

# Clinical Sheet

## EFFICACY OF HYDROLYZED COLLAGEN INJECTIONS COMPARED TO PRP AND HYALURONIC ACID IN DIFFERENT TENDINOPATHIES

Hydrolyzed collagen is effective in reducing pain and promoting functional recovery in various tendinopathies.



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Tendons are hierarchically structures made up of type I collagen fibers for the 85% of the dry weight<sup>1</sup>. To date, > 30 million people worldwide are afflicted with tendinopathies. In the sports field, it has been found that 50% of the issues encountered by athletes are tendon-related<sup>2</sup>. Among the most affected anatomical sites, Achilles' tendon, patellar tendon, medial and lateral elbow epicondyles and rotator cuff tendons are the most common<sup>3</sup>. Tendinopathies can be due to overloading (quite common in sports or heavy works) or to a progressive degeneration triggered by microtraumas<sup>4</sup>. Tendinopathies result in the disorganization of the collagen fibers leading to pain and functional impairment. A plethora of infiltrative treatments aiming to reduce the patient discomfort such as corticosteroids, hyaluronic acid (HA) with different molecular weights and platelet-rich plasma (PRP) have been developed over the years. However, their efficacy is limited and especially for corticosteroids, important side effects, such as tendon rupture, may occur<sup>5</sup>. Recently, a new infiltrative device based on hydrolyzed collagen has been introduced in the market for treatment of painful symptoms and loss of functionality of joints, muscles, tendons and ligaments. The present study aimed to evaluate the efficacy and safety of CHondroGrid in patients affected by multiple tendinopathies (Patellar tendinopathy, Achilles' tendinopathy and supraspinatus tendinopathy) compared with HA and PRP.

1. Thankam., et al., <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6291732/> (2018).
2. Maffulli, N., et al., [https://doi.org/10.1016/s0278-5919\(03\)00004-8](https://doi.org/10.1016/s0278-5919(03)00004-8) (2003).
3. Hopkins, C., et al. <https://dx.doi.org/10.1016/j.ajsm.2016.01.002> (2016).
4. Sharma, P., et al. <https://pubmed.ncbi.nlm.nih.gov/16849830/> (2006).
5. Nichols, A. et al. <https://pubmed.ncbi.nlm.nih.gov/16162982/> (2005).

### Materials

CHondroGrid (Bioteck) is a medical device made of freeze-dried low molecular-weight hydrolyzed collagen (peptides of molecular weight < 3.3 kDa).

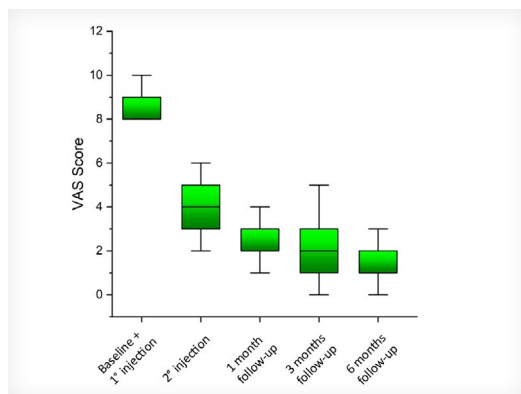
CHondroGrid is indicated for the treatment of painful symptoms and loss of functionality of the joints, muscles, tendons and ligaments, caused either by degenerative conditions or due to trauma or excess load. Before use, the device should be dissolved in 2 ml of water for injections. The protocol for the

peri-articular treatment consists of two injections 15 days apart. The mechanism of action is based on the ability of hydrolyzed collagen to reinforce the extracellular matrix of the damaged tissue once entering in contact with it following the injection.

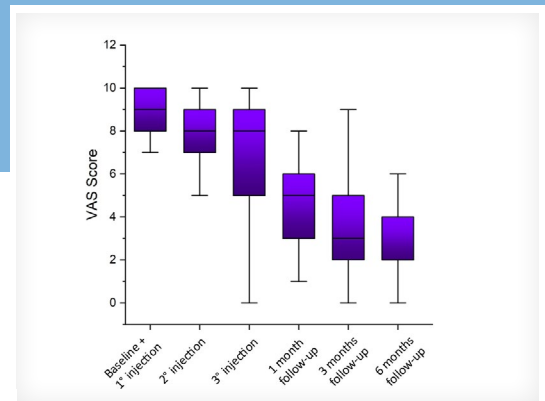
CHondroGrid, in fact, is able to perform a mechanical action of direct reinforcement of the collagenous structures, improving mobility and reducing the painful symptoms.

TREATMENT	SITE AFFECTED	AGE OF PATIENTS (YEARS)
CHONDROGRID	Patellar tendon=36% Achilles tendon=40% Supraspinatus tendon=24%	31,7 ± 9,7
HA	Patellar tendon=28% Achilles tendon=40% Supraspinatus tendon=28% Extens Pulgar=4%	40 ± 12,5
PRP	Patellar tendon=16% Achilles tendon=44% Supraspinatus tendon=40%	33 ± 7,2

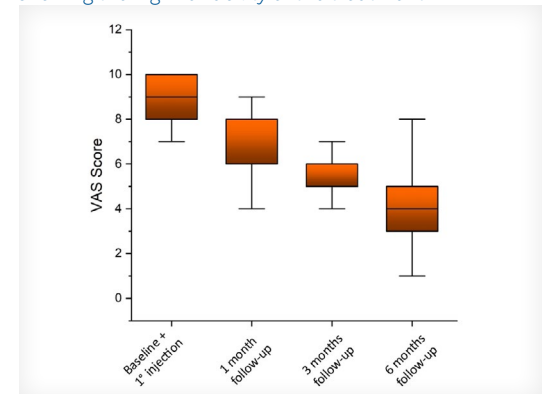
**Fig. 1** – Demography of the patients involved in the study divided by treatment.



**Fig. 3** – Box plot showing the score of CHondroGrid treatment. It is noteworthy the dramatic improvement already after the first injection. The pain decreased of about 76 % from the baseline at the last follow-up.



**Fig. 2** – Box plot showing the VAS score of PRP treatment. At the last follow-up the pain decreased of about 69 % from the baseline. Note the range of bars, showing the high variability of the treatment.



**Fig. 4** – Box plot showing the VAS score of HA treatment. At the last follow-up the pain decreased of about 50 % from the baseline.

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## Results

This leaflet summarizes a clinical study comparing the efficacy of CHondroGrid with that of HA of medium-high molecular weight (600-1500 kDa), and PRP. For each treatment, 25 patients were enrolled. All patients were affected by one of the following disorders: patellar tendinopathy, Achilles' tendinopathy and supraspinatus tendinopathy.

The study excluded all data concerning patients with a complete lesion of the tendons, patients undergoing the use of corticosteroids in the last 3 months, patients that have an infection at the level of the interested tendon, as well as the data concerning patients with BMI  $\geq 30$ .

For each treatment, the VAS score for pain occurring during movement was measured after each injection and at 1, 3 and 6 months after the last injection. CHondroGrid was administered with 2 injections 15 days apart, HA was administered in one single injection, while PRP was administered in 3 injections (once a week for 3 weeks).

Data are represented as box plots<sup>6</sup>. The box plots

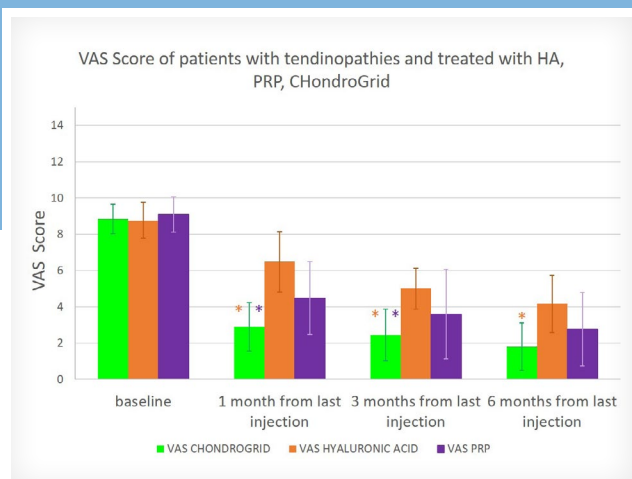
of VAS score at the last follow-up, show that CHondroGrid reduces the pain of 76 %, while HA reduces the pain of 50% and PRP of 69%. Regarding the specific improvements for pain, CHondroGrid reaches 50 % of the overall efficacy already after the very first injection. Noteworthy, CHondroGrid group shows a statistically significant ( $P < 0.05$ ) higher efficacy at every follow-up compared to HA and up to three months from last injection to PRP.

This study shows for the first time that the treatment with low molecular weight hydrolyzed collagen has better performance than HA and PRP in the treatment of tendinopathies.

Moreover, CHondroGrid shows a continuous and progressive improvement up to 6 months follow-up, while PRP started its efficacy after around 1.5 months from the first injection.

The study did not find any side effects associated with the use of the devices.

6. Krzywinski, M. et al., <https://doi.org/10.1038/nmeth.2813> (2014).



**Fig. 5** – Average VAS score  $\pm$  standard deviation for each treatment at every follow-up. The \* indicates that CHondroGrid pain reduction is statistically significant ( $P < 0.05$ ) versus HA at every follow-up, and \* at 1 month and 3 months versus PRP treatment.



**Fig. 6** – ChondroGrid® contains 4 mg of lyophilized low molecular weight ( $< 3.3$  kDa) collagen peptides in a double sterile package.