Stress Fractures and Spring Running

John Fiore, PT

Warmer temperatures, longer daylight hours and bare ground are signs that spring is here. Spring is also a time when more running athletes develop lower extremity stress fractures. While all athletes who run, jump, or cut are susceptible to stress fractures, distance runners have the highest incidence of stress fractures. One in five runners or (2 million runners annually in the United States) will sustain a stress fracture.\(^1\) While most stress fractures are assumed to be due to a rapid increase in mileage on hard surfaces, the true cause is less obvious. One study investigated stress fractures in 320 athletes. Of the 320 athletes in the study, 69% were distance runners but only 20% of the running-related stress fractures were due to a rapid increase in running mileage or training on hard surfaces.\(^2\)

**Stress Fractures:**
Understanding how running leads to stress fractures is an important way to reduce your risk. While the term *stress fracture* is commonly used, accurate diagnosis of a stress fracture using traditional X-ray is difficult. Many stress fractures are not initially visible on X-ray.

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Clinical testing of a running athlete with bone pain, therefore, is crucial for proper recommendations, referrals, and treatment. Ignoring the symptoms and running on a stress fracture will prolong healing and may worsen the extent of the fracture.

Stress fractures can be divided into high risk and low risk groups. High risk stress fractures occur in bones which are notorious for slow healing rates (femoral neck, navicular and sesamoid bones of the foot). Low risk stress fractures occur in bones with faster healing rates (metatarsals of the foot, tibia, fibula, pelvis). Healing rates for fractures are generally 6-8 weeks with your physician often ordering a follow-up X-ray to confirm healing prior to a gradual return to activity. Your physical therapist is often the one to diagnose a stress fracture based on clinical presentation, palpation, injury history, and functional testing. I utilize a tuning fork test to confirm any suspicions I may have based on injury presentation.

**Bone Stress Injury:**
It is important to point out that not all bone pain to palpation is a stress fracture. Bone stress injury is a more recent means of classifying overuse injuries impacting bone. Bone stress reaction injuries are achy or painful during or after weight bearing, may reveal bone marrow edema on an MRI, but lack a visible fracture line as a large or healing stress fracture displays.

Runners are familiar with muscle-related breakdown and build up secondary to training and high intensity efforts. Our long bones also undergo regular breakdown and build up in response to the stresses of training and racing. The process of bone remodeling involves osteoclasts and osteoblasts. When our bodies are stressed by a long spring run or fast, steep downhill run, osteoclast cells “eat away” or resorb small pockets of bone in the area of stress. These asymptomatic pockets of micro cracks stimulate the activation of osteoblast cells which fill in the pockets and micro cracks. Osteoblast activity builds a stronger bone matrix providing increased impact and torsional resistance to our long bones to reduce injury risk. Bone remodeling after activity, however, takes time. Two studies found the bone remodeling process takes three to four months to complete. Runners remain at a high risk of injury during the bone remodeling phase which is the reason why recovery is so important. A rule of thumb following completion of an ultra run is one day completely off from running for every ten miles raced.

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Biomechanical Causes:
In addition to lack of adequate rest and recovery, biomechanical issues may predispose a runner to bone stress injuries or stress fractures. Bone and joint impact loading forces are higher at a low running cadence. Running with a cadence of 170-180 steps per minute will reduce impact loading by approximately 20% when compared to cadences of <160 steps per minute. High pronation velocity rates (how rapidly your foot-arch moves into pronation onto the ground) and knee valgus (inward collapse of the knee and inward femur angle) increase impact and torsion through bones. Our long bones (femur, tibia, fibula, metatarsals) transfer impact better when torsion is not added to the load. A biomechanical running analysis can document running gait deviations to reduce injury and fracture risk.

Bone Density:
Bone stress injuries and stress fractures are more common in females. Females generally have less protective muscle mass, higher risk of osteopenia (low bone density) or osteoporosis, and hormonal changes which increase bone stress injury risk. In both male and female runners, eating disorders and low body weight greatly increase injury risk in general. Remember, a high level of fitness and running speed does not insulate one from a season-ending stress fracture.

Returning to Running:
If you have pain walking or with daily activities, see your physician to rule out a stress fracture. If a bone aches during or after running only and is tender to palpation, see a physical therapist who works regularly with running athletes. I utilize a single leg hopping test to determine when a person may consider gradually returning to running: If you can hop on the involved foot for sixty seconds pain-free, I will outline a return to running program. It is important to make sure the strength of the involved leg is sufficient to stabilize the joints to reduce torsional impact forces upon return to running. Lastly, do not ignore symptoms of fatigue and soreness associated with training and racing. Do not
skimp on nutrition as your bones require nutrients to recover and remodel.

Oteoblast-Osteoblast photo credit:  

Muscle of the Month: Latissimus Dorsi
Kate Hughes, DPT

Latissimus dorsi literally means “broad muscle of the back” in Latin. The latissimus dorsi (lats) is a large muscle originating along the lower spine and sacrum, with attachments on the upper pelvis, lower ribs, scapula, and proximal humerus. The lats are the only muscle connecting the arms to the spine and pelvis, allowing them to act as an important stabilizer of the body. The functions of the lats are quite extensive and play a role in the following actions:

- Moving your arms toward your body
- Extending your arms behind your body
- Medially rotation of the arms
- Helping your trunk, ribcage, and spine rotate and side bend
- Pushing yourself up from the ground or a chair

When your lats are tight, they limit the ability to reach overhead with your arms extended. Common compensations for limited overhead reaching due to tight lats include hyper-extending the back or bending the elbows to reach overhead. Because the lats are so expansive, underutilization may cause tightening and adherence to the multitude of muscles they cross over. Tight lats may also affect posture, negatively impacting compound movements such as deadlifts and squats.

To stretch the lats, grasp the edge of a doorway or wall with both hands. While keeping the spine long, slowly push your hips to the side until you feel a deep stretch along the side of the torso.

While many exercises strengthen the lats, you can isolate this muscle group with the following targeted exercises:

- Pull-ups
- Lat pull-downs
- Straight arm pull-downs
The lats play a key role in many everyday activities. Include latissimus dorsi specific strengthening and stretching exercises in your regular routine to maximize movement and function in all aspects of your daily life, sports, and hobbies.

References:


Spring Trail Etiquette Tips

John Fiore, PT

One of the most unique and treasured benefits of living in Missoula is easy access to trails in every direction from downtown. Spring in Montana draws Missoula residents out of home, cubicle, and climate controlled gyms in increasing numbers. Our individual trail experiences, however, are impacted by the presence or absence of community trail stewardship and user coexistence.

I began exploring local trails in 1983 as a twenty-one year-old. Local trail maps were limited, GPS locators were non-existent, trail use was light, and I often traveled miles in complete solitude. The open space, National Forests, and Wilderness Areas were my backyard. While I still have what is arguably the most incredible backyard in America, I now share it with 69,000 people. The population of Missoula and the surrounding area has nearly doubled since 1983 which is manifested on our local trail network.

Common spring trail transgressions include mountain bike tracks on the Smokejumper trail (no mountain bikes allowed), multiple hiking/running trails (to avoid ice, mud) on Blue Mountain and Mount
Sentinel trails, abandoned doggie bags deposited along the Rattlesnake and Pattee Canyon trails, deeply trenched mountain bike tire ruts on muddy Blue Mountain trails, and hikers-runners three abreast on single track trails. Long-term use and enjoyment of our trails by multiple user groups hinges on an understanding of basic trail use etiquette.

Yielding right of way: Horses are huge, so yield to horses, period. Step off the downhill side of the trail, stop, and speak calmly. Generally, uphill traffic should be given the right of way (whether you are on a bicycle or foot). If a convenient spot is available, pull over and allow the uphill hiker, runner, or cyclist to pass. Do not continue to move forward once off the trail as this leads to the creation of multiple trails.

Announce yourself: Say “hello” to fellow trail users. Be courteous, respectful, and announce your presence if approaching someone from behind. Be aware of your surroundings by limiting your use of earbuds.

Slow down: The most important tip for the survival of a trail is traveling at a safe and appropriate speed. Both foot and bicycle users must travel at a speed conducive to the trail design. Washboard trails and extra wide or multiple parallel trails are caused by poor speed control. Negative encounters with fellow trail users can be reduced by simply knowing your safe speed and being aware of your surroundings.

Leave no trace: Pack out what you pack in. If you see trash on a trail, pick it up.

Dogs: Missoula is synonymous with canine companions. Be aware of local leash laws as the law varies throughout Missoula’s open space areas. If you are unable to call your dog by voice command, please keep your dog on a leash. Avoid potential collisions and encounters with fellow trail users by keeping your dog close to your side and under control.

Respect trail closures: Trail closures apply to everyone and are mandated for a reason. Avoid giving your user group a bad name by abiding by and being aware of the local trail closures. Most of the trails with user group restrictions are narrow, steep, and inherently dangerous for high volume use. Please respect trail closures.

Stay on the trail: If the trail is snowy or icy, wear traction devices. If your shoes or mountain bike tires sink deeply into the mud, you should not be on the trail until it dries out. Do not create a new trail by avoiding mud, puddles, or other trail users.
Support our trails: Give back to our local trail network. The Montana Trail Crew hosts trail maintenance work days, and Mountain Bike Missoula schedules trail work days as well. Get involved in local and National Forest decisions regarding trail maintenance, use, and support. As educated, involved trail users, we can work together to improve our individual trail experiences in and around Missoula.