Clinical Sheet

COMPARATIVE EVALUATION OF HYDROLYZED COLLAGEN, PRP AND HYALURONIC ACID IN KNEE OSTEOARTHROSIS

Hydrolyzed collagen is more effective in reducing pain and promoting functional recovery than PRP and HA.

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Osteoarthrosis (OA) is an inflammatory disease that hits cartilage, a tissue made up essentially of type II collagen (> 60 %)[1]. To date, more than 340 million people worldwide are affected by osteoarthrosis of the major joints, with more than 70% suffering from osteoarthrosis of the knee[2], while another 20% suffer of osteoarthrosis of hip and shoulder. Although the etiology is not completely understood, it is clear that a major role is played by metalloproteases (MMP-1, MMP-3. MMP-13) responsible for the degradation of collagen and the other components of the extracellular matrix resulting in joint pain and loss of functionality. A plethora of infiltrative treatments aiming to reduce the OA 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 cartilage damage, may occur[3]. Recently, a new infiltrative device based on hydrolyzed collagen (CHondroGrid, Bioteck Spa) has been successfully introduced in the clinic[4]. In the present study the efficacy of CHondroGrid in patients affected by OA of the knee of Kellgren-Lawrence 1-4 have been compared with medium-high molecular weight HA and PRP.

1. Fox, S., et al., https://doi.org/10.1177/1941738109350438 (2009);
2. Cieza, A., et al., https://doi.org/10.1016/S0140-6736(20)32340-0 (2021);
3. Ayub, S., et al. https://doi.org/10.1093/rheumatology/keaa808 (2021);
4. Volpi, P., et al., https://doi.org/10.1007/s00264-020-04616-8 (2020).

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 standard treatment protocol for intra-articular application consists of three injections, the first two 15 days apart and the third 30 days after the second. The mechanism of action is based on the ability of hydrolyzed collagen to diffuse in the synovial fluid and to evenly spread on the surface of the damaged joint, reinforcing the cartilage matrix. ChondroGrid is able to perform a mechanical action of direct reinforcement of the collagenous structures, improving mobility and reducing the painful symptoms.

TREATMENT	KELLGREN LAWRENCE (KL)	AGE OF PATIENTS (YEARS)
CHONDROGRID	KL1=20% KL2=44% KL3=28% KL4=8%	48
HYALURONIC ACID	KL1=32% KL2=24% KL3=24% KL4=16%	47
PRP	KL1=0% KL2=48% KL3=40% KL4=12%	48

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

Fig. 2 *– CHondroGrid is commercialized as 4 mg lyophilized low molecular weight collagen peptides in a double sterile package.*

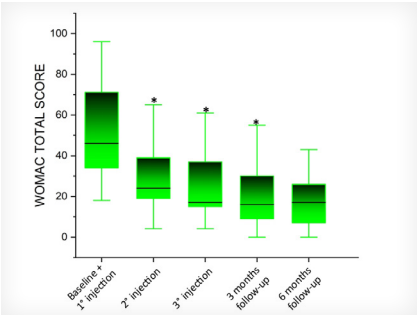

Fig. 3 *– Box plot showing the WOMAC total score of CHondroGrid treatment. The statistically significant improvement between every data point is indicated by *. The follow-up is referred to the last injection. The black line is the median.*

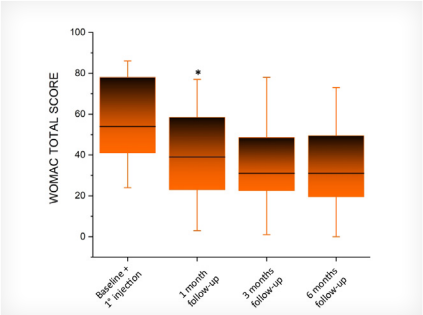

Fig. 4 *– Box plot showing the WOMAC total score of HA treatment. The statistically significant improvement between every data point is indicated by *. The follow-up is referred to the last injection. The black line is the median.*

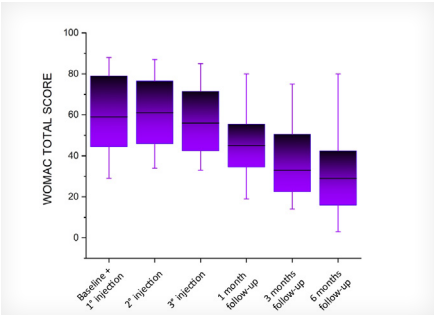

Fig. 5 *– Box plot showing the WOMAC total score of PRP treatment. No statistically significant improvement between any data point was observed. The follow-up is referred to the last injection. The black line is the median.*

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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 knee osteoarthrosis with grades from 1 to 4 (Kellgren-Lawrence scale). For each treatment, the WOMAC score for pain, functional recovery and stiffness were measured after each injection and at 1, 3 and 6 months after the last injection. CHondroGrid was administered in 3 injections (time 0, 15 days and 30 days after the second), HA was administered in one single injection, while PRP was administered in 3 injections (once a week for 3 weeks). The results were represented with a box plot5. The box plots of total WOMAC show that CHondroGrid is effective from the very first injection with statistical significance ($P < 0.05$). Conversely, both PRP and HA display a statistically significant improvement after 1 month from the last injection and at 1 month from the first injection, respectively. Moreover, CHondroGrid shows a significant statistical improvement ($P < 0.05$) up to the 3 months follow-up, while at 6 months follow-up, the improvement is not statistically significant (P=0.19).

Regarding the specific improvements for pain, at the last follow-up, WOMAC scores show that CHondroGrid reduces the pain of 61 %, while HA reduces the pain of 38% and PRP of 42%. Similarly, the WOMAC score for the functional recovery shows that CHondroGrid improves the joint functionality of 58 %, while HA of 40% and PRP of 48.5%. CHondroGrid shows also a better performance regarding the improvement of the stiffness of the knee, with an improvement of 65% against 47% for both HA and PRP. This study shows for the first time that the treatment with low molecular weight hydrolyzed collagen has better performance than HA and PRP. Moreover, CHondroGrid shows a continuous and progressive improvement all over the 6 months of the 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.

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

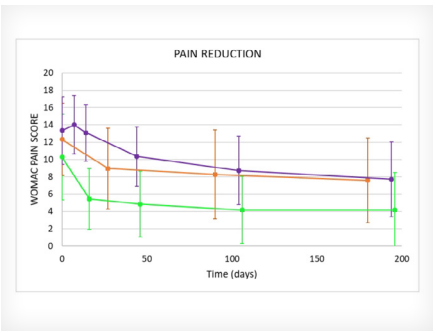

Fig. 6 *– The WOMAC Pain Score shows that CHondroGrid (green) is more efficient in pain reduction compared to PRP (purple) and HA (orange).*

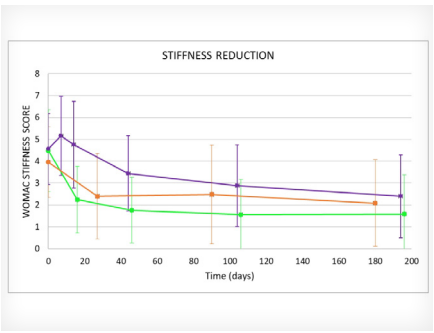

Fig. 7 *– The WOMAC Stiffness Score shows that CHondroGrid (green) is more efficient in stiffness reduction compared to PRP (purple) and HA (orange).*

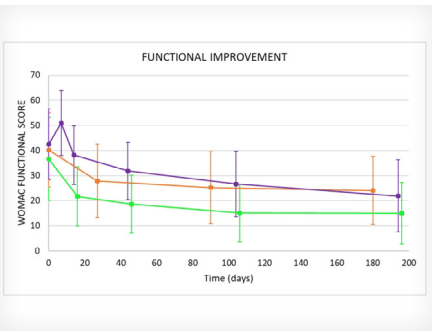

Fig. 8 *– The WOMAC Functional Score shows that CHondroGrid (green) is more efficient in favoring the joint functional recovery compared to PRP (purple) and HA (orange).*

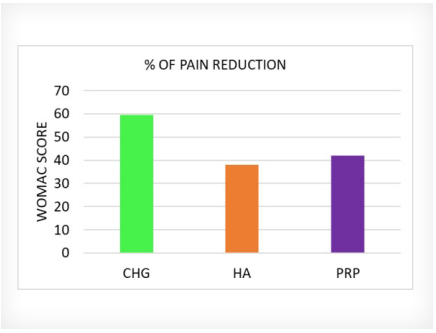

Fig. 9 *– The graph shows that at the last follow-up CHondroGrid (green) reduces the initial pain of 60% compared to 38% and 42% for HA (orange) and PRP (purple), respectively.*

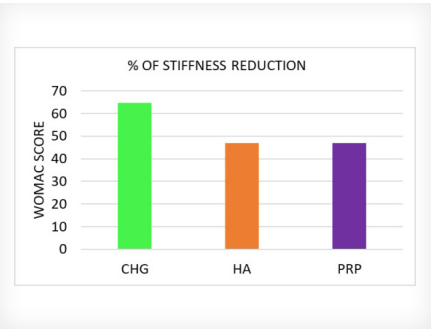

Fig.10 *– The graph shows that at the last follow-up CHondroGrid (green) reduces the initial stiffness of 65% compared to 47% for both HA (orange) and PRP (purple).*

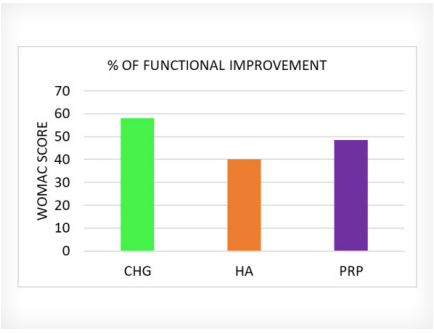

Fig.11 *– The graph shows that at the last follow-up CHondroGrid (green) improves the joint functionality of 58% compared to 40% and 48% for HA (orange) and PRP (purple), respectively.*

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