

Climbing

BONUS TIPS GUIDE

TECH TIPS:

**Joints
and tendons—
a climber's guide
to staying fit**



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Tech Tips: Joints and tendons—a climber’s guide to staying fit

Stay healthy to pull harder, longer! In this technical miniseries, orthopedic surgeon Dr. Thomas Rosenberg and Doctor of Physical Therapy Stacy McCooey offer guidance on injury-proofing your knees, preventing tendonitis, and dietary supplements for joint health.

These Training Tech Tips are presented in conjunction with the nonprofit ProHealth Lab, in Park City, Utah.

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Joint health, from the inside out

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TO SUPPLEMENT OR NOT TO SUPPLEMENT?

Joint health, from the inside out



BY THOMAS ROSENBERG, MD, ORTHOPEDIC SURGEON • ILLUSTRATION BY KEITH SVIHOVEC

CLIMB LONG ENOUGH, and you'll experience setbacks: tendonitis, torn pulleys, injured tendons/ligaments, joint pain, or shoulder injuries. They're our war wounds from battling gravity. But just as year-round conditioning is important to stave off injury, so too is "training" from the inside out.

Besides the obvious — following a healthy diet (protein, fruits and veggies, whole grains) and not overtraining — you can also optimize training and recovery with supplements that promote tendon, ligament, and cartilage health. Research has shown that glucosamine/chondroitin, omega-3 fatty acids, vitamins/minerals, and antioxidants are your best bets. Equally important is avoiding regular use of meds that mask pain (see "NSAID Sandbag"). Here are some recommendations:

CONNECTIVE TISSUES

Before we get too deep, let's look at the structures that climbers rely upon.

CARTILAGE: This dense connective tissue, present in the intervertebral discs, articulation surfaces of bones, and attachment points for certain tendons and ligaments, has no blood vessels, so it might heal marginally. Still, healing of recent cartilage trauma is possible if you supply the key building blocks glucosamine/chondroitin and vitamin E.

LIGAMENTS: These fibrous tissues connect bone to bone, to stabilize joints (e.g., elbows and knees). Ligament health depends largely on nutrition — similar to tendons, ligaments become stronger and more resistant to injury with regular training and optimal nutrition. Following injury, ligaments might take six months to heal fully, during which time they'll need extra nutrients. Feed them vitamins C and E, glucosamine, and healthy proteins.

TENDONS: These tough bands of fibrous connective tissue link muscle to bone. If you've ever blown a pulley tendon or, worse, your bicep tendon, you know all too well that these heal glacially because they don't see a lot of oxygen. During healing and strength building, tendon cells require antioxidants and collagen-building nutrients like vitamin C, zinc, copper, manganese, and glucosamine.

BONE: Without our skeletons, we'd be jellyfish. Good nutrition increases the intrinsic strength of bones, making them more resistant to traumatic fractures, stress fractures, and bone bruises. Bone depends not only on calcium and magnesium, but also vitamins C, D, and K, potassium, zinc, copper, and manganese.

SUPPLEMENT OPTIONS

GLUCOSAMINE/CHONDROITIN: The molecules glucosamine and chondroitin comprise the cartilage matrix found in joints. The cartilage undergoes constant breakdown and repair, but with climbers, there's often more of the former than the latter. Many climbers in fact suffer from wear-and-tear arthritis (osteoarthritis), which occurs when the joints' smooth cartilage deteriorates, leading to pain, swelling, and even deformity. Glucosamine and chondroitin supplements, however, can push that balance toward repair.

In the National Institute of Health's 2006 GAIT study, combined therapy with glucosamine and chondroitin significantly improved pain and function in 79 percent of subjects with moderate to severe osteoarthritis pain, outperforming the prescription drug Celebrex (only 69 percent of Celebrex users showed improvement). Optimal doses are 1,500mg a day glucosamine and 1,200mg a day chondroitin sulfate.

VITAMINS C AND E: Everyone knows exercise is good for you, but it also creates damaging molecules called free radicals — the more food and oxygen we process into energy, the more free radicals and risk of oxidative damage to our cells. Antioxidants such as vitamins C and E, alpha-lipoic acid, and coenzyme Q10 neutralize free radicals, reducing damage to connective tissue. During intense training, aim to take 750mg vitamin C, 400 IU vitamin E (alpha-tocopherol), 25mg CoQ10, and 100mg alpha-lipoic acid.

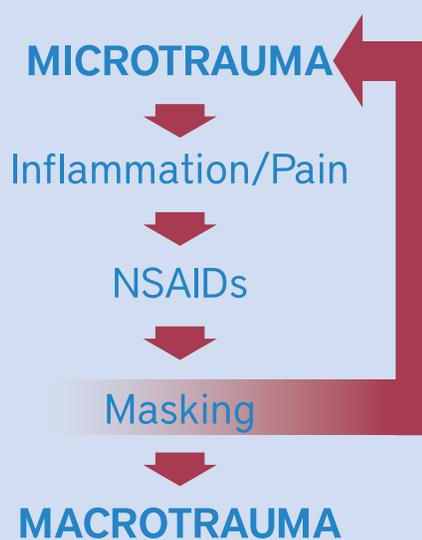
OMEGA-3 FATTY ACIDS: Omega-3 fatty acids, such as in high-quality fish oils, reduce joint stiffness and pain, strengthen grip, and improve healing. Omega-3's also decrease inflammation and inhibit enzymes that destroy cartilage. Look for the following in an omega-3 supplement: 1) high levels of combined EPA (700mg) and DHA (500mg), the two omega-3's known for their health benefits, 2) molecular distillation, which removes any heavy metal or PCB contaminants, and 3) no fishy taste. ➔

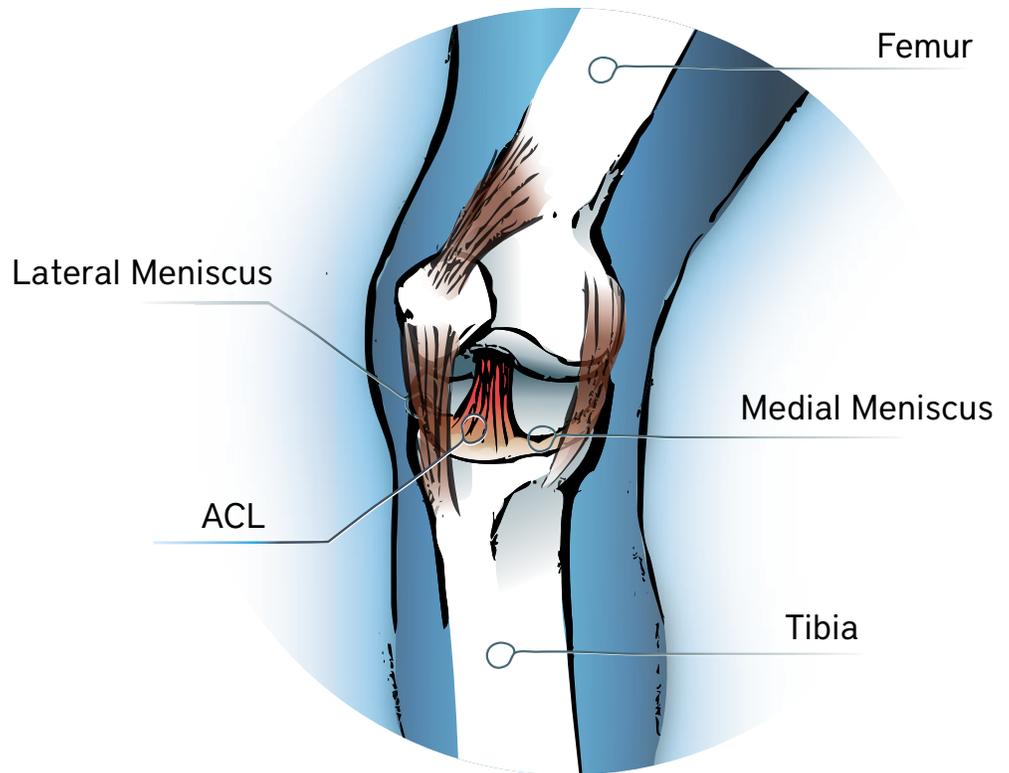
NSAID SANDBAG

If your finger and elbow joints trouble you (that “creaky, achy” feeling you get from too much climbing), avoid continual use of drugs like Celebrex, ibuprofen, naproxen, etc. In aching athletes, these nonsteroidal anti-inflammatory drugs (NSAIDs) mask the pain of micro-trauma to tendons and joints but offer no protective effect (see diagram, right). While handy occasionally — NSAIDs are OK for the three days post-injury — it's not recommended you use these on a regular basis.

Why? Well, studies show that NSAIDs might inhibit bone and cartilage healing and, with long-term use, contribute to cartilage breakdown. Experimental evidence, however, has shown that glucosamine and chondroitin can counteract some of the negative effects of NSAIDs, though not other potential adverse effects such as drug interactions, high blood pressure, kidney damage, and bleeding ulcers. —TR

THE MASKING EFFECT OF NSAIDs IS SIGNIFICANT





“5.15” ACLS

Injury-proof your climber knees

BY THOMAS ROSENBERG, MD, ORTHOPEDIC SURGEON; AND STACY MCCOOEY, MSPT, PHYSICAL THERAPIST
ILLUSTRATION BY KEITH SVIHOVEC

A COMMON CLIMBER INJURY is the tearing of the anterior cruciate ligament (ACL) and/or meniscus. One of the knee’s four major ligaments, the ACL is a connective-tissue cord about 8 or 9 mm at its narrowest; it connects the distal femur to the tibia’s top. The menisci are C-shaped, gasket-like pads at the perimeter of the knee’s two weight-bearing compartments — medial (inside) and lateral (outside); they absorb shock, lubricate/nourish, and expand load distribution.

Climbers stress the knees, especially when heel hooking, kneebaring, and highstepping, or taking bouldering falls — in fact, a fall from five feet can tear an ACL just as easily as one from twenty, especially onto an uneven surface. Like any other connective-tissue structure, the ACL typically benefits from healthy, repetitive use (read on), while a de-conditioned ACL is akin to leaving your rope in the sun for weeks. In fact, primate surgery has revealed that casting a limb for four weeks results in serious ACL weakness, from which it takes a year to recover!

So while surgeons all too often focus on reconstruction, it’s possible to prevent tears with proper nutrition, conditioning, and strength building. Here are some pointers before we move into specific exercises...

STAY ACTIVE. While biking won't strengthen the ACL much, running on flat and slightly declining grades can. Also helpful is using a leg-press machine into near-terminal extension, as well as cross-country skiing, with its forward propulsion from the nearly fully extended knee.

AVOID “PRO-INFLAMMATORY” NUTRITION. Junk food, soda, hamburgers, etc. can tip your biochemical balance toward chronic inflammation, which damages cells and connective tissue. By shirking on fruits, vegetables, fish, lean meats, and fresh, unprocessed foods, you deprive yourself of key tendon and ligament nutrients.

PROTECT YOUR MENISCUS. Prevention of meniscal injuries requires first and foremost an intact ACL. Sports nutrition, including cartilage nutrients, can stimulate meniscal strength over time. In Asian and African societies, where squatting is a daily habit, the meniscus' posterior part is often engaged healthily. In Western societies, since we rarely flex this zone — the most frequently torn — it can get “soggy” (the so-called grade 2 MRI signal), which often evolves to significant meniscal tearing. Thus, it's important to fully mobilize your knee, including maximum flexion. For climbers, this means warming up, cross-training, cardio, strength training, maintaining a normal body-mass index, and full joint mobilization (including full-squatting activities like yoga).

LEARN TO LAND. When falling while bouldering, our instinct is to straighten our legs — but this extension makes the knees vulnerable. To absorb the shock, fall like a cat, with knees bent.

WARM-UPS FOR ROCK-JOCK ACLS

Since the ACL is a ligament (non-contractile tissue connecting bone to bone), it's difficult to warm it up as you would a muscle. However, the muscles that cross your hip and knee actually protect the ligament, so prepping these promotes ACL health. Try the following before climbing:

- 10 lunges on each leg, to open your hips and warm up your legs
- 10 floor touches (exercise No. 2 on page 7)
- Balance on one leg for 20 seconds — close your eyes
- Two 30-second quad stretches (hold your foot in your hand and bend your knee, with your heel touching your behind)

THREE EXERCISES THAT PROTECT YOUR KNEES

Note: Ramp up gradually — building connective tissue can take two years.

1. Hamstring Curl on a Physioball

HOW: Lie on your back with heels on the ball, knees straight. Tighten your abdominals and bridge your hips up, and then bend your knees to roll the ball toward you. Try two sets of eight reps with good form; work up to three sets of 15. Advanced challenge: single leg atop the ball!

WHY: The ACL prevents forward movement of the tibia. Your hamstrings assist in preventing that motion (particularly in this exercise).

2. Floor Touches

HOW: Stand on one foot with your knee slightly bent. With the opposite hand, touch the ground outside your standing foot. Keep your back straight. Repeat on the other leg. If tight hamstrings restrict your reach (and your lower back rounds), bend your knee more and reach only halfway. Begin with two sets of 12 slow, controlled reps, and work up to holding a three-to-ten-pound weight in the hand reaching the floor. Advanced options: reach to the front, then inside your standing foot.

WHY: Multi-joint proprioception and eccentric hip control. This exercise enhances the body's positional awareness, to improve protective reflexes, and strengthens the hip muscles that maintain knee alignment.

3. Sidestepping with a Theraband

HOW: Place both feet atop a Theraband and hold opposite handles with your arms crossed. Slightly bend your hips and knees, and then step left with your left foot, stretching the band. Lift (don't drag) the right foot, and then step it left to narrow your stance slightly, keeping your feet greater than hip width apart — use core muscles to steady your shoulders, with your feet forward. Begin with 15 to 30 steps in each direction (depending on the band's tension) and work up to 100.

WHY: ACL injury can also occur when the knee is forced into a valgus (knock-kneed) position; your hip abductors and external rotators can minimize this vulnerability. Traditional exercises and day-to-day activities don't strengthen these muscles, making the ACL injury-prone in certain climbing positions. ➤

TARGETED OPPOSITION

Strengthening and stretching exercises to beat upper-body tendonitis

BY STACY MCCOOEY, MSPT, PHYSICAL THERAPIST • ILLUSTRATIONS BY KEITH SVIHOVEC

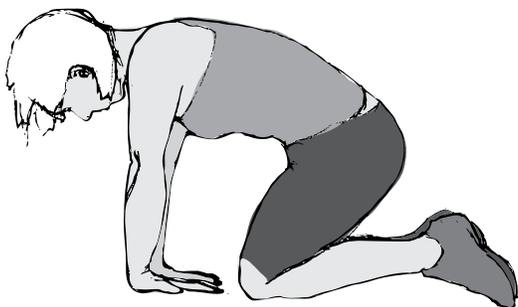
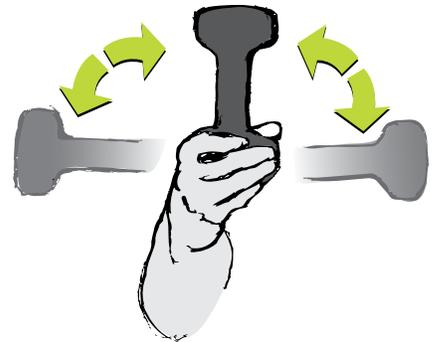
TENDONITIS — LIKE IT OR NOT, if you're an avid climber, at some point you'll feel that deep, dull ache in your elbows or shoulders, a sign of inflamed tendons. The constant tugging is what does us in — using loads of *pulling* muscles (lats, shoulders, biceps, forearms) while neglecting the pushing muscles (pectorals, anterior deltoids, triceps), thus placing unidirectional strain on your tendons. If you mostly climb steep stuff, you're especially susceptible — think of the hunchbacked, grapefruit-shouldered cave monsters at Rifle and the Red.

As with all things in life, the key is balance. With these few simple stretches and weight routines, done two to three times a week on rest (non-climbing) days, you'll balance the pushing and pulling muscles and increase mobility, thus enhancing your abilities and preventing injury.

Forearm Pronation/Supination:

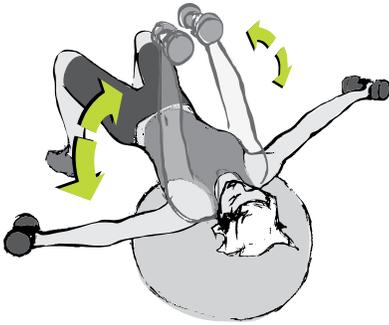
Overusing the forearm's finger flexors and pronators often causes elbow pain (epicondylitis). The following exercise builds strength, as well as range of motion (let the weight stretch your forearms).

Hold one end of a three-to-eight-pound dumbbell vertically, with your elbow bent at 90 degrees and your upper arm by your side. Let your forearm rotate clockwise so that the weight drops outward and your palm faces the ceiling; hold for five seconds. Now reverse the rotation so your palm faces the ground; hold for five seconds. Complete two sets of 15 reps, cultivating a comfortable fatigue by the final few repetitions.



Finger/Wrist Flexor Stretch:

Place your palms flat on the ground, a tabletop, or even against a wall, fingers facing toward you. Lean back to flex your wrists until you feel a comfortable stretch. Hold 30 seconds or longer, repeating two to three times.

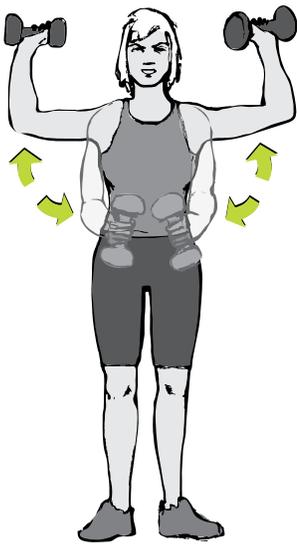


Pec Fly, with Shoulders on Physioball:

This exercise strengthens pectoral (chest) muscles, as well as the core and stabilizing muscles in your shoulder. Assume a bridge position, head and shoulders relaxed on the ball. Begin with a mid-weight dumbbell (10 to 20 pounds), arms fairly straight, palms facing each other. Slowly drop your hands ground-ward until they stop at or below shoulder height. Smoothly return them to their starting position; aim for three sets of 12 reps.

Latissimus Dorsi Stretch:

Lats, the prime climbing muscles, can get tight, creating hunched shoulders and back pain. To loosen them, stand in a doorway and hook the fingers of your right hand on the frame; now step back two to three feet with your right foot and bend forward. Look under your right armpit until you feel a comfortable stretch. Hold 30 seconds or longer, doing two to three stretches on each side.



Reverse Butterfly:

To support the often-overtaxed shoulder joint, you need strong rotator-cuff muscles. This exercise will get you there, while also promoting good posture — crucial to shoulder health, since it reduces subacromial impingement, of the tendons under your AC joint. The prime muscles worked here are those in the backs of your shoulders: the rear deltoids, external rotators, and rhomboids.

Begin with light dumbbells (five to ten pounds), hands together in front of your hips, elbows slightly bent. Draw your “butterfly wing” by bringing your hands up and diagonally outward, to finish with your elbows at shoulder height, hands facing forward. Now set your shoulders back and down, and bring your hands back to rotate your arms externally and complete the motion. Finally, with good control, reverse the motion by bringing your hands forward, down, and in — back to their starting position. Keep your torso stable and your shoulders pulled away from your ears at all times; aim for three sets of 15 reps. —

Thomas Rosenberg, MD, is director of the ProHealth Lab, where he has helped develop Nutriex supplements (nutriex.com) to improve athletes' healing and recovery. An orthopedist and knee specialist, Dr. Rosenberg has been a team physician to the U.S. ski, speedskating, and snowboarding teams.

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