C. Contributions to Science *ResearchGate, RG score of 14.98, 2799 publication views, research Interest score of 160.4; Google Scholar- no. of citations-831, i10 index of 23*

1. Wearable for Wound Healing- I have a broad background in wearables for wound care applications, with expertise in medical device development (i.e. outcomes research, preventive care, and clinical assessment). A Wound Moisture and Assessment System includes a flexible body worn coupon containing a disposable electrochemical sensor array for measuring a moisture profile of a wound. The coupon is activated by a wireless near-field RF energy operating as a wound moisture map that allows a patient or caregiver to assess the health and healing progress of a wound such as an ulcer. The ability of a body to self-heal a wound is dependent, in part on its ability to maintain optimum moisture levels throughout and immediately surrounding the woundbed. The assessment of moisture levels will facilitate timely removal and replacement of the wound dressing without risk of infection.

a) Moisture Assessment System and Method for Wound Care- PCT Patent W0/2019/238180- issued 12/19/2019; US Patent app- 2019/0192066 A1

2. Wearable for Preventing Skin Breakdown- The key focus for the Self-Sealing Therapy Ostomy Pouch (S2TOP) is detect leakage, inform the patient, and prevent leakage occurrence for colostomy and ileostomy patients. The ability to inform the patient of that leakage prior to seal loss provides better patient comfort and quality of life, eliminating the cycle of misery caused by today's ineffective seals, subsequent skin breakdown leading to peristomal skin complications. A 5-mil polymer-thick-film (PTF) multielement electrochemical sensor array detects radial leakage and the degree of undermining up to 32 hours prior to appliance change and extending wear cycles up to 94 hours. A body-worn disposable non-electrically powered pump dispenses a stoma-friendly sealant to prevent leakage as a second level of protection

a) Thermoresponsive Skin Barrier Appliances- US Patent 10,531,977 B2, issued January 14, 2020

3. Self-Powered Wearable Wound Pump- The world's first disposable medical-grade body-worn wound pump for wound streaming therapy. The EdenPump features dispensing of 0.1 to 10 ml per hour with an innovative polymer muscle-activated treatment which been clinically proven to dispense a bio-sealant. Multiple triggering options include heat, vibration, remote pressure, and position. A pressure capability of up to 9 psi (3.6 psi/hour), a 4-mil thick microchannel delivery system, and 3D printed fabrication have been successfully demonstrated in clinical tests.

a) Miniature Pumps- US Patent 9,046,085 B2, issued June 2, 2015

b) EdenPump- A Self-Powered Wearable Polymer Muscle Pump for Wound Care Treatment- Diabetic Foot Global Conference (DFCON) 2019 https://journals.sagepub.com/doi/10.1177/1932296819897643, P29

c) polyMed: Self-Powered Polymer Muscle Activated Streaming Therapy, Journal of Medical Devices. 7. 020939. 10.1115/1.4024312 https://www.researchgate.net/publication/270774240_polyMed_Pump-Self Powered_Polymer_Muscle-Activated_Streaming_Therapy

d) Rapid Deswelling of Poly(N-isopropyl Acrylamide-co-acrylic acid) Hydrogels in Response to Temperature Changes, World Res Journal of Biomaterials, World Res J Biomaterials 1.1 (2012):12-15 https://bioinfopublication.org/pages/article.php?id=BIA0000452

4. Mobile Health- I have been the principal investigator to develop a mobile wound care tool for diabetic foot assessment. This US patented tool has successfully demonstrated impaired skeletal muscle oxygen delivery during exercise and the impact of exercise impairment. A key focus is low-power near infrared

spectroscopy to quantify a noninvasive *in vivo* measure of muscle oxygen extraction and perfusion recovery. A hand-held imaging device quantified absorption of oxyhemoglobin and deoxyhemoglobin biomarkers to determine ulceration risk assessment by a regional perfusion index(RPI) calculation. A mechano-transduction method is implemented to assess perfusion recovery.

a) Diagnostic Transducer and Method- US Patent 10,506,961 B1, issued December 17, 2019

5. Wound Diagnostics and Healing - Developing a mobile medical imager to automate size and depth ID, wound categorization to enable medical professionals to better track progress of wound healing. The prediction of recurrence extending ulcer free days will be used for hospital in-patient ulcer screening market opportunities. Identifying skin hotspots associated with repetitive stress earlier (0.02-degree sensitivity) than standard technology reduces ulceration risk. Using machine learning artificial intelligence (AI) strategy focusing on creating wound classification models to identify regions of interest (ROIs) and perform thermal indexing analysis to predict wound healing and recurrence.

a) Imaging System For, and Method for Assessing Wounds, US Non-provisional application 17/005,257, 08/27/2020

b) Infrared Eyes-Thermal Indexing to Quantify Wound Healing Diabetic Foot Global Conference (DFCON) 2019 https://journals.sagepub.com/doi/10.1177/1932296819897643, P18

c) Applications of Angiosome Classification Model for Monitoring Disease Progression in the Diabetic Feet, SummerSim '14: Proceedings of the 2014 Summer Simulation Multiconference, https://www.researchgate.net/publication/224882231

d) Coming events cast their shadows before: detecting inflammation in the acute diabetic foot and the foot in remission, Diabetes Metab Res Rev 2012 Feb;28 Suppl 1:15-20. https://doi.org/10.1002/dmrr.2231

e) Wound inflammatory index: a "proof of concept" study to assess wound healing trajectory. J Diabetes Sci Technol. 2010 Jul 1;4(4):773-9. https://doi.org/10.1177%2F193229681000400402. PMID: 20663437; PMCID: PMC2909505.

6. Mobile Apparatus for Exercise Therapy- Adults with peripheral arterial disease (PAD) have an exercise impairment but the incorporation of exercise therapy can reverse the impairment providing recovery through exercise dosage prescriptions. The Exercise Evaluation and Recovery Therapy *EXERT* system, a mobile health (mHealth) solution for assessing exercise impairment of peripheral vascular disease (PVD) patients and increasing their exercise capacity. The *EXERT system* a wearable Bluetooth enabled near infrared spectroscopy (NIRS) system to quantify skeletal muscle deoxygenation levels to assess muscle oxidative recovery between exercise sessions and reverse the PVD impairment.

a) Exercise Evaluation and Recovery Therapy System and Method, US Patent Application US 63/111,974, 11/10/2020