Research Evidence

The geko™ device has been the subject of scientific rigor to demonstrate its ability to increase blood circulation. The body of evidence continues to grow, targeting clinical issues such as CVI, in the management of lower leg wounds.

Clinical Issue	Device Effect
Abnormal Calf Muscle Pump	
• Non-healing VLU correlate with impairment of the calf muscle pumps • 55% of patients with CVI have Calf Muscle Pump Dysfunction related to altered gait, causing venous hypertension[1]	• The geko™ device creates concentric contraction of the extensor muscles that cause dorsiflexion of the ankle and passive stretch of the calf flexor muscles. This acts as a calf muscle pump, which may enhance venous return by increasing intramuscular pressure.[2] • This may be effective in reducing venous stasis and edema, influencing muscle oxygenation.[2] • The results may indicate that the geko™ device effectively counteracts increases in muscle blood volume and deoxygenated hemoglobin during venous stasis.[2]
Edema	
• Dependent edema begins in the perimalleolar region and ascends the leg in early stages of CVI, changes over time to become fibrotic and indurated with Lipodermatosclerosis (LDS) due to changes in the fibrinolytic system.[3] • It may develop into lymphedema.	• Case studies have shown that some patients with chronic and complex edema have had edema reductions with the geko™ device.[4] • In a trial of the geko™ device in individuals with CVI, leg swelling reduced by 16% ($p<0.05$) in patients with venous disease.[5,6] • Many patients with chronic VLU who were unable to tolerate ANY compression therapy, or who only tolerated minimal 10-15 mm Hg compression were able to start or increase their level of compression, leading to further edema reduction.[7] • There is also a fibrinolytic effect[8] with the geko™ device which may reduce the fibrotic changes of LDS.
Incompetent Venous Valves	
• 84% of people with VLUs have superficial vein valve failure[9], • Failure of the deep vein valves speeds venous disease[9] and increases the risk of venous ulcers • Both cause venous reflux and venous hypertension.[9]	• The geko™ device reduces venous refilling and venous volume seen in venous stasis due to the activation of the muscle pumps.10 • It decreases the amount of "sludge" blood (erythrocytes seen as light gray in an ultrasound image) that is not effectively ejected forward through the valves.11 • When off, the Venous Sludge Index (VSI) was 53.5, when activated, the geko™ device stimulation reduced the VSI to 7.6 (p=0.0005).11
Decreased Range of Motion, Decreased Muscle Strength and Activation, Decreased Mobility	
• Decreased ROM can be related to nociceptive and neuropathic pain, woody fibrosis/lipodermatosclerosis, edema, and fixed ankle joint related to CVI, over time develop decreased muscle strength and activation, and decreased mobility.[17, 12]	• In case series studies, patients have reported an increased ability to flex and dorsiflex their foot and ankle,[3] with increased strength in their legs with increased exercise tolerance.[4]
Pain	
• People living with VLUs often report pain as 10/10 and are unable to tolerate compression therapy, a key intervention in treating CVI.[7]	• Up to 90% of individuals with chronic VLUs using the geko™ device indicated a marked reduction in pain[13, 21] • Patients unable to tolerate compression pre-geko™ were able to start and/or increase to therapeutic levels with the effect of the geko™ device[7]
Neuropathy	
• Neuropathy in individuals with CVI without Diabetes is related to perineural degeneration, edema, collagen replacement and contributes to trophic skin changes and impaired healing.[14] • Worse in proximal medial and lateral malleolus, proximal medial and lateral calf and thigh.[14] • Maybe an unrecognized source of pain.[14]	• A pre-geko™ study of a low frequency stimulation device to either the common peroneal or saphenous nerve,[15] depending on proximity to the ulcer, in conjunction with a four-layer compression bandaging system over 12 weeks, showed nearly 4x greater improvement in the nerve sensation and 2x the response to capsaicin applied topically, (both parameters reflecting improvement in C-fibre function).[15] • The improvement of C-fibre activation is also an indicator of the reversal of the neuropathy.[18]
Decreased Arterial Flow	
• 15 to 30% of people with CVI will also have peripheral arterial disease (PAD)[16]	• The geko™ device augments arterial, venous and microcirculatory volume flow in peripheral arterial disease patients and may prove a useful treatment adjunct.[19, 8]
Ambulatory Venous Hypertension	
• Unabated venous hypertension may result in dermal changes with hyperpigmentation, subcutaneous tissue fibrosis, termed "lipodermatosclerosis", and eventual ulceration.[9]	• The geko™ device was tested in 19 healthy volunteers, using settings of 100 µs, 200 µs and 400 µs while volunteers were standing, sitting and lying. Mean Venous Transit Times (VTT) from the dorsal foot to the popliteal vein were measured along with ambulatory venous pressure and leg volume. • The geko™ device had a statistically significant impact, reducing VTT by up to 64%, Mean ambulatory pressure by up to 67% and leg volume by 17% ($P< 0.001$).10

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