



Killing it: Can a Biofilm-Disrupting, Antimicrobial Wound Cleanser Improve Wound Healing?

25 June 2020 2020

San Antonio Military Health System (SAMHS) and Universities Research Forum

Valerie G. Sams, Lt Col, MC, USAF

Brooke Army Medical Center

Division of Trauma Critical Care



Disclaimer



The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the Department of the Air Force, the Department of the Army, the Department of the Navy, the Department of Defense, or the U.S. Government.



Background



- Antibiotic-resistant infections increasingly prevalent and major concern (civilian and military)
- Combat wounds prone to infection; may develop hard-to-treat biofilms due to delayed treatment
- A product that disrupts microbial biofilm and kills the biofilm-protected micro-organisms, while not damaging human tissue:
 - may lead to infection mitigation
 - Ability of chronic wounds to progress to healing
- Biofilm disruption → microbes lose their protection → systemic antibiotics/ topical antimicrobials can be effective



Objectives



- BIAKŌS vs. Vashe: effectiveness in the ability to decrease biofilm formation in chronic wounds
- BIAKŌS vs. Vashe: effectiveness in the ability to decrease healing time of chronic wounds





Methods



- Retrospective review chronic wounds treated with either Vashe or BIAKŌS wound cleanser ~4 weeks in outpatient wound ostomy clinic
- Wounds assessed by wound care team on day zero and at regular intervals/clinic appointments: physical exam + MolecuLight
- Collected age, gender, comorbidities, wound type, duration, Bates Jensen Wound Score, & MolecuLight photos pre/post each treatment



Results



Demographics

	Vashe (n=7)	BIAKŌS (n=7)
Average Age (years)	66	62
Male gender	7	2
Comorbidities		
Venous insufficiency	5	1
Diabetes Mellitus	1	1
Type of wound		
venous stasis ulcer	5	2
pressure ulcer	2	1
post surgical	2	4
Duration of wound (months)	5	6.8



Results



Outcomes

	Vashe (n=7)	BIAKŌS (n=7)
% Wound size reduction	52	70
% Bates Jensen Score reduction	10	32



MolecuLight iX Imaging Device

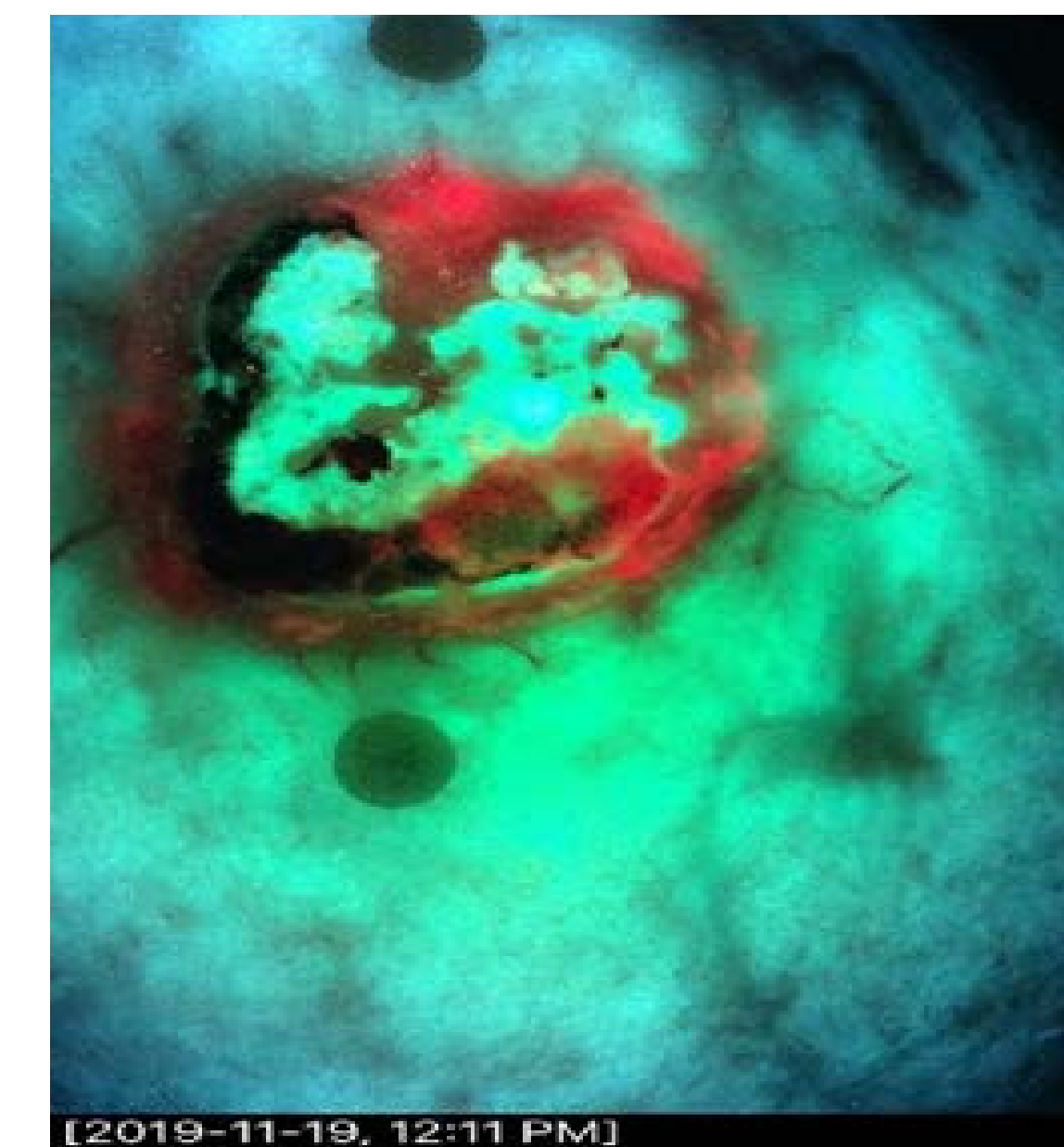
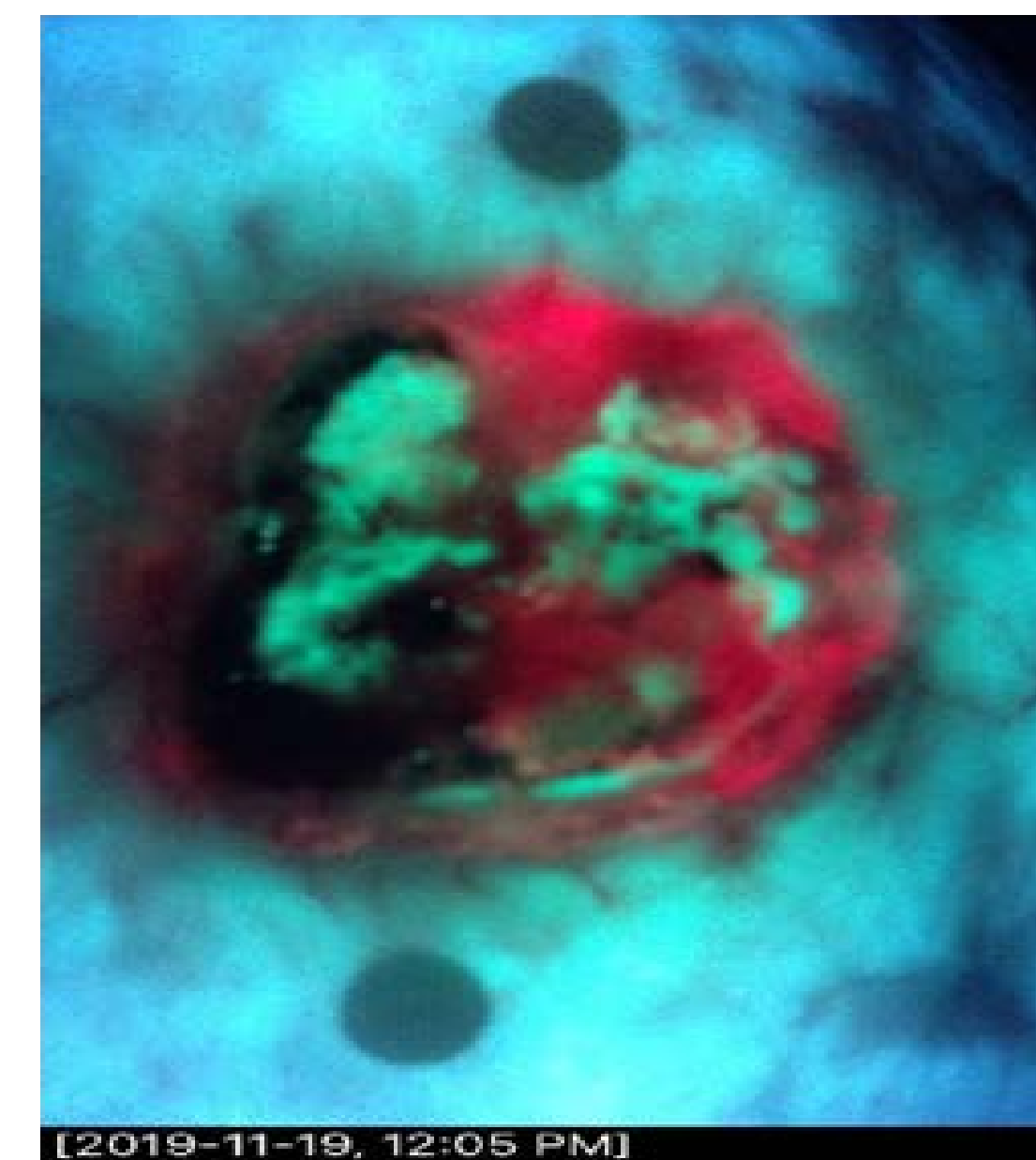
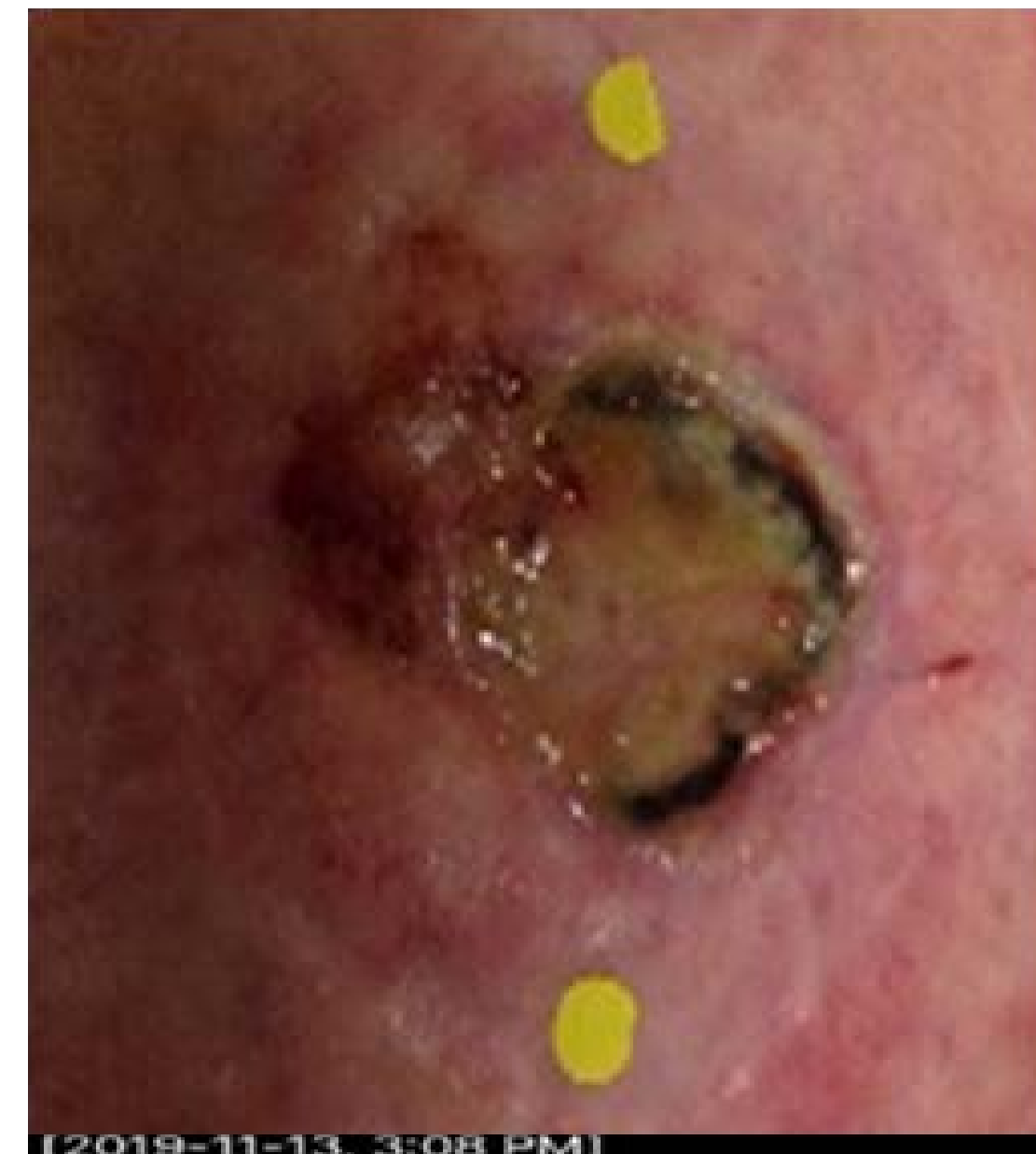
****The MolecuLight photos demonstrated a subjectively greater reduction in biofilm luminescence in the BIAKŌS group**

Results

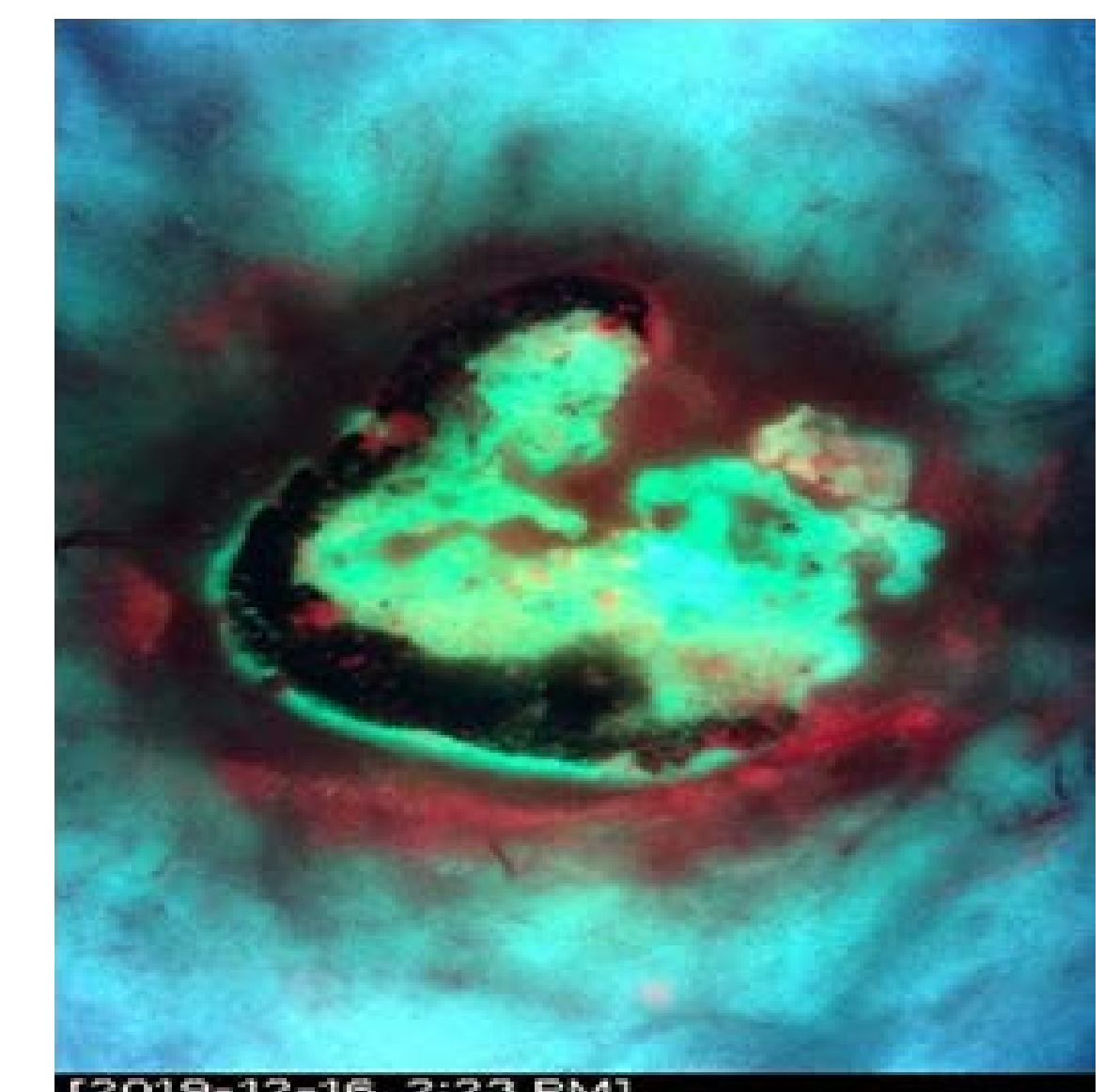
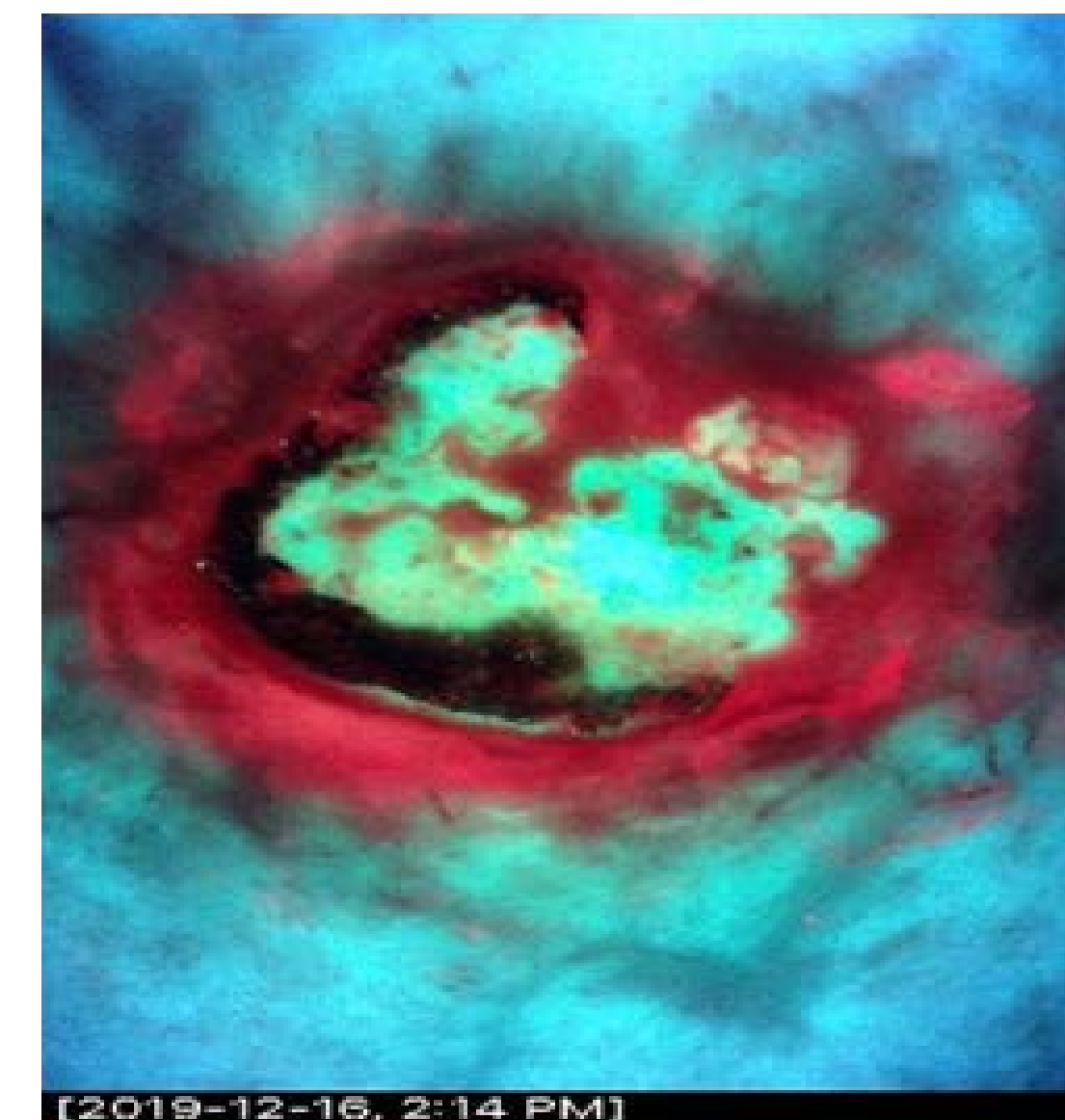
Case 1:

70yo male SCC
scalp, failed flap,
prolonged wound
vac and biologic
dressings

BiaKos Patient 1 @ 1st visit



BiaKos Patient 1 @4 wks

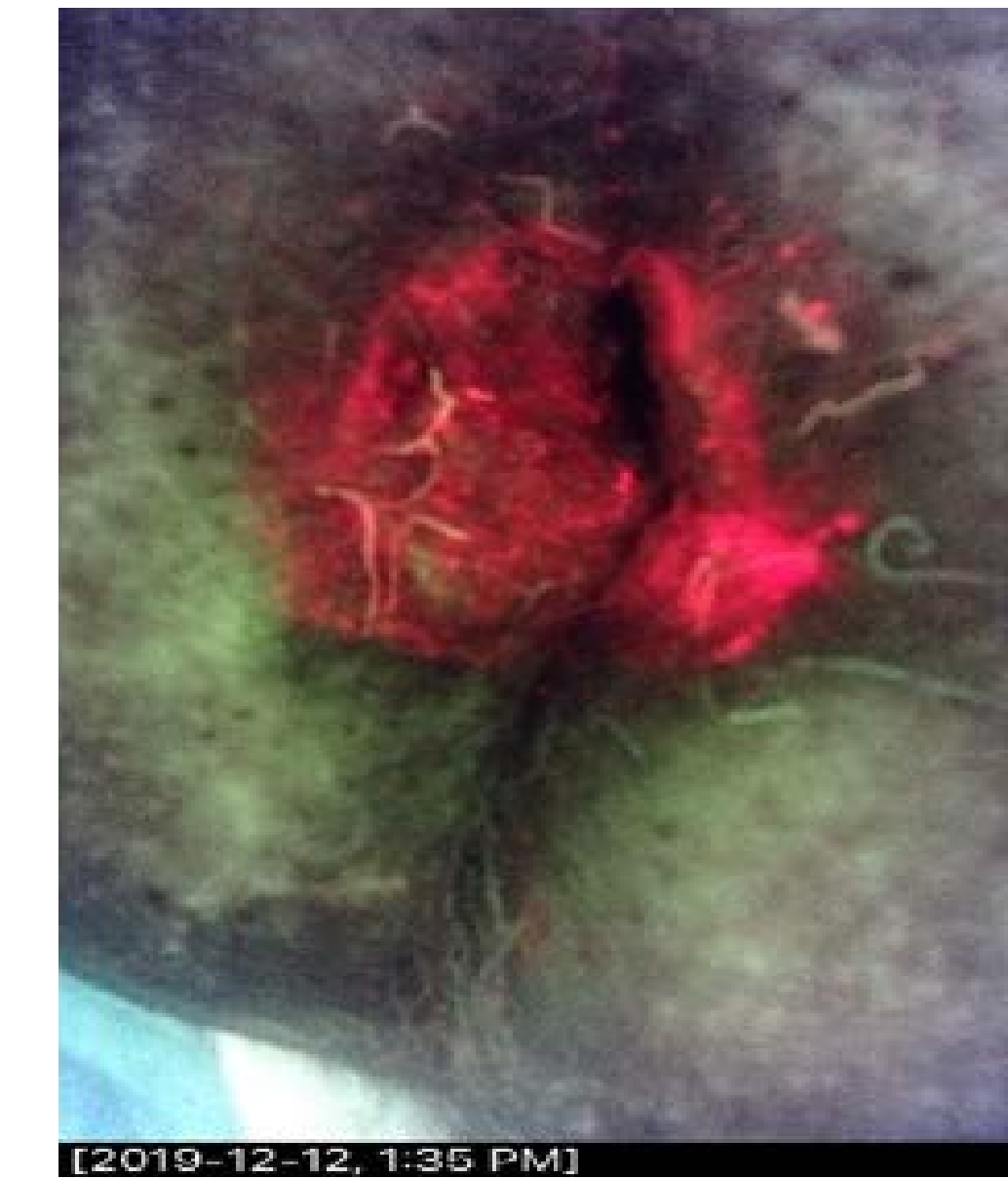
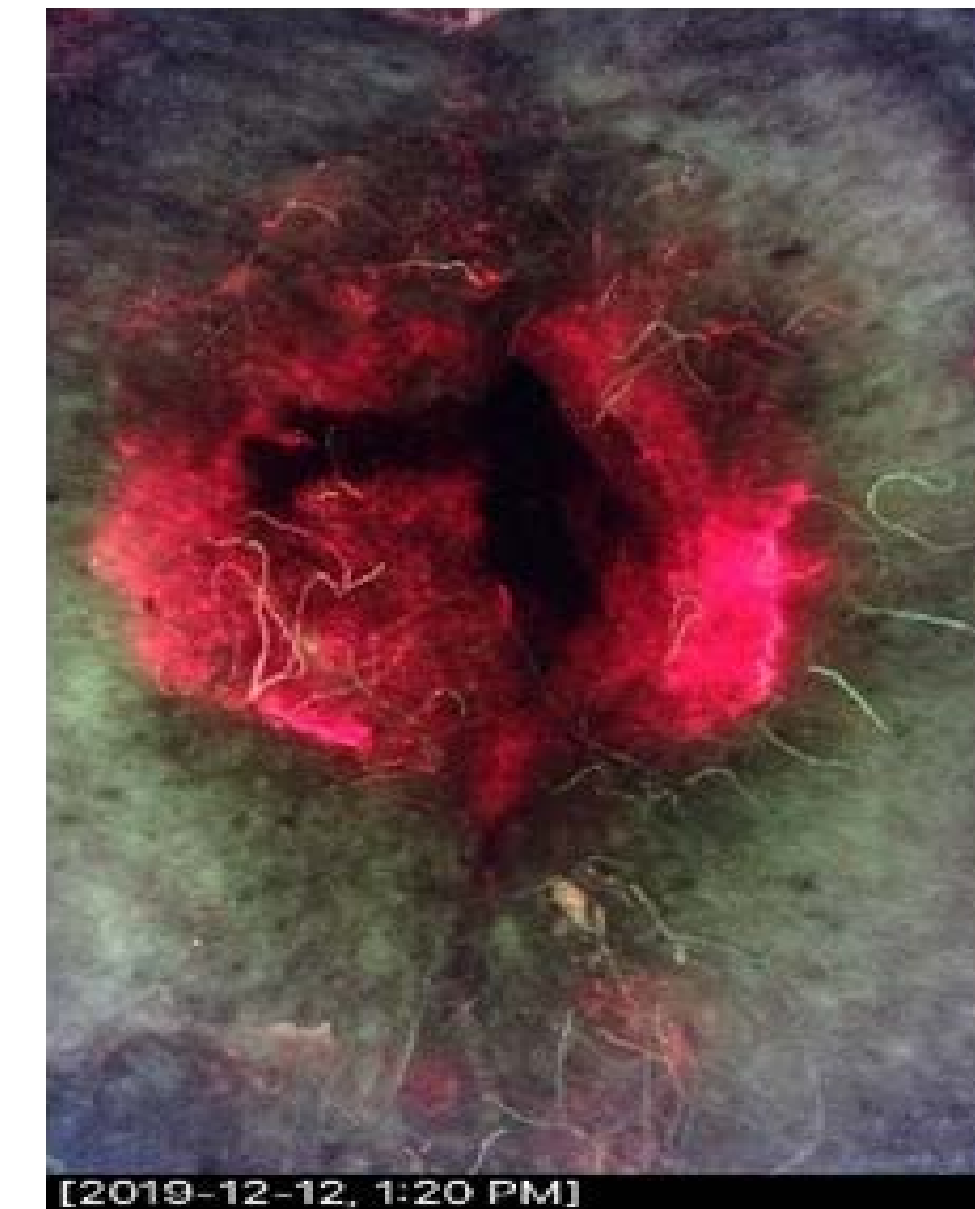


Results

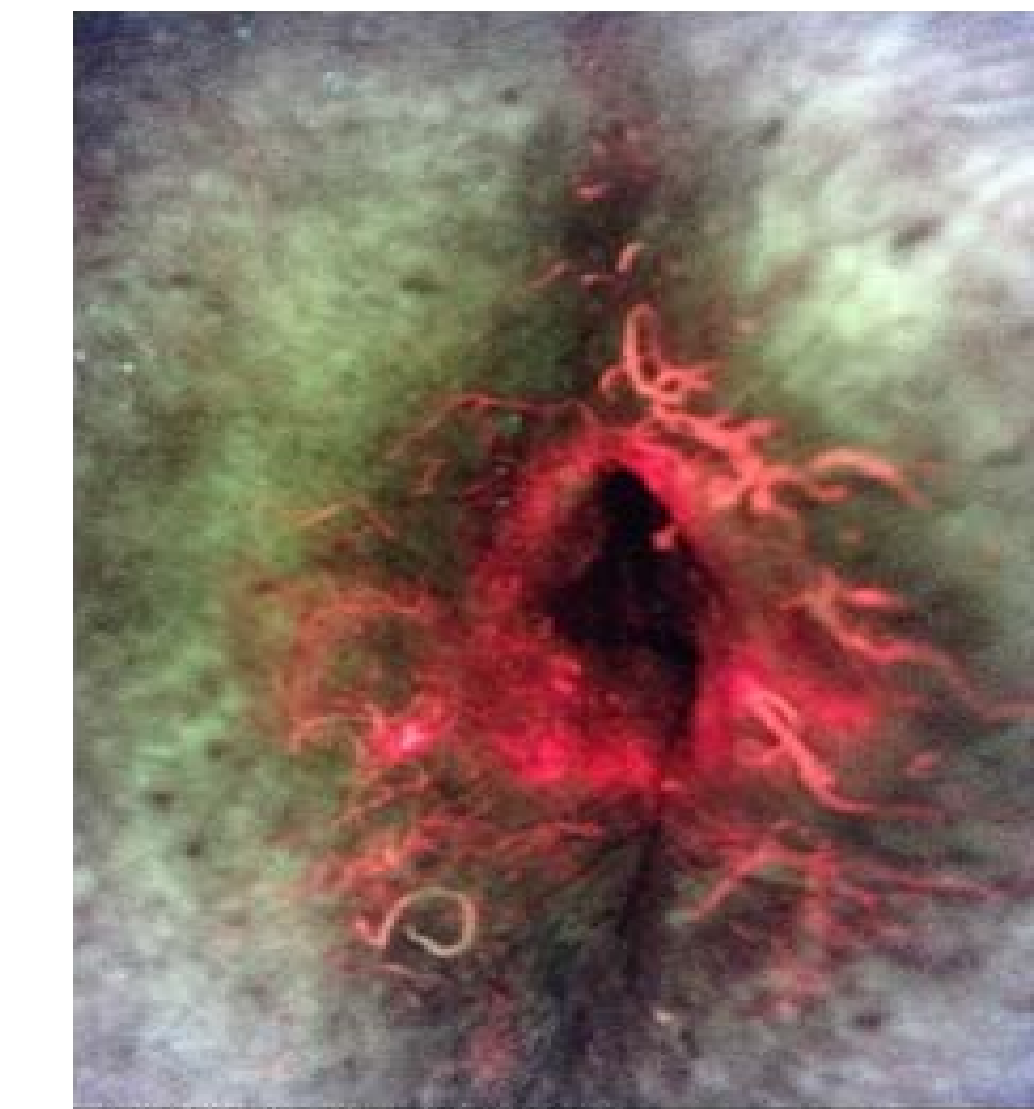
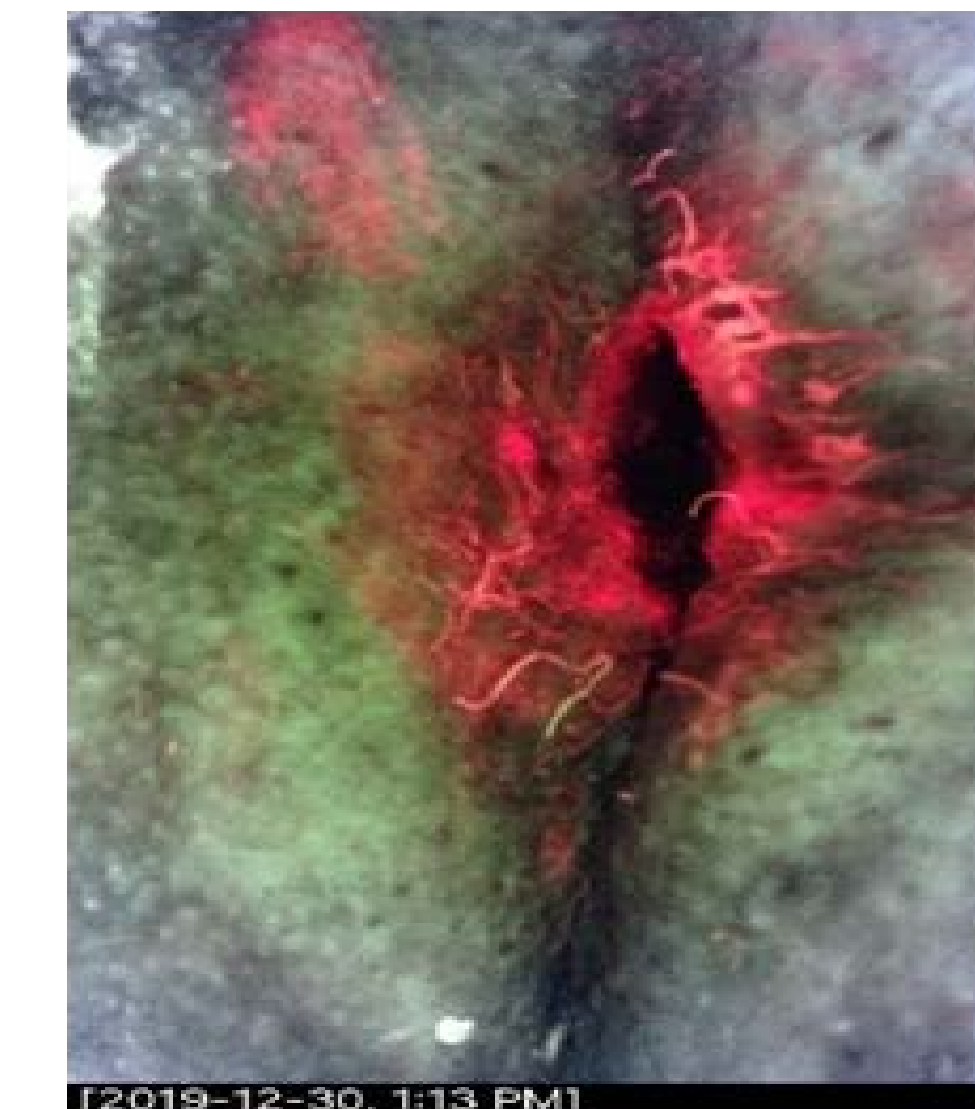
Case 2:

54yo male MCC
polytrauma, Stage IV
pressure ulcer,
several months
duration

Vashe Patient 3 @ 1st visit



Vashe Patient 3 @ 4wks





Discussion



- BIAKŌS Antimicrobial Skin and Wound Cleanser appears to reduce biofilm formation and persistence
- Leads to decreased time to wound closure and improvement in wound score
- We will continue to compile data in patients in each group to determine if this wound cleanser promotes healing of chronic wounds.



Conclusion



- This study will inform future clinical research that aims to determine the ability of the same antimicrobial product in its gel formula to:
 - reduce wound infection in acute traumatic wounds
 - decrease wound healing time
- Ultimate goal is to determine if the use of a topical antimicrobial gel applied on acute wounds can mitigate clinical incidence of sepsis by reducing wound infection rates in trauma patients



Acknowledgements



- Rochal Industries
 - Carlyn Abbott
 - Rebecca McMahan
 - Ann Beal
- BAMC Wound Ostomy Clinic
 - Pamela Collins
 - Jackie Polson
- 59th MDW S&T
- Dr. Remealle How



Thank you.

Questions?



References



- Emergency War Surgery, Fourth United States Revision, Borden Institute US Army Medical Department Center and School Fort Sam Houston Texas, Office of The Surgeon General United States Army Falls Church Virginia, Chapter 10 Infections, 113 -131, 2013.
- Black CE, Costerton JW. 2010. Current concepts regarding the effect of wound microbial ecology and biofilms on wound healing. *Surg. Clin. North Am.* 90:1147–1160.
- Bowler PG, Duerden BI, Armstrong DG. 2001. Wound microbiology and associated approaches to wound management. *Clin. Microbiol. Rev.* 14:244–269.
- Church D, Elsayed S, Reid O, Winston B, Lindsay R. 2006. Burn wound infections. *Clin. Microbiol. Rev.* 19:403–434.
- Percival SL, Hill KE, Williams DW, Hooper SJ, Thomas DW, Costerton JW. 2012. A review of the scientific evidence for biofilms in wounds. *Wound Repair Regen.* 20:647–657.
- Donlan RM, Costerton JW. 2002. Biofilms: survival mechanisms of clinically relevant microorganisms. *Clin. Microbiol. Rev.* 15:167–193
- Hoiby N, Bjarnsholt T, Givskov M, Molin S, Ciofu O. 2010. Antibiotic resistance of bacterial biofilms. *Int. J. Antimicrob. Agents* 35:322–332.
- Leid JG, Willson CJ, Shirtliff ME, Hassett DJ, Parsek MR, Jeffers AK. 2005. The exopolysaccharide alginate protects *Pseudomonas aeruginosa* biofilm bacteria from IFN--mediated macrophage killing. *J. Immunol.* 175:7512–7518.
- Stewart PS, Costerton JW. 2001. Antibiotic resistance of bacteria in biofilms. *Lancet* 358:135–138.
- Gutierrez, D., Hidalgo-Cantabrana, C., Rodriguez, A., Garcia, P., Ruas-Madiedo, P., “Monitoring in real time the formation and removal of biofilms from clinical related pathogens using an impedance-based technology”, *PLoS ONE*, Oct 2016
- Wolcott, R.D., Rhoads, D.D., Bennett, M.E., Wolcott, B.N., Gogokhia, L., Costerton, J.W., Dowd, S. E., “Chronic wounds and the medical biofilm paradigm”, *Journal of Wound Care*, 19:2, 2010.
- Rebecca McMahon, PhD. “Combat Casualty Infection Mitigation during Evacuation from Battlefield (Echelon A) to SAMMC (Echelon E),” December 11, 2018.