Effectiveness of Lower Extremity Electrical Stimulation to Improve Skin Perfusion

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Disclosures

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BACKGROUND

- **Significance:** Diabetic foot Ulcer (DFU) creates a high expenditure for healthcare systems and could lead to **limb loss**.

-**Premise:** Electrical Stimulation (E-stim) is an alternative treatment option to speed up wound healing.

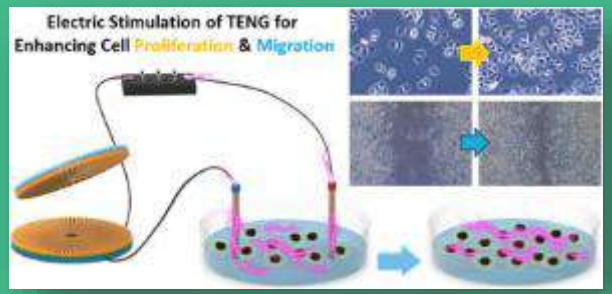
-Supporting studies:

- **In vitro:** association of **angiogenesis** with **E-stim**.
- **Animal studies**: association of increased blood **flow velocity** with **E-stim**.
- **Human studies**: association between **E-stim** and venous **ulcer healing.**

GAPS

-**Pre-clinical and human** trials have **evidenced** the **mechanism** of action of E-stim to speed up wound healing**,** yet:

-The **underlying mechanism** of action is **still debated.**



Jeong G et al, 2017

Hu W, et al 2017

Objective

Aim: To examine the potential effectiveness of E-Stim therapy by measuring blood pressure and tissue oxygenation of lower extremity during treatment.

Hypothesis:

E-Stim may improve immediate tissue perfusion and blood flow in patients with non-healing diabetic wounds.

STUDY DESIGN

Design: 1 time, Pilot study

- **Participants,** 38 patients with DFU and mild vascular deficiency

Intervention:

Treatment location: Acupuncture points at ankle of the injured foot

Intensity: Maximum E-Stim magnitude or comfort tolerance

Duration of E-stim: 60min

Time points: 0min, 30min, and 60min + 10min post-therapy retention

Inclusion criteria	Exclusion criteria
DM type II	ESRD
Mild-mod PAD	Major amputation
1 or more active ulcer/wound(s)	Charcot foot
Ability to provide informed consent	Osteomyelitis
Willing to maintain E-stem	Malignancy/immunocompromised
	Alcohol/drug abuse

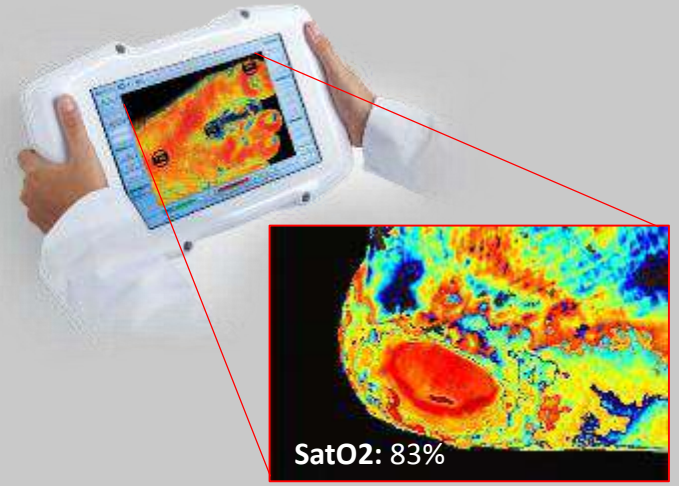
OUTCOMES

Primary: Skin Perfusion Pressure

(PadIQ Sensilase)

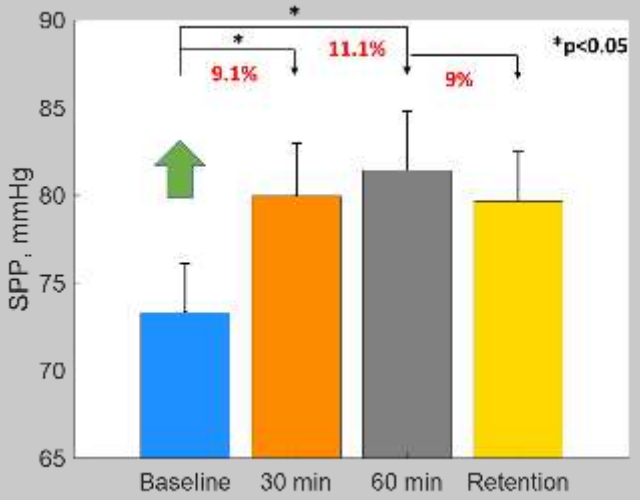
Secondary:

- Tissue SatO2 (Kent Near-Infrared Camera)

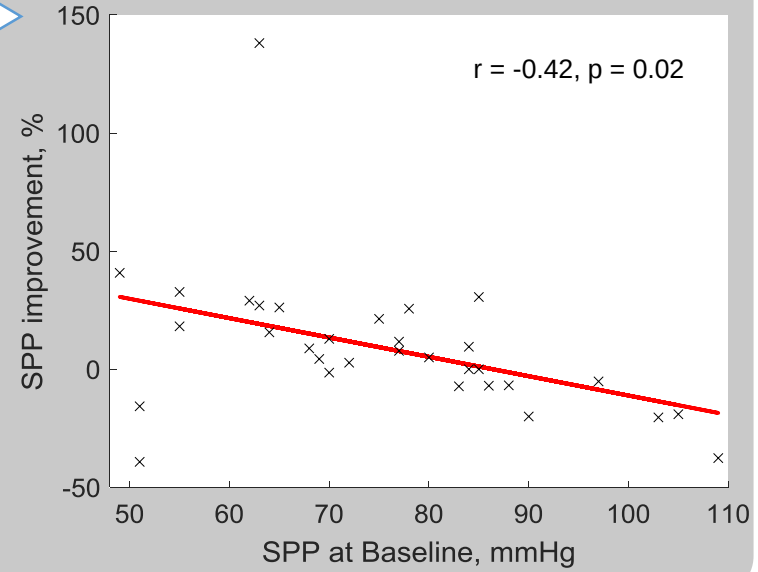


RESULTS

SPP by time-point during E-Stim

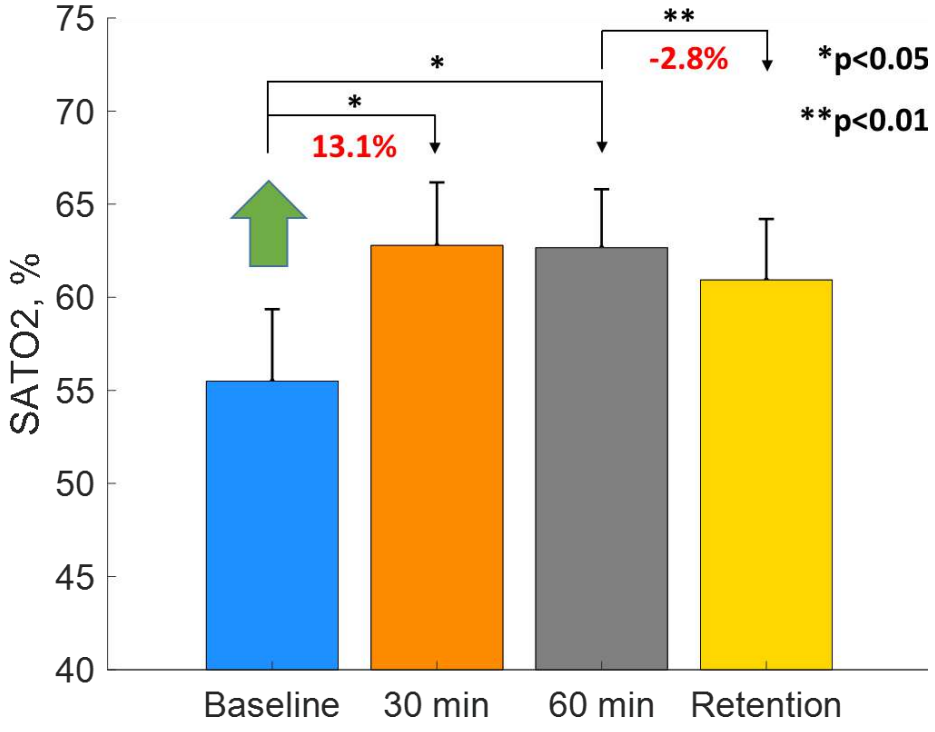


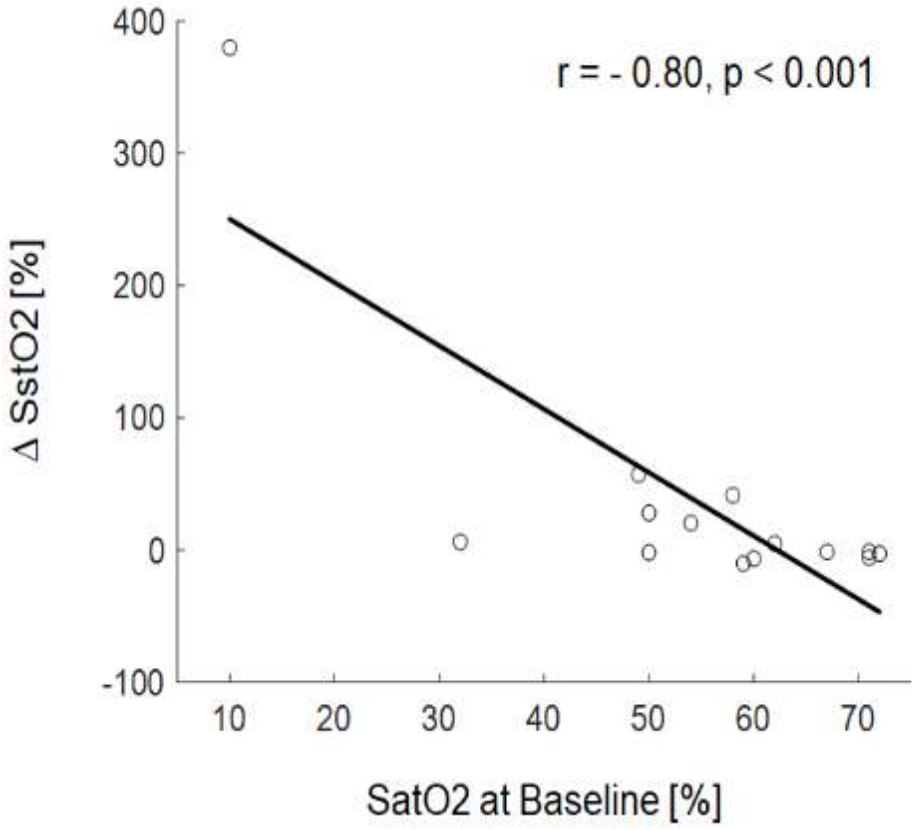
SPP % of improvement correlation BL/60 min



RESULTS

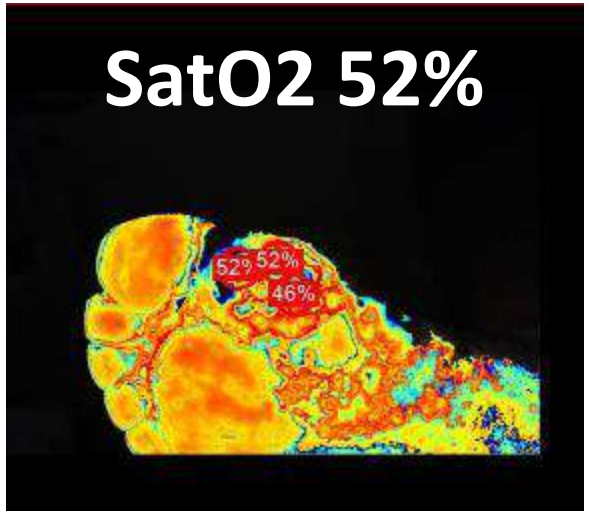
Moderate-severe PAD (ABI: <0.8 or >1.4)



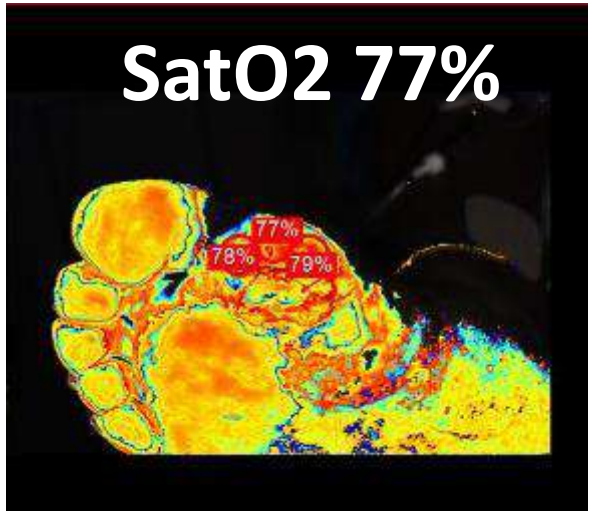


Typical case: Tissue Oxygen Saturation in real time

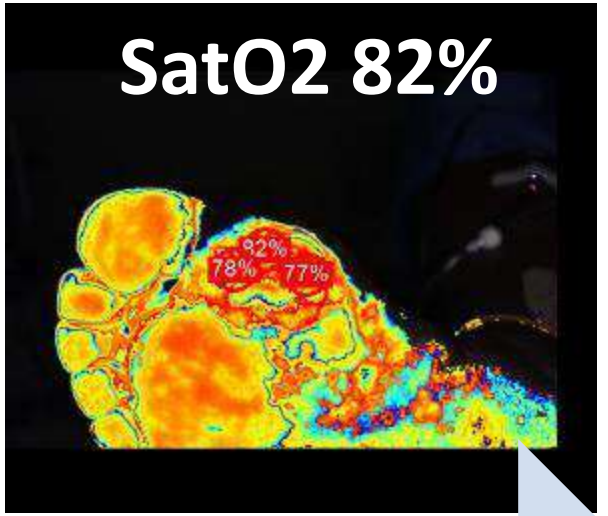
BASELINE



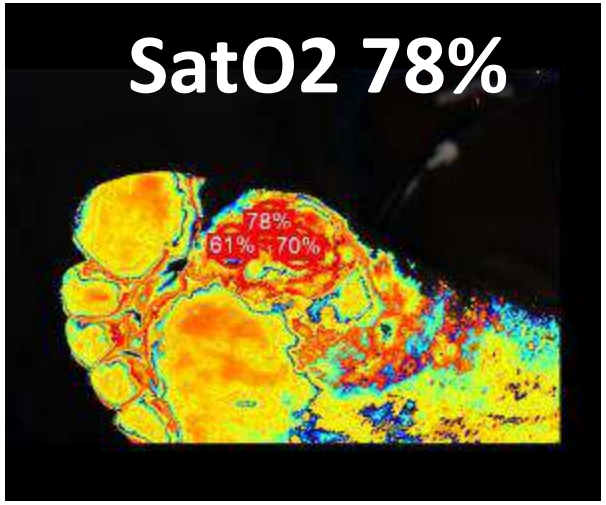
30-MIN



60-MIN



RETENTION



Baseline

Mid-point (30min)

Last-point (60min)

Retention (10min)

Conclusions

- **Feasibility:** This study provides early results on the feasibility and effectiveness of E-Stim therapy to improve skin perfusion in patients with DFUs.
- **Effectiveness:** The evidence of tissue perfusion effect with E-Stim in patients with DFUs was demonstrated in real-time.
- **Mechanism of action**: E-Stim therapy significantly increases direct tissue perfusion in patients with DFUs and might be even more beneficial in patients with moderate to severe PAD or poor skin perfusion.
- **Future outcomes:** Effect of E-Stim could be washout after stopping the therapy and thus regular daily application may be required for the effective benefit for wound healing.

Thank you

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