Suspected Deep Tissue Injury

- Definition
- History
- Basic Science
- Clinical Studies
- Interventions
- Future Direction
### NPUAP Biennial Conference: 2007

- The definition were updated to provide accuracy, clarity, succinctness, utility, and discrimination
- Prior terms include deep tissue trauma, malignant lesions, closed pressure ulcer, purple pressure ulcer, deep bruise, dark tissue

### History

- 1873 Paget may have been the first to describe suspected deep tissue injury describing purple areas with sloughing of tissue and large cavities once they open.
- 1942, Groth created deep, "malignant pressure sores" in an animal model
- Experimentally these lesions begin in deeper tissues and spread to the surface.

### Series Report

- Wide variety of presentations, patient characteristics, outcomes.
- Focus on early diagnosis
- Care team awareness
- Increased mortality
- Up to 30% spontaneous healing
- Established protocols for intact skin care and monitoring.

Black J, Black S. Wounds. 2003
Baharestani M. SAWC 2008
- At Follow Up 1-20 days
- sDTI 65%
- Healed 5%
- Open wound 30%

<table>
<thead>
<tr>
<th>Location of Suspected Deep Tissue Injury</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sternal</td>
<td>18</td>
</tr>
<tr>
<td>Head</td>
<td>18</td>
</tr>
<tr>
<td>Anterior</td>
<td>18</td>
</tr>
<tr>
<td>Axilla</td>
<td>2</td>
</tr>
<tr>
<td>Anterior</td>
<td>1</td>
</tr>
<tr>
<td>Nape</td>
<td>1</td>
</tr>
<tr>
<td>Buttocks</td>
<td>1</td>
</tr>
<tr>
<td>Winging Ribs</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation (N=45, n=4)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast Reduction</td>
<td>33</td>
</tr>
<tr>
<td>Back Reducer</td>
<td>2</td>
</tr>
<tr>
<td>Thigh Reducer</td>
<td>4</td>
</tr>
<tr>
<td>Winging Ribs</td>
<td>1</td>
</tr>
<tr>
<td>Hip</td>
<td>1</td>
</tr>
<tr>
<td>Foot</td>
<td>1</td>
</tr>
</tbody>
</table>

- 8 cases or sDTI in the MICU
- Continuous bedside pressure monitoring in place
- All 8 cases resolved prior to hospital discharge
- Improved results with effective patient repositioning
Role of Fluidotherapy

- Envelopment
- Shear
- Mechanical stress
- Microclimate
- Friction
Heel sDTI treated with noncontact LF ultrasound

Noncontact Low Frequency Ultrasound

FDA approval for low energy ultrasound-generated mist used to promote wound healing through wound cleansing and maintenance debridement by the removal of yellow slough, fibrin, tissue exudates and bacteria.

- Decreased inflammatory and oxidative response
- Upregulation of TGF-b and KGF
- Evidence of vasodilation and angiogenesis

Silicone Border Foam Dressings

- Originally for high risk patients
- Adhesive properties
- Sacral Use
- Prophylactic and Therapeutic Use

Brindle CT, Wegelin JA J Wound Ostomy Continence Nurs. 2012
Walsh N et al J Wound Ostomy Continence Nurs 2012;
Gentry T et al WOCN WCET meeting 2010 AZ
Ulcer Prevention

- Shear
- Microclimate
- Pressure

Prevention of pressure-induced deep tissue injury using intermittent electrical stimulation

- Experimental model of spinal cord injury
- Electrical stimulation of paralyzed muscles may have protective effect on deep tissue injury

L. Solis et al J Appl Physiol. 2013

Differential Diagnosis

- Abscess
- Gangrene
- Hematoma
- Calciphylaxis
Interventions

- No consensus
- Case series
- Many cases resolve
- Some modalities may impact the natural history

Treatment Goals

- Education/ recognition
- Keep skin intact
- Pressure shear relief
- Support healing (nutrition, skin care, education)

Future

- Documentation
- Diagnosis
- Outcomes
- Education
- Modeling / Translational Research