

# **Calf muscle stimulation with the Veinoplus device results in a significant increase in lower limb inflow without generating limb ischemia or pain in patients with peripheral artery disease**

Submitted by Emmanuel Lemoine on Tue, 02/24/2015 - 15:24

Titre	Calf muscle stimulation with the Veinoplus device results in a significant increase in lower limb inflow without generating limb ischemia or pain in patients with peripheral artery disease
Type de publication	Article de revue
Auteur	Abraham, Pierre [1], Mateus, V. [2], Bieuzen, F. [3], Ouedraogo, N. [4], Cisse, F. [5], Lefth�riotis, Georges [6]
Editeur	Elsevier
Type	Article scientifique dans une revue � comit� de lecture
Ann�e	2010
Langue	Anglais
Date	2010
Num�ro	3
Pagination	714 - 719
Volume	57
Titre de la revue	Journal of Vascular Surgery
ISSN	1097-6809
Mots-cl�s	Aged [7], ankle brachial index [8], Biological Markers/blood [9], Blood Gas Monitoring, Transcutaneous [10], Electric Stimulation Therapy/adverse effects/instrumentation [11], Equipment Design [12], Exercise Test [13], Female [14], France [15], Humans [16], Intermittent Claudication/blood/diagnosis/physiopathology/therapy [17], Lower Extremity [18], Male [19], Middle Aged [20], Muscle Contraction [21], Muscle, Skeletal/blood supply/innervation [22], Oxyhemoglobins/metabolism [23], Pain/etiology [24], Peripheral Arterial Disease/blood/diagnosis/physiopathology/therapy [25], Regional Blood Flow [26], Treatment Outcome [27], Ultrasonography, Doppler, Duplex [28]

Résumé en  
anglais

**OBJECTIVE:** Increase in arterial inflow to the lower limbs is important to obtain functional improvement in peripheral artery disease (PAD) patients with claudication. The aim of this study was to assess the effect of electrical stimulation of calf muscles on arterial inflow and tissue oxygen content in PAD in the area of stimulation. **METHODS:** Fifteen adult patients [mean (standard deviation) age, 62 (12) years; height, 165 (8)cm; weight, 76 (13) kg; lowest ankle-brachial index 0.66 (0.19)] with stable arterial claudication were recruited. All patients performed a treadmill test (3.2 km/h, 10% slope) associated with a transcutaneous oximetry test expressed as decrease from rest of oxygen pressure (DROP) index values (calf changes minus chest changes from rest) with a maximum walking distance (median [25th/75th percentiles]) of 295 [133-881] m. The DROP index on the symptomatic side was -25 [-18/-34] mm Hg. On another day the patients underwent electrical stimulation in the seated position on the leg that was the most symptomatic on the treadmill. After resting values were recorded, the gastrocnemius was stimulated for 20 minutes at increasing contraction rates at 5-minute steps of 60, 75, 86, and 100 bpm on the most symptomatic side. Arterial blood inflow with duplex Doppler ultrasound scanning of the femoral artery, DROP transcutaneous oxygen pressure value, and oxygen concentration (O<sub>2</sub>Hb) from the near-infrared spectroscopic signal of the calf were recorded on both sides. Patients were instructed to report eventual contraction-induced pain in the stimulated calf. Results are given as mean (standard deviation) or median [25th/75th percentiles] according to distribution, and the level of statistical significance was set at  $P < .05$  on two-tailed tests. **RESULTS:** Lower limb inflow (mL/min) was 64 [48/86] vs 63 [57/81] ( $P > .05$ ) before stimulation, 123 [75/156] vs 57 [44/92] ( $P < .01$ ) at 60 bpm, 127 [91/207] vs 49 [43/68] ( $P < .01$ ) at 75 bpm, 140 [84/200] vs 57 [45/71] ( $P < .01$ ) at 86 bpm, and 154 [86/185] vs 55 [46/94] ( $P < .01$ ) at 100 bpm on the stimulated vs nonstimulated limb, respectively. No apparent decrease or significant leg difference was observed in DROP index or O<sub>2</sub>Hb values. None of the patients reported contraction-induced pain in the leg. **CONCLUSIONS:** Electrical stimulation of calf muscle with the Veinoplus device results in a significant increase of arterial inflow without measurable muscle ischemia or pain. Potential use of this device as an adjuvant treatment to improve walking capacity in PAD patients remains to be evaluated.

URL de la  
notice

<http://okina.univ-angers.fr/publications/ua8185> [29]

DOI

10.1016/j.jvs.2012.08.117 [30]

Lien vers le  
document

<http://dx.doi.org/10.1016/j.jvs.2012.08.117> [30]

Titre abrégé J Vasc Surg

---

## Liens

- [1] <http://okina.univ-angers.fr/pierre.abraham/publications>
- [2] [http://okina.univ-angers.fr/publications?f\[author\]=13634](http://okina.univ-angers.fr/publications?f[author]=13634)
- [3] [http://okina.univ-angers.fr/publications?f\[author\]=13635](http://okina.univ-angers.fr/publications?f[author]=13635)
- [4] [http://okina.univ-angers.fr/publications?f\[author\]=13457](http://okina.univ-angers.fr/publications?f[author]=13457)
- [5] [http://okina.univ-angers.fr/publications?f\[author\]=13636](http://okina.univ-angers.fr/publications?f[author]=13636)
- [6] <http://okina.univ-angers.fr/g.lefther/publications>
- [7] [http://okina.univ-angers.fr/publications?f\[keyword\]=1072](http://okina.univ-angers.fr/publications?f[keyword]=1072)
- [8] [http://okina.univ-angers.fr/publications?f\[keyword\]=9958](http://okina.univ-angers.fr/publications?f[keyword]=9958)
- [9] [http://okina.univ-angers.fr/publications?f\[keyword\]=12901](http://okina.univ-angers.fr/publications?f[keyword]=12901)
- [10] [http://okina.univ-angers.fr/publications?f\[keyword\]=12902](http://okina.univ-angers.fr/publications?f[keyword]=12902)
- [11] [http://okina.univ-angers.fr/publications?f\[keyword\]=12900](http://okina.univ-angers.fr/publications?f[keyword]=12900)
- [12] [http://okina.univ-angers.fr/publications?f\[keyword\]=12903](http://okina.univ-angers.fr/publications?f[keyword]=12903)

- [13] [http://okina.univ-angers.fr/publications?f\[keyword\]=12757](http://okina.univ-angers.fr/publications?f[keyword]=12757)
- [14] [http://okina.univ-angers.fr/publications?f\[keyword\]=1075](http://okina.univ-angers.fr/publications?f[keyword]=1075)
- [15] [http://okina.univ-angers.fr/publications?f\[keyword\]=1334](http://okina.univ-angers.fr/publications?f[keyword]=1334)
- [16] [http://okina.univ-angers.fr/publications?f\[keyword\]=991](http://okina.univ-angers.fr/publications?f[keyword]=991)
- [17] [http://okina.univ-angers.fr/publications?f\[keyword\]=12904](http://okina.univ-angers.fr/publications?f[keyword]=12904)
- [18] [http://okina.univ-angers.fr/publications?f\[keyword\]=12905](http://okina.univ-angers.fr/publications?f[keyword]=12905)
- [19] [http://okina.univ-angers.fr/publications?f\[keyword\]=968](http://okina.univ-angers.fr/publications?f[keyword]=968)
- [20] [http://okina.univ-angers.fr/publications?f\[keyword\]=5941](http://okina.univ-angers.fr/publications?f[keyword]=5941)
- [21] [http://okina.univ-angers.fr/publications?f\[keyword\]=11027](http://okina.univ-angers.fr/publications?f[keyword]=11027)
- [22] [http://okina.univ-angers.fr/publications?f\[keyword\]=12906](http://okina.univ-angers.fr/publications?f[keyword]=12906)
- [23] [http://okina.univ-angers.fr/publications?f\[keyword\]=12907](http://okina.univ-angers.fr/publications?f[keyword]=12907)
- [24] [http://okina.univ-angers.fr/publications?f\[keyword\]=12908](http://okina.univ-angers.fr/publications?f[keyword]=12908)
- [25] [http://okina.univ-angers.fr/publications?f\[keyword\]=12909](http://okina.univ-angers.fr/publications?f[keyword]=12909)
- [26] [http://okina.univ-angers.fr/publications?f\[keyword\]=6082](http://okina.univ-angers.fr/publications?f[keyword]=6082)
- [27] [http://okina.univ-angers.fr/publications?f\[keyword\]=6062](http://okina.univ-angers.fr/publications?f[keyword]=6062)
- [28] [http://okina.univ-angers.fr/publications?f\[keyword\]=12910](http://okina.univ-angers.fr/publications?f[keyword]=12910)
- [29] <http://okina.univ-angers.fr/publications/ua8185>
- [30] <http://dx.doi.org/10.1016/j.jvs.2012.08.117>

Publié sur *Okina* (<http://okina.univ-angers.fr>)