

EVIDENCE BASED STATEMENT

DOMAIN **12**, Statement **08**

TOPIC: “**Neuromuscular electrical stimulation evidence in venous-lymphatic disease management.**”

SEARCH TERMS & SOURCES

(electrical stimulation) AND (calf)

INCLUSION CRITERIA

- Lower limb only
- Systematic Reviews, Meta-Analysis, Reviews, RCT
- Publication < 10 years, only ENG

SEARCH RESULT BEFORE - AFTER SELECTION

34/11

PERTINENT LITERATURE NOT IDENTIFIED BY THE LITERATURE SEARCH

1. Ravikumar R, Lane TR, Babber A, et al. A randomised controlled trial of neuromuscular stimulation in non-operative venous disease improves clinical and symptomatic status. *Phlebology*. 2021 May;36(4):290-302
2. Williams KJ, Moore HM, Ellis M, et al. Pilot Trial of Neuromuscular Stimulation in Human Subjects with Chronic Venous Disease. *Vasc Health Risk Manag*. 2021 Dec 1;17:771-778.
3. Vena D, Rubianto J, Popovic MR, et al. The Effect of Electrical Stimulation of the Calf Muscle on Leg Fluid Accumulation over a Long Period of Sitting. *Sci Rep*. 2017 Jul 20;7(1):6055.
4. Ravikumar R, Williams KJ, Babber A, et al. Randomised Controlled Trial: Potential Benefit of a Footplate Neuromuscular Electrical Stimulation Device in Patients with Chronic Venous Disease. *Eur J Vasc Endovasc Surg*. 2017 Jan;53(1):114-121.

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IDENTIFIED REFERENCES

1. Palmieri B, Vadalà M, Laurino C. Electromedical devices in wound healing management: a narrative review. *J Wound Care*. 2020 Jul 2;29(7):408-418.
2. Hajibandeh S, Hajibandeh S, Antoniou GA, et al. Neuromuscular electrical stimulation for the prevention of venous thromboembolism. *Cochrane Database Syst Rev*. 2017 Nov 21;11(11):CD011764.
3. Khouri C, Kotzki S, Roustit M, et al. Hierarchical evaluation of electrical stimulation protocols for chronic wound healing: An effect size meta-analysis. *Wound Repair Regen*. 2017 Sep;25(5):883-891.
4. Ravikumar R, Williams KJ, Babber A, et al. Neuromuscular electrical stimulation for the prevention of venous thromboembolism. *Phlebology*. 2018 Jul;33(6):367-378.
5. Ovens L. Electrical stimulation therapy and electroceutical treatment for the management of venous leg ulcers. *Br J Community Nurs*. 2017 Mar;22 Suppl 3(Sup3):S28-S36.
6. Williams KJ, Ravikumar R, Gaweesh AS, et al. A Review of the Evidence to Support Neuromuscular Electrical Stimulation in the Prevention and Management of Venous Disease. *Adv Exp Med Biol*. 2017;906:377-386.
7. Stefanou C. Electrical muscle stimulation in thromboprophylaxis: review and a derived hypothesis about thrombogenesis-the 4th factor. *Springerplus*. 2016 Jun 24;5(1):884.
8. Alavi A, Sibbald RG, Phillips TJ, et al. What's new: Management of venous leg ulcers: Treating venous leg ulcers. *J Am Acad Dermatol*. 2016 Apr;74(4):643-64; quiz 665-6
9. Thakral G, La Fontaine J, Kim P, et al. Treatment options for venous leg ulcers: effectiveness of vascular surgery, bioengineered tissue, and electrical stimulation. *Adv Skin Wound Care*. 2015 Apr;28(4):164-72.
10. Martínez-Rodríguez A, Bello O, Fraiz M, et al. The effect of alternating and biphasic currents on humans' wound healing: a literature review. *Int J Dermatol*. 2013 Sep;52(9):1053-62.
11. Hajibandeh S, Hajibandeh S, Antoniou GA, et al. Neuromuscular electrical stimulation for thromboprophylaxis: A systematic review. *Phlebology*. 2015 Oct;30(9):589-602

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TEXT FOR INCLUSION IN THE DOCUMENT

DOMAIN 12, Statement 08,

TOPIC: “**Neuromuscular electrical stimulation evidence in venous-lymphatic disease management**”

The medical market is offering several neuro-electrical stimulation devices aimed to improve venous drainage and decrease the thrombotic risk. Among these devices, too many are not validated by proper scientific investigations.

A 2017 Cochrane analysis concluded that neuro-electrical stimulation showed no significant benefit in venous thrombo-prophylaxis compared to the traditional methods, but might bring some advantage versus no prophylaxis. Data in support of this statement are of low medium quality, therefore further investigations have been recommended.

***[Hajibandeh S, Hajibandeh S, Antoniou GA, et al. Neuromuscular electrical stimulation for the prevention of venous thromboembolism. Cochrane Database Syst Rev. 2017 Nov 21;11(11):CD011764].**

Different modalities of electrical stimulation are available and unidirectional high voltage pulsed current type demonstrated superiority in wounds healing.

[Khouri C, Kotzki S, Roustit M, et al. Hierarchical evaluation of electrical stimulation protocols for chronic wound healing: An effect size meta-analysis. Wound Repair Regen. 2017 Sep;25(5):883-891].

A recent randomized comparative trial involving 76 chronic venous disease patients, showed electrical stimulation benefits on femoral vein Time Averaged Mean Velocity, on Aberdeen Varicose Veins Questionnaire Score and on Venous Clinical Severity Score.

[Ravikumar R, Lane TR, Babber A, et al. A randomised controlled trial of neuromuscular stimulation in non-operative venous disease improves clinical and symptomatic status. Phlebology. 2021 May;36(4):290-302]

Similar data were reported in an observational study in the same year, using the device for 4-6 hours per day, for 6 weeks.

[Williams KJ, Moore HM, Ellis M, et al. Pilot Trial of Neuromuscular Stimulation in Human Subjects with Chronic Venous Disease. Vasc Health Risk Manag. 2021 Dec 1;17:771-778]

Future multi-center investigations should focus on specific different protocols and devices, while addressing also the minimum required time to obtain an effect, considering a multiple hours per day use could limit the patient compliance.

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STATEMENT FOR PUBLIC EVIDENCE-BASED AWARENESS

DOMAIN 12, Statement 08

“Neuromuscular electrical stimulation has shown preliminary evidence of potential benefit in leg venous drainage.
More data are needed to validate its use, for which an indication of the expert physician is suggested.”

SELECTED REFERENCES

1. ***Hajibandeh S, Hajibandeh S, Antoniou GA, et al. Neuromuscular electrical stimulation for the prevention of venous thromboembolism. Cochrane Database Syst Rev. 2017 Nov 21;11(11):CD011764**
2. **Khouri C, Kotzki S, Roustit M, et al. Hierarchical evaluation of electrical stimulation protocols for chronic wound healing: An effect size meta-analysis. Wound Repair Regen. 2017 Sep;25(5):883-891**
3. **Ravikumar R, Lane TR, Babber A, et al. A randomised controlled trial of neuromuscular stimulation in non-operative venous disease improves clinical and symptomatic status. Phlebology. 2021 May;36(4):290-302**
4. **Williams KJ, Moore HM, Ellis M, et al. Pilot Trial of Neuromuscular Stimulation in Human Subjects with Chronic Venous Disease. Vasc Health Risk Manag. 2021 Dec 1;17:771-778**

identified LITERATURE BIAS

Devices and protocols heterogeneity

SUGGESTED NEXT LINES OF RESEARCH

Multi-center different protocols and devices testing