

Synergy of specialized medical training and regenerative medicine treatments: how to strengthen and optimize the natural healing processes of sports injuries

Piotr Gawda

Department of Sports Medicine, Faculty of Health Sciences, Medical University of Lublin, Poland

Key words: injectable collagen therapy, musculoskeletal disorders, regenerative medicine

Tissue injuries initiate specific healing processes, which are sequentially: inflammatory, regenerative, and tissue remodeling, and these are time-consuming. Additionally, the natural response to injury is reduced physical activity, which in turn weakens anabolic signaling, disrupting mechanotransduction mechanisms. Through appropriate therapeutic intervention, we can modulate these processes, accelerating and simultaneously optimizing the healing process without risking re-injury.

One solution to avoid stagnation in training is the use of occlusion exercises. By controlled introduction of the injured tissue to stress, using low loads with partially restricted arterial blood flow and complete venous outflow occlusion, we allow the influx of pro-inflammatory factors without further damaging the tissue structure. This accelerates and stimulates the body's natural healing and repair cycles, such as lactate accumulation, pH increase, and enhanced anabolic signaling, which triggers growth and remodeling.

Such an intensified process requires collagen supplementation, providing the essential building material for faster and safer regeneration of injuries. Collagen presence supports the reconstruction of tissue struc-

ture, which is crucial for restoring full functionality post-injury.

Thanks to modern diagnostic ultrasound methods, it is possible to inject collagen directly into the injured tissue structures and monitor the structure itself and the ongoing remodeling processes. Combining such therapy with a well-planned rehabilitation training program allows for a quicker return to full fitness and reduces the risk of re-injury. This has been demonstrated through clinical examples illustrating the effectiveness of this training and sports therapy synergy in practice.

References

1. Cognetti DJ, Sheean AJ, Owens JG. Blood Flow Restriction Therapy and Its Use for Rehabilitation and Return to Sport: Physiology, Application, and Guidelines for Implementation. *Arthrosc Sports Med Rehabil* 2022; 4: e71–e76, DOI: 10.1016/j.asmr.2021.09.025.
2. Kolimi P, Narala S, Nyavanandi D, et al. Innovative Treatment Strategies to Accelerate Wound Healing: Trajectory and Recent Advancements. *Cells* 2022; 11: 2439, DOI: 10.3390/cells11152439.
3. Lin C-R, Tsai SHL, Huang K-Y, et al. Analgesic Efficacy of Collagen Peptide in Knee Osteoarthritis: A Meta-Analysis of Randomized Controlled Trials. *J Orthop Surg* 2023; 18: 694, DOI: 10.1186/s13018-023-04182-w.