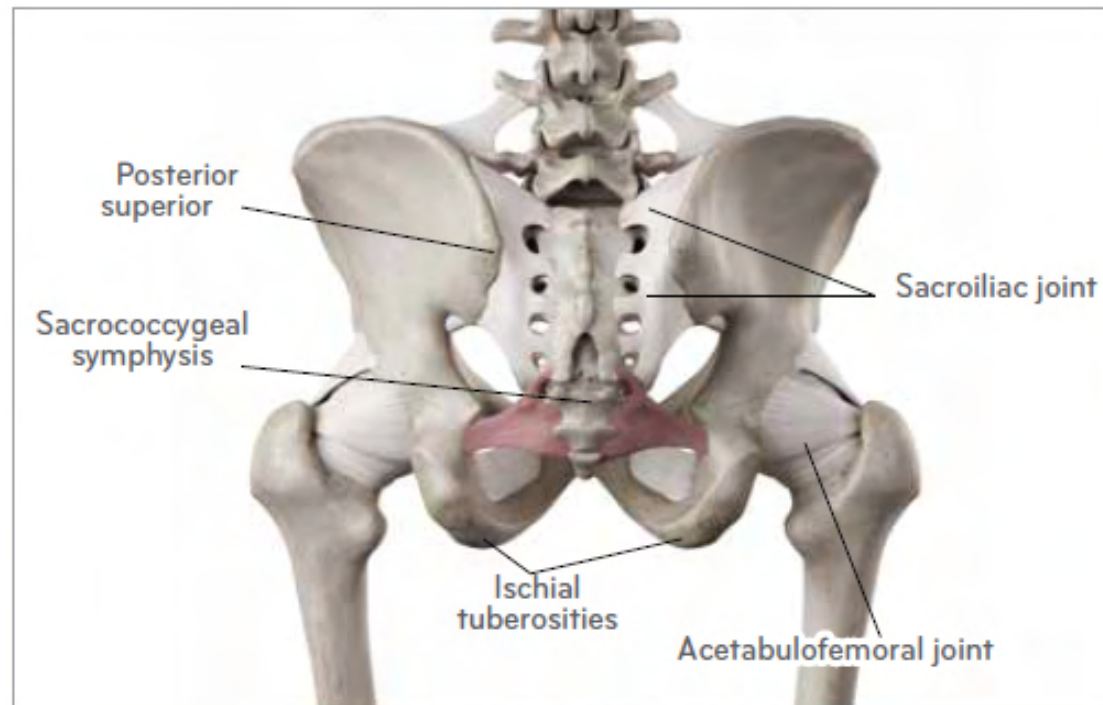
Pelvis - Bony Landmarks



The Hip – Bony Landmarks

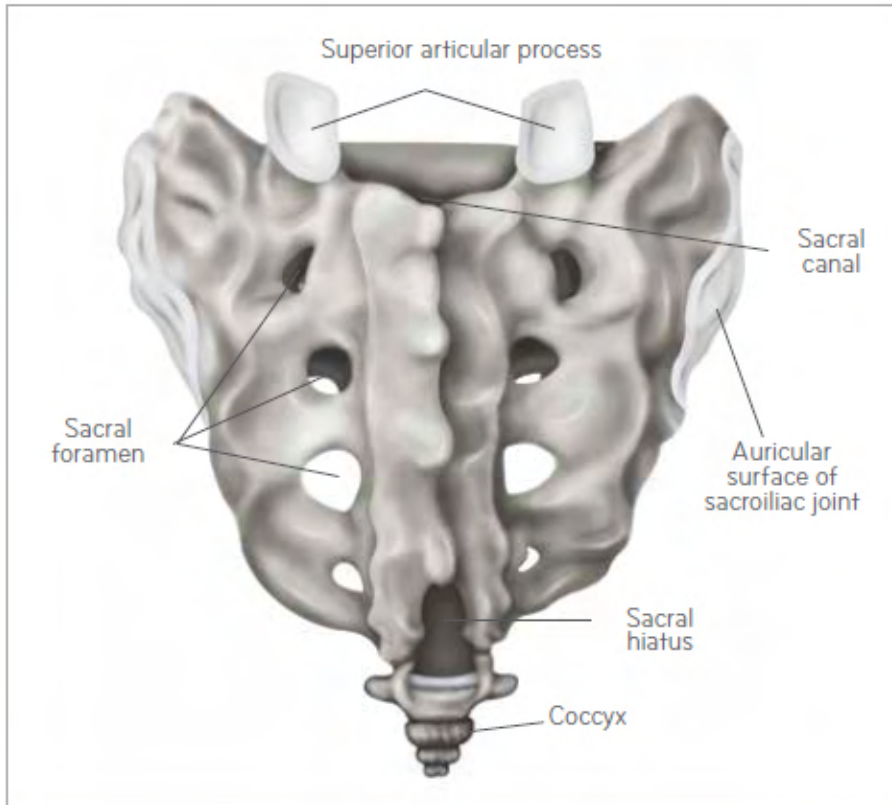


Pelvis, Hip and Spine, Anterior View

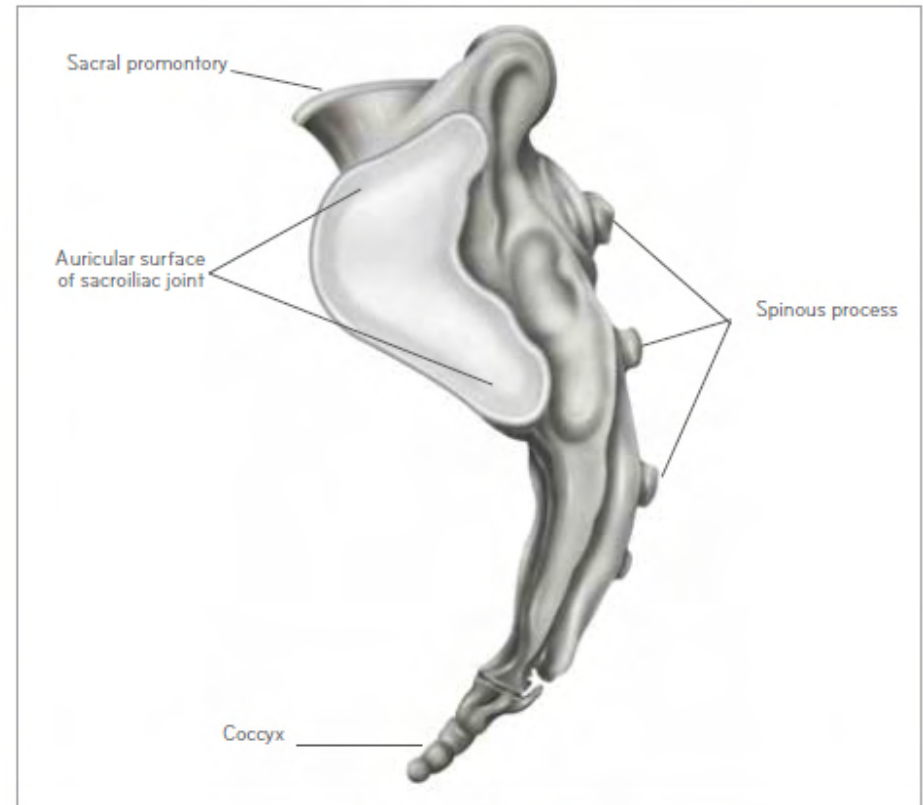


Pelvis, Hip and Spine, Posterior View

Sacrum – Bony Landmarks



Sacrum, Back View



Sacrum, Side view

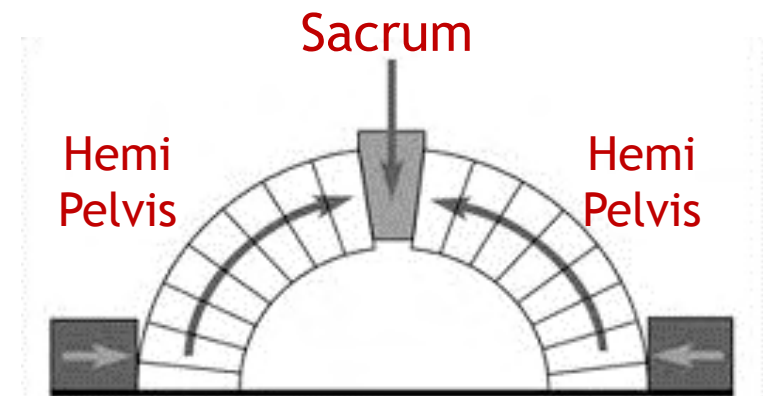
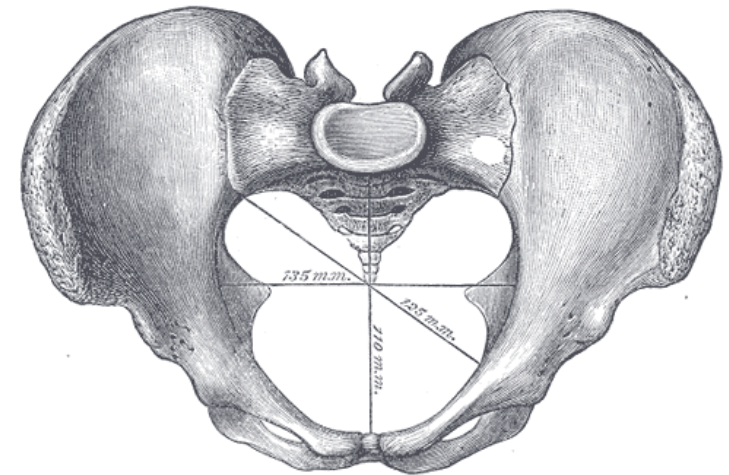
Sacrum as Keystone of the Pelvis

The sacrum has two roles, one is the keystone to pelvis, the other is the platform for the spine.

Keystone is a wedge between two arching columns.

A keystone prevents the columns from falling in on one another

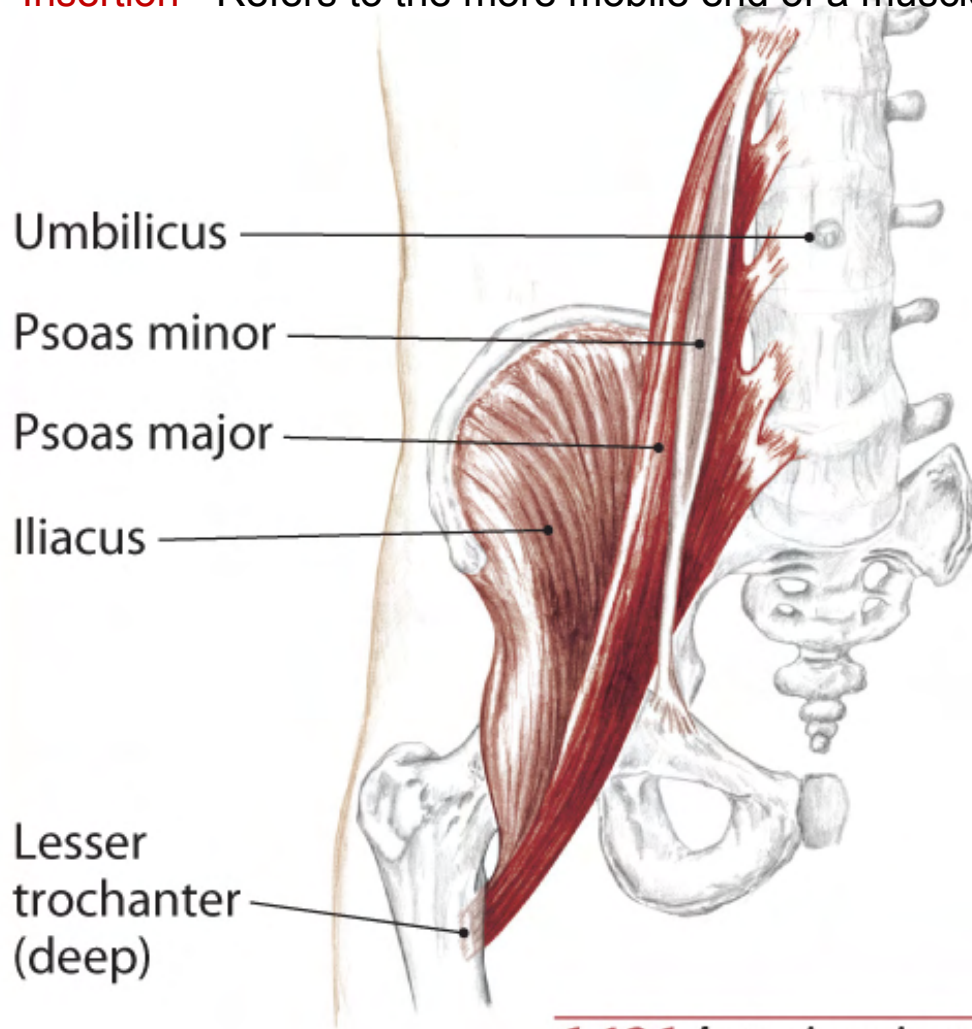
The downward forces of the body fall onto the sacrum via the spine and are met by the ground forces pressing upward and inward through the femur heads and around the ilium.



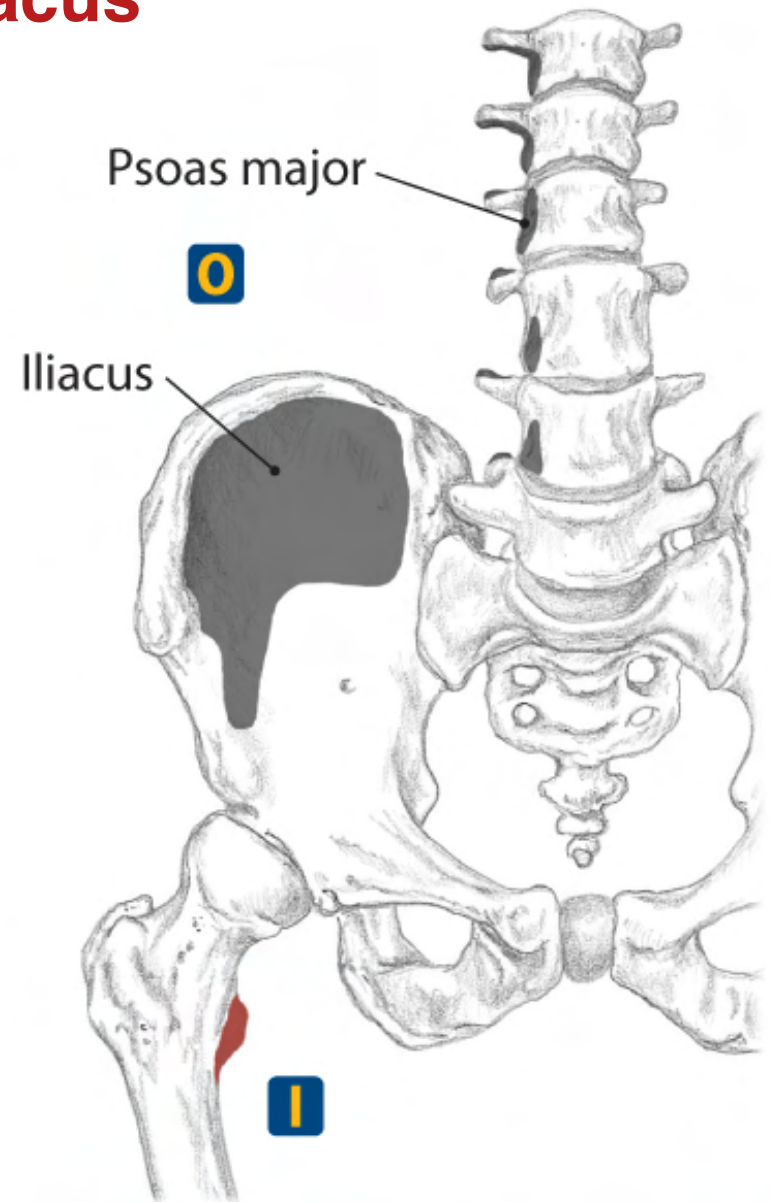
Origin and Insertion - Example Iliacus

Origin - Refers to the stationary or fixed end of a muscle (O)

Insertion - Refers to the more mobile end of a muscle (I)



6.126 Anterior view of spine and right hip



6.129 Anterior view of spine and right hip showing origins and insertions

Let's Build the Hip

Deep Rotators

- Obturator Externus and Internus
- Gemellus Inferior and Superior
- Piriformis
- Quadratus Femoris

Psoas and Iliacus

Abductors and lateral thigh

- Gluteus Minimus and Medius
- Iliotibial Band
- Tensor Fascia Lata
- Gluteus Maximus

Movements of the Hip

Flexion



Extension



Medial and Lateral
Rotation



Movements of the Hip

Abduction



Adduction



Deep Rotators

Ready, set, build!

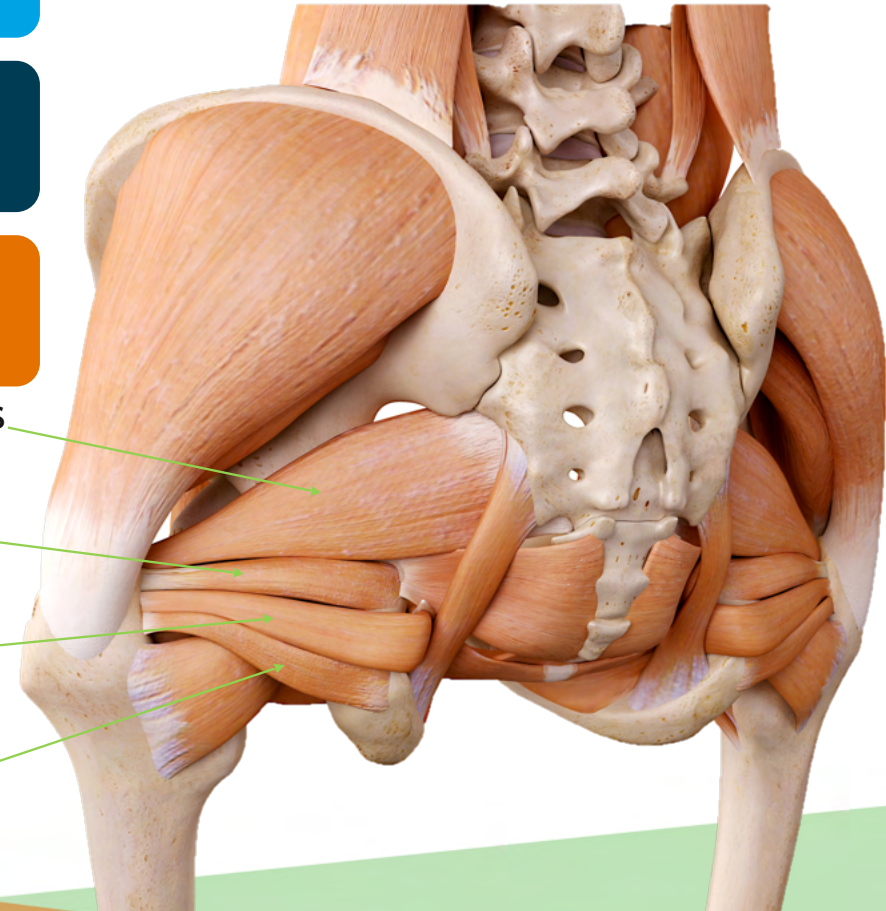
Obturator Externus and Internus

Gemellus Superior and Inferior

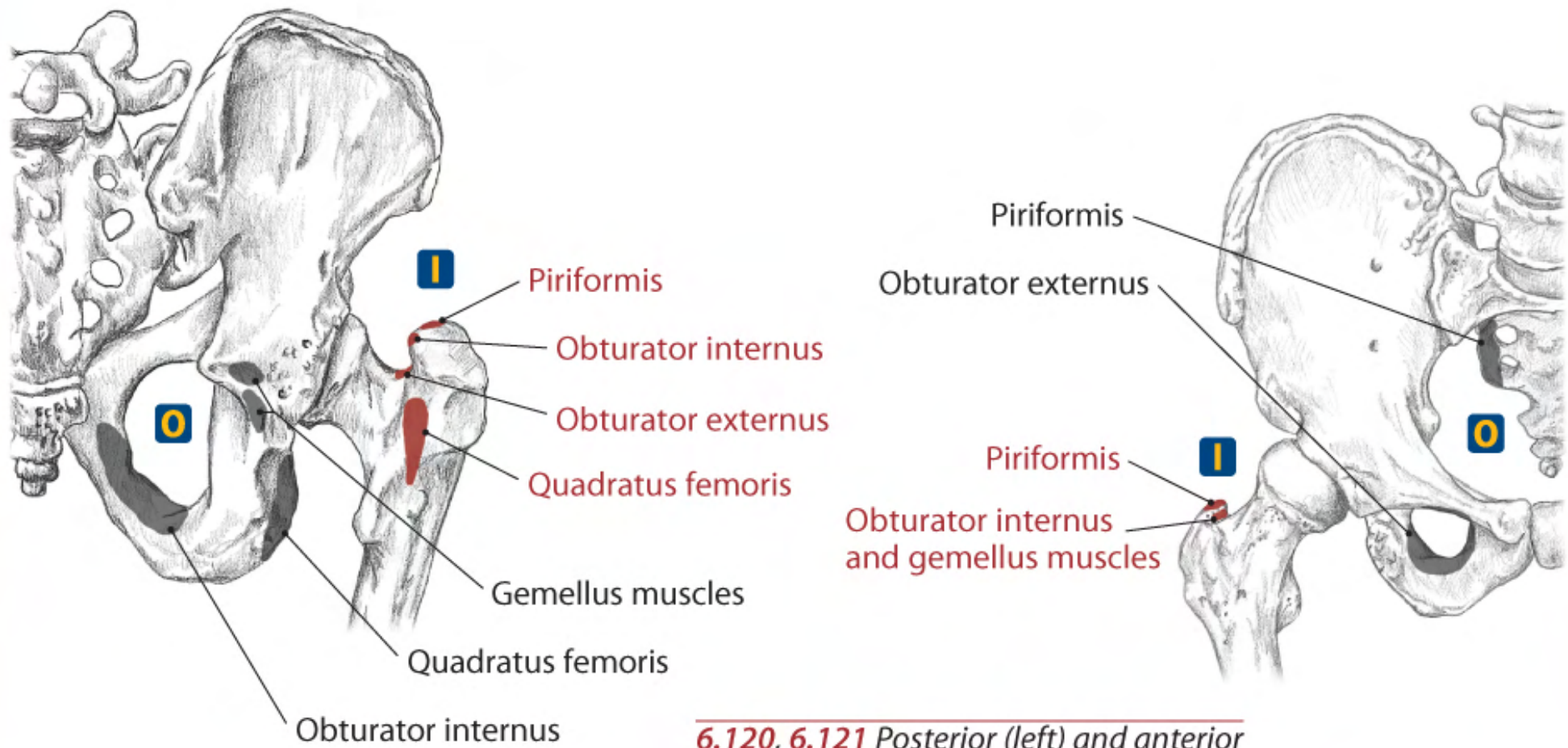
Quadratus Femoris

Piriformis

Piriformis
Gemellus Superior
Obturator Internus
Gemellus Inferior



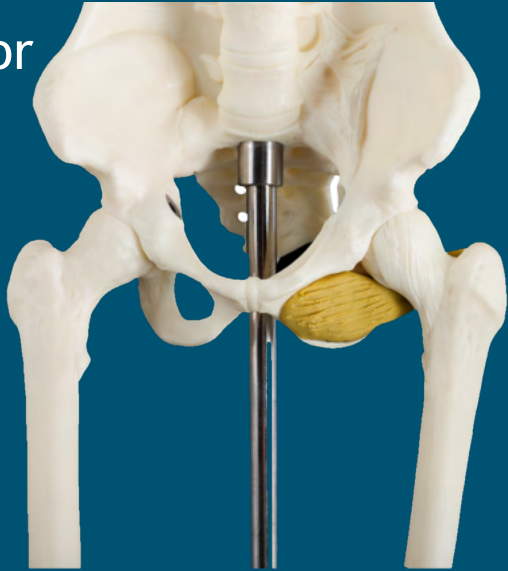
Lateral Rotators of the Hip



6.120, 6.121 Posterior (left) and anterior (right) views, origins and insertions

Obturator Externus

Anterior
View



Origin:

- Rami of pubis
- Rami of the ischium
- External surface of obturator membrane

Insertion:

- Trochanteric fossa of the femur

Actions:

- Lateral rotation
- Adduction
- Supports the inferior surface of femoral neck and stabilizes the pelvis

Posterior
View



Obturator Internus

Posterior
View



Origin:

- Fills lesser pelvis covering inferior surface of obturator membrane

Insertion:

- Medial surface of greater trochanter of femur
- Proximal and superior to trochanteric fossa.

Actions:

- Laterally rotates
- Abducts and laterally rotates extended hip
- Abducts leg when hip is neutral, flexed or extended
- Stabilizes hip during walking
- Serves as attachment point for Levator

Gemellus Superior and Inferior

Posterior
View



Origin:

- *G. Superior*: External surface of ischial spine superior to obturator internus.
- *G. Inferior*: Superior ischial tuberosity just inferior to obturator internus.

Insertion:

- With the tendon of the obturator internus onto medial surface of greater trochanter of femur

Actions:

- Lateral rotation on neutral or extended hip
- Abduction on neutral, flexed or extended hip
- Steadies head of the femur in acetabulum

Quadratus Femoris

Posterior
View



Origin:

- Proximal part of lateral border of ischial tuberosity

Insertion:

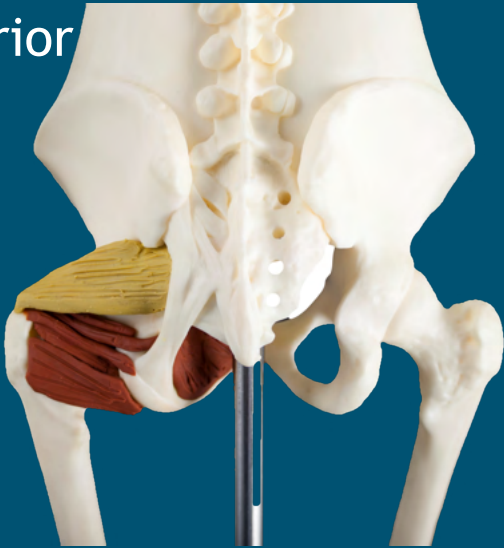
- Intertrochanteric crest between the greater and lesser trochanters

Actions:

- Lateral rotation of the hip
- Adduction of the hip
- Stability of femur and acetabulum

Piriformis

Posterior
View



Anterior
View



Origin:

- Pelvic surface of sacrum between (and lateral to) pelvic sacral foramen 1-4
- Margin of greater sciatic foramen
- Pelvic surface of sacrotuberous ligament

Insertion:

- Superior border of the greater trochanter

Actions:

- Laterally rotates and abducts neutral or extended hip
- Medial rotation when hip flexed above 60°
- Creates posterior wall of the pelvis and shares connective tissue with the Coccygeus of the pelvic floor

Deep Posterior Hip Muscle Movements

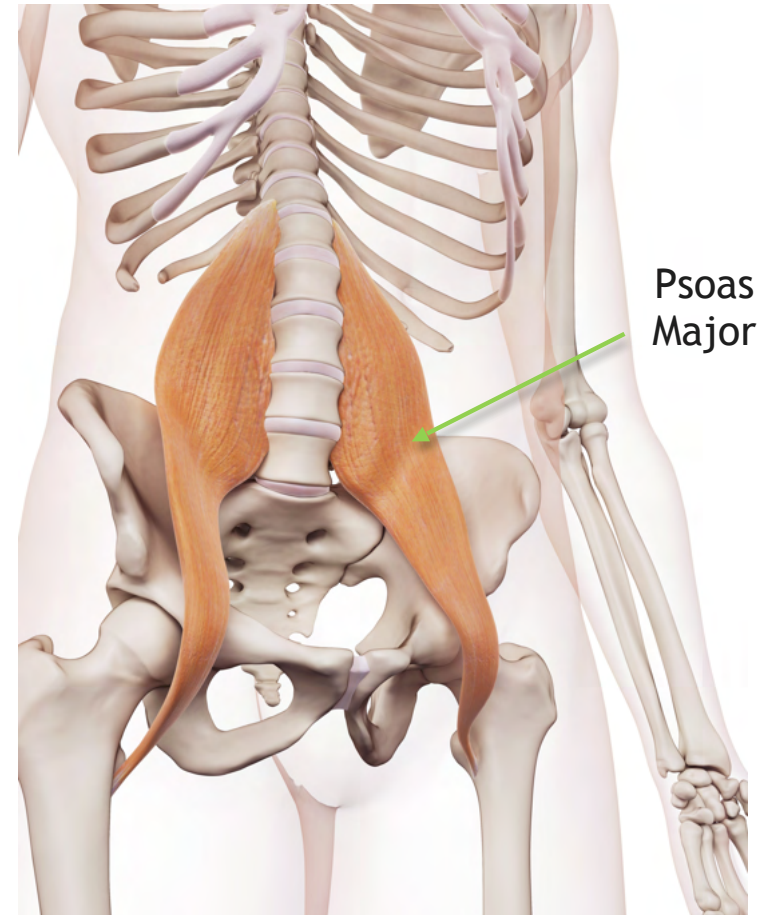
Muscle	Lateral rotation	Medial rotation	Adduction	Abduction	Extension	Stability
Quadratus femoris	X		X			X
Obturator externus	X		X			X
Obturator internus	X			X		X
Gemellus inferior and superior	X			X		X
Piriformis	X	X (above 60 degrees of flexion)		X	X	X

Iliacus and Psoas

Iliacus

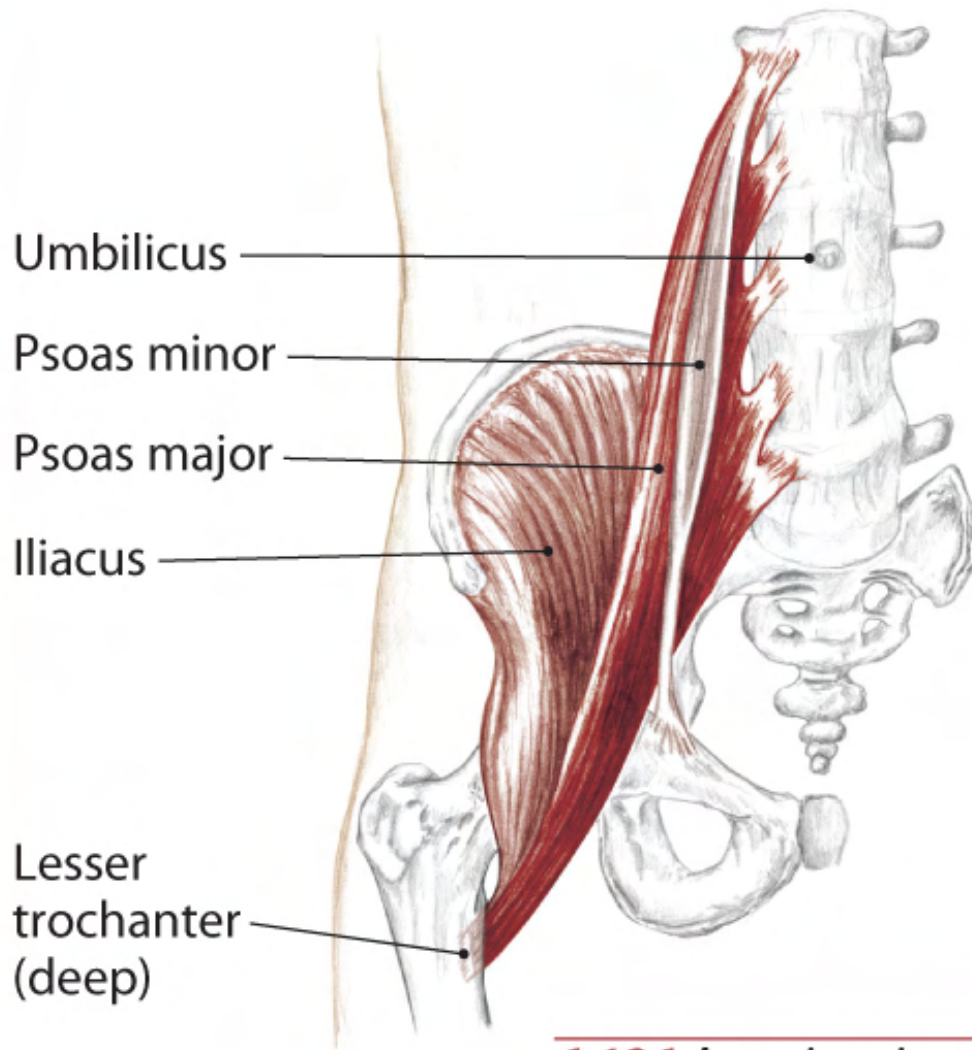
Psoas Major

Psoas Minor

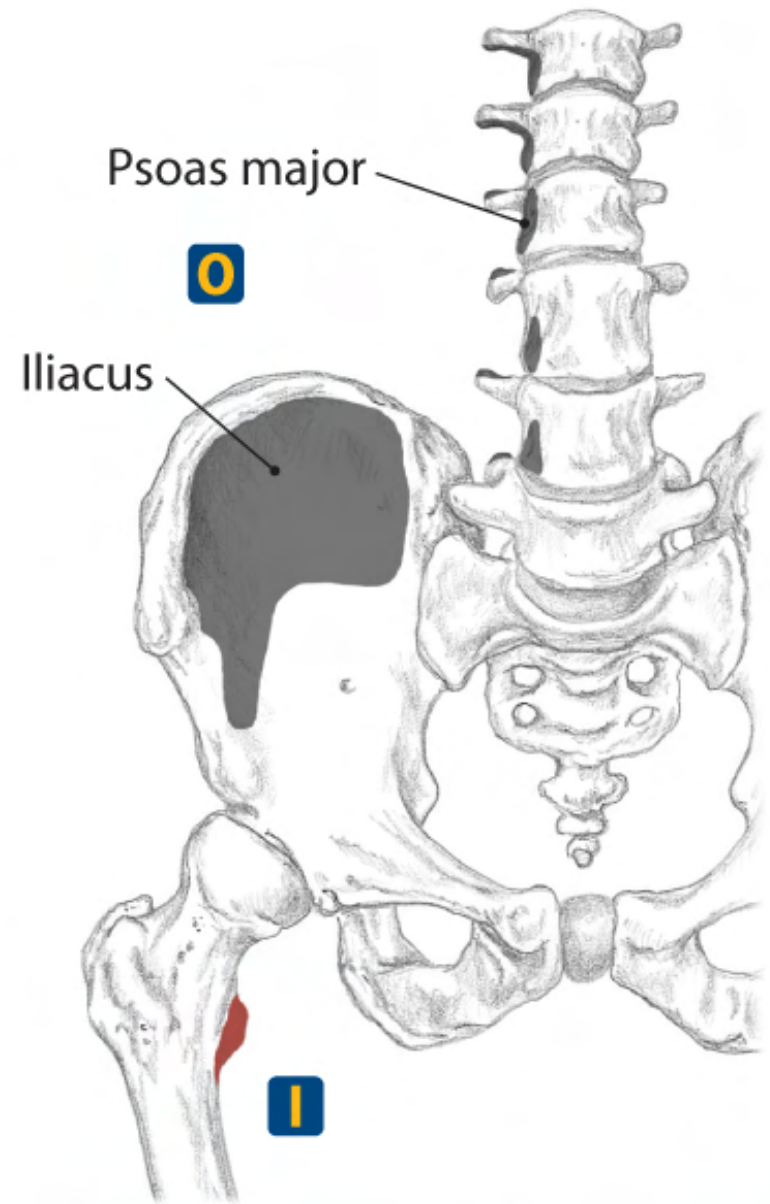


Iliopsoas

Psoas Major
Iliacus



6.126 Anterior view of spine and right hip



6.129 Anterior view of spine and right hip showing origins and insertions

Iliacus

Anterior
View



Origin:

- Superior two thirds of iliac fossa
- Iliolumbar and ventral sacroiliac ligaments

Insertion:

- Lesser trochanter of the femur

Actions:

- Fixed Pelvis:
 - Hip flexion, adduction, lateral rotation
- Fixed Leg:
 - Anterior pelvic tilt

Psoas Major

Anterior
View



Origin:

- Bodies, transverse processes and intervertebral discs of T12 to L5

Insertion:

- Lesser trochanter of the femur
- Shares common tendon with iliacus

Actions:

- Fixed Pelvis:
 - Hip flexion, adduction, lateral rotation
- Fixed Leg:
 - Anterior pelvic tilt

Psoas Minor

Anterior
View



Origin:

- Sides of vertebral bodies of T12 and L1

Insertion:

- Superior pubic ramus
- Medial to iliopsoas tendon

Actions:

- Posterior pelvic tilt
- Anterior translation of the ribcage

Psoas minor is absent in approximately 60% of the population.

Deep Anterior Hip Muscle Movements

Muscles	Hip Actions			Pelvic Actions	
	Flexion	Adduction	Lateral rotation	Anterior pelvic tilt	Posterior pelvic tilt
Iliacus	X	X	X	X	
Psoas major	X	X	X	X	
Psoas minor					X

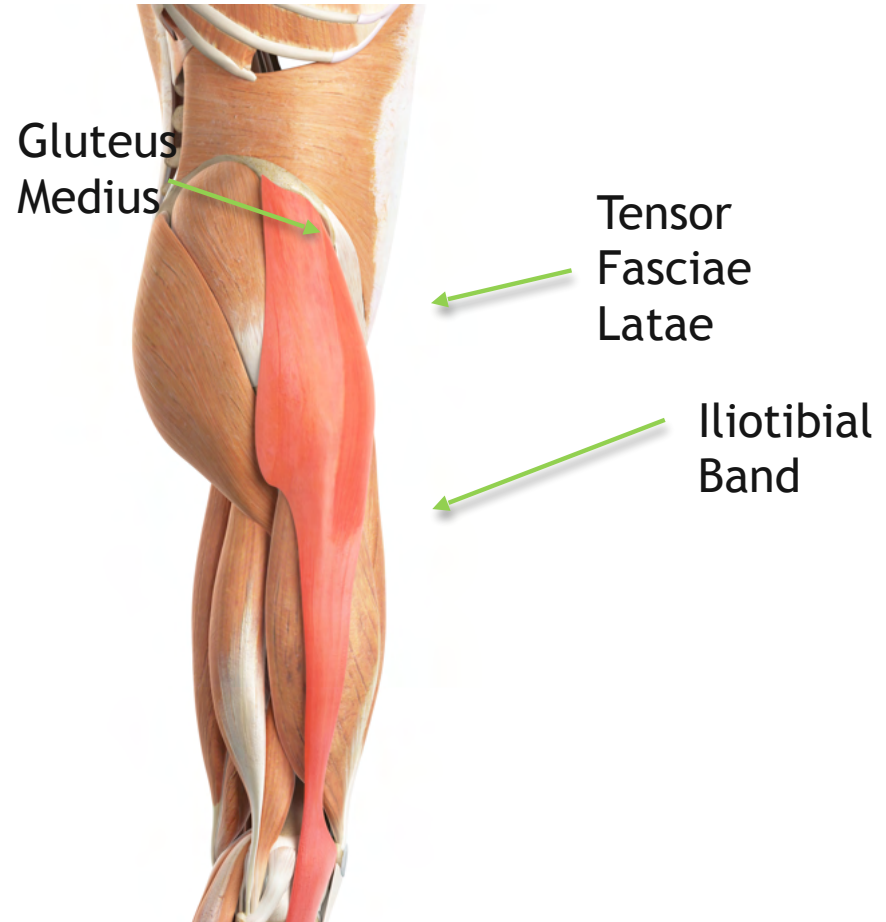
Abductors and Lateral Thigh

Gluteus Minimus

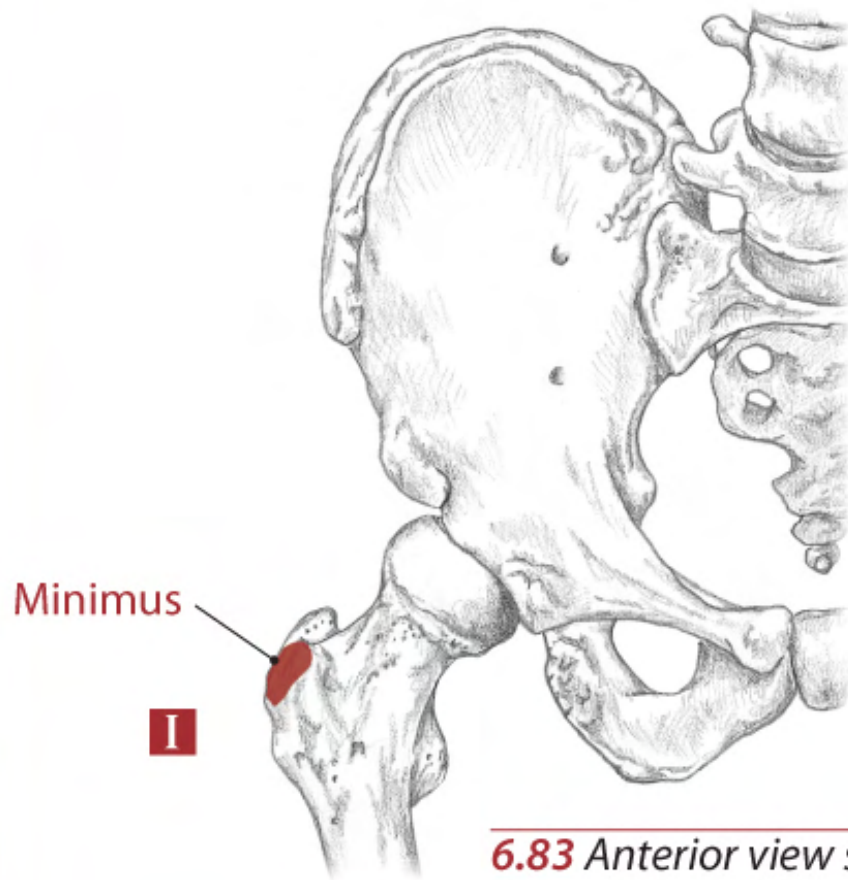
Gluteus Medius

Iliotibial Band

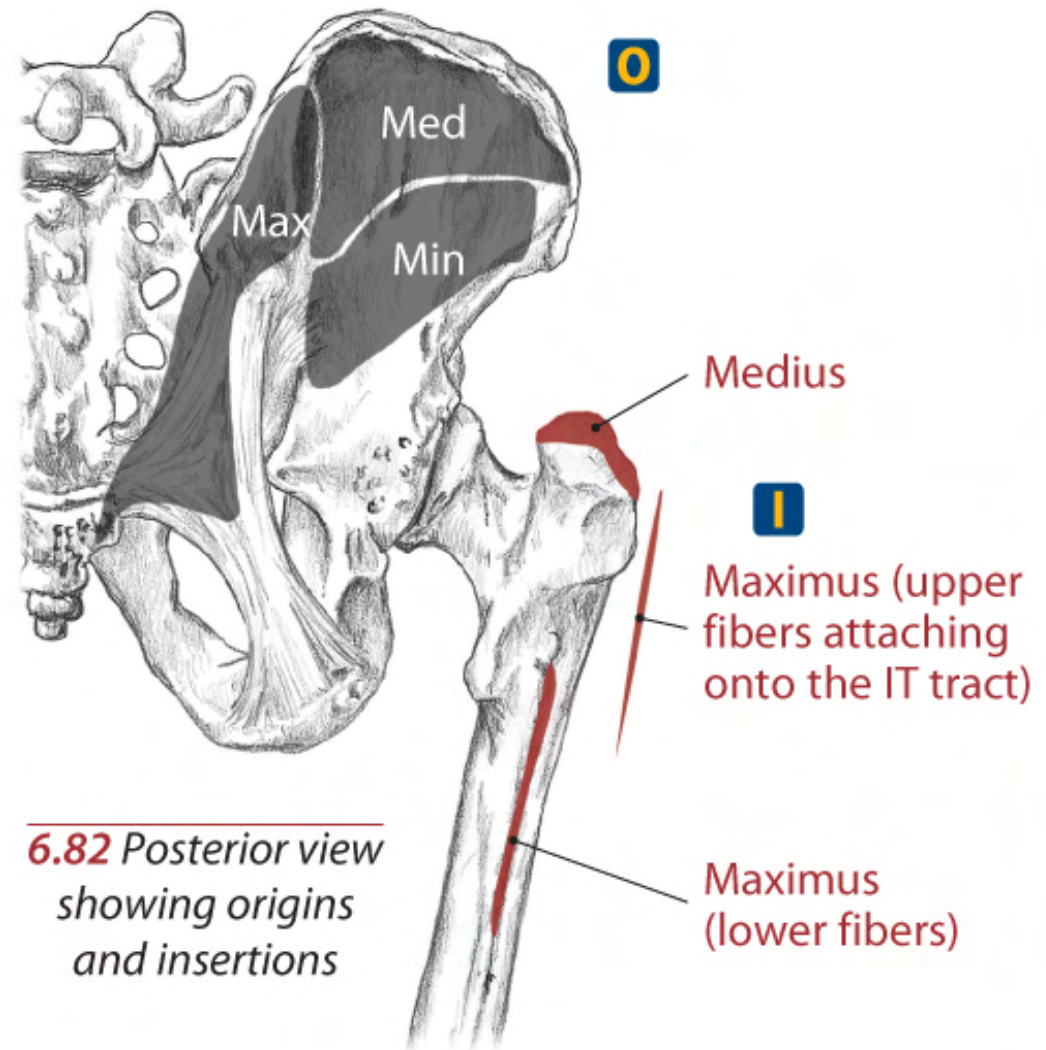
Tensor Fasciae
Latae



Gluteals



6.83 Anterior view showing insertion of gluteus minimus



6.82 Posterior view showing origins and insertions

Gluteus Minimus



Origin:

- Gluteal surface of the ilium between the anterior and inferior gluteal lines

Insertion:

- Anterior aspect of greater trochanter and hip joint capsule



Actions:

Fixed Pelvis

- Abducts the hip
- Hip flexion
- Medially rotates a flexed hip
- Stabilizes the hip

Fixed Leg

- Anterior pelvic tilt
- Pelvic down slip
- Pelvic out flare

Gluteus Medius



Origin:

- External surface of ilium between iliac crest and posterior gluteal line

Insertion:

- Lateral surface of greater trochanter of femur



Actions:

Fixed Pelvis

- Hip abduction, flexion, and medial rotation

Fixed Leg

- Anterior pelvic tilt

Fixed Pelvis

- Hip abduction, extension and lateral rotation

Fixed Leg

- Posterior pelvic tilt
- Pelvic down slip

Iliotibial Band (ITB)



Origin:

- High point of iliac crest, over greater trochanter.

Insertion:

- Lateral anterior tibia.

Actions:

- Acts as an attachment for Tensor Fascia Lata and Gluteus Maximus.
- Stabilizes lateral leg.

The Iliotibial Band is a thick band of connective tissue originating on lateral iliac crest and inserting onto lateral side of the tibia. It is not a muscle!

Tensor Fascia Lata



Origin:

- Anterior part of iliac crest
- Outer surface of ASIS and proximal part of IT band

Insertion:

- Into IT Band at proximal and middle third of thigh

Actions:

- Abduction and medial rotation when the hip is flexed
- Stabilize lateral knee through IT band

Gluteus Maximus



Deep
Fibers



Superficial Fibers

Origin:

- Posterior gluteal line of ilium and a portion of bone superior and posterior to it
- Posterior surface of lower part of sacrum, side of coccyx
- Aponeurosis of erector spinae, sacrotuberous ligament and gluteal aponeurosis

Insertion:

- Deep fibers insert into the gluteal tuberosity of femur
- Proximal and superficial fibers inserts into iliotibial tract of fascia lata

Actions:

- Fixed pelvis - Hip extension, lateral rotation, adduction and abduction
- Fixed leg - Posterior pelvic tilt

Lateral Hip and Thigh Muscle Movements

	Hip Actions, Pelvis stable					Pelvis Actions, femur stable	
Muscle	Abduction	Flexion	Extension	Medial Rotation	Lateral Rotation	Posterior Tilt	Anterior Tilt
Gluteus minimus	X	X		X			X
Gluteus medius (anterior fibers)	X	X		X			X
Gluteus medius (posterior fibers)	X		X		X		
Gluteus Maximus	X		X		X	X	



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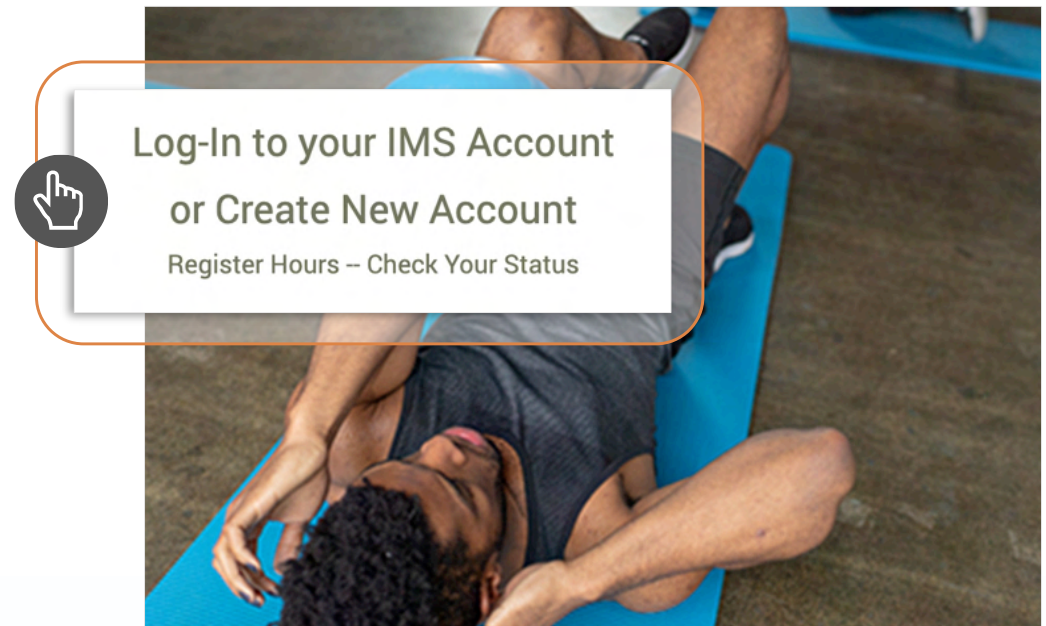
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