

Understanding Tendons and Tendinopathy

What They Are, Why They Hurt, and How to Help Them Heal

Tendons are the unsung workhorses of your lower limb — transmitting every muscle contraction into movement, storing elastic energy with each step, and bearing loads many times your body weight. When they become painful, recovery can feel slow and confusing. This guide explains what tendons are, why they hurt, and what the evidence says actually helps.

1 What Is a Tendon?

A tendon is a tough, rope-like band of connective tissue that links a muscle to a bone, transmitting every muscle contraction into movement at a joint. At the microscopic level, tendons are composed of tightly bundled Type I collagen fibres maintained by specialised cells called tenocytes, surrounded by a gel-like extracellular matrix that acts as a shock absorber.

Tendons do far more than simply connect muscle to bone: they transmit force, store and release elastic energy like a spring (the Achilles tendon alone reduces the energy cost of running by up to 35%), and protect muscle by absorbing shock that would otherwise transfer directly to muscle tissue.

2 What Is Tendinopathy? — and Why It Heals Slowly

Tendinopathy is the modern clinical term for tendon pain and dysfunction. The older term "tendinitis" is now considered outdated — research shows painful tendons contain no significant inflammatory cells; instead there is degeneration: disorganised collagen, abnormal cell changes, and failed repair.

Why the Name Change Matters Clinically

Because there is no significant inflammation, NSAIDs and corticosteroid injections offer limited benefit for chronic cases. Treatment focuses on rehabilitating the tendon through progressive load.

Stage	What's happening	Pain level
1 — Reactive	Tendon cells swell; collagen intact; fully reversible with load management	Moderate; improves with warm-up
2 — Dysrepair	Failed healing; collagen disorganised; abnormal new vessels; partially reversible	Moderate-high; variable
3 — Degenerative	Cell death; extensive matrix breakdown; structural changes largely irreversible but function can still improve	High; persistent

Figure 1: The Tendinopathy Continuum (Cook & Purdam, BJSM 2009)

NORMAL TENDON → INCREASING PATHOLOGY → DEGENERATION



Why tendons heal slowly

- Poor blood supply — tendons are hypovascular; limited circulation slows delivery of repair cells and nutrients.
- Slow collagen turnover — tenocytes are metabolically quiet; new collagen takes weeks to months to integrate, so damage accumulates faster than it is repaired under excessive load.
- Disorganised repair — new collagen laid down during healing is haphazardly arranged and mechanically weaker; load-guided remodelling is required to restore proper fibre alignment.

3 Common Sites and Causes

Tendon	Location	Typical symptom
Achilles	2–6 cm above heel; or at heel bone insertion	Morning stiffness; pain with initial steps; warm-up phenomenon
Patellar	Kneecap to shin bone (tibial tuberosity)	Pain at lower pole of kneecap; worse squatting, stairs, jumping

Posterior tibial	Behind inner ankle (medial malleolus)	Inner ankle pain; difficulty with single-leg heel raise
Peroneal	Behind outer ankle bone (lateral malleolus)	Outer ankle/foot pain; snapping behind ankle; worse on cambered surfaces

Cause	Example
Sudden load spike	Starting Couch to 5K; returning to sport after a break
Training errors	Increasing weekly mileage >10% per week; adding hills too quickly
Repetitive overuse	Prolonged standing or climbing without adequate recovery
Biomechanics & footwear	Excessive pronation (Achilles/tibialis posterior); sudden switch to minimalist shoes
Metabolic factors	Diabetes, high cholesterol, fluoroquinolone antibiotics impair tendon metabolism

4 Symptoms and What Helps

Symptom	What it means
Morning stiffness	Ground substance becomes viscous at rest; eases within 5–15 min of movement
Warm-up phenomenon	Pain worst at start of activity, eases mid-session, may return if intensity exceeds capacity
Load-dependent pain	Provoked by activity (running, squatting, stairs) and relieved by rest; indicates tendon irritability
Pain ≠ damage	Structural changes can exist without pain, and significant pain can occur with modest changes; pain also reflects nervous system sensitivity

Approach	What it involves	Evidence
Isometric exercise	Sustained muscle contraction without joint movement (e.g. wall sit, static calf hold)	Immediate pain reduction (Rio et al. 2015); best for reactive/early stages
Heavy slow resistance (HSR)	Loaded exercises (calf raises, heel drops, squats) performed slowly through full range, progressing weight over weeks	Equivalent to eccentric-only; higher patient satisfaction; primary treatment modality (Beyer et al. 2015)
Graduated loading protocols	Alfredson eccentric (heel drops 3×15 twice daily, 12 wks) or Silbernagel phased 6-month protocol allowing sport continuation with pain ≤5/10	~60% return to sport; pain monitoring model reduces setbacks

Recovery typically takes 3–6 months for reactive/dysrepair stages and up to 12+ months for degenerative tendinopathy; functional improvement in pain and capacity usually begins within 6–12 weeks of a structured loading programme.

5 Key Takeaways

KEY TAKEAWAY 1

Your tendon needs load — not rest. Complete rest weakens the tendon further. Progressive, appropriately dosed loading is the primary treatment for tendinopathy — it stimulates collagen production, improves tendon organisation, and builds capacity.

KEY TAKEAWAY 2

Pain is a guide, not a stop sign. Some discomfort during rehabilitation is acceptable. The key question is not "does it hurt?" but "is pain worse the next morning?" If pain returns to baseline the following day, you are within a safe loading range.

KEY TAKEAWAY 3

Tendon recovery takes months, not weeks — and that is normal. Tendons have a slow metabolism and limited blood supply. Most patients notice improvement within 6–12 weeks, but ongoing conditioning is essential to maintain gains and prevent relapse.