SURGICAL, ENZYMATIC, & HYDROSURGICAL DEBRIDEMENT MECHANISM OF ACTION

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NORMAL WOUND HEALING

• Components:
  – Inflammatory phase: Injury 7 days
  – Proliferative phase: 3 days 3 weeks
  – Remodeling phase: 3 weeks 1-2 years

T.I.M.E. Principles of Wound Bed Preparation

<table>
<thead>
<tr>
<th>Tissue non viable or deficient</th>
<th>Infection or inflammation</th>
<th>Moisture imbalance</th>
<th>Edge of wound non-advancing or undermined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defective matrix and cell debris</td>
<td>High bacterial counts or prolonged inflammation</td>
<td>Desiccation or excess fluid</td>
<td>Non-migrating keratinocytes Non-responsive wound cells</td>
</tr>
<tr>
<td>Debridement</td>
<td>Antimicrobials</td>
<td>Dressings compression</td>
<td>Biological agents Adjunct Therapies Debridement</td>
</tr>
<tr>
<td>Restore wound base and ECM proteins</td>
<td>Low bacterial counts and controlled inflammation</td>
<td>Restore cell migration, maceration avoided</td>
<td>Stimulate keratinocyte migration</td>
</tr>
</tbody>
</table>

WOUND HEALING REQUIREMENTS

• Signal (inflammation)
• Building Blocks (protein)
• Energy (oxygen)
  – Perfusion
• Proper environment
  – Debridement, moist wound, dry surrounding skin, exudate management, protection

If wound is not healing one or more of these requirements is not met
SURGICAL DEBRIDEMENT

SURGICAL DEBRIDEMENT: MECHANISM OF ACTION

- Fast
- Selective
- Excision of nonviable tissue revitalizes the wound bed with cytokines and growth factors
- +/- anesthetic
- Mild-moderate bleeding

Serial surgical debridement: A retrospective study on clinical outcomes in chronic lower extremity wounds

- Retrospective analysis of 2 controlled, prospective, randomized trials
- 366 VLUs, 310 DFUs
- Serial debridement:
  - higher rate of healing
  - shorter time to healing

<table>
<thead>
<tr>
<th></th>
<th>Surgical Debridement</th>
<th>No Debridement</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLU</td>
<td>11.7% (SAR)</td>
<td>8.7% SAR</td>
</tr>
<tr>
<td>50% (12 wk closure rate)</td>
<td>28% (12 wk closure rate)</td>
<td></td>
</tr>
<tr>
<td>DFU</td>
<td>15.5% (SAR)</td>
<td>12.5% (SAR)</td>
</tr>
<tr>
<td>30% (12 wk closure rate)</td>
<td>13% (12 wk closure rate)</td>
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</tbody>
</table>

EFFECT OF EXTENSIVE DEBRIDEMENT AND TREATMENT ON THE HEALING OF DIABETIC FOOT ULCERS

- Randomized, prospective, double-blind trial
- N= 118 at 10 centers
- ALL patients had aggressive sharp debridement
- Centers with more frequent debridement = Higher rate of healing
ENZYMATIC DEBRIDEMENT

Collagenase:
Specifically digests ONLY triple helical collagen

ENZYMATIC DEBRIDEMENT: MECHANISM OF ACTION
- Naturally occurring proteolytic enzymes stimulate breakdown of necrotic tissue:
  - Slow
  - Not selective
  - Material digested by enzyme may provide a medium for bacterial growth
- Painless
- Minimal blood loss
- No anesthetic required

Prospective & retrospective studies that compared collagenase or papain-urea (1960-2008)
- Does enzymatic debridement remove necrotic debris and promote wound healing in ulcers (i.e., pressure ulcers, leg ulcers, or burn wounds)?
- Collagenase more effective than placebo
- Collagenase and Papain-urea rate of healing is equivocal
HYDROSURGICAL DEBRIDEMENT

- **Versajet:**
  - FDA-approved medical device
  - Ability to focus a high-powered (15,000 psi) stream of water into a high-energy cutting device
  - +/- anesthetic
  - Mild-moderate bleeding
CONCLUSION

- Wound debridement is a vital adjunct in the care of patients with chronic foot ulcers