

# Tendonitis and Tendinopathy

## What Are They and How Do They Evolve

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### KEYWORDS

- Tendinopathy • Degenerative tendinopathy • Tendonitis • Achilles • Posterior tibialis • Peroneal tendons

### KEY POINTS

- The development of tendinitis and tendinopathy is often multifactorial and the result of both intrinsic and extrinsic factors.
- Intrinsic factors include anatomic factors, age-related factors, and systemic factors, whereas extrinsic factors include mechanical overload and improper form and equipment.
- Although tendinitis and tendinopathy are often incorrectly used interchangeably, they are two distinct pathologies.
- Due to their chronicity and high prevalence in tendons about the ankle, including the Achilles tendon, the posterior tibialis tendon, and the peroneal tendons, tendinitis and tendinopathies cause significant morbidity and are important pathologies for physicians to recognize.

### INTRODUCTION

Tendons are dense, highly structured connective tissues that produce joint motion by transferring forces from muscle to bone. They are composed primarily of type I collagen arranged in parallel fibers, with minor constituents, such as proteoglycans, glycosaminoglycans, and other collagens constituting the remaining 20% to 30% of dry weight.<sup>1</sup> Although the structure and inherent characteristics of tendons give them great tensile strength and allow them to transfer force from muscle to bone, many of these same characteristics also result in poor healing potential. As such, chronic tendon problems, including tendonitis and tendinopathies, account for a significant portion of visits to primary care and sports medicine doctors. Epidemiologic studies report that work-related musculoskeletal disorders encompass more than one-third of all work days missed,

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and the repetitive trauma disorders, such as tendinopathies, encompass more than 65% of these work-related musculoskeletal disorders.<sup>2</sup> Although the prevalence and incidence are variable, chronic tendon disorders comprise a significant portion of all sport-related injuries. Studies report that chronic tendon problems represent 30% of all running-related injuries and have a prevalence of almost 40% in tennis players.<sup>3,4</sup> These injuries are important to understand not only due to their prevalence in society but also for their chronicity in both affliction and treatment.

At their root, many chronic tendinopathies are a result of excessive mechanical load across a tendon. That is to say that the tendon was not preconditioned for the load that it is exposed to. For this reason, it is not necessarily the absolute force, duration, or frequency of load a tendon is exposed to across a period of time, but instead that these factors were in excess of the tendon's usual conditioning. The high intensity or frequency the tendon is exposed to is believed to injure the structure of the tendon. If the regenerative capabilities are not exceeded, then spontaneous healing generally occurs; however, if these capabilities are exceeded, clinical symptoms of tendinopathy occur. Inflammation is a common result, and for this reason, tendonitis is frequently the diagnosis under these circumstances. Much basic science and clinical literature, however, does not fully agree on this as the uniform reason for tendinopathies and tendonitis, and these terms are often used incorrectly.

Tendinitis is inflammation of a tendon proper, whereas tenosynovitis is inflammation of the tendon and its sheath. Tendinosis is degeneration of the collagen bundles forming the tendon tissue without significant inflammation<sup>5</sup> (Table 1). In distinguishing between these entities, it is important to understand the different types of tendons. Tendons that have altered directional courses or are bound by tunnels or retinacula often have synovial sheaths, which act to decrease the frictional forces encountered during tendon motion.<sup>5</sup> Tendons that are linear often do not have sheaths. With regard to commonly injured tendons of the foot and ankle, the posterior tibial tendon and peroneal tendons are sheathed tendons whereas the Achilles tendon is not. Instead, the Achilles tendon is encased with a thin, vascular layer known as the paratenon. Deep to this is a layer rich with mucopolysaccharides that allows significant freedom of movement of the Achilles.<sup>6</sup>

## ETIOLOGY

In most cases of chronic tendon injuries, there is often a combination of intrinsic and extrinsic factors leading to injury. In many cases, a patient has an intrinsic predisposition that is subsequently exposed to an extrinsic factor, resulting in a chronic tendon injury. It has been postulated that tendinopathy in younger populations often develops in the setting of systemic inflammatory disease or secondary to trauma or intense athletics, whereas in older populations it is often the result of chronic microtrauma from overuse in the setting of age-related degeneration.<sup>5</sup>

### *Extrinsic Factors*

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Mechanical overload is generally considered to be one of primary causes of chronic tendinopathy. It can be further broken down into subcategories, such as increased duration, frequency, and intensity as well as errors in technique. In general, tendons respond more favorably to cyclic loading rather than large magnitudes of load.<sup>7</sup> A study by Simonsen and colleagues<sup>8</sup> showed that the Achilles tendon of rats did not strengthen with an exercise regime of high force and few cycles but that the tendons did increase in strength with endurance swimming training. Increases in tendon strength and stiffness have not been found due to hypertrophy or increases in collagen concentration, as might be suspected.

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