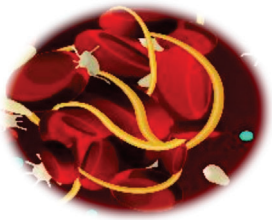
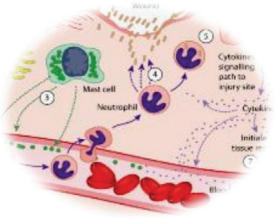
Skin and Wound Care 2022, Updates to Current Best Practices for the Treatment and Prevention of Chronic Wounds

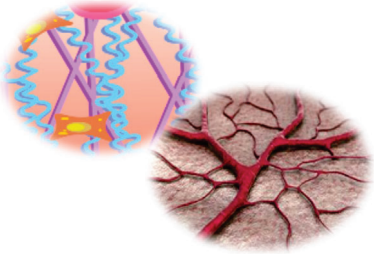
Presented by Ryan Dirks MS, PA, CWS
CEO and CMO United Wound Healing

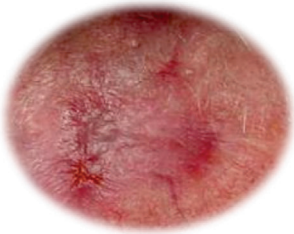
HEAL UNIVERSITY
A Division of United Wound Healing

Expected Wound Healing









Hemostasis **Inflammation** **Proliferation** **Remodeling**

Unexpected…

Acute vs. Chronic Wounds

Acute wound: A wound with an etiology that occurs suddenly, either with or without intention, but then heals in a timely manner.

Chronic wound: a wound that has a slow progression through the healing phases, or shows delayed, interrupted or stalled healing due to intrinsic and extrinsic factors that impact on the individual and their wound.

- *A chronic, non-healing wound could be suggestive of a biofilm, providing holistic evaluation has excluded or corrected underlying pathologies such as ischemia.*

International Wound Infection Institute (IWII) Wound infection in clinical practice. Wounds International 2016
Murphy C, Atkin L, Swanson T, Tachi M, Tan YK, Vega de Ceniga M, Weir D, Wolcott R. International consensus document. Defying hard-to-heal wounds with an early antibiofilm intervention strategy: wound

Most Common Chronic Wound Etiologies

Pressure Ulcer/ Injuries

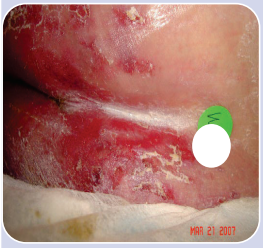
Peripheral Arterial Disease

Venous Insufficiency

Diabetic Neuropathic Foot Ulcers

Lymphedema

Other Frequently Encountered Wounds



Moisture Associated Skin Damage

Deep Tissue Pressure Injury

Kennedy Terminal Ulcer

(KTU)

AKA

Skin Failure

Medical Adhesive Related Skin Injury

(MARSI)

Medical Device Related Pressure Injury

Must be staged and reported on the MDS

Other Frequently Encountered Wounds


Surgical Dehiscence

Infection

Poor closing technique

Too much strain on incision by patient

Skin Tears

Can be partial or full-thickness injuries

Considered traumatic wound

Atypical Wounds

Host of different etiologies often associated with autoimmune diseases

Cancer Wounds

Fungating wound depicted here

Mixed Etiologies

Arterial and Venous

Venous Insufficiency and Lymphedema

AKA Phlebolymphedema

Pressure and Arterial

Moisture Associate Skin Damage (MASD) and Pressure

Autoimmune/Atypical Wounds

Pyoderma Gangrenosum

Beware of Pathergy Effect

Vasculitis

Inflammation and destruction of blood vessels

Pemphigus Vulgaris

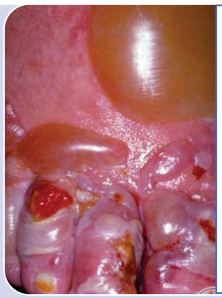
Auto-antibodies against some part of epidermis

Oral lesions seen 1st

Bullous Pemphigoid

Most common auto-immune dermatosis

(Allergy to one's own



Attribution: Dermatology Information Center

Bullous Diabeticorum

Spontaneous non-inflammatory blistering unique to patients with diabetes

Factors that Contribute to Wound Chronicity

Time Driven

- Increased bacterial load
- Excessive proteases
  - Degraded
    - Growth factors
    - Matrix proteins
    - Cell surface receptors
- Prolonged inflammation
- Cellular senescence
- Inadequate / inappropriate treatment

Patient Driven

- Diseases or conditions
  - Competing for oxygen or metabolic resources
- Medications
  - Steroids
  - Immunosuppressive agents
  - Chemotherapy
- Patient adherence
  - Diet/blood glucose
  - Smoking
  - Off-loading

Evolution of Wound Care Treatments

- The oldest medical manuscript, a clay tablet, describes three healing principles: washing the wounds, making the plasters, and bandaging.
- The ancient Egyptians applied a paste of honey, grease, and lint into an open wound to remove skin and pus and encourage wound healing.
- The ancient Greeks focused more on cleanliness and washed wounds with clean water, vinegar, or wine. The Hippocratic Collection states, “For an obstinate ulcer, sweet wine, and many patients should be enough.”
- The ancient Romans were the first to describe the four cardinal signs of inflammation: “rubor, tumor, calor, et dolor,” meaning redness, swelling, heat, and pain.
- In the Middle Ages, the customary practice was to allow a wound to “rot a bit.”
- Napoleon’s surgeon, Dominique Jean Larrey, was the first physician to document the necessity for early amputation for any limb injury in which the limb could not be saved, by noting that early amputation would create a relatively clean and viable wound.
- Wound care has evolved from simple dressing changes to a board certified specialty.

Modern Advancements in Wound Care

- In 1860, Joseph Lister published a report on the treatment of compound fractures with **carbolic acid**, a method known as the Lister Antiseptic System. Lister is also credited with the development of the first **wet-to-dry** dressing. In the mid-1800s, he used clean cotton batting soaked in carbolic acid to pack wounds. In 1890, Robert Wood Johnson, co-founder of Johnson & Johnson, began using the Lister Antiseptic System to develop gauze and wound dressings sterilized with dry heat, steam, and pressure.
- In the 1880s, textbooks on wound care began to stress the importance of **skin cleansing and removal of foreign matter.** Dr. Carl Reyher, a Russian military surgeon, was the first to recommend adding more extensive mechanical wound cleansing, which he termed **“debridement.”**
- From 1909 to 1918, before and during World War I (WWI), it was common practice to apply **dry gauze packed with salt** to the wound bed. Toward the end of WWI, the **Carrel-Dakin method** of continuously infusing **hypochlorite solution** directly into gauze packed into the wound became a standard treatment in the British Army.
- In the late 19th century, metallic antiseptics were introduced. **Silver ceramic powder** was introduced in 1928, and the latest silver preparation of silver sulfadiazine became available in 1958.
- The 20th century brought about numerous changes in how we treat wounds. In the 1960s, George Winter[12] and Cameron Hinman and Howard Maibach[13] reported on the superior efficacy of a **moist wound healing technique**. This discovery led to a focus on creating and maintaining a moist wound healing environment through the use of **specialized dressings.**

CMS SOM F686

Dressings and Treatment Per F686

Determination of the need for treatment for a PU/PI is based upon the individual practitioner's clinical judgment, facility protocols, and current professional standards of practice.

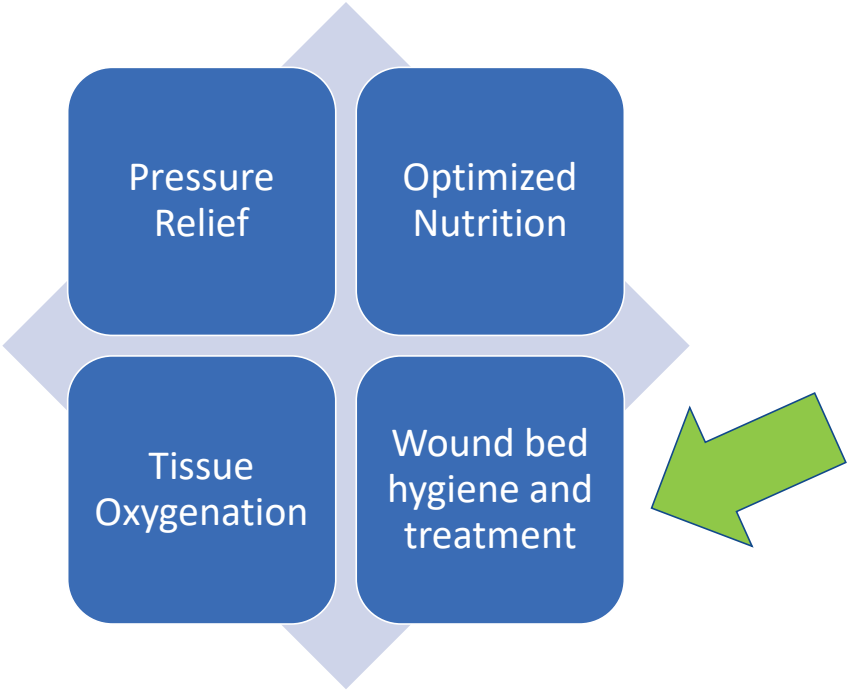
A facility should be able to show that its treatment protocols are based upon current professional standards of practice and are in accord with the facility's policies and procedures as developed with the medical director's review and approval.

Below current professional standards of practice

Wet to dry
Damages new tissue

Cytotoxic to new cells & tissues

2022 Chronic Wound Treatment Paradigm



HEAL UNIVERSITY
A Division of United Wound Healing

Wound Hygiene & Biofilm-Based Wound Care

HEAL UNIVERSITY
A Division of United Wound Healing

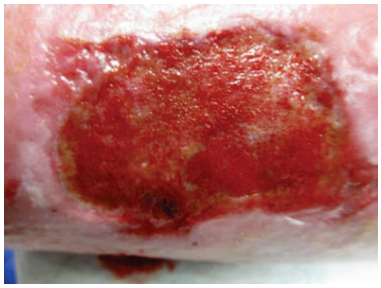
Overt (classical) Signs of Local Infection

- Erythema
- Local warmth
- Swelling
- Purulent discharge
- Delayed wound healing beyond expectations
- New or increasing pain
- Increasing malodor

HEAL UNIVERSITY
A Division of United Wound Healing

Covert Signs of Local Infection

- Hypergranulation tissue
- Bleeding, friable granulation
- Epithelial bridging and pocketing in granulation tissue
- Wound breakdown and enlargement
- Delayed wound healing beyond expectations
- New or increasing pain
- Increasing odor



Modes of Bacterial Growth

- Planktonic
  - Free floating
  - Antibiotics can destroy easier
  - Most antibiotic testing is on planktonic (wound cultures)
- Biofilms
  - Complex communities of microbes that adhere to solid surfaces
  - Embedded in an extracellular polysaccharide matrix

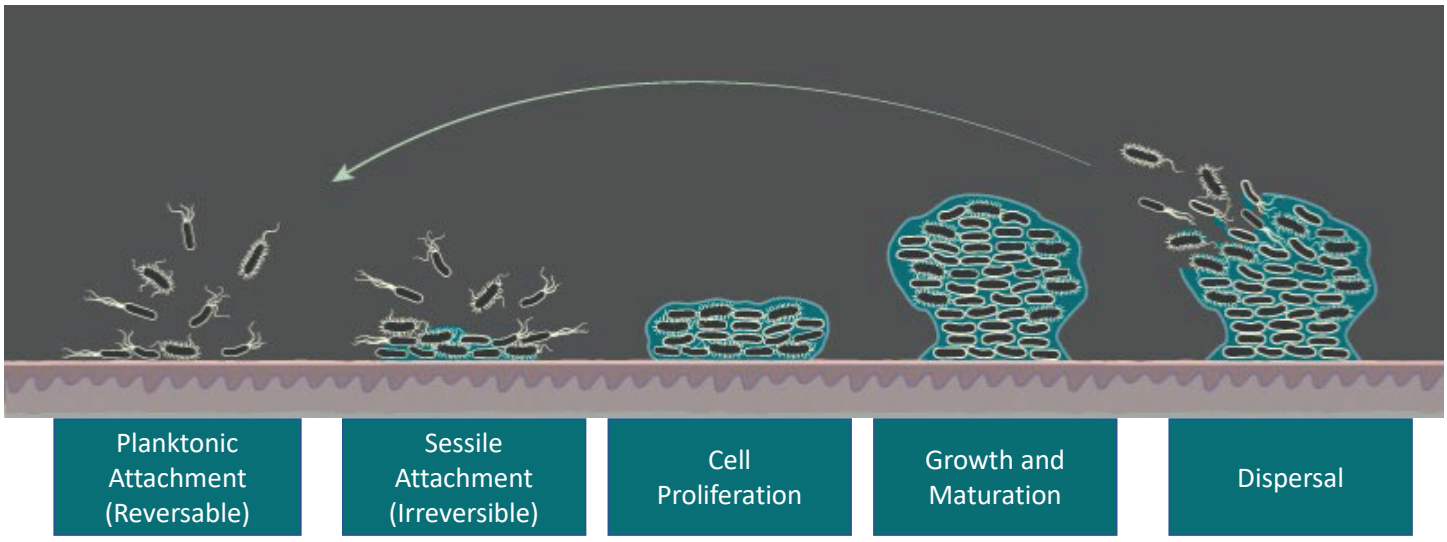
HEAL UNIVERSITY
A Division of United Wound Healing

Biofilm in a Nutshell

- Multiple species of microbes
  - Gm + and -, aerobes and anaerobes
  - Exudes film of extracellular polymeric substances (EPSs) composed of proteins, lipids, and polysaccharides.
  - Fungi are often found in wound biofilms
- Between 60-90% of chronic wounds contain biofilm versus only approximately 6% of acute wounds
- Can begin to form within 2 hours, and reform within 48-72 hours after removal

Phillips PL, et al. Biofilms Made Easy. Wounds International. 2010;1(3):1-6. www.woundsinternational.com/media/issues/288/files/content_8851.pdf.Accessed March 28, 2017.
Hyang R, Li M, Gregory RL. Bacterial interactions in dental biofilm. Virulence;2011;2(5):435-444.

Biofilm Development



Biofilm-Based Wound Care

- Debridement is primary initial approach (remove the biofilm)
- Topical management (keep it from regrowing)
  - Antimicrobial cleansing
  - Antimicrobial dressings
    - Biofilm "busting" agents to disrupt biofilm matrix exposing bacteria making them more vulnerable

HEAL UNIVERSITY
A Division of United Wound Healing

Debridement

- Debridement is one of the most important treatment strategies against biofilms, but does not remove all biofilm, and therefore cannot be used alone
  - *Repeated debridement alone is unlikely to prevent biofilm regrowth*
  - *Effective topical antiseptic application within this time-dependent window can suppress biofilm reformation*
- In vitro data suggest that there is a window of opportunity for biofilm prevention following debridement of up to 24 hours when biofilms are susceptible to topical antiseptics and other treatments.

Schultz G et al. Consensus guidelines for the identification and treatment of biofilms in chronic nonhealing wounds. Wound Rep Reg (2017) 25 744–757

Biofilm Based Wound Management

- Begins with wound hygiene!
  - Lessons from oral hygiene
- Even if the wound does not 'look' like it has biofilm wo
  must be a priority.
- Vigorously cleanse the skin and wound to the extent pc
- Debride when necessary and able
  - ***Include the edges***
- Continue with maintenance hygiene with each dressing change
- Decide how to cleanse and what to cleanse with

Consider this...

Therapeutic Wound and Periwound Cleansing

- Wound cleansing is the use of fluids and/or devices to remove loosely adherent contaminants and devitalized material from the wound surface and wound edges[1]
- Promotion of skin cleansing of the periwound is considered part of completing a dressing change
- When cleansing the periwound skin, concentrate on the area that is 10–20 cm away from the wound edges, or that is covered by the dressing, whichever is larger[2]
- Use an antiseptic wash or surfactant for cleansing, if possible, and avoid cross-contamination[2]

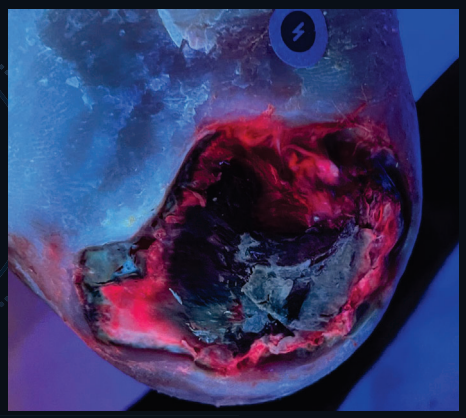
1. Rodeheaver GT, Ratliff CR. Wound cleansing, wound irrigation, wound disinfection. In: Krasner DL, van Rijswijk L, eds. Chronic Wound Care: The Essentials e-Book. Malvern, PA: HMP; 2018:47–62. Available at http://online.fliphtml5.com/zxoes/kzzg/ Accessed 5/19/2019.2. Murphy C, Atkin L, Swanson T, Tachi M, Tan YK, Vega de Ceniga M, Weir D, Wolcott R. International

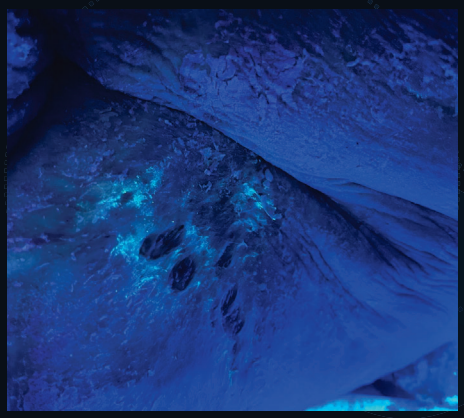
Wound Cleansing

- Even if the wound does not 'look' like it has biofilm, wound cleansing must be a priority[1]
- Integral part of wound bed preparation[2]
  - Removes surface debris
  - Reduces bacterial load
  - Mitigates biofilm activity
- Challenge is the right balance
  - How to clean
  - What to clean with

1. Murphy C, Atkin L, Swanson T, Tachi M, Tan YK, Vega de Ceniga M, Weir D, Wolcott R. International consensus document. Defying hard-to-heal wounds with an early antibiofilm intervention

Images from real-time bacterial fluorescence imaging





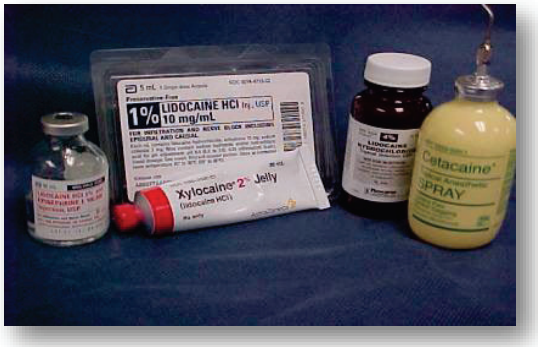
Mechanical Cleansing

HEAL UNIVERSITY
A Division of United Wound Healing

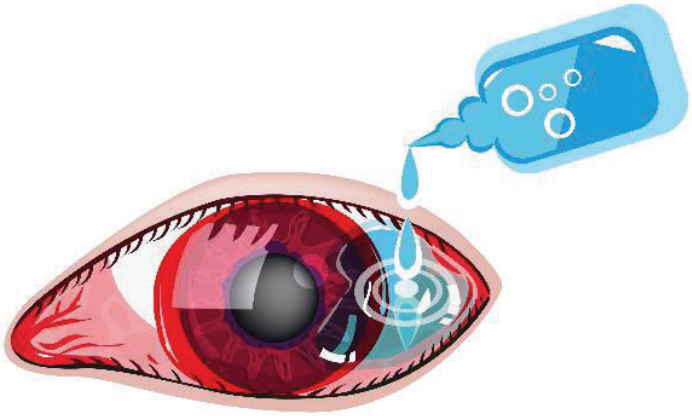
Plan for the Pain

- To assume we can provide care without causing some pain is unrealistic

- Nursing pre-medicate patient
- Use topical anesthetics
  - 4% lidocaine cream is OTC and helps soften slough



What to Clean With



Wound Cleansing

- Commercial cleansers
  - Enhanced wound cleaning due to surface active agents, which break the bonds of foreign bodies on wound surface
  - Strength of their chemical reactivity directly proportional to their cleansing capacity and toxicity to cells

Skin cleansers (those for incontinence) should not be used to cleanse an open wound

Fernandez R, Griffiths R. Water for wound cleansing. Cochrane Database of Systematic Reviews 2012, Issue 2. Art. No.: CD003861. doi: 10.1002/14651858.CD003861.pub3
Wolcott R, Fletcher J. The role of wound cleansing in the management of wounds. Wounds International 2014. 1(1).

What is a Surfactant?

- A compound that lowers the surface tension between two liquids or between a liquid and a solid.

SURF -	-ACT-	-ANT
Surface	Active	Agent

Surfactants in Everyday Life

What to Clean With?

- Isotonic Saline (0.9%)
  - No impact on microbes and biofilm
  - Best used with monofilament or gauze scrubbing
- Potable (tap) water
  - 2012 Cochrane Review concluded **no difference in healing or infection rates in using saline vs tap water**
  - *Concern of water borne pathogens such as pseudomonas, and known growth of biofilm in pipes*
  - No impact on microbes and biofilm

Wound cleansing, topical antiseptics and wound healing. Atiyeh B, Dibo S, Hayek S. *Int Wound J*. 2009;6(6):420-430.

What to Clean With?

- **Polyhexinide / Polyhexamethylene biguanide (PHMB) 0.1%**
  - One commercially available cleanser contains polyhexanide and betaine, a surfactant, to lift microbes and debris and suspend them in solution to prevent wound recontamination
  - Has an increased ability to penetrate difficult-to-remove coatings, lifting debris, bacteria, and biofilm from the wound
  - Broad spectrum of activity against bacteria, viruses, and fungi
  - No evidence of toxicity or resistance
  - Commonly used with NPWT
- MRSA Killer
  - To evaluate activity of polyhexanide and betain cleanser on MRSA and biofilms in a partial thickness porcine wound model, against untreated control
  - Significant reduction of MRSA at 48 and 72 hours ($P<0.05$) compared to the other treatment groups. Reduction of MRSA biofilm was only demonstrated using PHMB; saline solutions failed to reduce MRSA counts

Wolcott R, Fletcher J. The role of wound cleansing in the management of wounds. Wounds International. 2014;1(1):25-31
Perez R, Davies SC, Kaehn K. Effect of different wound rinsing solutions on MRSA biofilm in a porcine wound model. Wound Management 2010; 4(2); 44-8

What to Clean With?

- Hypochlorous Acid (Vashe)
  - Broad-spectrum antimicrobial activity
  - Non-irritating, non-sensitizing, non-toxic
  - Has rapid antimicrobial activity at concentrations safe for human cells

  - In vitro study comparing HOCL, 0.05% chlorhexidine wound cleanser (CWS) and 1% and 10% povidone iodine (PI) against staph aureus and pseudomonas biofilm found similar reduction in biofilm with less cytoxicity than PI and CWS

Wolcott R, Fletcher J. The role of wound cleansing in the management of wounds. Wounds International. 2014;1(1):25-31. Day A, et al. . Disruption of Biofilms and Neutralization of Bacteria Using Hypochlorous Acid Solution: An In Vivo and In Vitro Evaluation. Adv Skin Wound Care. 2017;30(12):543-551. doi:10.1097/01.ASW.0000526607.80113.66

What to Clean With?

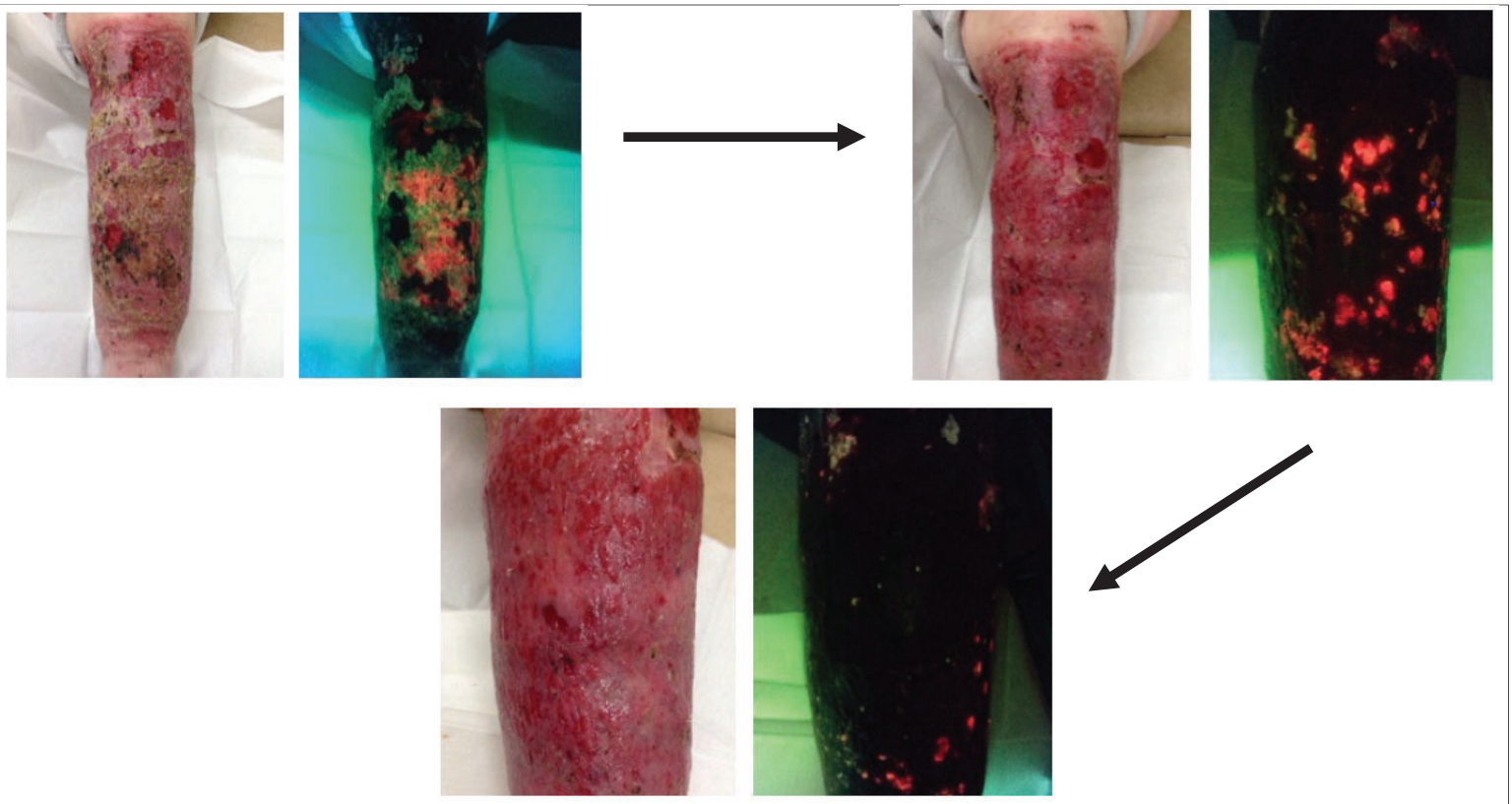
- Acetic Acid (Vinegar Solution)
  - Shown effectiveness against many Gram-positive and Gram-negative organisms, especially *Pseudomonas aeruginosa*
  - Does not kill bacteria, creates an acidic environment unfavorable for bacterial growth
  - Acetic acid in 1% and 5% concentrations has been widely used in an attempt to reduce pH
  - Effective against odor
  - In vivo studies have shown safety for short periods (4-7 days) to control bacterial levels without compromising the healing process

Nagoba B, et al. Acidic environment and wound healing: A review. *Wounds*. 2015;27(1):5-11.

Does This Look Familiar?

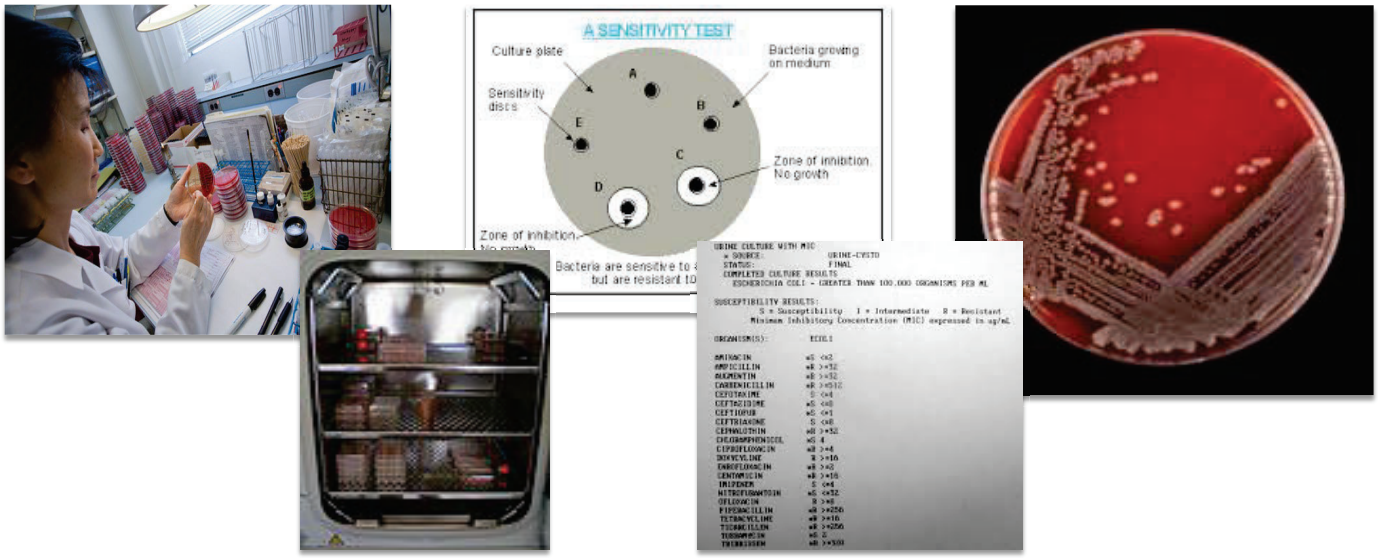
HEAL UNIVERSITY
A Division of United Wound Healing

Descaling Hyperkeratotic Skin



Identification and topical treatment options for Biofilm

Advancements in the Identification and Diagnosis of Biofilms and Infections

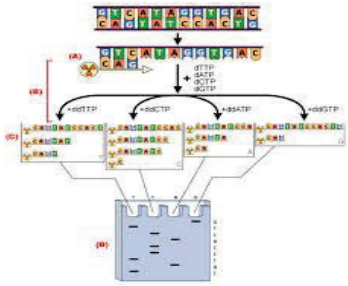


Medicine: Diagnose & Treat

- The more accurate your diagnostic information the better your treatment decisions

Traditional Cultures
Grow the microbes

or



NGS
Extracts the DNA

DNA Analysis (PCR & NGS) vs. Traditional Cultures

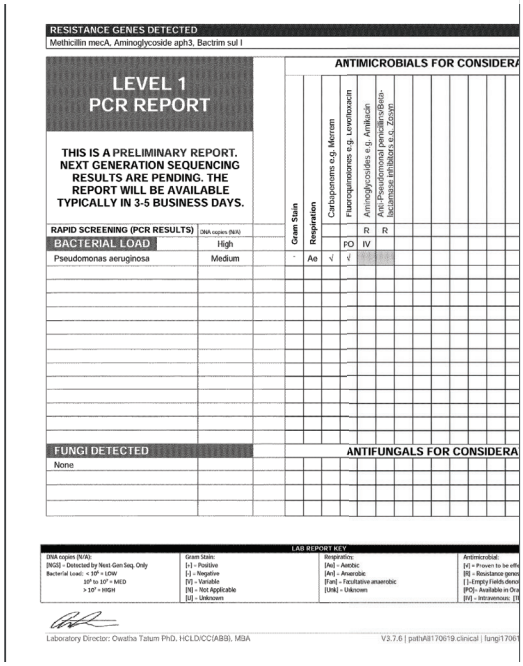
51 Chronic Wounds: Parallel Samples

PCR + NGS	Traditional Culture
48/51 Staph Identified	28/51 Staph Identified
32/51 Pseud Identified	8/51 Pseud Identified

DNA Sequencing Outperformed Traditional Cultures
DNA Sequencing Identified 145 Species – Culture Identified 14

Cost Comparison

Traditional Culture	PCR and NGS
Basic C&S = $50 - $70 • Does not include anaerobic testing or fungal	PCR/NGS = $199
Anaerobic = $160	Included
Fungal = $655	Included
TOTAL COST = $855	**MAX COST TO PATIENT/Facility = $199**



RESISTANCE GENES DETECTED
Methicillin mecA, Aminoglycoside aph3, Bactrim sul I

LEVEL 1
PCR REPORT

THIS IS A PRELIMINARY REPORT. NEXT GENERATION SEQUENCING RESULTS ARE PENDING. THE REPORT WILL BE AVAILABLE TYPICALLY IN 3-5 BUSINESS DAYS.

ANTIMICROBIALS FOR CONSIDERA

RAPID SCREENING (PCR RESULTS)	DNA copies (N/A)	Gram Stain	Respiration	Carbapenems e.g. Meropen	Fluoroquinolones e.g. Levofloxacin	Aminoglycosides e.g. Amikacin	Anti-Pseudomonal penicillins/Beta-lactamase inhibitors e.g. Zosyn
						R	R
BACTERIAL LOAD	High				PO	IV	
Pseudomonas aeruginosa	Medium	-	Ae	√	√		

FUNGI DETECTED
None

ANTIFUNGALS FOR CONSIDERA

LAB REPORT KEY

DNA copies (N/A):
[NGS] – Detected by Next-Gen Seq. Only
Bacterial Load: < 10^5 = LOW
10^5 to 10^7 = MED
> 10^7 = HIGH

Gram Stain:
[+] – Positive
[-] – Negative
[V] – Variable
[N] – Not Applicable
[U] – Unknown

Respiratory:
[Ae] – Aerobic
[An] – Anaerobic
[Fan] – Facultative anaerobic
[Unk] – Unknown

Antimicrobial:
[+] = Proven to be effe
[R] – Resistance genes
[ ] -Empty Fields denot
[PO]- Available in Oral
[IV] – Intravenous; [TP]

Laboratory Director: Owatha Talum PhD, HCLD/CC(ABB), MBA

V3.7.6 | pathAll170619.clinical | fungi1706

RESISTANCE GENES DETECTED
Methicillin mecA, Aminoglycoside aph3, Bactrim sul I

LEVEL 2
NGS REPORT

COMPREHENSIVE IDENTIFICATION NEXT-GEN DNA SEQUENCING RESULTS with PRIOR PCR RESULTS.

ANTIMICROBIALS FOR CONSIDERATION

COMPLETE (NGS & PCR RESULTS)	DNA copies (N/A)	NGS	Gram Stain	Respiration	Carbapenems e.g. Meropen	Fluoroquinolones e.g. Levofloxacin	Aztreonam	Fosfomycin	Aminoglycosides e.g. Amikacin	Ampicillin/Amoxicillin	Ansiblates e.g Bactrim	Anti-Pseudomonal penicillins/Beta-lactamase inhibitors e.g. Zosyn	Cephalosporins First Gen e.g. Keflex	Cephalosporins Third Gen e.g. Suprax	Cephalosporins Fourth Gen e.g. Maxipime	Broad spectrum penicillins/Beta-lactamase inhibitors e.g. Augmentin	Eclinocandins e.g. Mycamine	Polyenes e.g. Amphotericin B	Triazoles e.g. Diflucan
									R	R	R	R	R	R	R	R			
BACTERIAL LOAD	High	%				PO		PO	IV	PO	PO		PO	IV	PO	PO	IV	PO	PO
Proteus mirabilis	NGS	75%	-	FAn	√	√	√	√											
Pseudomonas aeruginosa	Medium	19%	-	Ae	√	√													
Morganella morganii	NGS	4%	-	Ae	√	√	√												

FUNGI DETECTED

ANTIFUNGALS FOR CONSIDERATION

	%	N	Unk															
Candida parapsilosis	100%	N	Unk													√	√	√

LAB REPORT KEY

DNA copies (N/A):
[NGS] – Detected by Next-Gen Seq. Only
Bacterial Load: < 10^5 = LOW
10^5 to 10^7 = MED
> 10^7 = HIGH

Gram Stain:
[+] – Positive
[-] – Negative
[V] – Variable
[N] – Not Applicable
[U] – Unknown

Respiration:
[Ae] – Aerobic
[An] – Anaerobic
[Fan] – Facultative anaerobic
[Unk] – Unknown

Antimicrobial:
[+] = Proven to be effective.
[R] = Resistance genes detected.
[ ]-Empty Fields denote Unknown.
[PO]= Available in Oral formulations.
[IV] = Intravenous; [TP] = Topical.

Page 1 of 2

Laboratory Director: Owatha Talum PhD, HCLD/CC(ABB), MBA

P2 V3.7.7 | pathAll170619.clinical | fungi170615.clinical

76-year-old female with chronic VLU's

Diagnosing and treating

Wound care study: DNA diagnostics + customized treatment show significant improvements in outcome

research

journal of wound care JWC

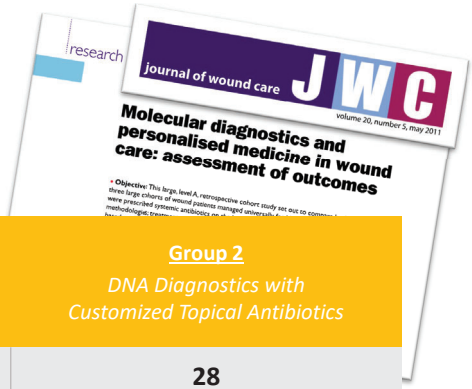
volume 20, number 5, may 2011

Molecular diagnostics and personalised medicine in wound care: assessment of outcomes

- **1378 patients were recruited into the study**
- In the standard of care group 48.5% of patients healed completely during the 7-month study period
- This increased to 62.4% in treatment group 1 and 90.4% in treatment group 2

Standard of Care Group	Group I	Group 2
Traditional Culture with Systemic Antibiotics	Molecular Diagnostics with Systemic Antibiotics	**Molecular Diagnostics with Customized Topical Antibiotics**
% of Patients Healed	**% of Patients Healed**	**% of Patients Healed**
48.5%	62.4%	**90.4%**
244/503	298/479	358/396

Wound care study:
Median number of days to heal by type



Wound Type	Standard of Care *Traditional Culture with Oral Antibiotics*	Group 1 *DNA Diagnostics with Oral Antibiotics*	Group 2 *DNA Diagnostics with Customized Topical Antibiotics*
Pressure Ulcer	N/A	107	**28**
Diabetic Foot Ulcer	168	84	**32**
Non-Healing Surgical Wound	176	75	**44**
Traumatic Abscess	39	33	**14**
Venous Leg Ulcer	177	98	**37**
TOTAL	177	77 ($p<0.001$)	**28** ($p<0.001$)

Topical Antibiofilm Treatments

- PHMB Containing Products (Biakos Gel)
- Blastx
- Lipogel (with or without Rx)
- Slow Release Cadexamer Iodine (Iodasorb/flex) – *must be used for less than 30 days due to cytotoxicity*
- Hypochlorous acid (Vashe)
- Hypochlorite acid (Dakins, Anicept)- should be used as last resort due to cytotoxicity

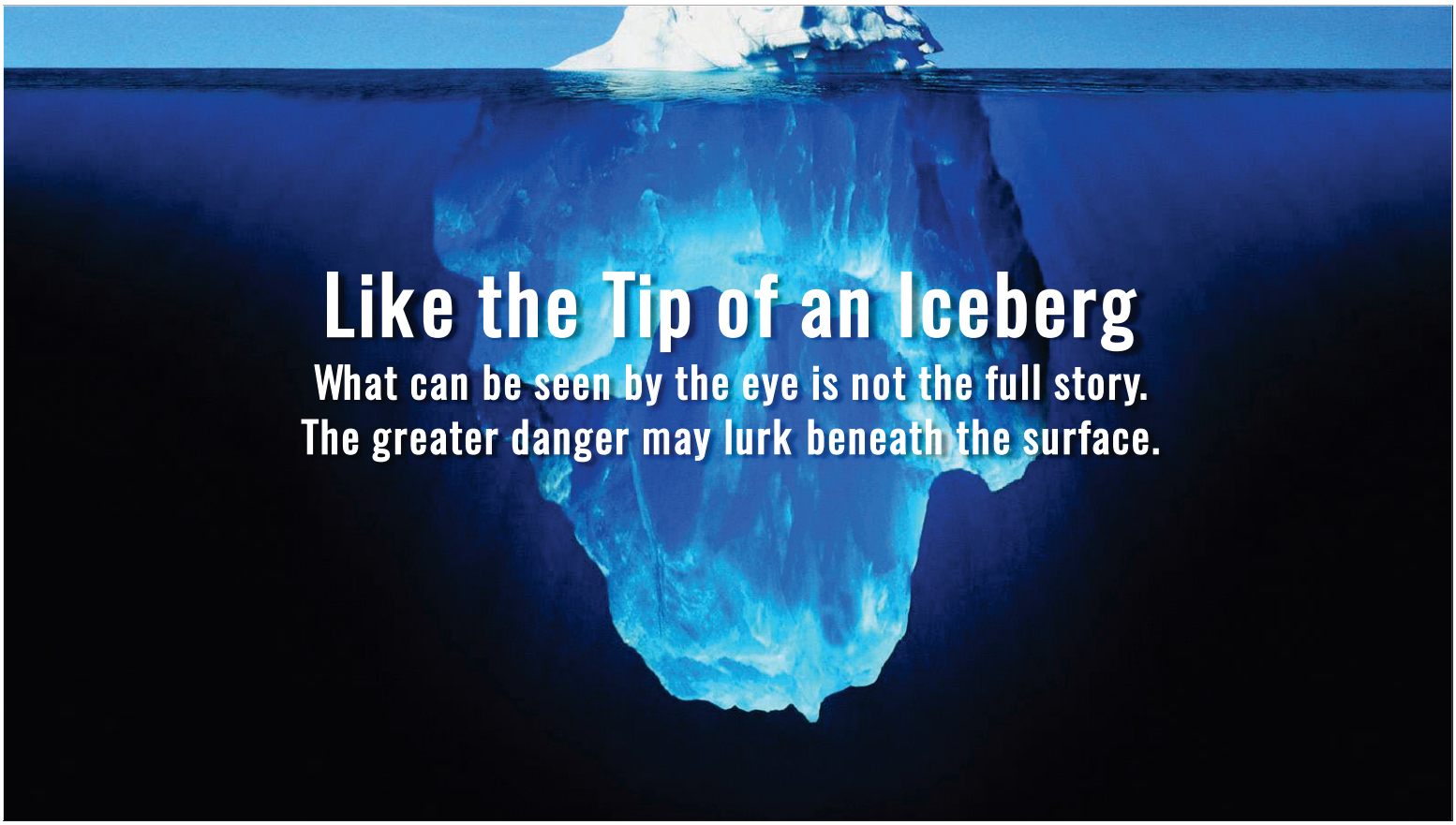
Topical Products *not* Proven Effective Against Biofilm

- Medical (manuka) honey
- Silver containing products (foams, gels, alginates)
- Hydrofera blue products

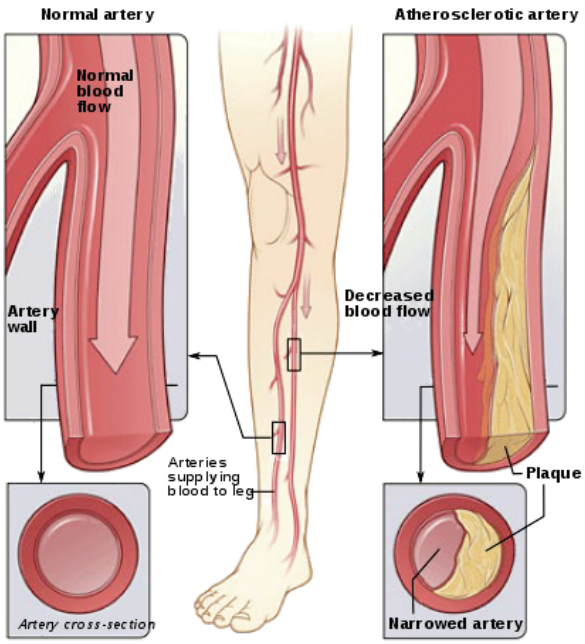
Economics of Treating Biofilm

Product	Cost/average application	Considerations
Cadexamer Iodine (Iodasorb/flex)	$10.00	Becomes cytotoxic with prolonged use
PHMB (Biakos gel)	$4.00	Non cytotoxic
Lipogel	$2.50	
Lipogel + Antibiotics/Antifungals	$5.83	Customized by compound Rx

Cleanser	Cost/8 oz bottle	
PHNB (Biakos Spray)	$39.50	
Hypochlorous acid (Vashe)	$29.49	
Wound Cleanser (generic with surfactant)	$4-10.00	



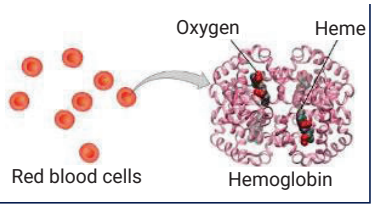
Macro vs. Micro Vascular Disease



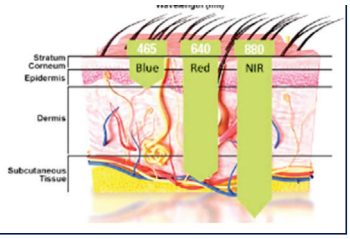
NIR Imaging

The Science

1. Oxygen in hemoglobin

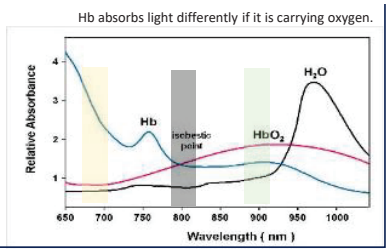


2. NIR passes through skin

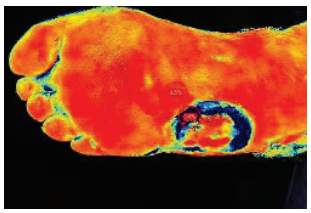


3. NIR is absorbed

Hb absorbs light differently if it is carrying oxygen.



4. Data processing

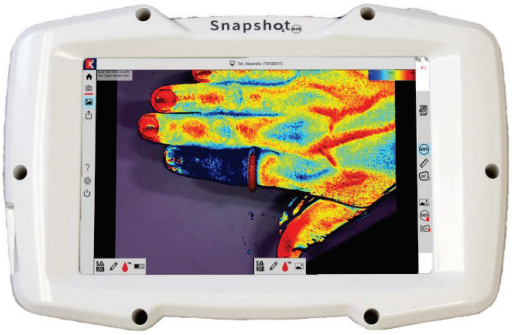


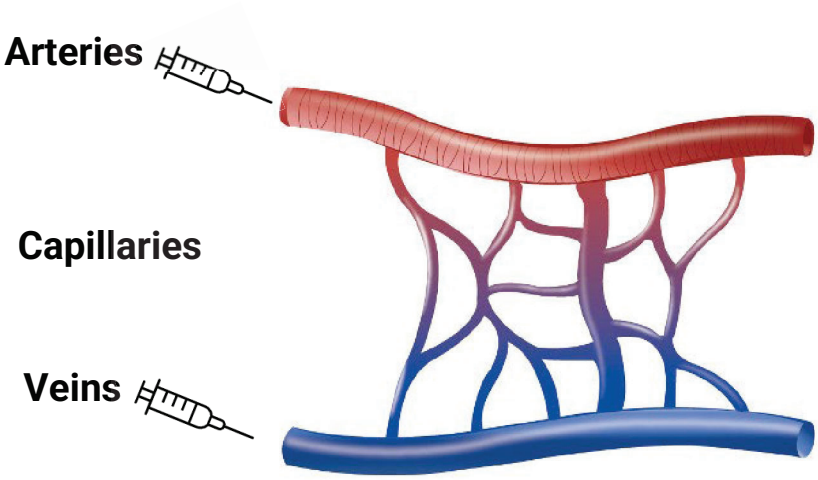
Near-infrared light provides a non-invasive, comprehensive measure of the hemoglobin oxygen saturation of the tissue.

Near-Infrared Spectroscopy

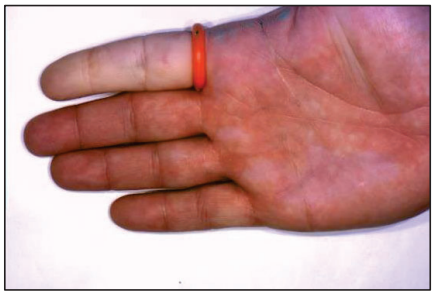
Measuring hemoglobin oxygenation at the tissue/cellular interface (S_tO_2)

- Provides a non-invasive measure of the content of oxygen bound to hemoglobin in the blood just below the surface of the tissue being imaged



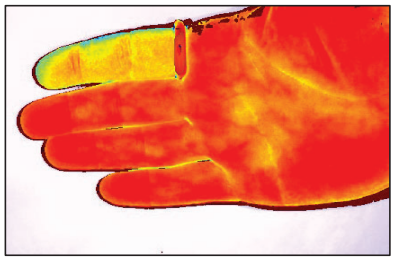


Snapshot$_{NIR}$ Captured Views

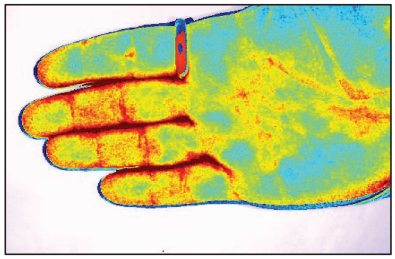


Color or "RGB" view

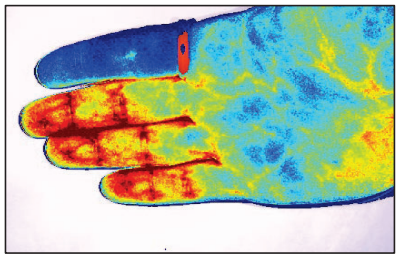
$$S_tO_2\,(\%) = \frac{\text{Oxy Hemoglobin}}{\text{Total Hemoglobin}} \times 100$$



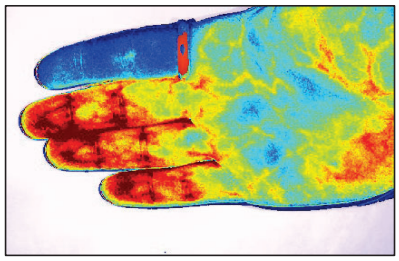
S_tO_2



Deoxygenated Hemoglobin

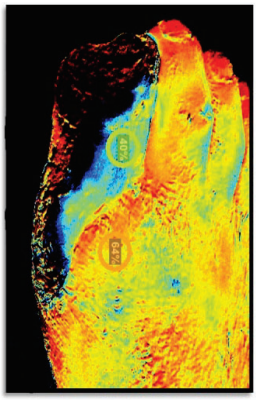


Total Hemoglobin



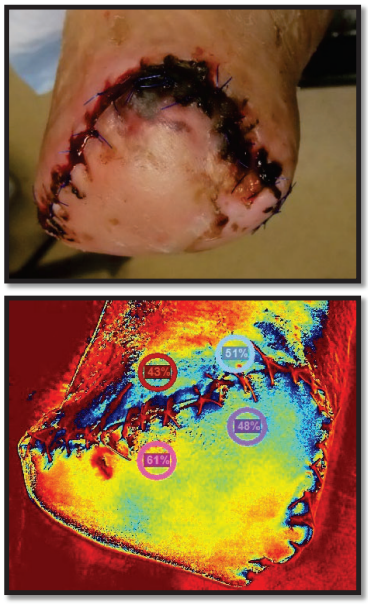
Oxygenated Hemoglobin

Surgical Decisions



- History of arterial disease
- Developed a gangrenous great toe

- Great toe amputation
- NIR Image shows flap at risk while clinical image appears normal



- Initial amputation demonstrated continued failure, which led to secondary amputation

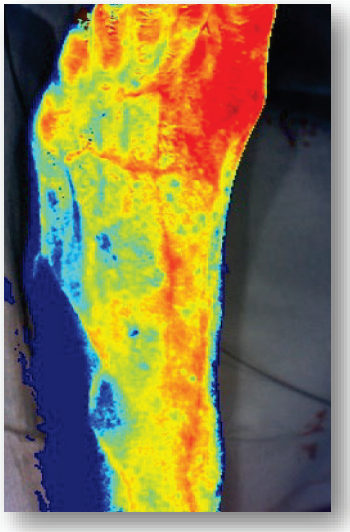
COULD THIS HAVE BEEN AVOIDED?

Vascular Intervention

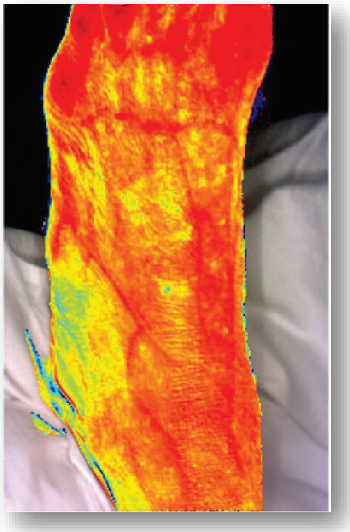
Time is tissue **with early detection**

~ 138,000 peripheral vascular interventions were performed annually (2000-2011)[1].
Imagine what that number is now!

Clinical

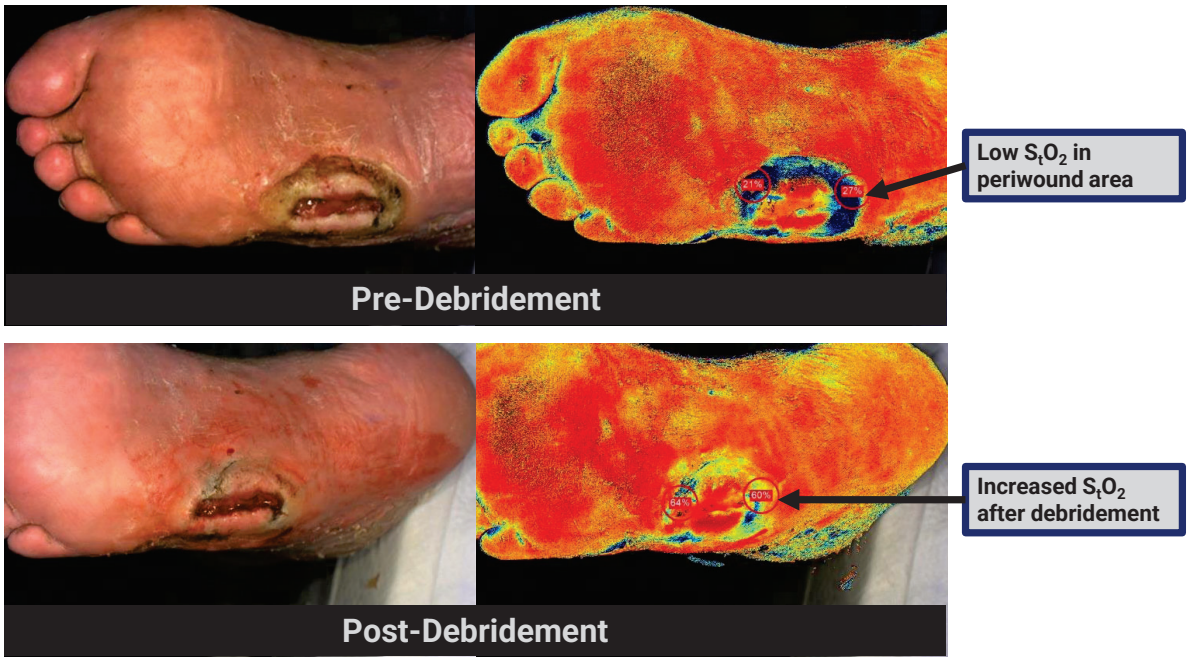


Pre-Intervention

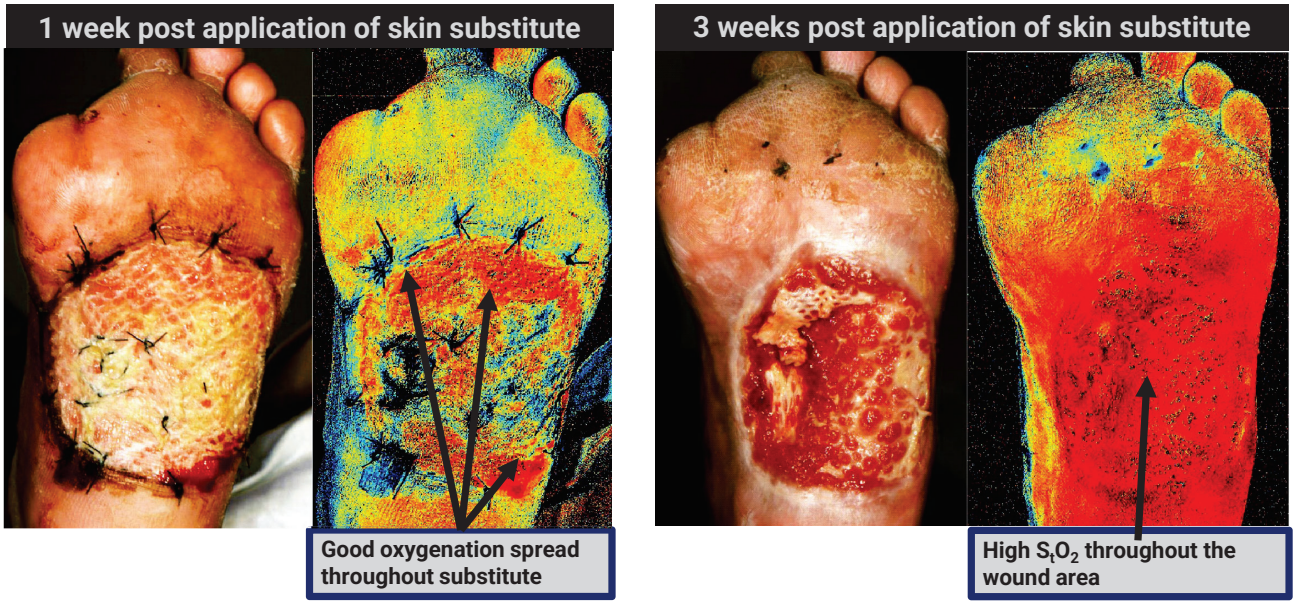


Post-Intervention

Wound Care



Wound Care



Future Applications of NIR Imaging in Long Term Care

Early detection of deep tissue pressure injuries

Determining "avoidable vs unavoidable"

Is it *really* a pressure injury?

Summary

Chronic wounds need our collective efforts to heal (Team-Centered Wound Care)

We need to intervene early (prevention and treatment of biofilm, oxygenation and perfusion) to get the wound to a state of readiness to heal; but it doesn't stop there.

Continuous diligence in reducing the potential for stalling is essential

- Presume biofilm presence on every chronic wound
- Suspect reduced blood flow in wounds not healing
- Debride often; address the edges to prevent rolling
- Practice good wound hygiene

Clean it like you mean it!

HEAL UNIVERSITY
A Division of United Wound Healing