

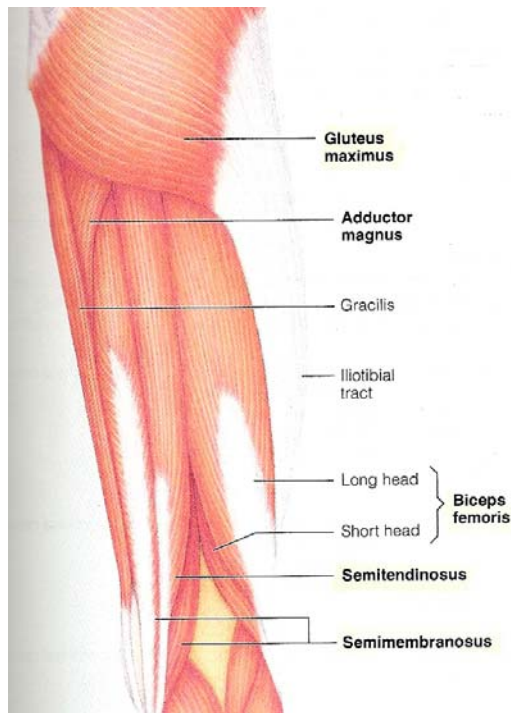
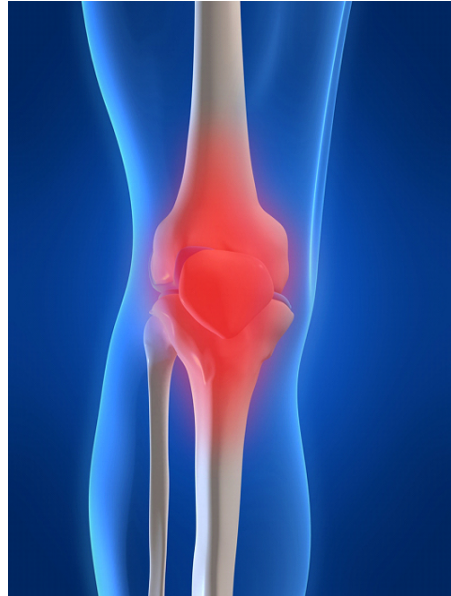
# Cycling Knees in Winter

By Dario Fredrick

It's the time of year when many cyclists' knees begin to protest the combination of increased mileage and cold temperatures. Some may take the knees for granted, but many experience knee pain at one time or another when cycling, especially in winter. Understanding the knee joint and its role in pedaling can help. Preventative maintenance such as good biomechanics and proper use and care is important, and what you do off the bike can make a difference as well.

## Know your knee

The knee joint is fundamental in producing pedaling power on the bike. The torque applied through the downward segment of the pedal stroke is the highest area of force production, accomplished through a combination of hip and knee extension. The extension of the knee is a result of contracting the quadriceps muscles in the front of the thigh, which cross the front of the knee joint and pull against the lower leg. The quads straighten the leg at the knee, a hinge joint. Since the quadriceps make up the largest muscle group (especially in cyclists!) the knee joint deals with much of the workload in cycling.

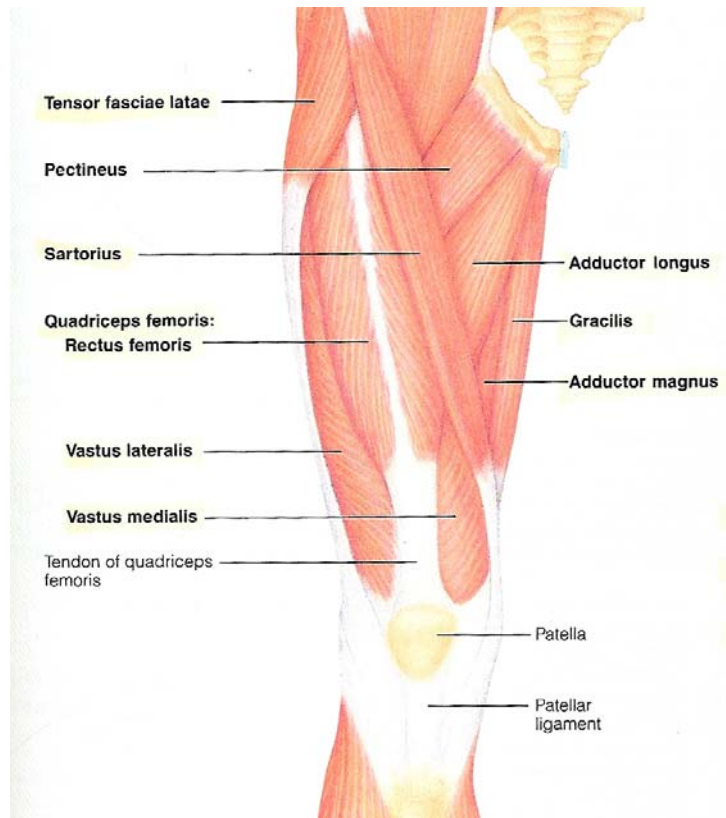


While many tend to associate the ilio-tibial (IT) band with the knee, it is not directly involved in movement of the joint. The IT band is a long, broad tendon that originates above the hip at the ilium bone (hence “illio”), runs along the side of the outermost quadriceps muscle (vastus lateralis), and crosses the lower, front of the knee, attaching to the larger of the two lower leg bones (tibia = “tibial”).

The IT band actually begins as two muscles, the gluteus maximus and the tensor fasciae latae (TFL) at the hip. The glut max is a hip extensor, a primary muscle involved in downward torque in the pedal stroke. The TFL is an abductor, so while its main job is to take the leg away from the midline to the side, in cycling it works more to stabilize the leg as the hip flexes and extends.

## Knee problems

Knee pain is one of the most common problems cyclists experience, typically a result of various degrees of tendonitis: inflammation or strain of the tissue that connects the quadriceps across the knee to the lower leg, or friction along the outer knee from ilio-tibial band tension. Although many people refer to IT band tightness as the cause of their knee problems, technically it's the muscles that develop tightness initially, rather than the tendon itself. If the glut max is tight, it can pull the IT band. Since the IT band runs along the outer quad like a sheath, if the muscle develops knots or tension, these areas can inhibit movement of the IT band. IT tension can result in friction where it passes across the side of the knee, creating an internal "blister" called a bursa.



Lateral misalignment of the knee joint can also result in tendonitis from pedaling when the muscles on one side become overworked. When the knees are valgus (bowed inward when standing), or the outer quads are extremely tight, the mid and inner quadriceps (rectus femoris & vastus medialis, A.K.A. VMO) can become challenged and fatigued, straining its tendon attachment. The result is pain along the inner border and/or the lower front of the kneecap (patella). This situation is often coupled with resulting IT band tension. Less common, although equally challenging is pain in the back of the knee - usually a result of hamstring tendonitis where the muscles that flex the knee become overworked and their lower attachments strain.

## Solutions

Many tendon problems can be avoided or reduced by deeply relaxing and smoothing out the muscle from which the tendon originates, or in the case of the IT, also the muscle along which it runs (lateral quadriceps). Chronically tight or knotted muscles can increase tension at the attachment, thus overloading the tendon. Avoid stretching a muscle with an inflamed tendon, as it often places additional strain on the weak or injured tendon attachment. Instead, massage the belly of the muscle itself to help release it. Professional deep tissue sports massage can do wonders for overworked or knotted cycling muscles, while acupuncture can be extremely effective at healing damaged tissue as well.



Acupuncture & massage can help keep our knees healthy



Keep the knees warm in winter

Knees are no exception to the chestnut of ‘prevention being the best medicine’. First and foremost, proper biomechanics are fundamental to minimizing risk of injury. As a professional bike fitter and long time cyclist myself, I cannot stress highly enough the importance of optimal bike positioning for the knees. This includes cleat alignment in addition to proper saddle position. Once you have an optimal fit, *how* you pedal determines the load at the knees as well. Try to pedal in a more *horizontal* rather than vertical, downward manner at times to develop the weaker areas of the pedal stroke. Avoid overgearing, especially when climbing. For the same relative power, climbing vs. flat terrain tends to require higher force, as we are limited by gearing and working against gravity. We know that the most efficient range of cadence when climbing is ~70-90 rpm, depending on the workload. Have low enough gears on your bike to pedal at a minimum of 70 rpm on most climbs and at a moderate level of intensity.

Keep your knees warm. Since tendons do not receive direct blood supply like muscle tissue, the body cannot regulate their temperature as well. Like most elastic tissue, when it is colder, it loses elasticity, becoming more vulnerable to tearing at higher force. A pre-ride knee prep I have found effective in the winter includes massaging arnica oil into the knees and wearing leg or knee warmers. The oil serves as both a barrier to the cold, as well as a lubricating, anti-inflammatory agent, and the warmers keep both muscles and joints warm.

### **The bee's knees**

Be kind to your knees - they're the only ones you've got. Keep your cycling muscles long and relaxed off the bike, and be sure that your fit and pedaling mechanics are the best you can create. Keep your knees warm on the bike, and spin light enough gears to become supple in your pedal stroke and strong in your legs. Your knees will thank you in the long run.

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