MRI Evaluation of Athletic Injuries - Overuse Syndromes of the Lower Extremities in Athletes

Approximately 50% of all sports injuries are secondary to overuse and result from repetitive microtrauma that causes local tissue damage.

Stress Fractures
Stress fractures account for 20% of all injuries seen in sports medicine clinics and may be classified in two types. Fractures of abnormal bone subjected to normal forces are termed “insufficiency” fractures; fractures of normal bone subjected to abnormal forces are termed “fatigue” fractures. Most commonly involved bones are the femoral neck, the tibia, and various bones of the foot. Medial tibial pain in runners is clinically often diagnosed as a shin splint syndrome. At magnetic resonance imaging a progression of injury can be identified, starting with periosteal edema, then progressive marrow involvement, and ultimately frank cortical stress fracture.

Jumpers Knee
A jumper's knee is an overload lesion of the patellar or quadriceps tendon near its insertion at the lower or upper pole of the patella. The AP diameter of a normal patellar ligament should not exceed 7 mm. In jumpers knee increased signal intensity on T1-, T2-, and proton-density-weighted images and increased AP diameter proximally is observed.

Iliotibial Band Friction Syndrome
Iliotibial band friction syndrome (runners knee) is a cause of lateral knee pain that occurs in long-distance runners or cyclists. With MR imaging, poorly defined signal intensity abnormalities or a circumscribed fluid collection located between the lateral femoral condyle and the iliotibial tract with obliteration of the fatty layer distal to the vastus lateralis muscle is observed. Correlation of MR imaging and microscopic examination in cadavers and showed no bursa beneath the ITT.

Plantar Fasciitis
The term fasciitis may be somewhat of a misnomer since the disease is actually a degenerative process without inflammatory changes, which may include fibroblastic proliferation. Plantar fasciitis accounts for about 10% of runner-related injuries. The most common finding is an increased signal intensity consistent with edema in the perifascial soft tissue on T2-weighted images. The second most common MR imaging finding is a thickening of the plantar aponeurosis. The third most common MR imaging finding is increased signal intensity within the involved plantar fascia on T2-weighted images. The least common MR imaging finding of plantar fasciitis is calcaneal marrow edema.

Turf Toe
Turf toe refers to an injury to the first metatarsophalangeal joint that occur in several sports. MRI findings may demonstrate a sprain or tear of the plantar metatarsophalangeal joint capsule. The mechanism of injury is typically hyperextension of the MTP joint.

Joints and Osteoarthritis
Overuse syndromes of joints in athletes may be a result of extending the range of motion beyond the physiological limits, a good example is the femoroacetabular impingement in ballet dancers. Controversy exists if and to which extent athletic activities contribute to the development of osteoarthritis. Athletes from all types of competitive sports are at slightly increased risk of requiring hospital care because of osteoarthritis of the hip, knee, or ankle. Mixed sports and power sports lead to increased admissions for premature osteoarthritis compared to endurance athletes.