

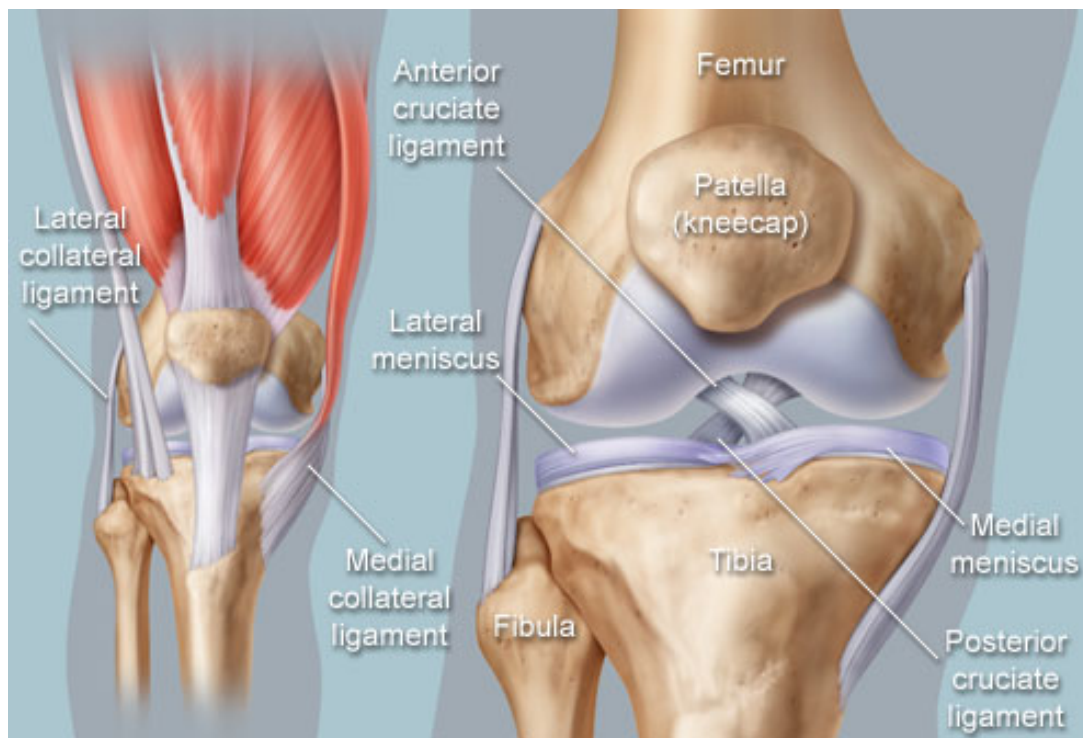
**Information and opinions supplied by the staff at  
UP and RUNNING (Sports Injury Clinics) Ltd**

**Article 1: Knee Pain**

Knee pain can result from a number of different structures and in a variety of ways. In this series of articles we shall look at the more common complaints and deal with each condition separately.

The knee is a simple hinge joint with slight accessory movements available to it. Primarily it extends and flexes the knee that is the joint between the Femur (thigh bone) above and the Tibia (shin bone) below. 5.7.9.

There is a small rotational component in the knee joint and some glide forward and backward between the Femoral Condyles and the platform made by the Tibia as in the diagram below.



(WebMD, LLC 2010)

The Quadriceps Muscles attach to the Patella (Knee cap), which in turn is attached to the Tibial Tuberosity on the Tibia (shin) via the Patella tendon. 5.6.

Although in action it produces a simple movement the knee joint is one of the most complex structures in the human body. This complexity gives rise to the potential for injury but also makes diagnosis problematic for the medical team.

In this series of articles on the knee the following injuries will be explored giving views by various authors and with an overview by this author giving his opinion based on a lifetime of experience in Sports Therapy:

1. Patello-Femoral Pain Syndrome (Anterior Knee Pain)
2. Ilio-Tibial Band Syndrome
3. Osgood Schlatters Disease

4. Patella-Tendonitis (Jumpers knee)
5. Knee ligament injuries
6. Meniscus injuries (Cartilage)
7. Patella dislocation
8. Bone injuries (fractures, pitting, bruising)

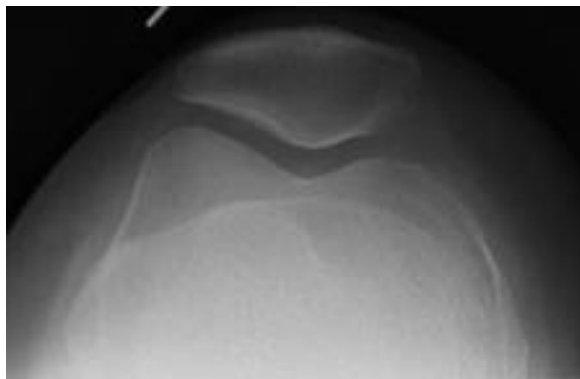
## **1. Patello-Femoral Pain Syndrome (Anterior Knee Pain)**

### **PFPS - What is it?**

Patello-Femoral Pain Syndrome (PFPS) is a painful condition where the patella (knee cap) rubs on the Femur (thigh bone) in such a way that pain and sometimes swelling is produced. <sup>11</sup> The Patella is meant to glide over the Femur and is equipped with a hard shiny covering over the bones in both areas to facilitate this glide. This Hyaline Cartilage, as the hard shiny surface is called, reduces friction at the point of contact. <sup>12</sup> However things can go wrong.

### **PFPS - What causes it?**

The under surface of the Patella has a “V” shape to it that corresponds with a reciprocal groove in the Femur as in the X-Ray image below (taken from above the knee looking down).



(Essex Knee Surgery, 2008)

As the knee is extended and flexed the Patella glides over the Femur along the line of this groove that extends from the front of the Femur to under the distal Femur. In standing the Patella sits at the top end of the groove but as the knee is bent such as when squatting, the angle of the Femur changes and the Patella sits more on the under surface of the Femur. <sup>11</sup> <sup>13</sup>.

All is well if this mechanism functions correctly and there is no trauma to either bony surface. However several factors may cause changes. <sup>3</sup> <sup>7</sup> <sup>11</sup> <sup>12</sup>. These include:

- 1) biomechanical factors
- 2) muscular factors and
- 3) overuse factors

### **1) Biomechanical Factors**

Of the biomechanical factors some of the more common issues in available literature include the following:

- Altered tilt of the Patella
- Rotation of the Patella
- Mal-tracking of the Patella
- Altered Q angle
- Pes Planus – flat feet or over pronated feet
- Pes Cavus – high arch over supinated feet
- Knee valgus or varus – knock knees or bow legged

Small changes to the tilt or rotation of the Patella reduce the contact area between the Patella and the Femur. <sup>14</sup> Over time this produces a “hot spot” of pressure causing the hyaline cartilage to abnormally wear.

Mal-tracking of the Patella occurs when for a variety of reasons the Patella does not track accurately in the groove of the Femur. Most commonly the Patella tracks laterally (towards the outside of the knee) causing a friction to occur between the under surface of the Patella where it rubs on the hard ridge of the Femoral Condyle. <sup>13, 15</sup>

Altered Q angle has been postulated as a biomechanical cause, particularly in females. This is the angle between the width of the hips and the alignment of the knees in relation to the vertical. Excessive Q angle is proposed to increase lateral pull on the Patella. <sup>2, 10</sup>

Pes Planus and Pes Cavus are thought by some to have an effect on the knees. The biomechanical effects are postulated to change the Patello-Femoral function thereby causing PFPS. <sup>2, 3, 4, 7, 8, 9</sup>

Knee Valgus and Varus similarly are possibly factors contributing to Patello-Femoral function.

## **2) Muscular Factors**

Muscles exert a pull on the bones in order to produce movement. If the Quadriceps Muscles exert an uneven pull on the Patella then it is postulated that this could alter the Patello-Femoral function. <sup>1, 2, 6</sup>

The most common theory for PFPS is that the Vastus Medialis Obliquus muscle is weak and therefore does not balance the pull exerted by the other Quad muscles and laterally mal-tracks the Patella. <sup>6</sup>

Tightness or muscle imbalance between any of the muscles of the leg is also thought by many to be a causative factor. <sup>1, 5, 6</sup>

## **3) Over Use Factors**

As the term implies excessive activity is proposed to cause PFPS.

The tissues of the body are designed to accommodate to the stresses applied to them by getting stronger. By lifting weights the muscles adapt over time by increasing mass and therefore tensile strength. Similarly the bones, ligaments, heart and other tissues adapt in the same way.

This tissue adaptation is the process all sportsmen and women go through to get fitter for their activity, however when these stresses are applied before the body has had time to make adaptations then the tissues can break down. It is therefore postulated that too rapid an increase in activity may cause injury including PFPS. <sup>16</sup>

### **PFPS - What else could it be?**

There are several other factors which could cause knee pain. Some of these require more sophisticated equipment such as X-Rays, MRI's or bone scans to determine the cause of pain. Dislocation of the Patella (as in the picture below) or Patella subluxation, stress fractures, bone bruising, bone defects, or pathological conditions such as Osteoarthritis all have the potential to cause knee pain and should not be lightly dismissed. <sup>4, 7, 11, 14, 16</sup>



(Body in Motion, 2010)

### **The Authors View**

The plethora of potential causes of PFPS is quite bewildering. There seems little consensus by medical experts as to the causes of PFPS and therefore the treatments prescribed are even more numerous. In a recent blog on a website of a particular medical profession as many as thirty-four different treatments were prescribed for PFPS. In other medical professions there may well be just as many treatments prescribed.

Whilst it must be accepted that there could be multifactorial causes in any one individual and that between individuals the causes may vary, there are nevertheless too many “red Herrings” proffered by medical professionals albeit in an honest attempt to solve PFPS. Trial and error seems to be the norm but this can be costly, time consuming and frustrating to the injured individual.

The author would like to pose some questions to those who are encountering this trial and error pathway for their particular knee pain:

1. Was there a single traumatic event that caused the knee pain or did it come on slowly?
2. Does the pain intensity vary from day to day or even from time to time?
3. Do the areas of pain vary slightly or are there other symptoms in the same leg i.e. tightness, heaviness, cramping etc?
4. Are the symptoms difficult to pin-point?

If the answer to some or all of these questions is yes then there may well be a single cause and therefore a simple answer! Up and Running (Sports Injury Clinics) Ltd are experts in the treatment and management of sports injuries and can be contacted on 02392664748 or via their website at [www.upandrunning.org](http://www.upandrunning.org)

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