

The geko™ a neuromuscular electrostimulation (NMES) device and its healing effect on diabetic foot and venous leg ulcers

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The Problem:

3 million Canadians live with diabetes, which cost the Canadian healthcare system and economy \$11.7 billion in 2010, and costs will rise to \$16 billion by 2020¹. 15% of those living with diabetes will develop a diabetic foot ulcer, complications of which led to more than 2,000 amputations across Canada in 2011–2012². Early detection and treatment can reduce the need for, and prevalence of, amputations, the cost of which is 10-40 times greater than the cost of effective initiatives to prevent amputation³.

Leg ulcers occur in 1-2% of adults, with 70% being of venous etiology⁴. The Medical Advisory Secretariat estimates the prevalence of lower limb ulcers in the general population to range between 50,000 to 500,000 Canadians. Half of the affected population have ulcer history spanning 5-10 years; a third exceeding 10 years. In one Ontario study, the care for fewer than 200 community leg ulcer cases cost in excess of \$1.5 million for supplies and nursing visits.^{4,5}

Solution

Small, wireless and worn at the knee, the geko™ is a novel, self-contained, wearable device powered by OnPulse™ technology to increase blood circulation in the veins to promote the healing of wounds. It stimulates the common peroneal nerve activating calf and foot muscle pumps, increasing venous, arterial, and microcirculatory blood flow, up to 60% of that achieved by walking.^{6,7,8}

Community patients from HNHB & ESC in Ontario with longstanding diabetic foot and venous leg ulcers were treated by adding the geko™ device to current therapies. Measurements and photographs were taken to record the healing progress.

Conclusion:

Challenging, refractory venous leg ulcer and diabetic foot ulcer patients from both Erie St. Clair (Managed by St. Elizabeth Health Care) and Hamilton Niagara Haldimand Brant (Managed by Bayshore Home Health), Community Care Access Centres in Ontario Canada, were involved in this evaluation. With the patients as their own controls, meaning nothing else worked to date and all other therapies were kept constant with the addition of the geko™ device, we observed a marked improvement up to and including wound closure and discharge from service. In many cases wounds were chronic up to and exceeding ten years. The three case examples in this poster are representative of the observations.

This neuromuscular electrostimulation device, the geko™, activates the calf and foot muscle pumps to increase blood circulation which can help in a range of conditions. The tiny device has the ability to generate about 60% of the blood-flow normally achieved by walking. There are potentially significant therapeutic benefits of increased blood flow particularly in wound healing challenges. Adding the geko™ device to current wound care treatment may accelerate the healing process, improve refractory wounds, salvage limbs and reduce wound healing costs. Due to the low risk and high potential for gain, health care professionals should consider use of the geko™ device for the treatment of diabetic foot ulcers and venous leg ulcers.



Case 1

Background

- 74 year old male, left leg venous insufficiency and venous ulcers with edema
- Wound recalcitrant for >7 years at the time of geko™ introduction
- Two venous ulcers on the left leg. Proximal wound (4.6 x 1.9 x 0.5cm), distal (2.5 x 1.8 x 0.3cm)
- Prior to treatment seen 3 times weekly and was unable to tolerate compression
- Compression reintroduced at 4 weeks
- Throughout treatment the patient was MRSA positive and also experienced a pseudomonas infection which resolved with treatment

Treatment

- The geko™ T-1 titrated from 2 hours/day to 8 hours/day removing the geko™ after each session
- The geko™ T-2 and R-2 were later introduced to provide additional stimulation



Prior to treatment



Three months, 10 days



Wound closed with thin epithelial layer at 9 months

Case 2

Background

- 50 year old female, diabetic right leg amputation, left leg diabetic foot ulcer
- Wound recalcitrant for 1 month
- Infected tunnel, probed 8 cm depth along tendon, undermined to bone 360 degrees
- PICC line inserted for antibiotic therapy and adhered to offloading

Treatment

- The geko™ R-2 worn for 24 hours per day (clinician decision), instead of guidelines 2-8 hours per day, due to imminent limb loss



Prior to treatment



One month, 4 days



Wound closed at 3 months

Case 3

Background

- 80 year old female, 6.5 month non-healing venous leg ulcer on right leg
- Wound dimensions 4.8 x 2.0 cm prior to treatment. ABPI's left leg 0.86, right leg 0.9
- Episodes of critical colonization evident, treated with antimicrobial dressings
- 2 layer compression bandages discontinued due to discomfort
- Tolerated Velcro short stretch garment

Treatment

- The geko™ T-1 device worn for 2 hours per day for the first 3 days, progressing to a maximum of 4 hours per day for a 4 week period



Prior to treatment



15 days



Wound closed at 2 months