

Fix Your Achilles Pain & Keep Training.

An evidence-based guide to the Berlin Protocol

(explained for surfers, trail runners, hikers, climbers, mountain bikers, and spearos)

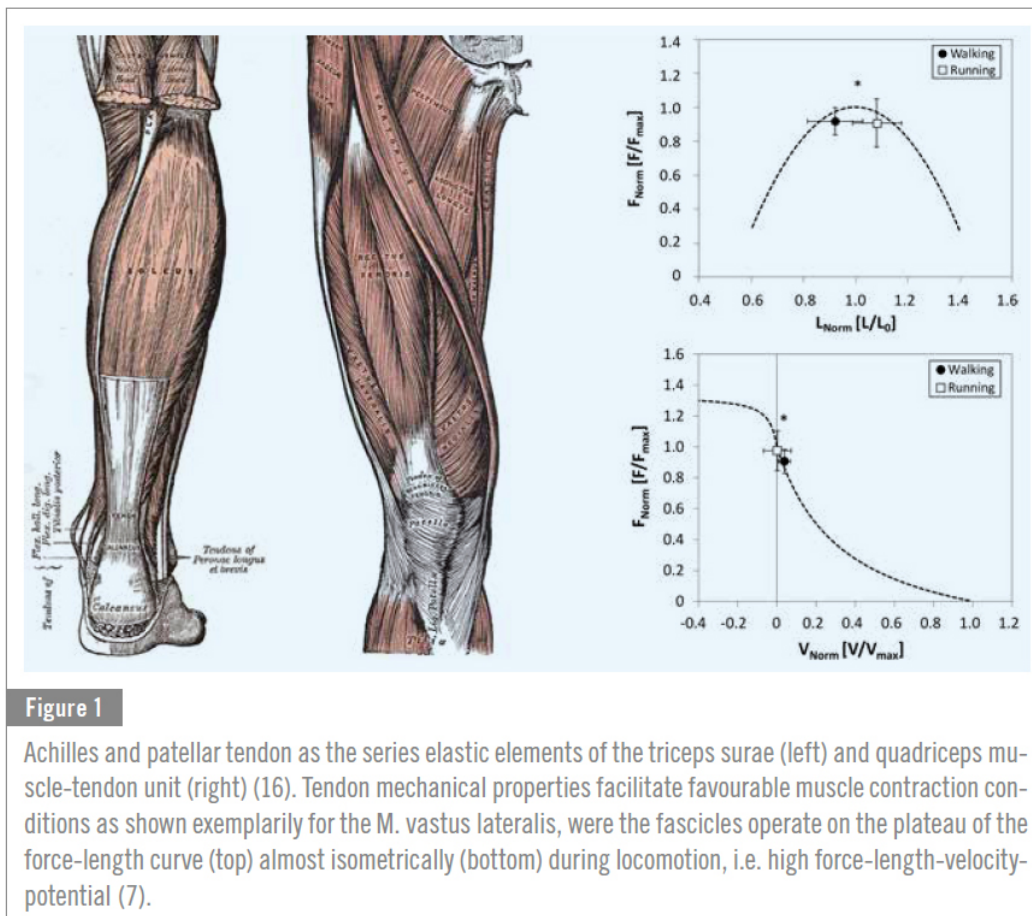


Figure 1

Achilles and patellar tendon as the series elastic elements of the triceps surae (left) and quadriceps muscle-tendon unit (right) (16). Tendon mechanical properties facilitate favourable muscle contraction conditions as shown exemplarily for the M. vastus lateralis, where the fascicles operate on the plateau of the force-length curve (top) almost isometrically (bottom) during locomotion, i.e. high force-length-velocity-potential (7).

Bohm S, Mersmann F, Arampatzis A. Functional adaptation of connective tissue by training. Dtsch Z Sportmed. 2019; 70: 105-110. doi:10.5960/dzsm.2019.366

Frustrated with heel pain?

If you've been dealing with heel pain for more than a few weeks, you've probably tried the usual advice: rest, ice, stretch your calves, maybe some heel drops off your steps... And maybe that helped a little, but your symptoms came back the moment you returned to doing the sport you love. That cycle is frustrating, there's a reason that a relatively passive approach doesn't work. If your pain is coming from your achilles tendon, you need to understand that tendons don't respond well to rest...they actually get weaker (this has been shown in countless studies where peoples limbs have been immobilized for a long duration). Tendons need *load* to remodel (get stronger), and they need the right kind of load at the right time.

I've been there too. In fact in 2024, I suffered an Achilles rupture then developed Achilles tendinopathy on my OTHER leg during my surgical recovery; both of which took some serious rehab work as you might imagine.

The Berlin Protocol is the closest thing we currently have to a systematic answer for that problem, and this guide walks you through exactly how it works. Read the whole thing. Then, if you want help figuring out where you are in the process and how to connect it back to your sport, please reach out to set up a free call with me (www.explore-pt.com).

SECTION 1

What's Actually Going On In Your Tendon: *Achilles tendinopathy is not tendonitis.*

That distinction matters more than it sounds. Tendonitis implies inflammation, which is why so many people reach for anti-inflammatories and rest. But research over the past two decades has shown that chronic Achilles pain often involves a different process: the tendon's structural proteins begin to break down and are replaced by disorganized tissue that handles load (mechanical stress) poorly. There is minimal ongoing inflammation in most cases. The tendon (depending on the stage it's in) is usually not inflamed. It's failing to keep up with the demands being placed on it. This matters because it changes the treatment approach.

Mid-portion vs insertional: two different problems

The Achilles tendon attaches at the back of the heel bone (the calcaneus). Pain that sits about 2 to 6 cm above that attachment point is called **mid-portion tendinopathy**. Pain right at the heel

bone is **insertional**. They look similar from the outside but often respond differently to treatment, and that difference will matter when it comes to exercise selection. Mid-portion often responds well to the full Berlin Protocol as written. Insertional tendinopathy usually requires modifications early on, specifically avoiding positions that compress the tendon against the bone (like deep heel drops). If you are not sure which one you have, that is worth figuring out before you start loading it.

SECTION 2

Why Rest Does Not Fix Tendons

Tendons are made primarily of collagen, arranged in long fibers that handle tensile load. When that structure begins to break down (from overload, from poor metabolic health, from abnormal gait mechanics) the tendon **needs** mechanical stimulation to reorganize that tissue. Without load, those collagen fibers can't remodel correctly. Imagine a fraying rope that gets stronger if loaded properly but weaker if not. You may get a reduction in symptoms during rest, but the tendon has not actually improved its capacity to handle the demands of surfing, running, or climbing. So the pain comes back. This is the core reason passive approaches fail. Ice reduces discomfort temporarily. Anti-inflammatories may help in very early acute presentations but have no meaningful effect on the structural remodeling that needs to happen in chronic cases. Stretching alone does not create the kind of tensile load tendons need to adapt. The old standard for Achilles rehab was the "Alfredson eccentric heel drop protocol": three sets of fifteen, twice a day, eccentric only loading. It worked reasonably well for a subset of patients. But the research that followed consistently showed that the key variable was not the eccentric component specifically. *It was the load*. There's some merit to this protocol for mid-portion issues early-on, but the approach needs to progress beyond that intensity, ultimately. The tendon responds to progressive mechanical stress. Eccentric training happened to be one way to deliver that. It is not the only way, and it turns out it's not the best solution.

SECTION 3

The Berlin Method: How It Works

The Berlin Method is a structured, progressive loading program developed from a body of research showing that heavy, slow resistance training produces **superior tendon remodeling** compared to *eccentric-only* or *rest-based* approaches. It was developed by researchers at the Humboldt University of Berlin, notably Adamantios Arampatzis, Sebastian Bohm, and Falk Mersmann. The protocol is typically recommended for 12 weeks consistently. The through-line is

progressive overload: you increase the demand on the tendon systematically, guided by how the tissue responds.

The pain monitoring rule

Before getting into the meat of it, this is the most important concept in the entire protocol. You are allowed to exercise with some pain. Not sharp, severe, or joint pain, but a 3 to 4 out of 10 on a standard pain scale during the exercise is acceptable. More importantly, that discomfort should settle back to your baseline within 24 hours. If you wake up the next morning with significantly more stiffness or pain than usual, you did too much and need to back off. If you feel the same or better, you are progressing appropriately.

(This guide is for educational purposes. It does not constitute medical advice and is not a substitute for professional assessment. You are responsible for any exercises you attempt and the consequences of these activities, good or bad. If you have pain or are unsure about your diagnosis or have had significant trauma to the area, see a clinician or consult with your doctor before starting any loading program.)

Equipment Needed

You'll be performing an isometric calf raise. This means you'll be pressing against an immovable object with one leg, through the ball of your foot. [Here's a video to demonstrate.](#) In order to perform correctly you'll need either a Smith Machine, a Safety Bar or a Straight Bar that you can set up in a squat rack.

Structuring the plan

Example Berlin Protocol	Exercise	Sets/Reps	Intensity	Rest
Monday	Single leg isometric calf raise	5 sets of 4 reps, 3 seconds on, 3 seconds off. Repeat on both legs.	90% of maximum effort (9/10 effort or 90% of your 1 rep max calf raise)	Rest 2 minutes between sets
Wednesday	Single leg isometric calf raise	5 sets of 4 reps, 3 seconds on, 3 seconds off. Repeat on both legs.	90% of maximum effort (9/10 effort or 90% of your 1 rep max calf raise)	Rest 2 minutes between sets
Friday	Single leg isometric calf raise	5 sets of 4 reps, 3 seconds on, 3 seconds off. Repeat on both legs.	90% of maximum effort (9/10 effort or 90% of your 1 rep max calf raise)	Rest 2 minutes between sets

In the research, 12 weeks of this protocol has been shown to produce significant improvements in clinical outcomes (pain) and tendon quality (stiffness) as well as calf strength. Considering it's only 20 reps per leg, this should take less than 15 minutes per session to complete.

See photo below for visual representation of the protocol.

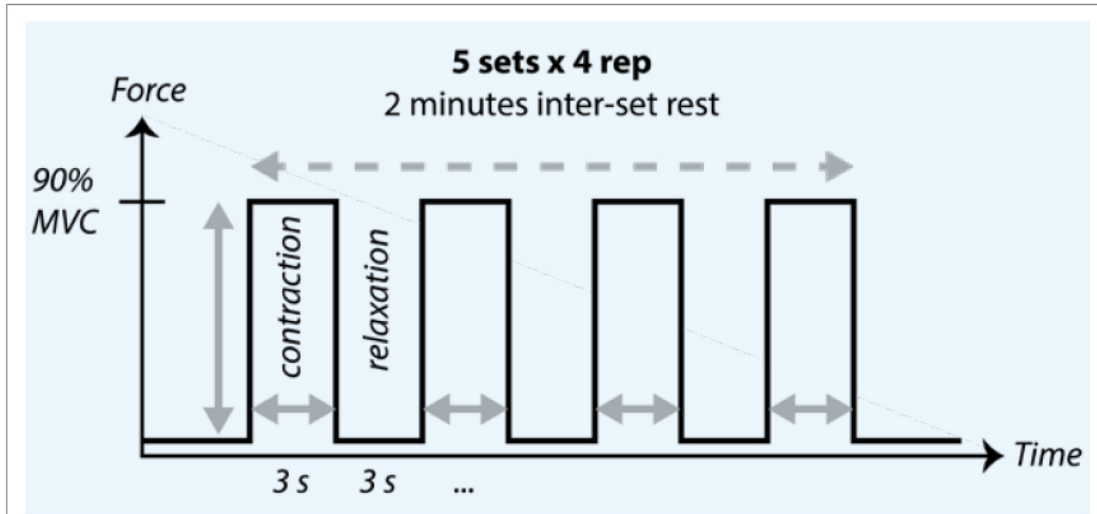


Figure 2

Evidence-based recommendations for an effective stimulus for tendon adaptation. High intensity loading to the tendon should be applied in five sets of four repetitions with a contraction and relaxation duration of 3 seconds each, and an inter-set rest of around 2 minutes. We suggest the training to be conducted three to four times a week for at least 12 weeks.

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Section 4

A Note on Your Sport

The Berlin Protocol gives you a solid tendon loading framework. What it does not do, is account for the specific demands of what you do outside. Surfers load their Achilles differently than trail runners. A surfer is constantly working through dramatic angles at their ankle, responding to an unstable surface, often with significant ankle dorsiflexion demands. A trail runner requires the tendon to function as a spring on variable terrain, particularly on descents where eccentric demands spike. A climber may be loading the Achilles in unusual positions through heel hooks or smearing on steep terrain. A mountain biker is dealing with vibration, sustained isometric holds,

and explosive out-of-saddle efforts. These differences can impact the rehab approach and they also matter in how you monitor your symptoms throughout the protocol. A trail runner who is continuing to run during rehabilitation should factor that load into their total tendon loading for the week. A surfer who is still getting in the water should be considerate of the intensity of their sessions. This is not a reason to stop your sport entirely during rehab. In most cases you should not, and in many cases you can maintain quite a lot of your activity if you are monitoring appropriately.

Sport	Key Consideration
Surfing	Dramatic ankle flexion can increase compressive load at the Achilles insertion, heavy pop-ups can strain the tendon.
Trail Running	Running results in forces 6-8x bodyweight on the Achilles. Downhill running can be higher due to gravity and uphill can be more compressive at the achilles insertion due to the angle of the ankles.
Climbing	Heel hooking and smearing can result in significant compression of the achilles insertion, be mindful of route selection with sensitive insertional tendinopathy.
Hiking	Pack weight and terrain choice (elevation especially) can influence tendon load. Be mindful of both; flat terrain may be better when rehabbing a sensitive tendon.
Mountain Biking	Out-of-saddle efforts, drops and technical terrain can create unpredictable loading. You may want to minimize high-output loading while rehabbing early on.
Spearfishing	Long duration finning can result in prolonged tendon loading. Be considerate of fin stiffness and dive duration. Softer fins will likely be less strain to the tendon.

Section 5

The Part That Usually Goes Wrong

Many people who try to self-direct this protocol run into the similar problems.

1. They aren't achieving a strong enough output with their calf raise; **90% is a lot of effort.**
2. They rush the phase transitions. Feeling better at week 4 *does not mean* the tendon has remodeled. Symptom reduction and structural improvement are not the same thing. Moving to higher level rehab like plyometric loading (jumping) before the tendon is ready is probably the most common reason people regress.
3. They do not account for **total load**. The protocol sets your exercise load, but your tendon is also absorbing everything else you do. If you are running 5 days a week and doing calf raises on top of that, the numbers need to be looked at together. Adding rehab on top of unreduced training volume often leads to overload.

4. They ignore the *24-hour rule*. Morning stiffness is the clearest signal the tendon gives you. Don't dismiss it. Make it a habit to assess how the tendon feels every morning when you get out of bed.

5. They stop too early. **Tendons take longer to remodel than muscles, ligaments, or even bones.** The research on HSR protocols typically shows meaningful structural improvement at 12 weeks and continued gains beyond that. Stopping at six weeks because symptoms have settled is leaving the job half done.

Ready to put this into practice?

The protocol works. But it's not necessarily the starting point for every case. It's important to know which phase to start in, whether your tendon presentation needs modifications, and how to keep training through it without making things worse requires an actual assessment. It should also be noted that, just because you have heel pain...doesn't mean it's tendinopathy. This is why it's important to consult with a trained healthcare provider. At Explore Physical Therapy, I work specifically with outdoor athletes. I understand what it takes to get you back on the water, on the trail, the wall, or the bike, and after recovering from my own achilles rupture, I know how to get your tendon ready for it.

You can book a **free 20-minute discovery call at www.explore-pt.com**

Mention this guide and I'll be happy to give you \$50 off your first-visit.

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