

Image-guided Scalpel Debridement of Diabetic Foot Ulcers Using a Smartphone-based Tissue Oxygenation Tool

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Introduction

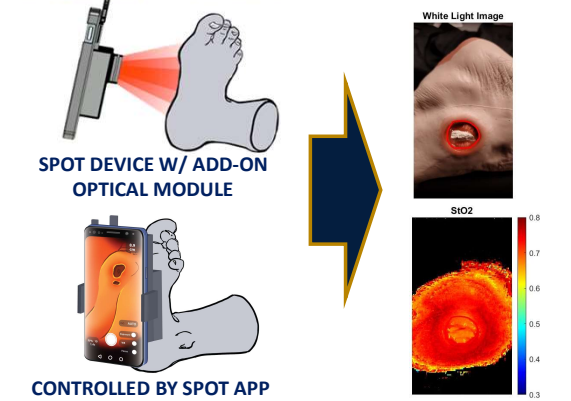
DFU patients: **five-year mortality rate of ~50%**.
 [Chen, *Diabetes Obes Metab*, 2023 doi:10.1111/dom.14840]
 Diabetic foot ulcers (DFUs) require frequent monitoring by clinicians which involves cleaning of dead tissue, eschar, slough by debridement to promote healing mechanisms.

GAP: Assessing debridement remains subjective.
Low oxygen levels in non-healing tissue
 [Nauta, *Int J Mol Sci*, 2014, doi: 10.3390/ijms151119791]
 SPOT is an inhouse smartphone-based device capable of non-contact area near-infrared (NIR) imaging which measures for tissue oxygenation.

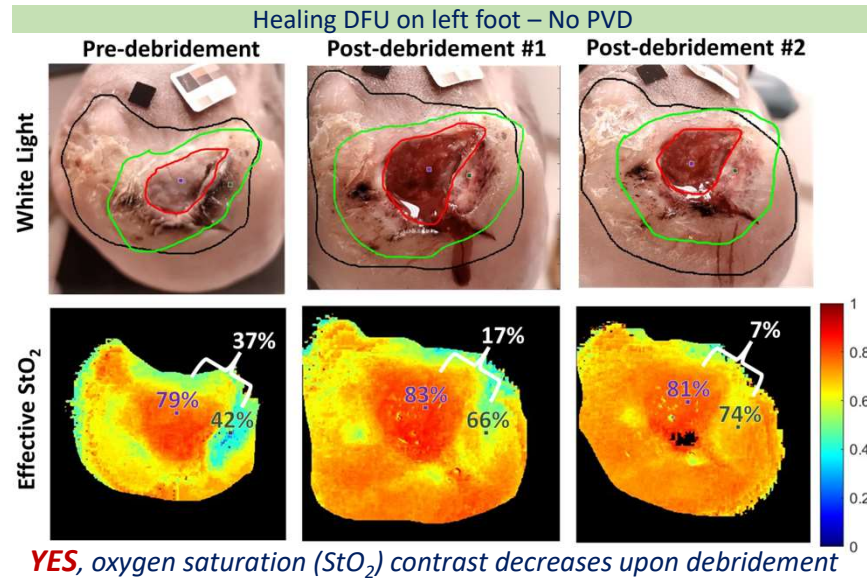
Objective: Evaluate spatial (2-D) changes in tissue oxygenation maps of DFUs during the debridement process using SPOT.

Methodology

15 DFU subjects across 4 weeks (31 cases)
Imaging: Non-contact NIR capture of the DFU before and after scalpel debridement (by the clinician) using our **SmartPhone Oxygenation Tool (SPOT)** IRB-18-0025



Results: Does tissue oxygenation change w/ debridement?



Results: Does the healing or PVD status of DFUs alter tissue oxygenation upon debridement?

	BEFORE	Healing	AFTER	
Left foot				No PVD
Left foot - lateral below pinky				No PVD
Left foot - plantar big toe				Yes PVD
Right foot - big toe				Yes PVD

Conclusions

-Tissue oxygenation in the debrided areas increase, and not dependent on DFU healing or PVD status.
 -Ongoing efforts: Objectively determine the effectiveness of debridement via tissue oxygenation contrasts

Acknowledgements

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NO, Change in StO₂ is independent of DFU healing status. Extent of debridement possibly has effect on StO₂ contrast