



Polydeoxyribonucleotide injection in muscle atrophy/immobilization: does that ring a bell?

Wei-Ting Wu^{1,2}, Ke-Vin Chang^{1,2,3}, Levent Özçakar⁴

¹Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital, Bei-Hu Branch, Taipei; ²Department of Physical Medicine and Rehabilitation, National Taiwan University College of Medicine, Taipei; ³Center for Regional Anesthesia and Pain Medicine, Wang-Fang Hospital, Taipei Medical University, Taipei; ⁴Department of Physical and Rehabilitation Medicine, Hacettepe University Medical School, Ankara, Turkey

Correspondence to: Ke-Vin Chang. Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital Bei-Hu Branch, No. 87, Nei-Jiang Rd., Wan-Hwa District, Taipei. Email: kvchang011@gmail.com.

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In August 2022, an interesting study entitled “*The effects of treatment using polydeoxyribonucleotide through ESWT: synergic regeneration effects on atrophied calf muscles in immobilized rabbits*” (1) was published in *Annals of Translational Medicine*. The authors attempted to explore whether the combinational use of polydeoxyribonucleotide (PDRN) and extracorporeal shock wave therapy (ESWT) would lead to a synergic effect concerning the regeneration of atrophic muscles. Using the rat atrophied calf model, they successfully demonstrated that ESWT when combined with PDRN injection had a superior regenerative effect as compared to ESWT, PDRN or normal saline injection alone.

First and foremost, we would like to applaud their wise initiative to focus on this clinically important issue. Muscle atrophy is inevitable after a long period of immobilization, which is commonplace in patients undergoing orthopedic surgeries. Indeed, patients with atrophic muscles have reduced strength of the affected limbs, which significantly hampers the post-operative recovery. Recently, the important condition of sarcopenia is being widely discussed (2). It is defined as age/aging related loss of muscle mass and function, which is associated with several adverse health consequences e.g. cognitive impairment (3), depression (4), cancer-related mortality (5), dysphagia (6) and musculoskeletal disorders (7). Of note, the most common therapy for sarcopenia remains to be nutritional support and resistive exercises (8). In this

sense, the authors are suggested to check whether their novel integrated intervention would also be effective for the sarcopenic model.

Second, the authors injected PDRN to stimulate the growth of new vessels and collagens. However, although the use of PDRN is not rare for wound care (9), it is not a common regimen in musculoskeletal medicine. Instead, dextrose prolotherapy and platelet rich plasma (PRP) are more frequently applied for muscle injections. For instance, Tsai *et al.* (10) demonstrated that dextrose could promote muscle satellite cell regeneration in the post-contusion injury model on mice. Rtail *et al.* (11) showed that autologous PRP could effectively increase the amount of muscle fibers and intra-muscular vessels in the rat muscle injury model (prepared by chronic hyperglycemia). To this end, we encourage the authors to try administrating dextrose (or PRP) with ESWT in their future trials.

Third, ESWT was chosen as one part of the therapeutic/interventional combination in their experimental design. Notably, it has been widely used in the rehabilitation field, e.g., for spasticity after stroke (12) or plantar fasciitis (13,14). Compared with PDRN injection, ESWT could be applied to a larger area of the affected muscle, probably contributing to the synergic effect observed in their study. Further, the authors wisely used ultrasound imaging to guide PDRN injection and to measure the calf muscle size. It is noteworthy that the use of ultrasound

guidance can facilitate the researchers to focus on the most atrophic region of the target muscle without damaging the vital/nearby neurovascular structures. Herein, as sonoelastography has recently emerged as a non-invasive tool to examine the mechanic properties of the muscle (15) and tendon (16), the authors may consider complementing the methodology of their incoming studies with this imaging modality as well.

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References

- Kim KL, Park GY, Moon YS, et al. The effects of treatment using polydeoxyribonucleotide through extracorporeal shock wave therapy: synergic regeneration effects on atrophied calf muscles in immobilized rabbits. *Ann Transl Med* 2022;10:853.
- Kara M, Kaymak B, Frontera W, et al. Diagnosing sarcopenia: Functional perspectives and a new algorithm from the ISarcoPRM. *J Rehabil Med* 2021;53:jrm00209.
- Chang KV, Hsu TH, Wu WT, et al. Association Between Sarcopenia and Cognitive Impairment: A Systematic Review and Meta-Analysis. *J Am Med Dir Assoc* 2016;17:1164.e7-1164.e15.
- Chang KV, Hsu TH, Wu WT, et al. Is sarcopenia associated with depression? A systematic review and meta-analysis of observational studies. *Age Ageing* 2017;46:738-46.
- Chang KV, Chen JD, Wu WT, et al. Association between Loss of Skeletal Muscle Mass and Mortality and Tumor Recurrence in Hepatocellular Carcinoma: A Systematic Review and Meta-Analysis. *Liver Cancer* 2018;7:90-103.
- Chen KC, Lee TM, Wu WT, et al. Assessment of tongue strength in sarcopenia and sarcopenic dysphagia: a systematic review and meta-analysis. *Front Nutr* 2021;8:684840.
- Han DS, Wu WT, Hsu PC, et al. Sarcopenia Is Associated With Increased Risks of Rotator Cuff Tendon Diseases Among Community-Dwelling Elders: A Cross-Sectional Quantitative Ultrasound Study. *Front Med (Lausanne)* 2021;8:630009.
- Chang KV, Wu WT, Huang KC, et al. Effectiveness of early versus delayed exercise and nutritional intervention on segmental body composition of sarcopenic elders - A randomized controlled trial. *Clin Nutr* 2021;40:1052-9.
- Shin DY, Park JU, Choi MH, et al. Polydeoxyribonucleotide-delivering therapeutic hydrogel for diabetic wound healing. *Sci Rep* 2020;10:16811.
- Tsai SW, Hsu YJ, Lee MC, et al. Effects of dextrose prolotherapy on contusion-induced muscle injuries in mice. *Int J Med Sci* 2018;15:1251-9.
- Rtail R, Maksymova O, Illiashenko V, et al. Improvement of Skeletal Muscle Regeneration by Platelet-Rich Plasma in Rats with Experimental Chronic Hyperglycemia. *Biomed Res Int* 2020;2020:6980607.
- Hsu PC, Chang KV, Chiu YH, et al. Comparative Effectiveness of Botulinum Toxin Injections and Extracorporeal Shockwave Therapy for Post-Stroke Spasticity: A Systematic Review and Network Meta-Analysis. *EClinicalMedicine* 2022;43:101222.
- Hsiao MY, Hung CY, Chang KV, et al. Comparative effectiveness of autologous blood-derived products, shock-wave therapy and corticosteroids for treatment of plantar fasciitis: a network meta-analysis. *Rheumatology (Oxford)* 2015;54:1735-43.
- Chang KV, Chen SY, Chen WS, et al. Comparative effectiveness of focused shock wave therapy of different

- intensity levels and radial shock wave therapy for treating plantar fasciitis: a systematic review and network meta-analysis. *Arch Phys Med Rehabil* 2012;93:1259-68.
15. Chu CA, Chen YJ, Chang KV, et al. Reliability of Sonoelastography Measurement of Tongue Muscles and Its Application on Obstructive Sleep Apnea. *Front Physiol*

- 2021;12:654667.
16. Hsu PC, Chang KV, Wu WT, et al. Effects of Ultrasound-Guided Peritendinous and Intrabursal Corticosteroid Injections on Shoulder Tendon Elasticity: A Post Hoc Analysis of a Randomized Controlled Trial. *Arch Phys Med Rehabil* 2021;102:905-13.

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