# The impact of introducing neuromuscular electrostimulation (the geko™ device, Firstkind Ltd) as an adjunct to standard care on the healing of a mixed aetiology ulcer

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## Introduction

Mixed aetiology leg ulcers typically arise from chronic venous insufficiency, and the extent to which they heal is frequently dependent on the severity of concurrent arterial disease. These ulcers can cause significant discomfort and distress for patients and can present a challenging management issue for healthcare professionals.

The incidence of lower extremity arterial disease increases with age, so it is likely that mixed aetiology ulcers will become more common as life expectancy increases.

This case study describes the wound management of Bill (pseudonym), a 78-year-old gentleman with a past medical history of peripheral arterial disease, 3x coronary artery bypass grafts, type 2 diabetes, hypertension, peripheral neuropathy and a stented popliteal artery in 2020. His BMI was 29.9. Bill spent most of the day sat in his chair due to his poor mobility.

## Method

Bill had a non-healing mixed aetiology leg ulcer of over 4 years duration. He had previously been reviewed by the vascular team who had advised light compression (20mmHg) despite having monophasic pulses and an ABPI of 0.62. Bill reported that his pain level was 7/10 and was taking oral morphine 30mg twice daily along with using CBD ointment which he purchased himself. Bill had declined to have any compression therapy and only agreed to a very limited selection of dressings (superabsorbent secured with orthopaedic wool and a light support bandage).

On assessment by the tissue viability team, Bill had an ulcer measuring 9cm x 7cm to the Achilles area of his right leg, with moderate levels of serous exudate causing maceration to the peri-wound area. There were no signs of healing from the wound edges. His whole lower limb was prone to small areas of superficial breakdown that would occur when oedema increased.

The aims of wound management were:

- Exudate management
- Oedema reduction
- Prevent further areas of skin breakdown
- Reduce pain

The treatment plan included continuing with his current dressing regimen but also introducing a Neuromuscular Electrostimulation (NMES) device as an adjunct therapy to aid in the healing process of Bill's wound. Bill agreed to try the NMES device for 1 month initially. The geko™ device was positioned (as per the instructions for use) to the skin over the common peroneal nerve at the head of fibula on his affected leg. A regular twitch of the foot indicated that the muscles of his leg were being stimulated. The usage was 12 hours on and 12 hours off each day for seven days a week. Bill was given training on application and removal of the NMES device and he was keen to self-manage.

## Results

Within just 30 minutes of activation of the NMES device, Bill reported that his leg felt warmer. After 1 week, the skin on his lower limb was in a much-improved condition, with less pain and a reduction in both exudate levels and oedema. There was also a reduction in the size of his wound. Bill was able to adjust the stimulation levels on the device to suit his own comfort. He was so happy with the improvements to his wound and his leg that he requested to keep using the NMES device at the end of the planned treatment period.

## Discussion

Electrostimulation of the nerves governing the calf and foot muscle pumps has been used successfully to treat hard-to-heal leg ulcers as an adjunctive therapy together with best practices for the management of VLUs, because of its ability to increase blood circulation thus augmenting blood supply to the leg.

The geko™ device is a small, self-adhesive, wearable NMES device that is applied to the surface of the skin on the lateral aspect of the leg just below the knee, over the head of the fibula. It delivers a charge-balanced electrical pulse once per second to the common peroneal nerve which passes through this site, eliciting a muscular twitch of the leg, so activating the venous muscle pumps of the leg and foot, and thus increasing venous, arterial, and microvascular flow.[1] The geko™ device has several stimulation levels to ensure a dorsiflexion is achieved whilst being comfortable for the patient.

The effectiveness of adding the geko™ device to standard care has been demonstrated in a recently published randomised self-controlled study.[2] In this study, two different treatment regimens were compared: multi-layer compression alone, versus multi-layer compression combined with activation of the venous leg pump by neuromuscular stimulation. With 51 patients, adding the geko™ device to multi-layer compression resulted in a significant two-fold increase in the rate of wound healing over a 4-week period, both in terms of wound margin advance and in terms of percentage area reduction.

## Conclusion

This case study demonstrates the effectiveness of adding NMES (the geko™ device) as an adjunct to standard care in a patient with a longstanding mixed aetiology leg ulcer. The enhancement of both venous flow and the additional enhancement of microcirculatory flow delivered by the device resulted in positive outcomes.

Bill very quickly felt benefits from wearing the geko™ device, so much so that he requested to keep using it for longer than planned. He managed the device easily himself and was happy to be involved in the care of his leg ulcer.

December 2022;
9 cm x 7 cm

End of January 2023;
8.5 cm x 6 cm

1. Tucker A, Maass A, Bain D, Chen LH, Azzam M, Dawson H, Johnston Augmentation of venous, arterial and microvascular blood supply in the leg by isometric neuromuscular stimulation via the peroneal nerve. Int J Angiol. 2010 Spring;19(1):e31-7
2. Bull R et al. The impact of a new intervention for venous leg ulcers: A within-patient controlled trial. Intl Wound Journal. 2023; DOI: 10.1111/iwj.14107

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