Pressure Ulcer

- Localized injury to the skin and/or underlying tissue, usually over a bony prominence, resulting from **sustained pressure** (including pressure associated with **shear**).
Pressure, Friction, and Shear Oh My

- What are they?
- What might cause them?

Pressure
Pressure & Tension

Pressure

Tension

Tension

Friction

- Surfaces sliding with respect to each other

- Contact force parallel to the skin surface

- Textile rubbing along surface
  - Friction blister
Friction

- **Static Friction**
  - Force resisting movement between 2 bodies when they are NOT moving
  - Keeps you from sliding out of bed when head of bed raised

- **Dynamic Friction**
  - Force resisting movement between 2 bodies when they are moving
  - Foot rubbing against a shoe
  - Person sliding in bed

Shear
Etiology of Pressure Ulcers

- Internal response to external load

Resultant Forces
Tissue Tolerance

- External Mechanical Load
- Internal Local Tissue Deformation
- Deformation Threshold
- Local Tissue Damage

What Magnitude of Pressure Causes a Pressure Ulcer?

Duration of pressure

- High pressure short duration
- Low pressure long duration
- Shear
Pressure vs. Time

Original Curve

Pressure vs. Time Relationship

Failure strength of muscle

Load that can be tolerated


Tissue Damage Mechanism

- **High Threshold**
  - Deformation-induced damage
  - Muscle deformation at strains >50% will lead to damage within minutes

- **Low Threshold**
  - Occlusion of blood vessels
  - Ischemia-induced damage
    - Muscle most susceptible

Tissue Survival

- Magnitude, Type of Load, Duration
- Location
  - Tissues present
    - Muscle
  - Anatomical blood supply
  - Morphology
    - Boney Prominence
Individual Tissue Tolerance

- Morphology of individual
- Individual physiology
- Transport thermal properties

- Type of load
  - Impact Damage not a pressure ulcer

Microclimate

- Temperature, humidity, and airflow at patient/support interface
- Tissue strength compromised
- Moisture increases friction and shear
  - Increased tissue deformation
Role of Microclimate

- Stage 1 and 2 pressure ulcers in particular
- Skin weakens
- Less stiff
- Dry skin – brittle breaks

Does the Etiology Differ By Stage?

Stage I/II vs. Stage III/IV
Individual Tissue Tolerance

- Properties of tissue
  - Aging
- Lifestyle
  - Muscle mass
  - Mobility
- Disease
- Chronic Injury
Thank You

QUESTIONS?