TABLE 2.5 Muscles causing and restricting hip movement from the anatomical position. Note that the action of the muscles changes as the orientation of the thigh to the pelvis changes, so these muscles may not always produce or resist the movements indicated. (Synergists assist the prime movers.)

HIP MOVEMENT	PRIME MOVERS	SYNERGISTS	RESISTING MUSCLES
Flexion	Psoas major and minor, iliacus, rectus femoris, tensor fasciae latae, sartorius	Pectineus, adductor longus, adductor magnus, gracilis	Semitendinosus, semimembranosus, biceps femoris, gracilis
Extension	Gluteus maximus, hamstrings	Gluteus medius, adductor magnus, piriformis	Rectus femoris, psoas major and minor, iliacus, tensor fasciae latae, sartorius
Abduction	Gluteus medius, gluteus minimus, tensor fasciae latae	Piriformis, sartorius, rectus femoris	Adductor magnus, adductor longus, adductor brevis, gracilis, pectineus, hamstrings
Adduction	Adductor magnus, adductor longus, adductor brevis, gracilis, pectineus	Bicep femoris, gluteus maximus, quadratus femoris, obturator externus	Gluteus medius, gluteus minimus, tensor fasciae latae, piriformis
External (lateral) rotation	Obturator internus and externus, gemellus superior and inferior, quadratus femoris, piriformis, gluteus maximus	Gluteus medius and minimus, sartorius, bicep femoris	Tensor fasciae latae
Internal (medial) rotation	No prime mover	Gluteus medius and minimus, tensor fasciae latae, adductor magnus, longus and brevis	Obturator internus and externus, gemellus superior and inferior, quadratus femoris, piriformis, gluteus maximus

Sources of Tension from the Capsular Ligaments

The capsular ligament fibers are oriented diagonally around the joint capsule so that they loosen when the hip is flexed but become taut when the hip is extended to its maximum. Indeed, the passive tension of these three ligaments is the reason extension is so limited. When the hip is fully extended, slightly internally rotated and abducted, it is in its *close-packed* position, which means the joint has its largest degree of stability.[72] These three ligaments effectively "screw down" the femur into the socket at full extension, and there is no "play" or wiggle-room in the joint: it is firmly held (see figure 2.45). Figure 2.46 shows how the capsular ligaments tighten or relax in various movements. Another contributor to joint stability is the relative vacuum in the joint; this suction between the femur and the acetabulum also helps to keep them drawn close together.

Sensing the tension in the hip socket caused by the ligaments is difficult. It is not always obvious why we can't move further. With practice and patient attention, a yoga student may be able to sense that the restriction to movement is happening in the hip socket by noticing a firm, stuck feeling deep in the socket. Determining whether this is caused by the ligaments becoming taut or by compression of the neck of the femur against the acetabular rim is quite challenging, and for some people impossible to know for sure. While this area has a lot of mechanoreceptor nerve endings, these primarily serve a proprioceptive function, helping us to stay balanced when walking, standing or running.[73] It is difficult to consciously sense these tissues; however, nociceptors (pain receptors—see the section in Volume 1 on the nervous system, pages 46–48) are present throughout the labrum and hip capsule and can tell us when something is wrong.[74]

Hip-Joint Summary

We can employ the WSM? spectrum to summarize what may stop you from greater ranges of motion in your hip sockets. Table 2.7 shows the spectrum applied to each of the main movements possible in the hip joint. As we start from the left end of the spectrum, progress in working through tension is relatively easy, but as we get closer to the right, it becomes progressively harder (ligaments are difficult to stretch), and at the far right, the game is over: no further progress in that direction for that pose will ever happen once one bone hits another. Asking "What stops me?" helps to locate where you are along this spectrum, and thus you will know whether it is wise to try to go further. Remember, due to the reality of human variation, the shape and orientation of some people's bones mean that they will move very quickly to the right, while others have a very large range of motion available before reaching their final edge.

Warning: This table does not indicate *why* the tension may have arisen. As we saw in Volume 1, tension has many causes other than short muscles, including emotions, nervous system interactions, hydration, or pathologies. Scar tissue or inflammation can cause tension, and compression can arise from a torn labrum. The limitations suggested in the table are indicators of possibilities, not static facts. The table is for general guidance rather than specific evaluation. Everyone has to answer for themselves: "What stops me?"

TABLE 2.7 The WSM? spectrum for the hip joint

	TENSILE RESISTANCE				COMPRESSION		
MOVEMENT IN THE HIP JOINT	**SURFACE TENSION**	**MYOFASCIAL MERIDIANS***	**MUSCLES & TENDONS**	**LIGAMENTS & JOINT CAPSULE**	**SOFT: FLESH ON FLESH**	**MEDIUM: BONE ON FLESH**	**HARD: BONE ON BONE**
FLEXION	Buttocks; back; back of legs	Superficial back lines	Hamstrings: semitendinosus, semimembranosus, biceps femoris; gluteus maximus; gracilis	Past 90° of flexion, the ischiofemoral ligament; inferior joint capsule. Past 160° of flexion, all capsular ligaments, possibly the ligamentum teres.	Chest hitting the thigh	ASIS hitting the thigh	Superior acetabulum impinging upon the superior anterior neck of the femur. Past 160° of flexion, the superior acetabulum impinging on the inferior neck of the femur.
FLEXION WITH INTERNAL ROTATION	Buttocks; back; back of legs and outside of hip	Superficial back lines and the spiral lines	Hamstrings: semitendinosus, semimembranosus, biceps femoris; gluteus maximus; gracilis; some external rotators (minimal)	Past 160° of flexion, all capsular ligaments	Chest hitting the thigh	ASIS hitting thigh	Superior acetabulum impinging upon the superior anterior neck of the femur

MOVEMENT IN THE HIP JOINT	TENSILE RESISTANCE				COMPRESSION		
	SURFACE TENSION	MYOFASCIAL MERIDIANS*	MUSCLES & TENDONS	LIGAMENTS & JOINT CAPSULE	SOFT: FLESH ON FLESH	MEDIUM: BONE ON FLESH	HARD: BONE ON BONE
FLEXION WITH ABDUCTION	Buttocks; back; the back of the legs and inner groin	Superficial back lines and the lateral lines	Past 45° of abduction: the adductor muscles. With 180° of flexion and full abduction, also the piriformis, gluteus maximus, obturator externus, quadratus femoris, gracilis, semitendinosus and semimembranosus	Pubofemoral ligament		At 180° of flexion, the greater trochanter squeezes various tissues against the ischium	At 90° of flexion, the posterior acetabulum impinges on the superior neck of the femur. Past 90° of flexion, the inferior rim against the superior neck of the femur.
EXTENSION	Lower belly, front of pelvis and front of thigh	Superficial front line and ipsilateral functional line	Hip flexors: rectus femoris, psoas major and minor, iliacus, tensor fasciae latae and sartorius	Iliofemoral, pubofemoral and ischiofemoral ligaments become taut after about 20–30° of extension	Minimal compression of buttocks to back of thigh		The superior posterior neck of the femur and the superior posterior acetabulum may impinge. This is only likely to occur if the acetabulum has a high version and low angle of abduction and if the femur has a high neck angle and low torsion.
EXTERNAL ROTATION	Minimal resistance. If any, it may be felt in the inner groin.	Minimal resistance. If any, it may be from the spiral lines	Tensor fasciae latae minimally	Pubofemoral ligament and anterior iliofemoral ligament, iliotibial band, possibly the ligamentum teres			Posterior inferior acetabulum with posterior neck of femur

THE HIP JOINT

	TENSILE RESISTANCE				COMPRESSION		
MOVEMENT IN THE HIP JOINT	**SURFACE TENSION**	**MYOFASCIAL MERIDIANS***	**MUSCLES & TENDONS**	**LIGAMENTS & JOINT CAPSULE**	**SOFT: FLESH ON FLESH**	**MEDIUM: BONE ON FLESH**	**HARD: BONE ON BONE**
EXTERNAL ROTATION WITH FLEXION	Minimal resistance. If any, it may be felt in the inner groin.	Minimal resistance. If any, it may be from the superficial back lines.	With 90° of flexion, the gluteus minimus and medius, the anterior fibers of the gluteus maximus	With 90° of flexion, the pubofemoral ligament and iliofemoral ligaments are taut; over 90°, the anterior iliofemoral and pubofemoral ligaments may shorten; the superior iliofemoral ligament lengthens.		With 90° of flexion, the lesser trochanter may trap the adductor muscles between the femur and the pelvis. With 180° of flexion, the greater trochanter compresses flesh against the pubis.	With 90° of flexion, the anterior inferior rim of the acetabulum impinges upon the posterior neck of the femur. With 180° of flexion, the anterior superior rim is against the posterior neck.
INTERNAL ROTATION	Minimal resistance. If any, it may be felt in the outside of the legs/hip.	Minimal resistance. If any, it may be from the spiral lines.	Obturator internus and externus, gemellus superior and inferior, quadratus femoris, piriformis, gluteus maximus, with some assistance from the gluteus medius and minimus, sartorius, bicep femoris	The ischiofemoral ligament and the superior iliofemoral ligament, posterior joint capsule		Tissues between the greater trochanter and the pubis or the ischium	Anterior inferior acetabulum with anterior neck of femur
INTERNAL ROTATION WITH FLEXION	Minimal resistance. If any, it may be felt in the outside of the hip and buttocks.	Minimal resistance. If any, it may be from the spiral lines and superficial back lines.	Obturator externus, quadratus femoris, posterior fibers of the gluteus maximus, gemellus superior and inferior	With 90° of flexion, the ischiofemoral ligament is taut.			With 90° of flexion, the anterior superior rim of the acetabulum impinges upon the anterior neck of the femur.
INTERNAL ROTATION WITH ADDUCTION	Minimal resistance. If any, it may be felt in the outside of the legs/hip	Minimal resistance. If any, it may be from the spiral lines and lateral lines.	Posterior fibers of the gluteus maximus, medius and minimus	Iliofemoral and ischiofemoral ligaments are taut.		Tissues between the greater trochanter and the pubis or the ischium	Impingement of anterior neck of the femur against the transverse ligament of the acetabulum

MOVEMENT IN THE HIP JOINT	TENSILE RESISTANCE				COMPRESSION		
	SURFACE TENSION	MYOFASCIAL MERIDIANS*	MUSCLES & TENDONS	LIGAMENTS & JOINT CAPSULE	SOFT: FLESH ON FLESH	MEDIUM: BONE ON FLESH	HARD: BONE ON BONE
ABDUCTION	Inner groin	Front functional lines, contra-ipsilateral functional line, deep front line, and contra-lateral line	Adductors: adductor magnus, longus, brevis; gracilis; pectineus	Pubofemoral ligament, ischiofemoral ligament, inferior joint capsule		Greater trochanter squeezing gluteus medius and minimus against ilium	Impingement of superior acetabulum and superior neck of the femur
HORIZONTAL ABDUCTION	Inner groin	Front functional lines, deep front lines, superficial back lines	Quadratus femoris; gemelli; obturator externus; adductor magnus, minimus, longus and brevis; gracilis; pectineus. Hamstrings: semitendinosus, semimembranosus, biceps femoris	Pubofemoral ligament becomes very tight		Greater trochanter compresses the gluteus muscles against the back of the pelvis.	Superior neck of the femur impinges on the posterior rim of the acetabulum.
ADDUCTION	Outer hips	Spiral lines and lateral lines	Posterior fibers of the gluteus minimus and medius and tensor fasciae latae	Iliofemoral ligament; possibly the ligamentum teres; iliotibial band and ligamentum teres	The inner thighs collide.	The medial shaft and neck of the femur compress tissues against the ischial tuberosities.	
ADDUCTION WITH FLEXION	Outer hips and buttocks	Spiral lines, lateral lines and superficial back lines	Gluteus maximus, posterior fibers of the gluteus minimus and medius, piriformis, quadratus femoris, obturator internus, tensor fasciae latae	Ischiofemoral ligament	The inner thighs collide.	The medial shaft of the femur and lesser trochanter compress tissues against the pubis.	The inferior neck of the femur may impinge on the anterior acetabulum.

* See Volume 1, pages 71–74 for a description of the myofascial meridians.

Table 2.8 shows the particular parameters of the pelvis' and femur's shape, size and orientations that play a significant role in determining our available range of motion. Each parameter is a morphological variation of the bone. Shown are how frequently it appears on average, along with the total observed range found in certain studies already cited. Also provided are the standard deviations found in the studies, and the range in which 95% of people will likely fall (the two standard deviation limits). The latter range shows that we are likely to find such variations in a class of 20 yoga students. This also means that one student in 20 will be outside the two standard deviation range.

TABLE 2.8 Variations of the pelvis and femur

BONE	TYPE OF VARIATION	AVERAGE VALUE	1 STANDARD DEVIATION (67% OF PEOPLE)	2 STANDARD DEVIATION RANGE (95% OF PEOPLE)	TOTAL RANGE OBSERVED
Pelvis	Acetabular angle of abduction	39.7°	4.3°	31.1–48.3°	29.4–57°
Pelvis	Acetabular version	21.3°	5.8°	9.7–32.9°	(12.9)–40.5°
Pelvis	Acetabular depth	34.2%	3.5%	27.2–41.2%	27–43%
Pelvis	Version of the anterior pelvic plane	6.9°	9.2°	25.3–(11.5)°	31.4–(17.6)°
Pelvis	Angle of ASIS/PSIS line to horizontal	13°	5°	3–23°	0–23°
Femur	Femoral torsion	15°	6°	3–27°	(15)–33°
Femur	Femoral neck-shaft angle	132°	6.1°	120–144°	110–150°
Femur	Neck length	3.41 cm	0.43 cm	2.55–4.27 cm	1.84–4.16 cm
Femur	Greater trochanter height	8 mm	4.7 mm	0–16.7 mm	Not Available
Tibia	Tibial torsion	29.6°	7.7°	14.2–45°	2–82°

Negative values are in parentheses.

TABLE 2.10 Muscles causing or resisting knee movement

KNEE MOVEMENT	PRIME MOVERS	SYNERGISTS	MUSCLES THAT RESIST MOVEMENT
flexion	hamstrings	· sartorius · gracilis · popliteus · gastrocnemius	· quadriceps
extension	quadriceps	· tensor fascia latae · gluteus maximus	· hamstrings · gastrocnemius · popliteus
valgus	none	none	· semimembranosus · semitendinosus · sartorius · gracilis · medial gastrocnemius
varus	None	None	· biceps femoris · popliteus · lateral gastrocnemius
lateral (external) rotation of the tibia	bicep femoris	· tensor fascia latae · gluteus maximus	· semimembranosus[181] · semitendinosus[182] · popliteus · in full extension, all the muscles crossing the back of the knee[183]
medial (internal) rotation of the tibia	· semimembranosus semitendinosus · sartorius · gracilis · popliteus		· biceps femoris[184] · in full extension, all the muscles crossing the back of the knee[185]

The cruciate ligaments help prevent the femur from slipping off a stationary tibia—the ACL by inhibiting too much backwards movement and the PCL too much forward sliding. Alternatively, we can picture this with the femur fixed and stationary and the tibia moving. In this scenario, the ACL prevents too much anterior tibial movement under the femur and the PCL too much posterior tibial movement. When we do a deep squat—think of Chair Pose (Utkatasana) and sitting down into Squat (Malasana)—or jump and land with the knees flexed, there is a large shear in the knee from the femur trying to slide forward. The PCL resists this movement and is assisted by the joint capsule and the muscles surrounding the knee, and especially by the popliteus, which runs parallel to the PCL.[186]

The two cruciate ligaments stabilize the knee when twisting stresses occur at the joint. They cross and have slightly oblique orientations, so they press against each other and tighten up when the lower leg medially (internally) rotates, but they become a little lax when the leg laterally (externally) rotates (see figure 2.113).

TABLE 2.11 Sources of ligamentous tension restricting knee movements.

DIRECTION OF MOVEMENT	LIGAMENTS THAT RESIST MOVEMENT	JOINT CAPSULE FIBERS THAT RESIST MOVEMENT
flexion	• patellar ligament • patellar retinaculum • posterior cruciate ligament	anterior
extension	• anterior cruciate ligament • oblique popliteal ligament • arcuate popliteal ligament	posterior
valgus	• medial collateral ligament primarily[189] • cruciate ligaments • medial patellar retinaculum (when in full extension)[190]	medial
varus	• lateral collateral ligament primarily[191] • cruciate ligaments • lateral patellar retinaculum (when in full extension)[192] • iliotibial band	lateral
medial rotation of the tibia	• cruciate ligaments	
lateral rotation of the tibia	• arcuate popliteal ligament • lateral collateral ligament	posterior-lateral

Knee-Joint Summary

We can employ the WSM? spectrum to summarize which tissues can be counted on, or employed, to stabilize the knee in all its possible directions of movement. Table 2.12 answers WSM? question as it pertains to the knee.

Warning: This table does not indicate *why* the tension may have arisen. As we saw in Volume 1, tension is caused by many things, not always short muscles. Other causes include emotions, nervous system interactions, hydration and pathologies. Scar tissue, arthritis or inflammation can cause or increase tension. The limitations suggested in the table are not static facts but indicators of possibilities. The table is for general guidance, not for specific evaluation. Everyone has to answer for themselves, "What is stopping me?"

TABLE 2.12 WSM? spectrum for the knee joint

MOVEMENT OF THE KNEE	TENSILE RESISTANCE				COMPRESSION
	MYOFASCIAL MERIDIANS*	MUSCLES	LIGAMENTS	JOINT CAPSULE	SOURCE
flexion	• superficial front line	• quadriceps	• patellar ligament • patellar retinaculum • posterior cruciate ligament	anterior	• back of thighs against calves • buttocks against heels
extension	• superficial back line • deep front line	• hamstrings • gastrocnemius • popliteus	• anterior cruciate ligament • oblique popliteal ligament • arcuate popliteal ligament	posterior	
valgus**	• deep front line • lateral lines	• semimembranosus • semitendinosus • sartorius • gracilis • medial gastrocnemius	• medial collateral ligament (primarily) • cruciate ligaments • medial patellar retinaculum (when in full extension)[278]	medial	
varus**	• deep front line • lateral lines	• biceps femoris • popliteus • lateral gastrocnemius	• lateral collateral ligament (primarily) • cruciate ligaments • lateral patellar retinaculum (when in full extension) • iliotibial band	lateral	
medial rotation of the tibia***		• biceps femoris[279] • in full extension, all the muscles crossing the back of the knee[280]	• cruciate ligaments		
lateral rotation of the tibia***		• semimembranosus[281] • semitendinosus[282] • popliteus • in full extension, all the muscles crossing the back of the knee[283]	• arcuate popliteal ligament • lateral collateral ligament		

* See Volume 1, especially pages 71–74, for a description of the myofascial meridians.
** Flexion, valgus and varus are also resisted in part by the pressure of the femoral condyles against the tibial plateau.[284]
*** The tibial eminence can make a small contribution to limiting rotation.[285]

TABLE 2.14 Summary of extrinsic and intrinsic muscles (M = main movers; A = accessory movers).

EXTRINSIC MUSCLES	DORSI-FLEXOR	PLANTAR-FLEXOR	PRONATOR (EVERTOR)	SUPINATOR (INVERTOR)	TOE EXTENDER	TOE FLEXOR
Gastrocnemius		M				
Plantaris		A				
Soleus		M				
Peroneus brevis		M	M			
Peroneus longus		M	M			
Peroneus tertius	A		M			
Tibialis anterior	M			M		
Extensor digitorum longus	M		M		M	
Extensor hallucis longus	M			A	M	
Tibialis posterior		M		M		
Flexor digitorum longus		M		A		M
Flexor hallucis longus		M		A		M

INTRINSIC MUSCLES	TOE EXTENDERS	TOE FLEXORS	TOE ABDUCTORS	TOE ADDUCTORS
Abductor hallucis		M	M	
Abductor digiti minimi		M	M	
Flexor digitorum brevis		M		
Flexor digitorum accessories		M		
Lumbricals	M	M		
Quadratus plantae		M		
Flexor hallucis brevis		M		
Flexor digiti minimi brevis		M		
Adductor hallucis		M		M
Extensor digitorum brevis	M			
Interossei (dorsal)	M		A	
Interossei (plantar)		M		A

limitation. Fortunately, they can be stretched out over time, and the range of plantarflexion can thereby be increased.

RESTRICTIONS TO PRONATION

As shown in table 2.17, the ranges of abduction and adduction are similar, but the range for inversion is almost twice that for eversion; it is easier to turn the sole of your foot inward than outward. Tightness or tension in the invertors of the foot, the tibialis anterior and tibialis posterior, can restrict eversion and thus pronation.

RESTRICTIONS TO SUPINATION

Moving the foot in the opposite direction, supination, may be resisted by tension in the evertor/pronator muscles: the peroneus longus, brevis and tertius.

Sources of Tension from the Ligaments

RESTRICTIONS TO DORSIFLEXION

A source of limitation to ankle dorsiflexion is capsular adhesion; the joint capsule may have lost some flexibility or become contracted.[400] This can often happen when someone has had to immobilize their ankle, perhaps to recover from a broken foot or bad ankle sprain. When the ankle is immobilized, the joint capsule undergoes contracture, which can significantly reduce range of motion in all directions.

Resistance to dorsiflexion may also arise in the ligaments that bind the tibia, fibula, talus and calcaneus. On the medial (inner) side of the ankle, the deltoid ligament's tibiotalar fibers and the tibiocalcaneal ligament may resist further dorsiflexion. On the lateral (outer) side, the ligament that joins the heel to the fibula (the calcaneofibular

TABLE 2.18 Muscles causing or resisting ankle and foot movements.

MOVEMENT	PRIME MOVERS	SYNERGISTS	MUSCLES THAT RESIST MOVEMENT
Ankle dorsiflexion	Tibialis anterior, extensor hallucis longus, extensor digitorum longus	Peroneus tertius	Gastrocnemius, soleus, peroneus brevis, peroneus longus, posterior tibialis, flexor digitorum longus, flexor hallucis longus
Ankle plantarflexion	Gastrocnemius, soleus, peroneus brevis, peroneus longus, posterior tibialis, flexor digitorum longus, flexor hallucis longus	Plantaris	Tibialis anterior, extensor hallucis longus, extensor digitorum longus
Foot pronation	Peroneus brevis, peroneus longus, peroneus tertius, extensor digitorum longus		Tibialis anterior, tibialis posterior
Foot supination	Tibialis anterior, tibialis posterior	Extensor hallucis longus, flexor digitorum longus, flexor hallucis longus	Peroneus brevis, peroneus longus, peroneus tertius

TABLE 2.20 The WSM? spectrum for the ankle-joint segment.

MOVEMENT OF THE ANKLE AND FOOT	TENSILE RESISTANCE			COMPRESSION	
	MYOFASCIAL MERIDIANS* THAT RESIST MOVEMENT	MUSCLES THAT RESIST MOVEMENT	LIGAMENTS THAT RESIST MOVEMENT	SOURCE OF MEDIUM COMPRESSION	SOURCE OF HARD COMPRESSION
Ankle dorsiflexion	plantar fascia, superficial back line	**primarily**: gastrocnemius when knee is extended; soleus when knee is flexed over 20° **secondarily**: tibialis posterior plantaris, peroneus longus and brevis, flexor digitorum longus, flexor hallucis longus	deltoid ligament (the tibiotalar fibers), calcaneofibular ligament, posterior talofibular ligament	extensors tendons caught between talus and tibia, inflammation of tissues caught between talus and tibia	talus abutting the tibial mortise, talus abutting the distal ends of the fibula and/or tibia, osteophytes trapped between talus and tibia
Ankle plantarflexion	superficial front line	dorsiflexors: tibialis anterior, extensor digitorum longus, extensor hallucis longus, peroneus tertius	deltoid ligament (tibionavicular fibers), anterior talofibular ligament		calcaneus abutting the tibia, talus (Stieda process) abutting the tibia, osteophytes or os trigonum caught between the calcaneus and tibia
Foot pronation	deep front line	invertors: tibialis anterior, tibialis posterior	deltoid collateral ligaments: tibionavicular ligament, tibiocalcaneal ligament, tibiotalar ligament, medial talocrural joint capsule		talus against the distal fibula
Foot supination	lateral lines	evertors: peroneus longus, peroneus brevis, peroneus tertius	calcaneofibular ligament, tarsal interosseous ligaments, talocalcaneal ligament, lateral talocrural joint capsule		talus against the distal tibia

MOVEMENT OF THE ANKLE AND FOOT	TENSILE RESISTANCE			COMPRESSION	
	MYOFASCIAL MERIDIANS* THAT RESIST MOVEMENT	MUSCLES THAT RESIST MOVEMENT	LIGAMENTS THAT RESIST MOVEMENT	SOURCE OF MEDIUM COMPRESSION	SOURCE OF HARD COMPRESSION
Toe extension (dorsiflexion)	fascia of the ball of the foot	flexors: flexor digitorum longus, flexor hallucis longus, flexor hallucis brevis, flexor digitorum brevis, the lumbricals, the interossei, quadratus plantae			osteophytes (bone spurs)
Toe flexion (plantarflexion)		extensor digitorum longus, extensor hallucis longus, extensor digitorum brevis			impingement of the distal phalanges upon the proximal phalanges

* See Volume 1, pages 71–74, for a description of the myofascial meridians.