## Dressings: Wet-to-dry and Why It Works

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#### No Disclosures

## How Do Wounds Heal?

#### Four predictable stages:

- Hemostasis: immediate
  - Initiation of coagulation cascade, builds fibrin scaffold
  - Platelet driven release of growth factors to attract other cells
- Inflammation: 2-5 days
  - Neutrophils clear debris & bacteria
  - Macrophages clear more debris, secrete proinflammatory mediators and cytokines for fibroblast recruitment
  - Proteases degrade damaged ECM





### **How Do Wounds Heal?**

Proliferation



Remodeling



#### Four predictable stages:

- Proliferation: day 4 3 weeks
  - Fibroblasts build new ECM scaffold
  - Neovascularization and formation
     of granulation tissue
  - Re-epithelialization via migration of epithelial cells from margins
- Remodeling: up to 1 year
  - Type III collagen  $\rightarrow$  type I collagen
  - Formation of scar, initially red and raised → flat and hypopigmented

# What Makes A Chronic Wound?

- Chronic wound = failure to heal within 4-12 weeks despite treatment
- Unable to move past the proinflammatory phase
  - Large burden of bacteria and debris
  - Metabolic abnormalities
    - Systemic steroids
    - Autoimmune disease
    - Inadequate nutrition
  - Inadequate tissue perfusion
    - Vascular disease
    - Tobacco/nicotine use





## **Wound Bed Preparation**

- Management of a wound to accelerate endogenous healing or facilitate the effectiveness of other treatments
- TIME Sequence
  - Tissue: debridement of nonviable tissue
  - Infection/Inflammation: debridement, antibiotic use, nutritional optimization
  - Moisture Imbalance: keeping wound moist, but removing excess fluid
  - Edge of Wound: undermined or non-advancing, may need debridement, reconstruction, biological agents



## **Moisture Imbalance**

- Landmark paper by Dr. Winter in 1962
  - Rate of epithelialization is 2-3x faster in moist wounds when compared to wounds kept dry
- Moist Wound Beds...
  - Increase keratinocyte migration, collagen synthesis, autolytic debridement
  - Decrease pain, inflammation, and scarring
- Excess moisture causes maceration and predisposition for infection





Formation of the Scab and the Rate of Epithelization of Superficial Wounds in the Skin of the Young Domestic Pig

GEORGE D. WINTER

Department of Biomechanics and Surgical Materials, Institute of Orthopaedics (University of London), Stammore, Middlesex.

#### Debridement



Autolytic	Mechanical	Enzymatic	Biologic	Surgical
<ul> <li>Body's innate mechanism</li> <li>Facilitated by moisture</li> </ul>	<ul> <li>Using force</li> <li>Usually non- discriminatory</li> </ul>	<ul> <li>Using endogenous or exogenous enzymes</li> <li>Works synergistically</li> </ul>	Using maggot larvae to eliminate dead tissue	<ul> <li>Cutting out debris</li> <li>Able to take cultures and biopsies</li> </ul>



### **The Ideal Dressing**



Removes excess exudate

Maintains moist micro-environment

Provides thermal insulation

Allows permeability to water, but not bacteria

Minimizes risk for wound infection

Avoids traumatizing the wound

Optimizes pH o the wound

Free of particulate contaminants left in the wound

Easy to apply

Cost effective

Comfortable for the patient



### What is a Wet-to-Dry Dressing?

- Moist gauze packed into a wound that is removed after it dries
- Often used for full thickness wounds unable to be closed
- Common wetting solutions:
  - Normal saline
  - Antiseptics
    - Dilute sodium hypochlorite (Dakin's solution, bleach)
    - Betadine
    - Acetic acid





# Benefits of a Wet-to-Dry

- Main purpose of a wet-to-dry dressing is mechanical debridement
  - As the gauze dries, it sticks to the wound bed
  - Removing the dried gauze physically removes tissue
- Easy to learn and teach
- Simple, easily accessible supplies







## Drawbacks of a Wet-to-Dry

"Mechanical debridement using wet-to-dry gauze is considered substandard practice" – Association for the Advancement of Wound Care Guidelines

- Non-selective debridement
- Painful for sensate patients
- Does not maintain a moist micro-environment
- Labor intensive requires frequent changes
- Less cost-effective



## So Why Still Use Them?

- Several meta-analyses of randomized-controlled trials assessing rate of wound healing with various dressings have been performed
- "...it is generally unclear whether the treatments examined are more effective than saline gauze" (Westby, 2017)
- Wet-to-dry dressings are still taught to physicians as default wound care

Choice of dressing should be individualized based on patient overall health, characteristics of the wound, risk for adverse events, and patient-specific goals



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#### **Thank You!**

