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# Effects of Autologous Tenocyte Injection for Overuse and Degenerative Tendinopathies: A Systematic Review

**Topic:** Specific Target Groups (Children, Women, Elderly, Athletes, Musicians, Refugees, Ethnic Groups, Workers, and Others)

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## BACKGROUND

The term tendinopathy commonly describes a series of alterations in the tendon, resulting in reduced functionality and pain. Tendons play a essential role in contributing strength, storing force, and allowing daily activities. During sports, where the load significantly increases, mechanical forces on the tendon also rise, demanding greater effort from the tendon. Patients with tendinopathy commonly experience pain and morning stiffness. The onset of tendinopathy represents a vulnerable moment for individuals. Since symptoms may temporarily improve after warming up, individuals often persist with sports, work, or activities. Tendinopathies can be treated using various methods, both active and passive. Among the active approaches, tendon load programs are effective as conservative treatment , including eccentric training, which induces structural adaptation in muscle-tendon units, helps protect tendons from stress and prevent re-injury, gradually increasing the load on the tendon enhance its resistance, and isometric exercises reduce pain. Moreover, instrumental physical therapy, e.g., laser therapy, extra-corporeal shock-wave therapy (ESWT), or injection therapy are usually employed. Injection therapy has gained ever more importance in the last years, and can involve various substances, including hyaluronic acid, platelet-rich plasma (PRP), corticosteroids, and elevated-volume injections. In this context, autologous tenocyte injection is a two-stage procedure. In the first stage, a small piece of a healthy tendon is collected under local anesthesia, with or without ultrasound guidance. The tenocytes are then isolated and cultured for 4-5 weeks. In the second phase, the autologous tenocytes obtained from *in vitro* culture are implanted into the damaged tendon area using ultrasound-guided injections. The objective of this systematic review was to investigate the current state of the art and determine the effectiveness of autologous tenocyte injection in improving pain, muscle strength, function, and magnetic resonance imaging (MRI) lesion appearance in patients with overuse and degenerative tendinopathies.

## METHODS

Two authors conducted a comprehensive search across PubMed Medline, Web of Science, Scopus, Cochrane Library and Google Scholar (PROSPERO: CRD42024565211). The search strategy incorporated the following keywords such as 'tendinopathy,' 'autologous tenocyte injection,' and 'treatment,' along with their synonyms. Depending on the specific database, they employed Boolean operators ('AND'/'OR') to combine these terms, following the PICOs tool from the Cochrane Collaboration. Additionally, a third expert author meticulously reviewed the bibliographic search results and resolved any uncertainties. From 174 articles, we finally included five articles.

## RESULTS

All studies included in the review reported clinically relevant effects of autologous tenocyte injection (ATI) in patients with chronic tendinopathy. Specifically, patients experienced a significant reduction in pain, measured using standardized scales, often within a few weeks after treatment, with benefits that tended to stabilize over the long term. This pain relief was frequently accompanied by an improvement in function and quality of life, allowing patients to gradually resume normal daily and sporting activities. From an imaging perspective, MRI showed positive structural changes in the treated tendon: a reduction in T2 signal hyperintensity, indicating decreased inflammation and tissue regeneration, with effects visible as early as four months and consolidated within one year. Another notable finding across the studies was the safety of the treatment: no serious adverse effects were reported,

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confirming that ATI is a well-tolerated procedure. Overall, the results suggest that ATI not only alleviates painful symptoms but also contributes to improving tendon structural quality, indicating a real regenerative potential beyond mere symptomatic relief.

## CONCLUSION

ATI might represent a safe and valuable option in the management of chronic tendinopathies as a second line treatment in case of resistant tendinopathies, with a minimal risk of side effects. The main effect obtained was the pain relief and, consequently, the improvement of patients' quality of life. The clinical improvement is also evident at MRI, in which is possible to see a progressive reduction with a general disappearance of the T2 signal hyperintensity between four months and one year.

**Statement of Disclosures**

None