

# KNEE MOVEMENT & STABILITY



The knee joint is a synovial (fluid lubrication enclosed in a capsule) hinge joint that moves in flexion (bent knee) and extension (straight leg), with some minor internal and external rotation of the joint. The bones involved are the femur (thigh), tibia (lower leg) and patella (knee cap). The articular (joint) surfaces are the large

rounded ends (condyles) of the femur, the flattened condyles of the tibia (also known as the tibial plateau) and the facets (under surfaces) of the knee cap.

The knee joint is well constructed and is one of the largest and strongest joints - particularly in extension. However, it is also one of the least secure joints because it is formed between the two longest bones in the body, which allows considerable leverage to be applied to the joint. Excessive (hyper) flexion or extension and/or trauma can easily strain or tear the ligaments or menisci of the knee. It is also relatively weak mechanically because of the configuration of its articular (joint) surfaces. It relies on the ligaments (tough flexible fibrous connective tissue) to bind the femur to the tibia and the surrounding muscle groups for strength.

The most important stabilizing muscles are the anterior thigh quadriceps. This group is made up of four powerful muscles that are responsible for extension of the leg. These are the primary movers that get us up and down stairs, in and out of chairs, and allow us to kick that soccer ball. All four muscles converge onto the patella (knee cap) and then insert (attach) as a tendon at the tibial tuberosity (rounded protuberance) just below the knee. The quadriceps can undergo considerable atrophy (wasting away) during periods of disuse - because of pain or injury. And residual instability of the knee joint is one of the most troublesome complications of a knee injury. Consequently, it is important to exercise this group to prevent disuse atrophy and possible instability of the knee.

The posterior thigh is made up of the three ham-

strings that are responsible for most of the flexion of the lower leg; they insert on both sides of the leg just below the knee joint. They are called hamstrings because it's these tendons that were used to hang up hams (hip and thigh regions of pigs) for processing. Muscle length of the hamstrings can differ considerably from person to person; in fact, some people can not stretch enough to touch their toes (me included) and others can easily touch the floor with the palms of their hands. Contracture of the hamstrings can also cause complications at the knee by increasing its flexion with some lateral rotation and possible minor posterior dislocation of the tibia. It's important to keep these muscles strong, but also to keep the group supple by stretching. Additional stability is provided by the calf muscle as it crosses the back of the knee and inserts on the femur just above the joint; this insertion also acts as an anchor for the calf when it flexes the foot for walking, jogging, etc...

Internal and external rotation of the knee is controlled by the hamstrings, and a small muscle that is behind the knee named

With the leg in



two other flexors located directly

popliteus. full extension the knee is locked in a slightly externally rotated position. Popliteus is

the muscle that takes the knee out of this locked position by internally rotating it before all five flexor muscles are used to bend the knee. Naturally, popliteus is known as "the key that unlocks the knee".

To maintain stability at the knee it is important to keep all of these muscle groups strong through proper exercise. It is also important that these groups remain supple through proper stretching techniques. Massage is also a very useful tool in maintaining muscle suppleness and in reducing recovery time should an injury occur.



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