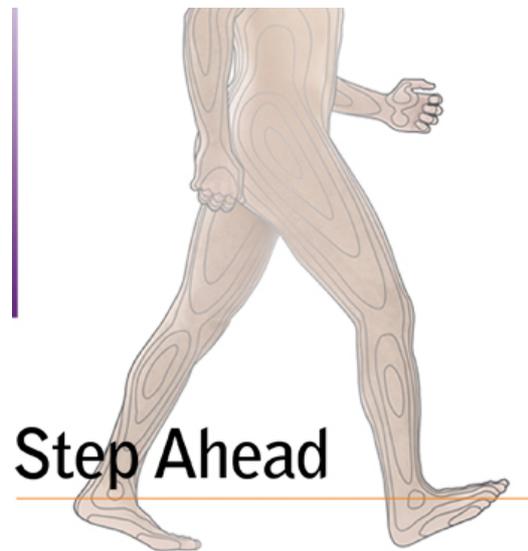


CYCLING PROBLEMS IN THE KNEE

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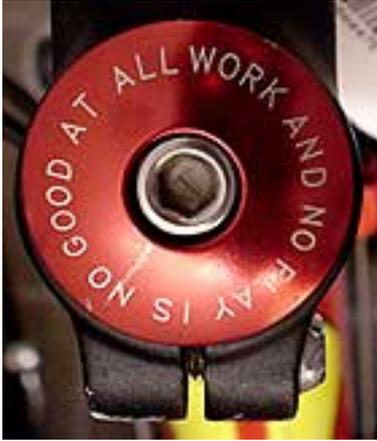
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Introduction



Cycling is a great low-impact aerobic activity. Cyclists are usually more efficient on both hills and flat terrain when they pedal quickly (at about 80-85 rpm) rather than at slower cadences. Although cycling is considered a knee-sparing exercise because it does not require impact with the ground, the repetitive motion of pedalling can lead to a variety of overuse knee injuries. The majority of cycling injuries are indeed caused by overuse, which leads to cumulative tissue microtrauma and consequent symptoms. In overuse injuries the problem is often not acute tissue inflammation, but chronic degeneration.

Cycling is obviously very repetitive: during one hour of cycling a rider may average up to 5000 pedal revolutions. But which cyclists sustain overuse knee injuries? Basically, cyclists of every ability level are at risk: riding too hard, too soon and too far is the usual recipe for numerous knee problems. Touring cyclists often develop a knee overuse injury during or after one specific usually long ride. These sporadic high-mileage riders often do not train adequately. Patellar pain is the most frequent problem (for more information see our Patellofemoral problems page), followed by Iliotibial Band Syndrome (see Overuse Injuries page and scroll down to ITBS section for further information). Bicycle maladjustments are also frequent in this group and amongst recreational cyclists.



Cyclists vs. Runners

Cycling and Running are two very popular sports, but compared to cycling, running seems to be a better way do build up leg bone density, while cycling regularly will improve on upper limb bone density. This is very important when you consider that osteoporosis causes 310,000 fractures in the UK every year. Runners have a bit less developed arm muscles. Apart from that, it seems that cycling and running have similar effects on body composition: participants in both have approximately 10% more leg muscle than the exercise abstainers.



Knee Pain

The knee is the most common site of **overuse injury** in the cyclist, with an estimated 40% to 60% of riders experiencing knee pain. Like other cyclists, mountain bikers can suffer overuse injuries. Such injuries have been studied little in mountain bikers. In one study involving 265 off-road cyclists, 30% had recently experienced knee pain associated with mountain biking, and 37% reported low-back pain while riding; wrist pain and hand numbness were each reported by 19% (4).

Overuse injuries: in chronic cases, continued activity produces degenerative changes that lead to weakness, loss of flexibility, and chronic pain. Thus, in overuse injuries, the problem is often not acute tissue inflammation, but chronic degeneration (hence, for example, patella tendinosis instead of tendinitis). Pain in overuse injuries typically has insidious onset, but it may have an acute-on-chronic presentation. Overuse injuries most likely occur when an athlete changes the mode,

intensity, or duration of training. Biomechanic (intrinsic) factors and equipment or training (extrinsic) issues are the main contributors to overuse injuries (3).

When evaluating knee pain it is very important to consider cyclists and bicycle anatomy, seasonal variations (early cycling season), training distance and intensity, and numerous human anatomical factors such as inflexibility, muscle imbalance, patellofemoral malalignment, leg-length discrepancy, etc. **Do check the leg length:** if the difference is up to 10 mm you can correct it by putting spacers under one cleat. If one leg is shorter by more than 10 mm you should try a shorter crank arm on the short leg side. Generally using shorter cranks keeps pedal speed up and knee stress down. Too long crank arms increase forces on the entire knee, but patellar and quadriceps tendons are most affected.

- For information on special bicycle adaptations see Chris Bell's website: [Highpath Engineering Specialist Services](#).

Causes of Knee Pain in Bicycling	
Factor	Possible Result
Anatomy	
Leg-length discrepancy	ITB stretch on shorter leg, posterior knee
Wide pelvis	Lateral knee stress (increased Q angle)
Pes planus and/or pronation	Medial knee pain
Internal tibial rotation	Patellar malalignment
Muscle weakness of quadriceps, hamstrings, hip flexors, gluteus	Fatigue-induced alterations in pedaling technique that transfer stress to other parts of the knee
Leg inflexibility	ITB syndrome
Bike Fit	
Saddle too high	Knee extension that irritates the ITB, stretches biceps tendon, patellofemoral loading, hip flexion by rocking while pedaling, posterior knee stress
Saddle too low	Stress on patellar and quadriceps tendons
Saddle too far forward	Stress on anterior knee from pedaling in full extension position
Saddle too far back	ITB stretch from excessive forward reach to pedal, stress on biceps tendon
Crank arms too long	Increased forces on the entire knee; patellar and quadriceps tendon are most affected
Internally rotated cleats	Patellar tendinosis, tibial rotation stress on knee
Externally rotated cleats	Medial knee stress
Training	
Rapid increase in distance or intensity	Muscle tightness, microtrauma
Excessive hill work (on bike)	Cartilaginous breakdown, chondromalacia
Pushing high gear ratio	Medial knee stress
Hill running (on foot)	Medial knee stress (uphill), tight quadriceps
Deep leg squats	Increased stress on entire knee
ITB = iliotibial band	

- Source: Chad Asplund and Patrick St Pierre: Knee Pain and Bicycling. [The Physician and Sportsmedicine](#), April 2004.

Further information on cycling knee problems:

1. Tony Wanich, et al.: Cycling Injuries of the Lower Extremity. *J Am Acad Orthop Surg*, December 2007;15:748-756.
2. Michael J Callaghan: Lower body problems and injury in cycling. *Journal of Bodywork and Movement Therapies* (2005) 9, 226-236.
3. Chad Asplund and Patrick St Pierre: Knee Pain and Bicycling. *The Physician and Sportsmedicine*, April 2004. Please note that free access to this article is no longer available from the PSM. However, try this link: <http://www.cptips.com/knee2.htm>
4. Robert L Kronisch: Mountain Biking Injuries: Fitting Treatment to the Causes. *The Physician and Sportsmedicine*, March 1998. Please note that free access to this article is no longer available.
5. Emma Colson: [Knee Pain - Anterior Anguish](#). PDF download. *Topbike Physio*, March - April 2006

Bike Fit

Proper bike fit is essential in reducing the incidence of knee and numerous other injuries. Frame size, seat height and position, handlebar height and position, crank length, and foot position are the primary fit-related adjustments that must be made for each cyclist. A comfortable, perfect-fitting bike means your skills will improve immeasurably as you go out and enjoy each ride. And it all starts with the frame. Handlebars, stems and saddles can be swapped out or adjusted to create a better-fitting bike. But **getting the frame right is the important first step** (2). And again, correct positioning and set-up of all components are extremely important in achieving optimum power output and avoiding overuse knee and other injuries.

Further information:

1. Robert L Kronisch: How to Fit a Mountain Bike. *The Physician and Sportsmedicine*, March 1998. Please note that free access to this article is no longer available.
2. REI staff: [The Perfect Fit - Bike Fit Basics](#). REI Expert Advice.
3. Guy Andrews: [Andy Pruitt's Fit Tips](#). Gear News, 23 January 2007. RoadCyclingUK.com.
4. Matt Russ: [Correcting Knees-out Pedalling](#). Active.com Cycling.
5. Rob Coppolillo: [Love Thy Knees: Get the Right Fit](#). Active.com Cycling.
6. Edmund R Burke: [Knees Among Most Vulnerable Joints for Cycling Injuries](#). Active.com Cycling.

How to Choose Cycling Shoes

- REI staff. [How to Choose Cycling Shoes](#). REI Expert Advice.

Indoor Cycle Trainers

The UK weather is not an excuse for giving up on cycling. If you have a bit of space at home, and a few pennies for a decent cycle trainer or a roller, or both, you can continue



to cycle, workout, build endurance, gain confidence, loose weight, etc. Indoor cycle training is not something reserved for winter months and bad weather. Rather, it is the most effective and rewarding exercise to do when conditions and circumstances will not allow you to get outside and ride a bike. Basically, if you want fitness training get a cycle trainer but if you want technical training get rollers. Rollers are less boring than cycle trainers, are nearly silent to operate and cause less tyre wear, but require a great deal more concentration than cycle trainers. Rollers are hands down the best way to maintain bike-handling skills and a fluid pedal stroke.

Cycling for Knee Rehabilitation

Exercise bikes, static bikes, stationary cycles, bicycle ergometers - these are all names for the bicycles that you find in virtually every physiotherapy clinic, gym or health club across the world. Many knee rehabilitation protocols include cycling so why is this exercise modality so popular for knee rehabilitation? In comparison with other exercises cycling is a relatively 'knee friendly' activity that can help to improve knee joint mobility and stability. Cycling is frequently used as a rehabilitation exercise modality after knee injury or surgery as well as part of the management of chronic degenerative conditions such as osteoarthritis. This article will give you an insight into the use of a cycle for knee rehabilitation:

- Karen Hambly: [Cycling for Knee Rehabilitation](#). [Cartilage Health](#) 2009.
- For specialist bicycle adaptations see Chris Bell's website: [Highpath Engineering Specialist Services](#).

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