

## injury clinic

# the achilles tendon

ONE OF THE BIGGEST TENDONS IN THE HUMAN BODY, THE ACHILLES ATTACHES THE GASTROC AND SOLEUS (CALF MUSCLE) TO THE CALCANEUS (HEEL BONE). NISHA MISTRY AND DR SOLOMON ABRAHAMS DISCUSS THE COMMON INJURIES



REPORT: NISHA MISTRY & DR SOLOMON ABRAHAMS

**T**he Achilles tendon is a unique tendon; it is able to sustain loads up to 17 times bodyweight, with minimal oxygen supply compared to a muscle and a long remodelling rate of greater than 100 days.<sup>1</sup> It is composed of 70-80% of two types of collagen. Mainly collagen type I, this has high tensile strength but is poor at sustaining shear forces, and collagen type III which lacks tensile strength. Despite its well-structured design, and its design for strength and acceleration and speed, the Achilles tendon is common to injury.

There are two main types of injury to the Achilles tendon: extrinsic or intrinsic damage. An example of extrinsic damage would be an Achilles tendon partial or full rupture. An Achilles tendon rupture occurs typically after the age of 30. A tendon rupture may occur because of a weak soleus muscle or more commonly in athletes who play socially once a week. Some patients report pain several days/weeks beforehand. The mechanism of injury usually involves eccentric loading (fast ballistic action and sudden slowing). This is when the soleus and gastroc muscle (the main calf muscle) is on maximal stretch.<sup>2</sup>

An example of intrinsic damage would be an Achilles tendinopathy. An Achilles tendinopathy represents a wide range of overuse injuries – the most common are tendonosis and tendonitis. An Achilles tendonitis is inflammation around the tendon and an Achilles tendonosis is degeneration of the tendon. These types of injuries often result from training errors in adults who are in their 30s and 40s. Most commonly it is affected by activities that involve repeated impact loading of the lower limbs, especially in running and jumping activities.

The healing process for an Achilles tendon is usually spread over three phases: inflammation, proliferation, remodelling. The initial inflammatory phase is about one week and begins immediately at the time of injury with immediate bleeding. Next is the proliferation phase, which can last up to one month. Initially, collagen type III is created, which is when the Achilles tendon is most prone to injury due to its weak tensile strength. At around the 12th to 14th day, the body starts to make type I collagen and starts to get stronger. At week three the remodelling phase begins. This phase is the longest and the time taken to achieve near-normal levels of

## A basic eccentric exercise programme would be:

- Bilateral heel raises with a straight knee
- Single-leg heel raises with a straight knee
- Single-leg heel raises with a bent knee
- Vary speed or add a load to progress exercise

tendon strength ranges from four to 12 months. The injury site will develop more collagen type I fibres, which will restore strength. A portion of the Achilles tendon will contain type III collagen fibres, therefore will always lack some tensile strength, and the final tensile strength can be decreased by as much as 30%.<sup>3</sup>

The management of the Achilles tendon can be frustrating because the response of the tissue to treatment is slow. The healing process can be improved by physiotherapy, electrotherapy modalities and rehabilitation exercise. Knowledge of the healing response is important within rehabilitation as the first few days following injury, initially the injured tissue contains weak type III collagen and therefore has a significant decrease in tendon tensile strength (see above). Therefore eccentric exercise during this phase should be minimal as excessive stress of eccentric exercise may disrupt the healing process rather than encourage it.<sup>4</sup> Eccentric training should be started at 2-3 weeks during the

proliferation stage. Training should be continued throughout the remodelling phase, but healing of an Achilles tendon can take as much as 10-12 months to reach near enough normal function.<sup>5</sup> However, regardless of the hard work put in during the remodelling phase, the injured tissue of the Achilles tendon will never match those of an intact tendon.

A method of preventing an Achilles tendon injury would be to introduce a heel raise; this would reduce the rate and range of eccentric load on the Achilles tendon. Additionally, a medial wedge to control the amount of pronation would reduce the shearing forces within the tendon, which is important as collagen type I fibres are not able to sustain shearing forces and hence lead to injury.<sup>6</sup> Finally, changing the training programme may prevent injury, as excessive training may be putting too much strain on the Achilles tendon. *fp*

### references

For a list of resources and references visit [www.fitpro.com/fitpro/references](http://www.fitpro.com/fitpro/references)



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