Anterior Cruciate Ligament (ACL)
The anterior cruciate ligament (ACL) is one of the 4 major ligament stabilizers of the knee. ACL tears are among the most common major knee injuries in active people of all ages and are particularly prevalent in young athletes.

What does it do?
The ACL provides stability to the knee in two ways. ACL injuries can cause the knee to shift abnormally in a front-to-back manner and create instability during twisting or pivoting motions.

How do injuries occur?
ACL tears can occur in multiple ways. A sudden cut, twist, pivot, or change of direction can cause the ACL to tear, even without contact (direct blow to the knee). Sometimes, landing awkwardly from a jump, particularly if the knees collapse together, can cause an ACL injury. During contact sports, a direct blow to the knee can result in ACL disruption.

Signs and Symptoms
Patients will often have immediate pain and describe hearing or feeling a “pop” in their knee. The knee can quickly become very swollen. Walking after an ACL tear can be difficult and oftentimes the knee will buckle or “give way.” Some patients describe the knee as loose and can feel “shifting” during certain motions.

Treatment
Surgery is typically recommended after ACL injury, particularly for athletic and active patients who wish to return to sports and activities. Non-surgical treatment for ACL tears can lead to further damage of the meniscus and cartilage of the knee, which can lead to early arthritis. The goals of ACL surgery are to restore knee stability, prevent further damage, and allow for effective rehabilitation.

Because the ACL does not heal on its own, the ligament must be reconstructed. There are multiple graft options which can be used to accomplish this goal, and Dr. Kumar will discuss these options with you prior to surgery. Many factors are considered, including previous knee injuries, prior surgeries, and type of sport. Surgery is performed arthroscopically using a minimally invasive technique. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team in order to reduce post-surgical pain, restore motion, and regain strength. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.
**Posterior Cruciate Ligament (PCL)**
The posterior cruciate ligament (PCL) is one of the 4 major ligament stabilizers of the knee. PCL tears are uncommon and injured less frequently than the other major ligaments.

*What does it do?*
The PCL provides stability to the knee in two ways. PCL injuries can cause the knee to shift abnormally in a front-to-back manner and create instability during twisting or pivoting motions.

*How do injuries occur?*
PCL tears can occur in multiple ways. Hyperextension, particularly when landing from a jump, can injure the PCL. A sudden cut, twist, pivot, or change of direction can cause the PCL to tear, even without contact (direct blow to the knee). Contact to the front of the knee, especially with the knee bent, can force the PCL to stretch and tear.

*Signs and Symptoms*
Patients can have immediate pain and may describe hearing or feeling a “pop” in their knee. The knee can quickly become very swollen. Walking after a PCL tear can be uncomfortable and sometimes the knee will buckle or feel unsteady.

*Treatment*
Treatment for PCL tears is individualized for each patient. Many factors are considered, including severity of tear, injury to other structures, and types of sports and activities patients wish to continue. Non-surgical treatment may be an option for certain patients. For others, particularly athletes who want to return to cutting, pivoting, and jumping sports, surgery may be recommended. The goals of PCL surgery are to restore knee stability, prevent further damage, and allow for effective knee rehabilitation.

Because the PCL does not heal on its own, the ligament must be reconstructed. There are multiple graft options which can be used to accomplish this goal, and Dr. Kumar will discuss these options with you prior to surgery. Many factors are considered, including previous knee injuries, prior surgeries, and type of sport. Surgery is performed arthroscopically using a minimally invasive technique. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team in order to reduce post-surgical pain, restore motion, and regain strength. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.
**Medial Collateral and Lateral Collateral Ligaments (MCL, LCL)**

The medial collateral ligament (MCL) and lateral collateral ligament (LCL) are 2 of the 4 major ligament stabilizers of the knee. MCL and LCL injuries can occur in active people of all ages and are particularly prevalent in young athletes.

**What do they do?**
The MCL is located on the inner (medial) half of the knee. It provides stability by preventing the knee from collapsing inward. The LCL is located on the outer (lateral) half of the knee. It provides stability by preventing the knee from collapsing outward.

**How do injuries occur?**
MCL tears typically occur when the knee moves abnormally inward, while LCL tears occur when the knee moves abnormally outward. A direct blow can push the knee in either direction, straining and possibly tearing 1 of the ligaments. Both ligaments can also be injured during twisting or pivoting motions or after an awkward landing from a jump. MCL and LCL tears can also occur when other ligaments of the knee are torn.

**Signs and Symptoms**
Patients can have immediate pain and may describe hearing or feeling a “pop” in their knee. The knee can quickly become very swollen. Walking after an MCL or LCL tear can be uncomfortable and sometimes the knee will buckle or feel unsteady. Usually, either the inner (MCL) or outer (LCL) half of the knee is painful.

**Treatment**
Surgery is usually not required for most MCL or LCL tears. These ligaments are quite strong and are often sprained or only partially torn. Treatment is focused on reducing pain and swelling, restoring motion, and regaining strength with a specific physical therapy program. A brace is worn during the healing period to prevent the knee from moving abnormally, which can further injure the ligament. Many athletes will wear a smaller brace during sports and activities for a short while as they regain confidence in the knee.

In patients with complete MCL or LCL tears, treatment is designed to allow the ligaments to heal without surgery. However, some patients may continue to have instability and pain after rest and rehabilitation. Although this is uncommon, in such circumstances surgery may be indicated to help restore stability. The ligaments may need to be repaired or reconstructed, depending on various factors. Prior to surgery, Dr. Kumar will discuss all of the potential options, including possible graft choices if a reconstruction is warranted. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team in order to reduce post-surgical pain, restore motion, and regain strength. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.
Multi-ligament Injury
The anterior cruciate (ACL), posterior cruciate (PCL), medial collateral (MCL), and lateral collateral (LCL) ligaments make up the 4 major ligament stabilizers of the knee. Injury to 2 or more of these ligaments typically occurs after a significant knee trauma. Multiple ligament injuries can occur after a sudden twist or pivot, an awkward landing from a jump, or a severe direct blow to the knee.

Signs and Symptoms
Patients will often have immediate pain, hear or feel a “pop” in their knee, and develop significant swelling. Walking or bearing weight after a multiple ligament injury can be very difficult. Oftentimes, the knee will buckle or “shift” even with basic everyday activities.

Treatment
A multiple ligament knee injury can be complex and quite severe. Surgery is typically recommended in order to restore stability. Many factors are considered when developing an individualized treatment plan for each patient, including injury to other parts of the knee such as the meniscus or cartilage. Dr. Kumar will discuss all of the surgical options with you prior to surgery. Some ligaments may be repairable while others may require reconstruction. Surgery is still performed arthroscopically but is often more complex than other ligament surgeries. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team in order to reduce post-surgical pain, restore motion, and regain strength. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible. Multiple ligament knee injuries often require a longer recovery period and longer rehabilitation.
Meniscus
One of the most commonly injured parts of the knee is the meniscus. There are 2 menisci: the inner (medial) meniscus and the outer (lateral) meniscus. Meniscal tears can occur in patients of all ages and activity levels.

What does it do?
The meniscus is a rubbery, wedge-shaped shock absorber made of cartilage. The meniscus has several important functions. It distributes the forces on the knee evenly to protect the cartilage and provides critical joint stability. The meniscus also allows for smooth motion during bending and twisting.

How do injuries occur?
Meniscal tears can occur in multiple ways. Sudden acute tears often occur during sports and athletics when patients twist their knee in the squatted position or with the leg planted on the ground. Acute meniscal injuries also frequently occur when knee ligaments are torn, such as the ACL. Acute tears typically happen in athletes and active patients with a normal knee joint. Degenerative tears are another kind of meniscus tear. These typically happen in older patients who have early signs of arthritis and cartilage wear. Cartilage wears and breaks down over time, making the meniscus more prone to developing tears. These injuries can occur even with everyday activity, such as walking or climbing stairs.

Signs and Symptoms
Patients with acute meniscus tears will often have immediate pain, hear or feel a “pop” in their knee, and slowly develop swelling over 1-2 days. Walking can be uncomfortable but some patients may still be able to continue sports and activities. The knee may become stiff and patients may lose their normal motion. Sometimes, the meniscus tears and shifts out of place. When this happens, the knee may buckle, catch, or lock. If an ACL tear also occurs, the instability sensation may be worse. Patients with degenerative meniscus tears may have similar symptoms as patients with acute tears. However, many patients will describe gradual knee pain, stiffness, and repeated swelling without a sudden “pop.” Patients may still be able to continue playing sports and participate in activities despite these symptoms.

Treatment
Treatment is determined based upon a variety of factors, including tear type and severity, patient activity, other knee injuries, and overall knee health. For some patients, a non-surgical treatment focused on reducing pain and swelling, restoring motion, and regaining strength can successfully return patients back to activities. For other patients, surgery may be recommended. Depending on the type of tear, the meniscus may either be repaired or partially resected. Surgery is performed arthroscopically using a minimally invasive technique. Dr. Kumar will explain in detail all of your treatment options, including possible surgical options. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team in order to reduce post-surgical pain, restore motion, and regain strength. Each program is tailored to the specific surgery performed. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.
**Medial Tibial Stress Syndrome (shin splints)**

Medial tibial stress syndrome, also called shin splints, is commonly seen in patients who participate in sports that involve running, jumping, and impact activities. Shin splints can occur due to overuse from excessive stress on the lower leg or if a sudden increase in training occurs without the proper progression of activity. Shin splints are caused by irritation and inflammation of the periosteum (covering of the bone) of the tibia (shin bone).

**Signs and Symptoms**

Patients with shin splints often have sport and activity related calf and lower leg pain. The pain is typically located on the front portion of the shin and can be a deep ache. Sometimes, the tibia and calf muscles can be tender to the touch. Prolonged rest helps alleviate the pain. Usually, regular daily activities do not cause discomfort. However, severe pain or shin splints that have been chronic can sometimes progress to become a stress fracture of the tibia.

**Treatment**

Surgery is usually not needed to treat shin splints. Treatment is focused on conditioning the leg to tolerate running, jumping, and impact activities. A physical therapy program focused on increasing limb flexibility, gaining strength, and improving mechanics is the initial step of treatment. Avoiding activities and sports which aggravate the pain is critical to avoid continued irritation and inflammation. It is recommended to combine the rehabilitation program with low impact activities such as biking or swimming until the leg is better prepared for running and impact. Once the leg has improved in strength and flexibility, sport-specific training and transitioning to running, jumping, and impact sports is performed. A home exercise program is used to help prevent repeat shin splints in the future.

Patients who have developed a stress fracture may require significantly longer treatment. Treatment can involve limited weight-bearing with a boot or crutches until the bone begins to heal. Prolonged rest and rehabilitation should be expected as continued activity could lead to a full fracture of the tibia. Many stress fractures are able to be treated without surgery. However, in some patients, surgery may be recommended if the bone is not healing as expected. In these cases, Dr. Kumar will discuss surgical options with you prior to surgery and describe the expected recovery course. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team. Each program is tailored to the specific surgery performed. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.
Osgood-Schlatter Disease
The patella (kneecap) is connected to the femur (thigh bone) and the tibia (shin bone) by 2 different tendons. The patellar tendon connects the patella to the tibia. The patellar tendon attaches to the tibia at a bony bump called the tibial tubercle.

How do injuries occur?
Osgood-Schlatter disease is an irritation of the growth plate at the tibial tubercle. Patients who participate in sports and activities that involve running and jumping can develop Osgood-Schlatter disease. This injury is an overuse injury where repetitive running and jumping causes the patellar tendon to constantly pull on the tibial tubercle. This leads to irritation and inflammation of the growth plate, which is weaker than the bone.

Signs and Symptoms
Patients with Osgood-Schlatter disease usually have pain in the front of the knee directly over the tibial tubercle. This pain is worsened when participating in sports and activities that involve running and jumping. Sometimes, even regular activities such as walking up and down stairs, squatting, or kneeling on the knee can aggravate the pain. Swelling can develop over the tubercle and it can be quite tender to the touch.

Treatment
Treatment is focused on reducing pain and swelling, restoring motion, and regaining strength with a specific physical therapy program. First, pain is decreased by avoiding activities and sports which cause the pain to become aggravated. This prevents continued irritation and inflammation of the growth plate. Icing and anti-inflammatory medications can reduce swelling and pain as well. Once the pain is improved, a rehabilitation program focused on strengthening the core, hip, and thigh muscles is implemented to recondition the leg. Therapy also focuses on increasing the flexibility of the leg. Once the leg has improved in strength and flexibility, sport-specific training is performed to prepare the patient for return to sports and activities as quickly and safely as possible. It is important to recognize that Osgood-Schlatter disease does not typically lead to long term issues with growth of the leg. Once the growth plate has closed, the pain is usually resolved for good.
**Patellar Tendinitis (jumper’s knee)**
The patella (kneecap) is connected to the femur (thigh bone) and the tibia (shin bone) by 2 different tendons. The quadriceps tendon connects the patella to the femur while the patellar tendon connects it to the tibia.

*How do injuries occur?*
Patellar tendinitis is often called jumper’s knee. Patients who participate in sports and activities that involve running and jumping can develop patellar tendinitis. This injury is an overuse injury where repetitive stress on the tendon creates small tears. This eventually leads to inflammation, pain, and decreased knee function.

*Signs and Symptoms*
Patients with patellar tendinitis usually have pain in the front of the knee directly over the site of tendon damage. This pain is worsened when participating in sports and activities that involve running and jumping. Sometimes, even regular activities such as walking up and down stairs, squatting, or kneeling on the knee can aggravate the pain. Swelling can develop over the tendon as well.

*Treatment*
Surgery is usually not needed to treat patellar tendinitis. Treatment is focused on reducing pain and swelling, restoring motion, and regaining strength with a specific physical therapy program. First, pain is decreased by avoiding activities and sports which cause the pain to become aggravated. This prevents continued irritation and inflammation of the small tears. Rest also allows these areas to heal completely. Icing and anti-inflammatory medications can reduce swelling and pain as well. Once the pain is improved, a rehabilitation program focused on strengthening the core, hip, and thigh muscles is implemented to recondition the leg. Therapy also focuses on increasing the flexibility of the leg to reduce stresses on the tendon. A deep tissue massage technique called Graston can be used to stretch the scarred areas of tendon damage and increase flexibility. Once the leg has improved in strength and flexibility, sport-specific training is performed to prepare the patient for return to sports and activities as quickly and safely as possible. A home exercise program is used to help prevent repeat tendinitis in the future.
**Patellofemoral (Kneecap) Pain and Instability**

Pain and instability of the patella (kneecap) is a very common condition. Normally, the patella sits in a groove at end of the femur (thigh bone) and glides smoothly in this groove during knee motion.

*How do injuries occur?*

Abnormal mechanics of the patellofemoral (kneecap) joint can lead to knee pain and possible dislocation of the patella. Many factors play a role in keeping good patellofemoral mechanics. Weak hip and thigh muscles from poor conditioning or overuse can put excess pressure on the patellar cartilage. This can lead to the cartilage becoming soft and worn out. Sometimes, the bony alignment of the femur and tibia (shin bone) can force the patella to track abnormally in the groove. The groove may also be shallow or uneven. The medial patellofemoral ligament (MPFL) can be stretched or torn, which can lead to the patella dislocating (coming out of the groove). This typically happens during sports or activities when the knee twists or after an awkward land from a jump. Some athletes can dislocate the patella with a direct blow to the kneecap or falling onto the patella.

*Signs and Symptoms*

Patellofemoral pain is a very common condition, particularly in younger active patients. This pain can be called several names, including anterior knee pain, patellar chondromalacia, or patellar hypermobility. The pain is usually in the front of the knee and gets worse during running and jumping sports. Going up and down stairs can also be problematic. Patients can have a hard time sitting with their knee bent for long periods of time and have to straighten out the knee to get comfortable. Some patients can feel and hear cracking during knee motion as well.

Patients who have a patellar dislocation can have immediate sharp knee pain and can feel their kneecap shift or come out of place. The knee can quickly become very swollen. Walking after a patellar dislocation can be difficult, and the knee can feel unstable and buckle.

*Treatment*

An understanding of the many factors that play a role in patellofemoral pain and instability is important to individualize treatment for each patient. For some patients, an intense rehabilitation course designed to increase flexibility and regain core, hip, and thigh strength can resolve the problem. Sometimes, a brace can be used to supplement this treatment and during sports to help prevent pain from coming back. An examination of the bony structure, leg alignment, and cartilage status will also help determine if non-surgical treatment can return patients back to sports and activities.

For patients with patellofemoral dislocation, an initial non-surgical course can also be very beneficial. Physical therapy is designed to reduce pain and swelling, restore motion, and regain strength before returning to sports and activities. However, because dislocation causes structural damage to the MPFL, the chances of having another dislocation is higher. Some patients may even break a piece of bone or cartilage after dislocation. In these patients, surgery may be recommended. The goals of surgery are to restore stability of the patella, protect the cartilage from further wear, and allow for effective rehabilitation.

Because many factors can lead to patellar instability, surgery can be very different for each patient. Surgical options include releasing tight tissue on the outer part of the knee, repairing or
reconstructing the MPFL, or repositioning the patella. Surgery can be arthroscopic or open, depending on the type of surgery. Dr. Kumar will discuss in detail all of the potential options with you prior to surgery. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team. Each program is tailored to the specific surgery performed. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.
Osteochondritis Dissecan of the Knee
Osteochondritis dissecan (OCD) is a condition that weakens the bone which supports cartilage inside a joint. Eventually, this leads to cartilage softening and damage and can sometimes cause a piece to break off. OCD usually affects younger patients ages 10-20 years old and can be found in multiple joints. The knee is the most common location for OCD to occur.

What does it do?
The cartilage inside each joint is supported by bone. The bone provides structural support and nutrition to the cartilage to keep it healthy and strong. OCD causes the bone in certain locations of the knee to become weak, soft, and diseased. Over time, this can lead to the cartilage becoming damaged and non-functional. In severe cases, the cartilage eventually dies and cannot heal.

How do injuries occur?
The exact cause of OCD is unknown. It has been associated with a disruption in the blood supply to the bone and with repeated impact stresses to the knee. Genetics may also play a role as there may be an association with family history.

Signs and Symptoms
Patients with OCD of the knee will oftentimes have gradual knee pain and soreness with sports and activities. Some patients will have swelling that comes and goes, particularly after times of intense training. The pain and swelling usually get more frequent and more bothersome over time.

Sometimes, patients will describe an acute, sharp, sudden pain in the knee and develop much more swelling than normal. Walking after this episode can be difficult and uncomfortable. The knee may start to click. These symptoms might indicate that the OCD has broken off inside the knee joint. This can also cause the knee to lock and lose motion.

Treatment
Treatment is based upon various factors including patient age, open or closed growth plates, and severity of disease. In early stages of OCD (“stable OCD”), non-surgical treatment can allow the body to heal the bone and cartilage. Usually this involves a period of limited weight-bearing to allow the knee to rest and recover. This is followed by physical therapy designed to rehabilitate the hip and thigh to restore strength and conditioning for return to sports and activities. In some patients, the OCD has difficulty healing and surgery may be recommended. Surgery is performed arthroscopically using a minimally invasive technique to help increase the blood flow to the area of sick bone.

In patients with severe or advanced disease, the OCD can become loose and even come out of place (“unstable OCD”). In such cases, surgery may be recommended to either fix the unstable lesion to allow it to heal or to replace the bone and cartilage if the OCD is too advanced. There are multiple options which can be used to accomplish these goals, and Dr. Kumar will discuss these options with you prior to surgery. Many factors are considered, including prior surgeries, patient age, status of the growth plates, and severity of disease. Surgery can be performed arthroscopically or open depending on the exact procedure. After surgery, a rehabilitation program specific for each patient is created with a physical therapy team in order to reduce post-
surgical pain, restore motion, and regain strength. Sport-specific training is a critical aspect of recovery in order to return patients to sports and activities as quickly and safely as possible.