



# Knee Pain in Swimmers

**K**nee pain is often associated with running and jumping ie. high impact sports. Swimming is perceived as one of the safest sports to participate in, because the water takes the weight off the lower limb joints. However, knee pain is common among people who perform a lot of breaststroke swimming, which is why it's often known as 'Breastroker's Knee'.

Whether you are a breaststroke specialist or not, 3 out of every 4 swimmers report breaststroke knee pain. The breaststroke kick is hardly a natural movement and can trigger knee pain in all swimmers. Though non-specialists may be at risk due to lack of conditioning for the kick, specialists may have an even higher risk due to much greater breaststroke training volume. Although eliminating all breaststroke knee pain may be unrealistic, you can take steps towards reducing its occurrence.

## WHAT HAPPENS IN YOUR KNEE?

The knee is a large weight-bearing joint formed by the lower thigh bone (femur) and upper part of the shin bone (tibia) along with the small kneecap (patella) bone which helps the muscles work across the knee joint.

The joint needs to be strong for all activities from walking, running, jumping, squatting and sitting. Some of these activities generate forces in excess of 8 times your body weight. Within the knee is cartilage (meniscus) which acts as a shock absorber and allows smooth movement of the bones against each other when you bend and straighten the knee. The joint is supported by thick ligaments on either

side which function to restrict sideways and twisting movements in the knee.

Breaststrokers put tremendous pressure on the medial (inner side) compartments of their knees during the kick phase. When the legs extend and are snapped together during the propulsive phase of the kick, the knee is subject to forceful external rotation (legs turned out like a ballerina), for which the knee was not designed. The inner side ligament of the knee, called the medial collateral ligament, is then put under stress. Repeated stress can strain the ligament and result in inflammation, swelling and pain. Although not an impact sport, the repeated rotational strain on the knee (from turning the feet out and pushing) can cause degeneration to the medial (inner side) cartilage in the knee over time.

The forceful long-lever adduction of the legs (squeezing them together) puts enormous twisting force on the knee. If the joint is not sufficiently strong and stable, the risk of injury increases. Forceful repetitive contraction of the adductor muscles (in the inner thigh) can cause injury to the tendon attachment on the inner side of the knee. Resulting in a tendonitis or chronic tendonopathy over time, which can also contribute to medial knee pain.

Two other types of knee pain can affect swimmers, although they're much less common:

**1. Patellofemoral pain and patellar tendonitis.** Pain in the front of the knee often just below the kneecap, can occur in all swimmers of any stroke. It is related to flip turns, pushing off the wall, and the butterfly and flutter kicks

– repeated, forceful contraction of the quadriceps (thigh) muscles, loads and strains the patellar tendon resulting in pain. This can be due to an underlying weakness of the quadriceps muscle. A strengthening programme including the gluteus and hip muscles as well as stretching throughout the year can help to prevent this injury.

**2. Fat pad irritation.** The 'fat pad' is a small, soft-tissue structure on the front of your knee, which may be pinched between your kneecap (patella) and the front of your thigh bone (femur). Although it's only small, it's highly sensitive, and the pain can be excruciating. The fat pad tends to get pinched when your knee is in a locked-out position (over-extended/ over straightening); in swimmers this occurs during a forceful down stroke on the leg kick in freestyle and butterfly.

## WHAT DO YOU FEEL?

Symptoms of breastroker's knee could include:

- General knee pain
- Inflammation
- Point specific pain, hypersensitive area to touch on the inner side of the knee or directly over the patella tendon
- Swelling of the knee
- A sharp pain when placing the knee under stress, like bending it with the lower leg and foot turned outwards
- Pain squatting down
- Mild stiffness after prolonged sitting or in the morning.



## THE CAUSE AND HOW TO SOLVE IT

### 1. Knee Posture

Some swimmers have knee hypermobility, where they stand with over-extended, locked knees (bowed backwards). That makes some ideally suited for breaststroke performance as their knees can 'twist' during the kick, but this can also contribute to their problem. Knee stability is essential to prevent pain, especially as knees aren't made to twist! Exercises to strengthen the quadriceps and hamstring muscles (front and back of the thigh) will help provide better joint support. If you know you have hypermobile knees, be aware not to stand for prolonged periods of time with your knees in a locked position.

### 2. Swimming Technique

- The "unhappy triad" of breaststroke knees is:
  - 1) Excess hip abduction (legs spread too far apart), try a narrower kick to reduce knee strain
  - 2) Limited hip internal rotation (this is turning your legs and feet out like a ballerina)
  - 3) Limited hip extension (straightening or moving leg backwards).

Although we did not mention the knees here, optimal function in these three hip patterns will protect the knees from excessive forces and overload. Take note that there are several ways you can address these joint movements, whether through exercise, manual treatment, stretching or strengthening and your physical therapist can help with this.

- Ankle mobility. The foot needs optimal positioning to push against the water and propel you forward. Limited ability to dorsiflex (lifting the foot upwards) and evert (tilt outwards) the ankle may affect your kicking performance. As the ankle forms part of the lower leg, limited

movement may load other surrounding structures like the knee. Exercises and physical therapy can assist in improving these ankle movements.

- In butterfly and freestyle kick, to avoid forceful hyperextension and locking of the knee during the kick, focus on generating the kick and force from your hips. Relaxing the quadriceps (front of the thigh) muscles will off-load the structures on the front of the knee.

### 3. Swimming Equipment and Training

Though it is easy to say cut back training volume to prevent injury, if you are a breaststroker, then doing a lot of breaststroke training is unavoidable. For non-breaststrokers, ask yourself how much is really essential?

Maybe you are spending too much time in intense training zones, compromising good technique with fatigue. Or maybe you are doing too much slow swimming, often swimming technique deteriorates with easy swimming. Always consider how much you are doing and progressing each week. Gradual build up will allow time for joints and muscles to adapt to the load without breakdown.

strengthen your hip rotators and extensors, like the gluteal (buttock) muscles. Stretches or hands-on mobilisation techniques will aid in improving hip and ankle mobility.

Focus on doing the correct exercises correctly. Many swimmers sustain or exacerbate swimming injuries when not in the pool! The quality of the exercise being performed is far more important than quantity or weight being used. Exercises used in treating breaststroker's knee are essentially the same as those used to prevent it.

Clearly, having breaststroke knee pain is detrimental to performance so it's important to manage your training volume, work on technique, and use exercise and physical therapists as tools to keep your knees healthy.

## TREATMENT OF KNEE PAIN

Initially treatment can focus on pain relief and healing which may include ice therapy, drug therapy, steroid injection, massage, taping, ultrasound and soft tissue mobilisation. Once the pain has settled rehabilitation should be started as soon as possible. This will include exercises to strengthen the quadriceps and hamstring muscles, like squats, lunges, and deadlifts. Your physical therapist can also teach you exercises to



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