PRESSURE ULCERS

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25.12.2013

What is a pressure ulcer?

International EPUAP-NPUAP Pressure Ulcer Definition:

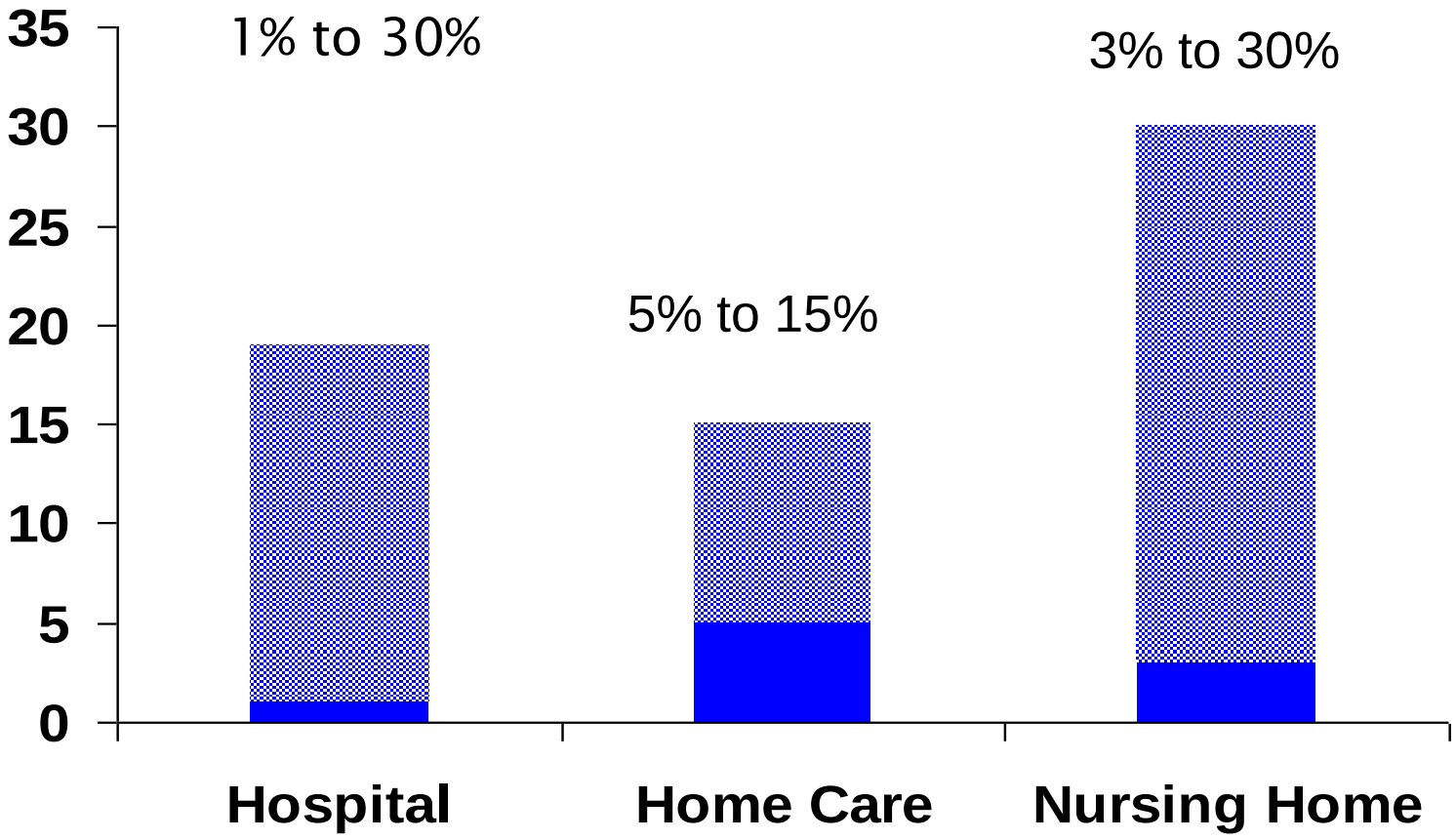
(European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel , 2010)

.. **is localized injury to the skin and/or underlying tissue**

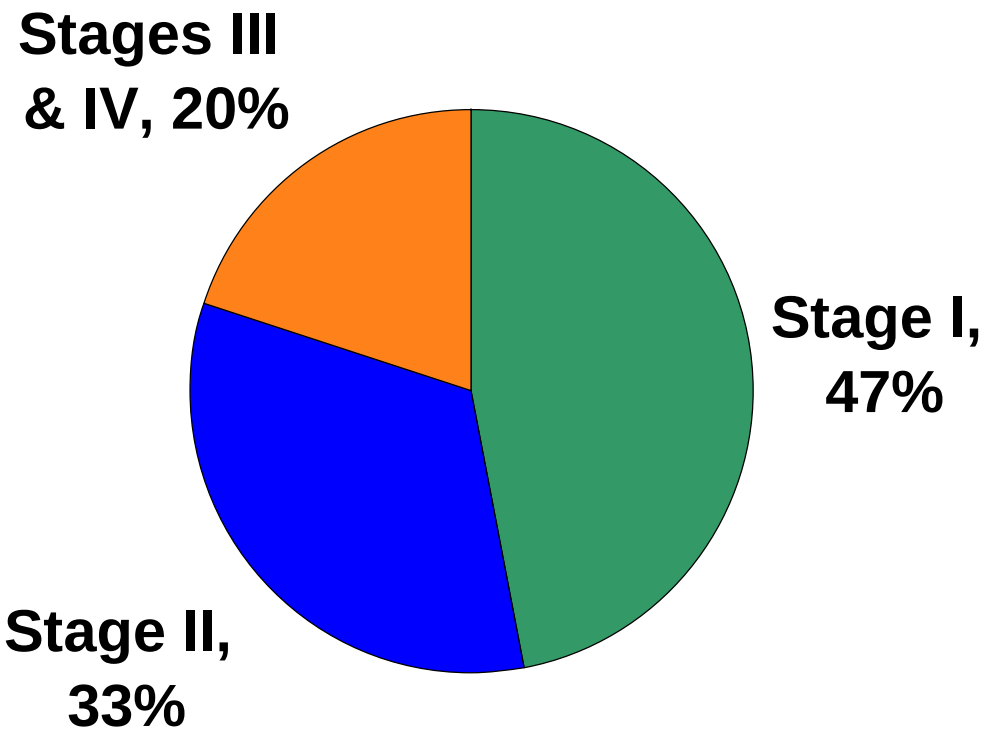
.. **usually over a bony prominence**

.. **a result of pressure, or pressure in combination with shear.**

PREVALENCE OF PRESSURE ULCERS VARIES BY SETTING



PREVALENCE OF PRESSURE ULCERS VARIES BY STAGE



PRESSURE ULCERS: A MAJOR ISSUE IN GERIATRIC MEDICINE

- more than 2.5 million patients in United States (US) acute-care facilities suffer from pressure ulcers, and 60,000 die from pressure ulcer complications each year

- Higher risk in older persons because:
  - Local blood supply to skin decreases
  - Epithelial layers flatten and thin
  - Subcutaneous fat decreases
  - Collagen fibers lose elasticity
  - Tolerance to hypoxia decreases

INTRINSIC FACTORS PREDICTIVE OF PRESSURE ULCER DEVELOPMENT

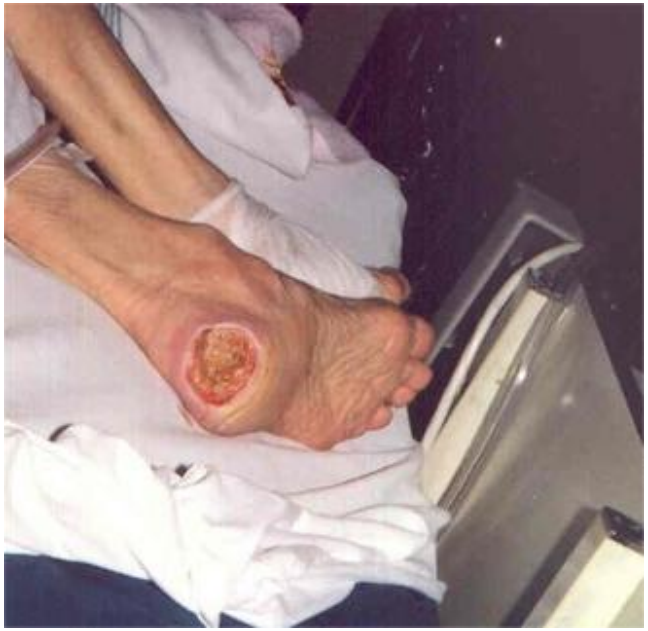
- Age 70+
- Impaired mobility
- Low BMI
- Confusion
- Urinary and fecal incontinence
- Malnutrition
- Restraints
- Neurologic diseases-dementia, delirium, spinal cord injury, and neuropathy

Comorbid conditions:

- Malignancy
- Diabetes
- Stroke
- Pneumonia
- CHF
- Fever
- History of pressure ulcers
- Hypoalbuminemia

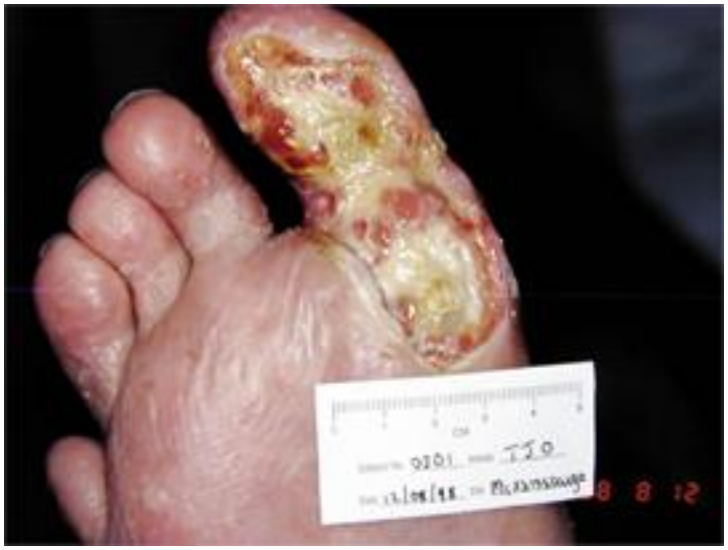
EXTRINSIC FACTORS PREDICTIVE OF PRESSURE ULCER DEVELOPMENT

- Alcohol/drug abuse
- **Friction/shear/pressure**
- **Inadequate current wound care**
- Immunosuppressive and chemotherapeutic agents
- **Nutritional deficiency**
- **Uncontrolled excess local pressure**
- Adverse reactions to skin care products

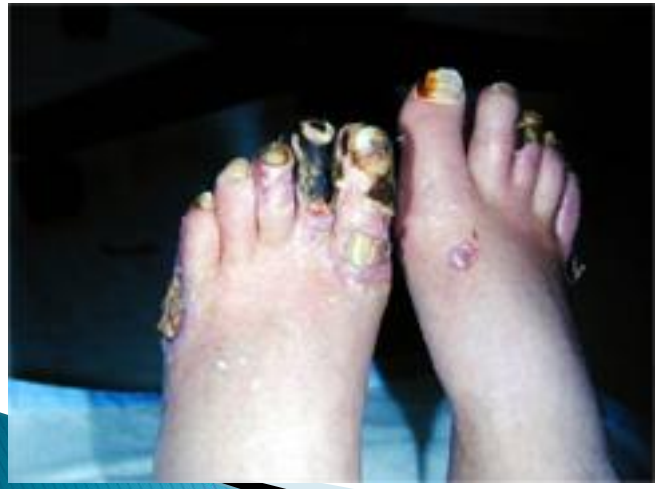


Pressure ulcer to heel

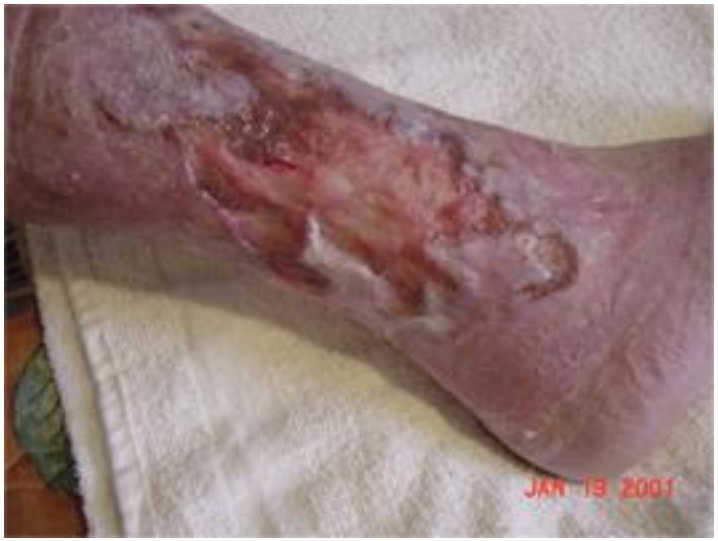
Not all ulcers are pressure ulcers



Neuropathic diabetic foot ulcer



Arterial ulcer on toes and forefoot

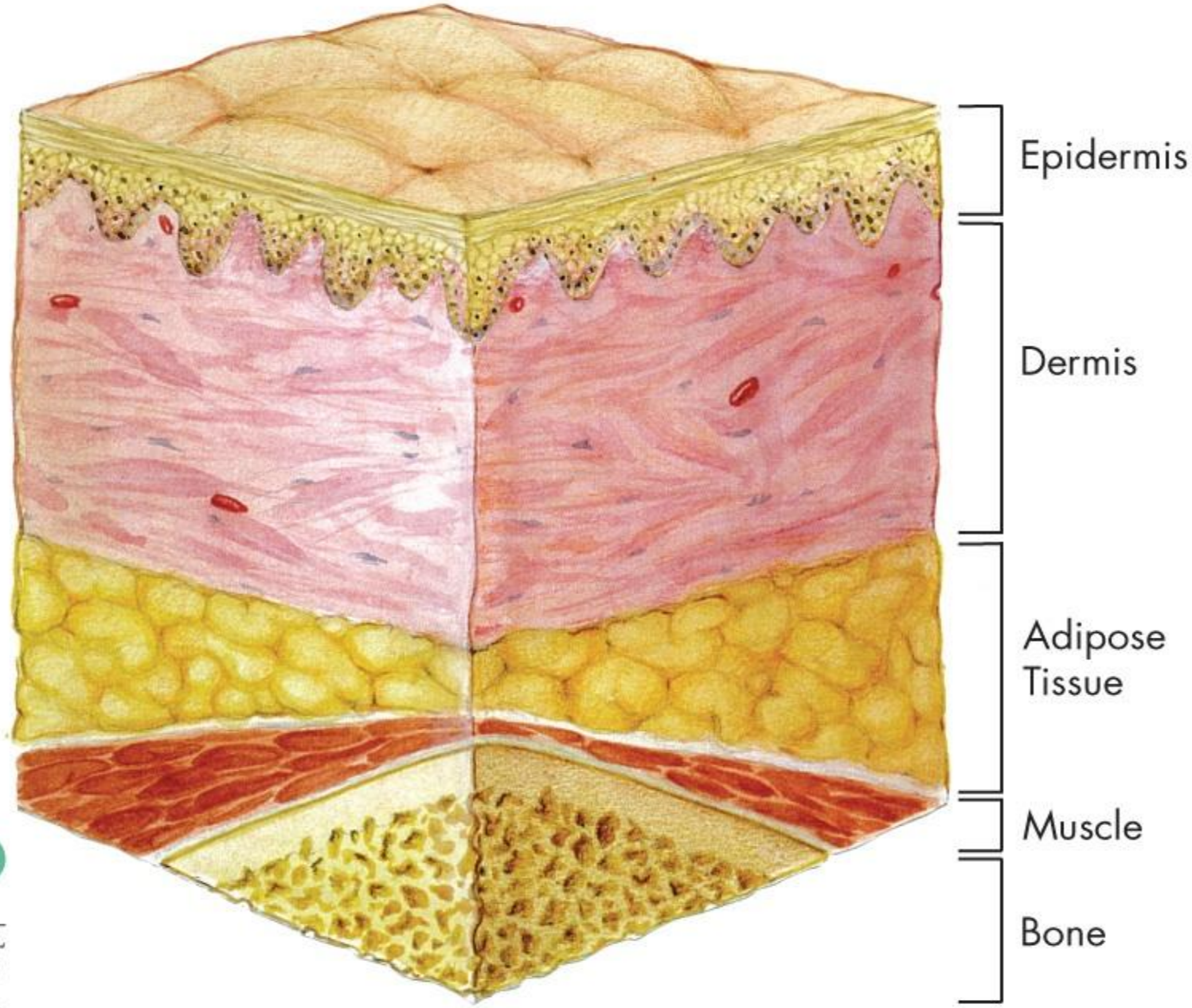


Venous leg ulcer

Guidelines for Pressure Ulcers

- Recognition
- Diagnosis
- Prevention and Treatment
- Monitoring

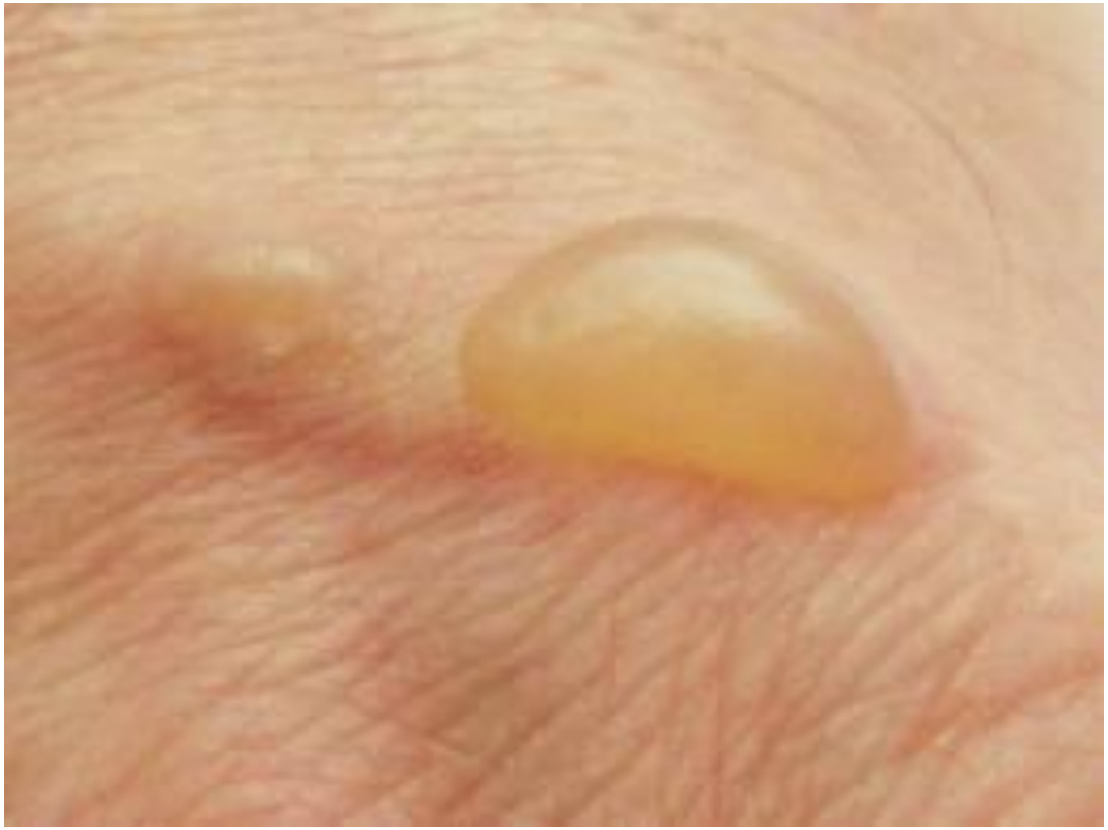
PRESSURE ULCER STAGE



NATIONAL PRESSURE ULCER ADVISORY PANEL

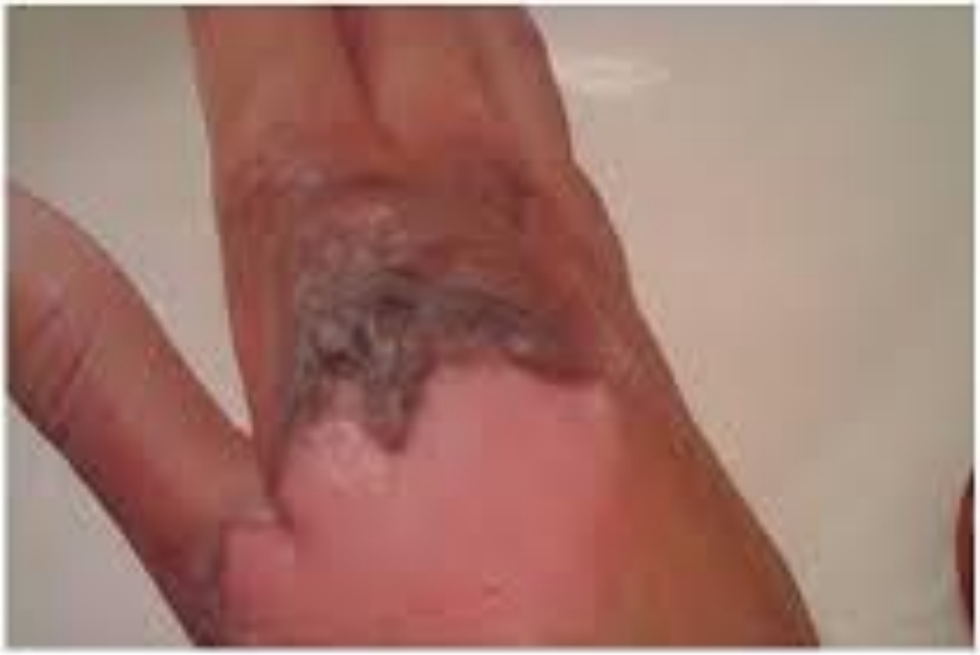
DEFINITIONS

- **BLISTER** – local swelling of the skin that contains watery fluid and is caused by burning, infection, or irritation



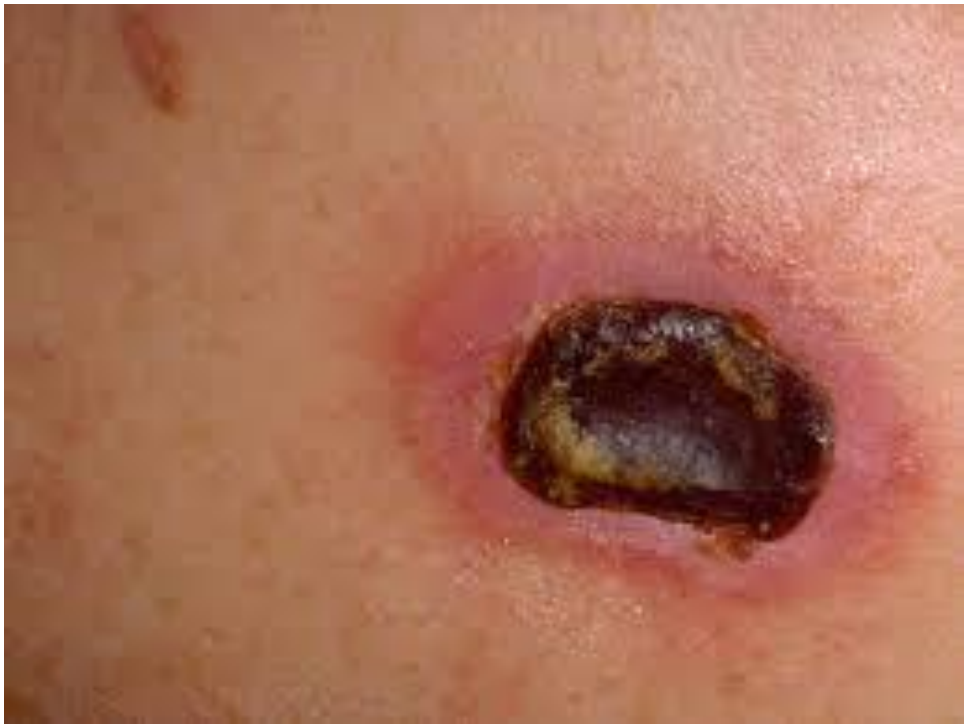
DEFINITIONS

- **SLOUGH -** layer or mass of dead tissue separated from surrounding living tissue



DEFINITIONS

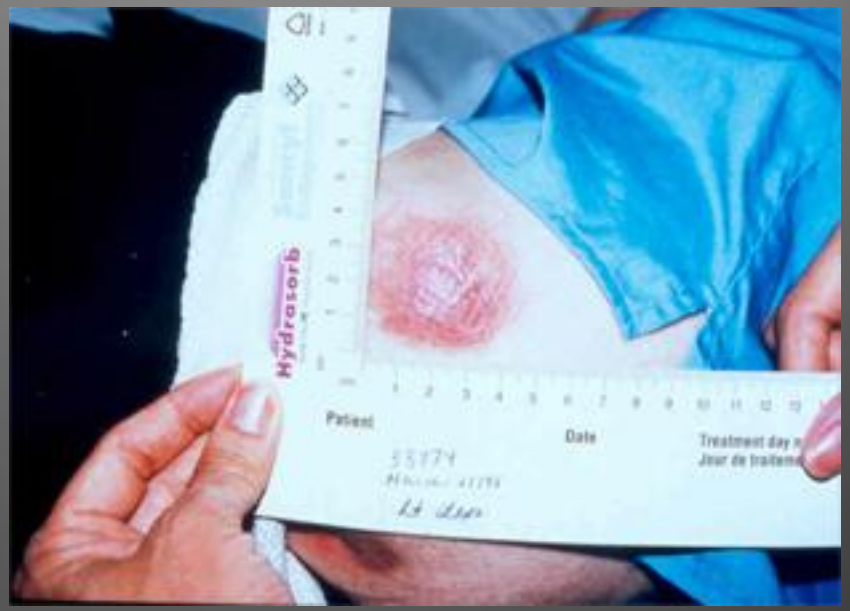
- **ESCHAR -** a deep cutaneous slough such as that produced by a thermal burn, a corrosive action, a decubitus ulcer



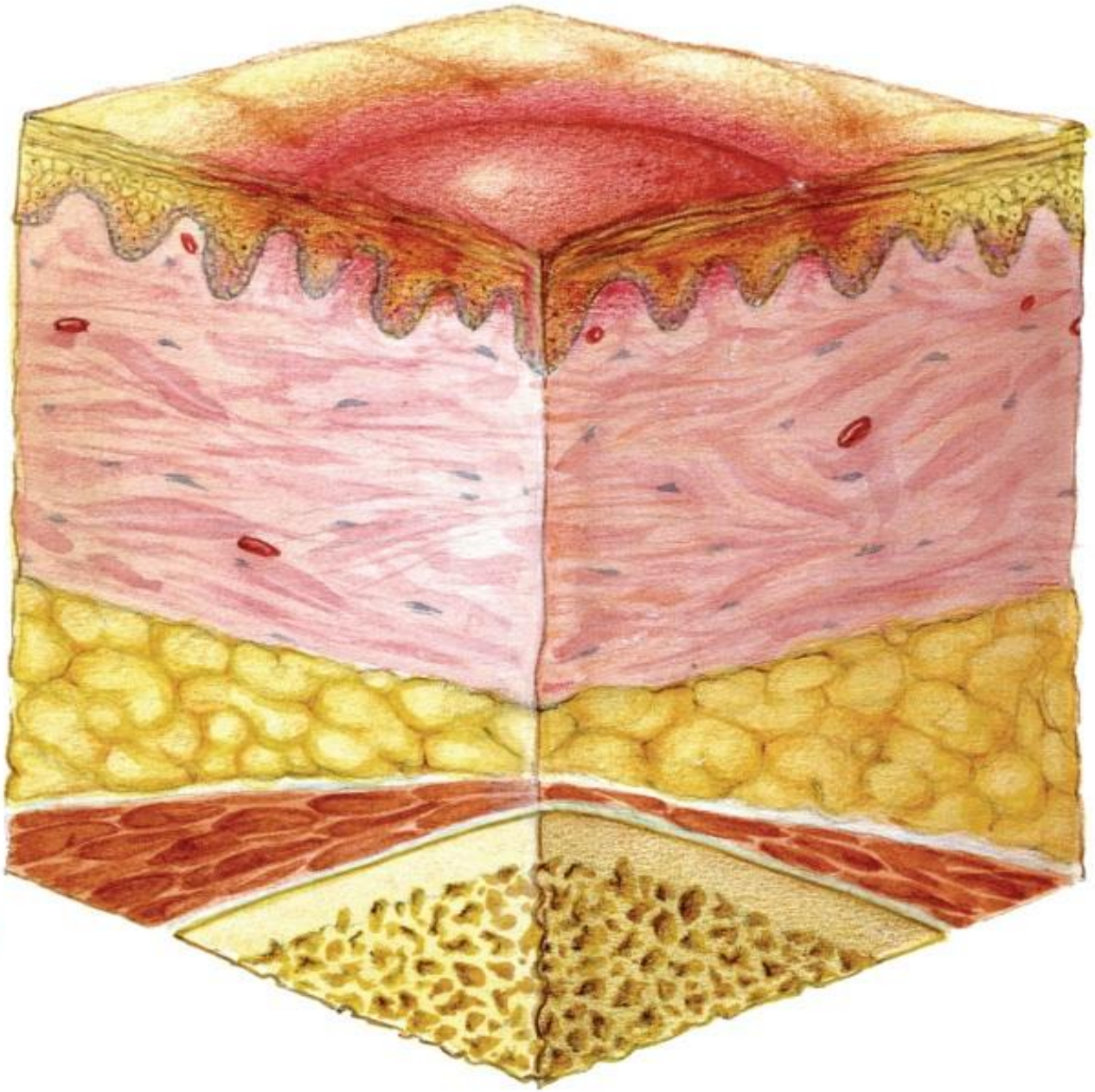
Stage I

Intact skin with non-blanchable redness of a localized area usually over a bony prominence.

Darkly pigmented skin may not have visible blanching; its colour may differ from the surrounding area.



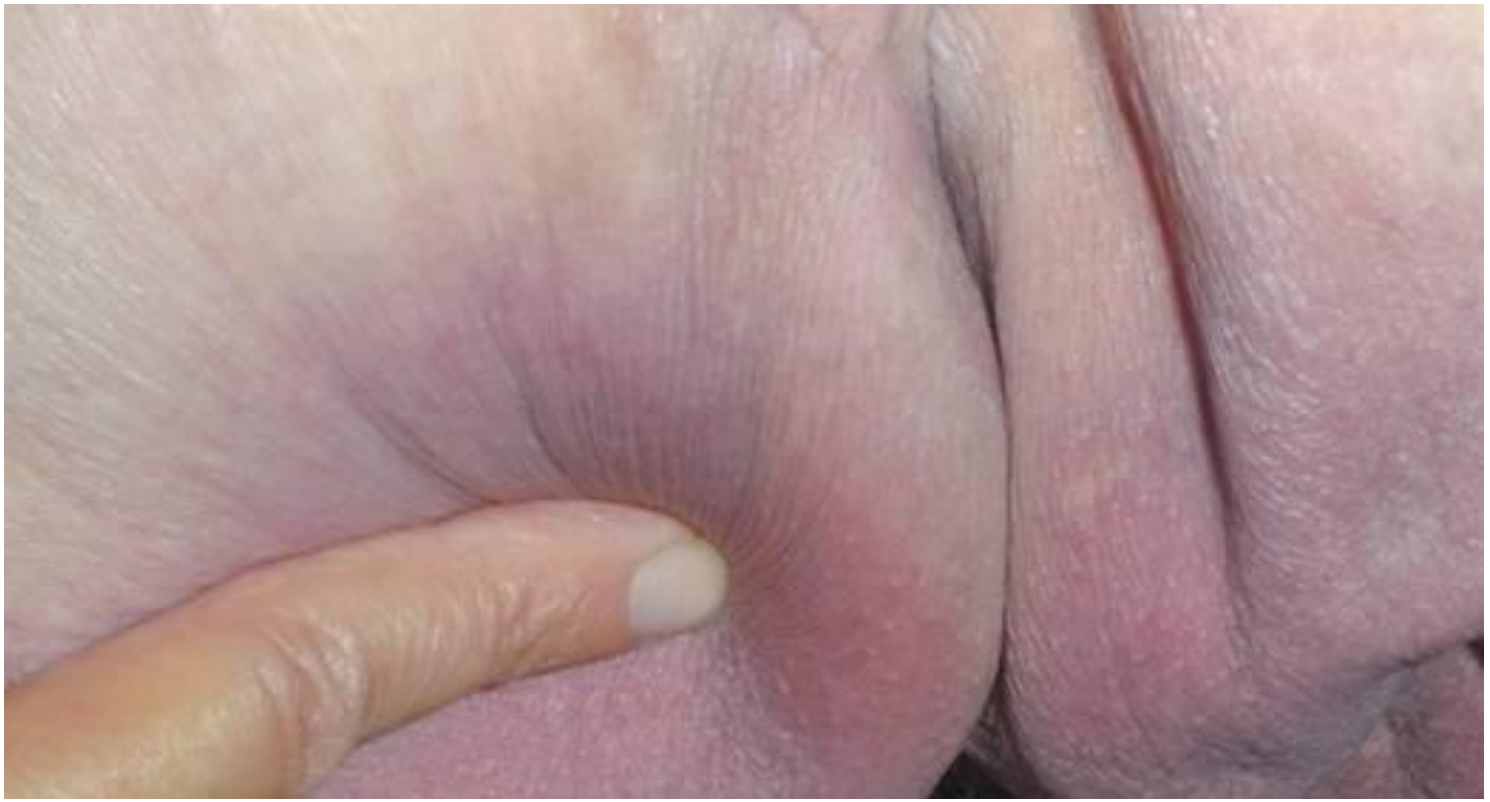
The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue.



NATIONAL PRESSURE ULCER ADVISORY PANEL

STAGE 1

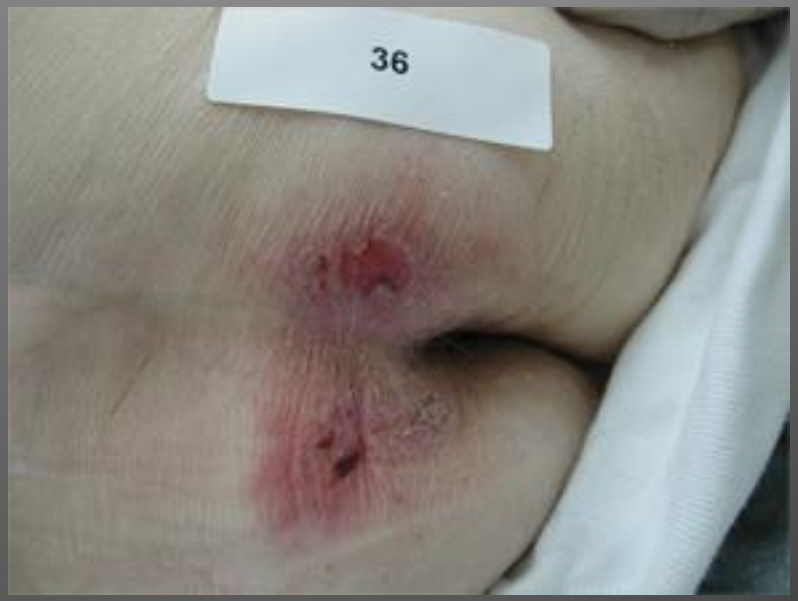
When you press on the reddened area it does not blanche or look white – it remains red.



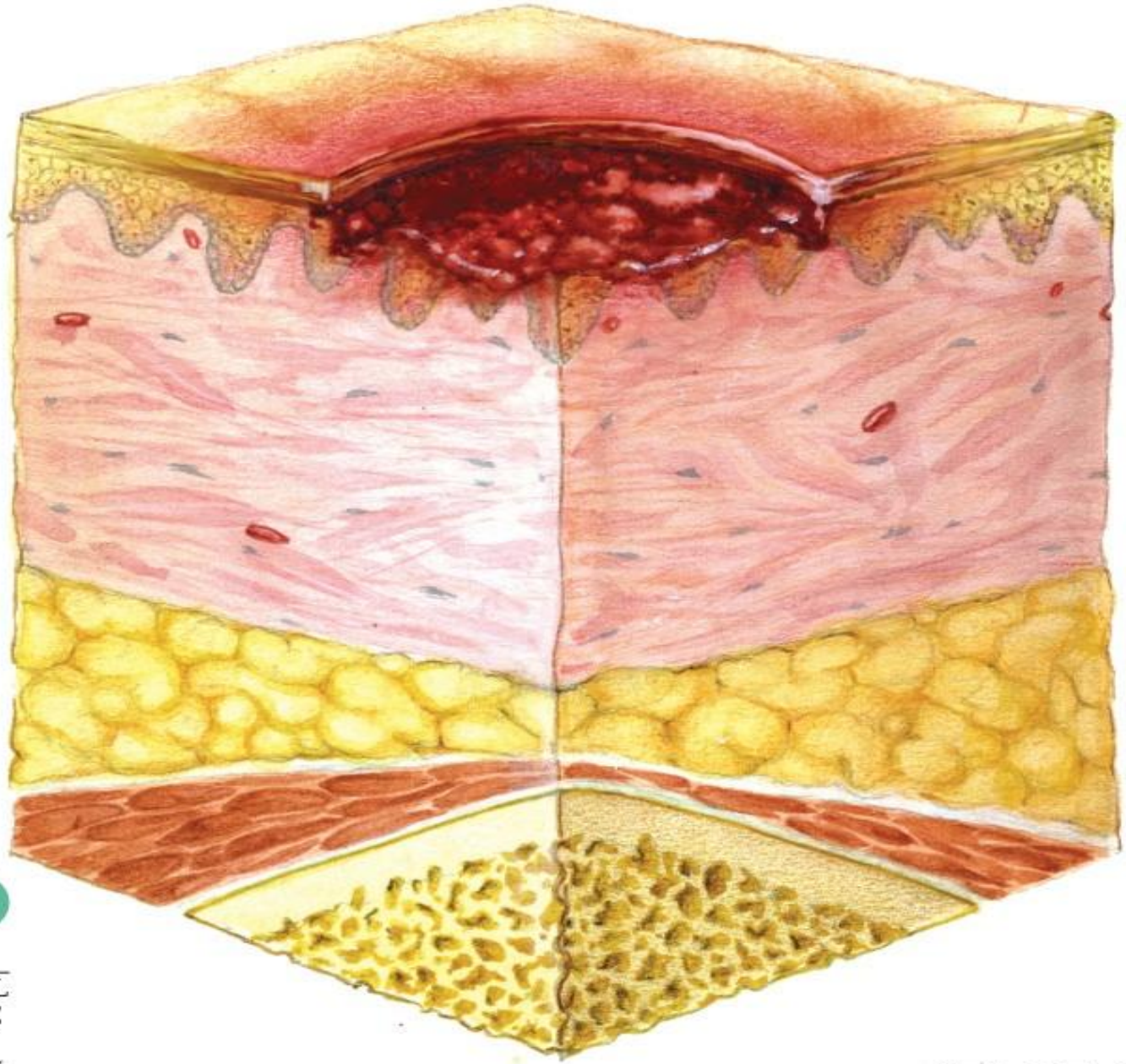
Stage II

Partial-thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough.

May also present as an intact or open/ruptured serum-filled blister.

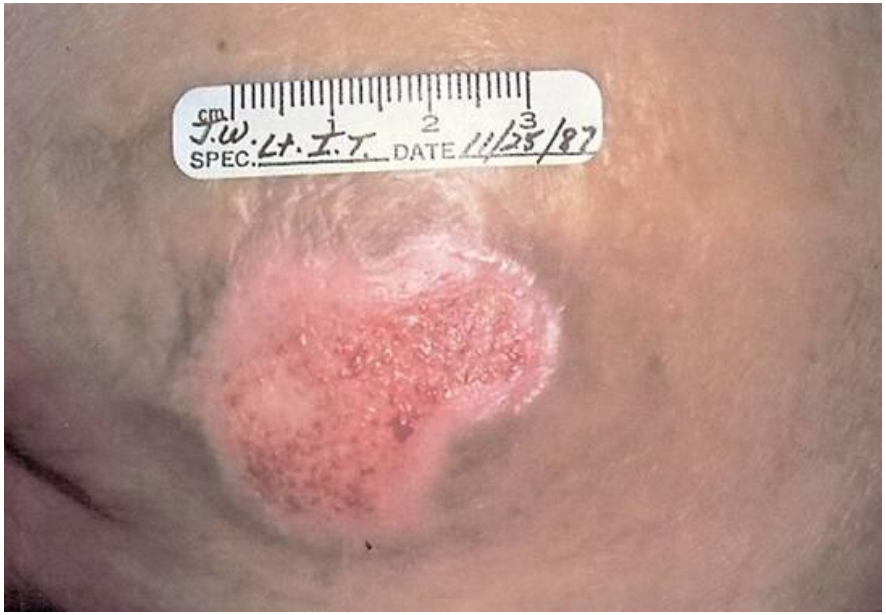


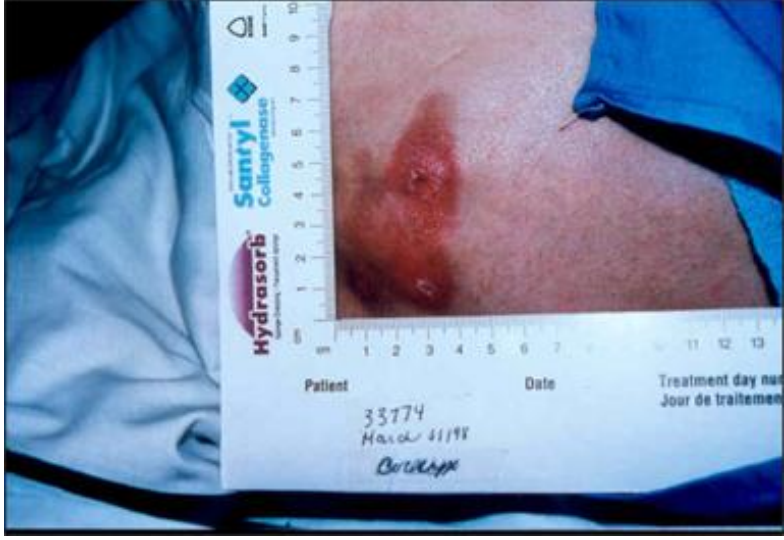
Presents as a shiny or dry shallow ulcer without slough or bruising.



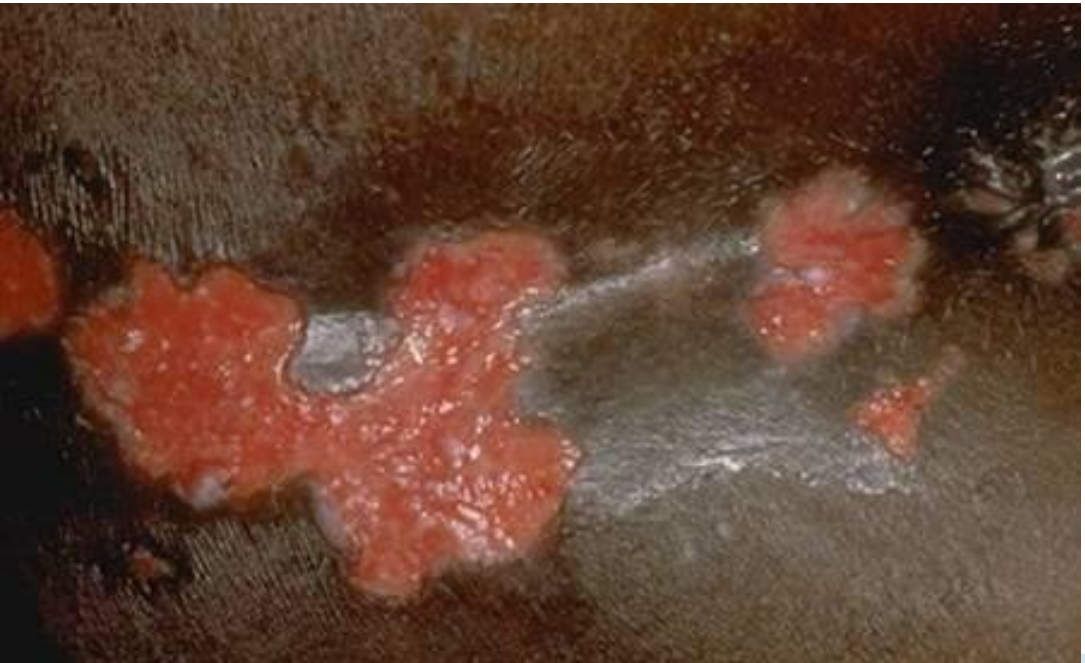
NATIONAL PRESSURE ULCER ADVISORY PANEL

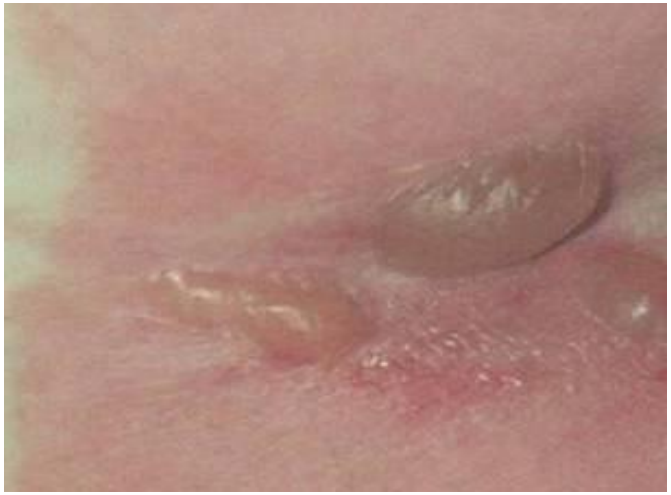
STAGE 2





Appears as a blister with or without the skin intact.



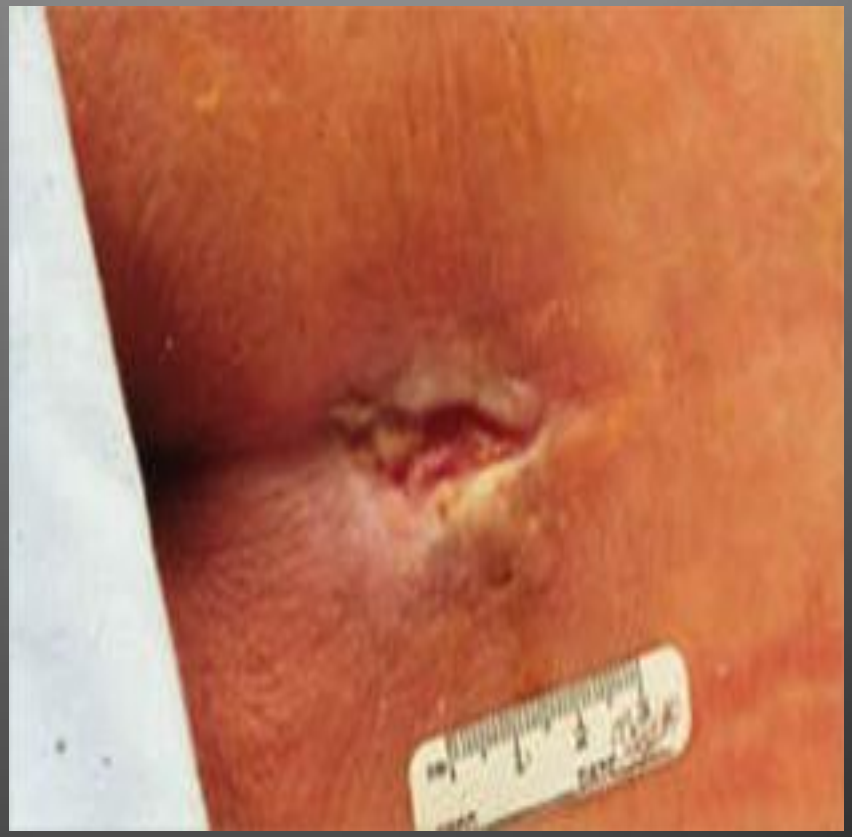


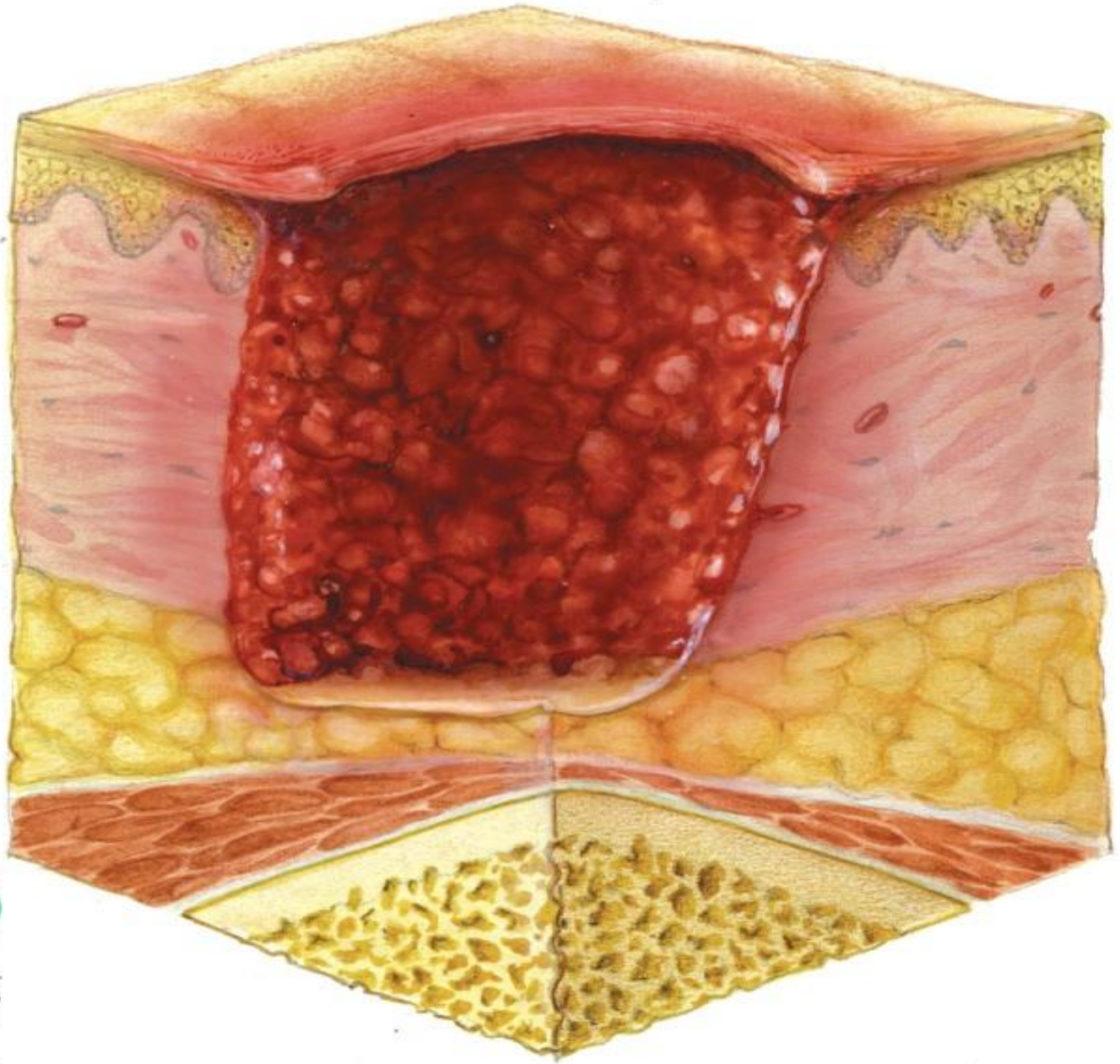
Stage III

Full-thickness tissue loss.

Subcutaneous fat may be visible but bone, tendon or muscle is not exposed.

Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling.





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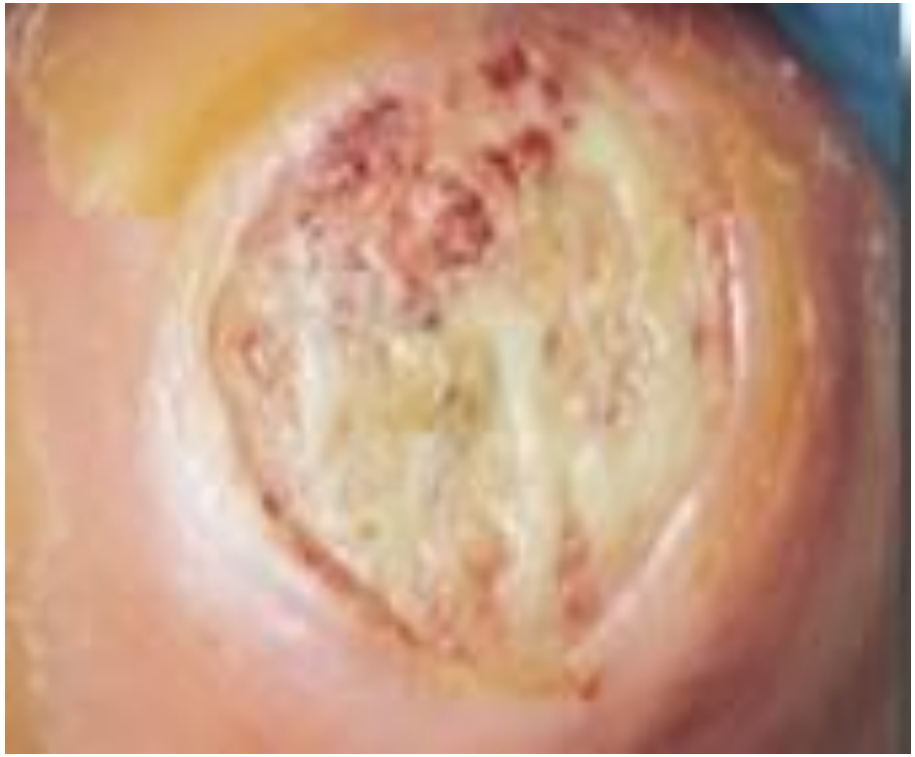
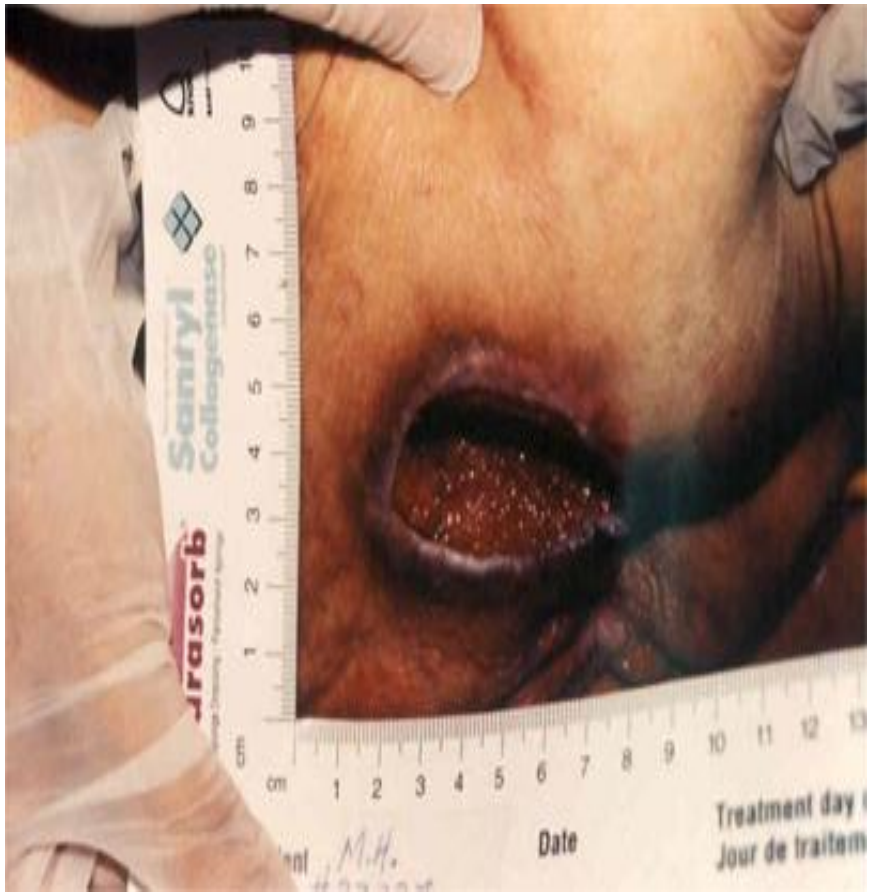
STAGE 3

Deeper than a blister but not deep enough to go into muscle or down to bone.



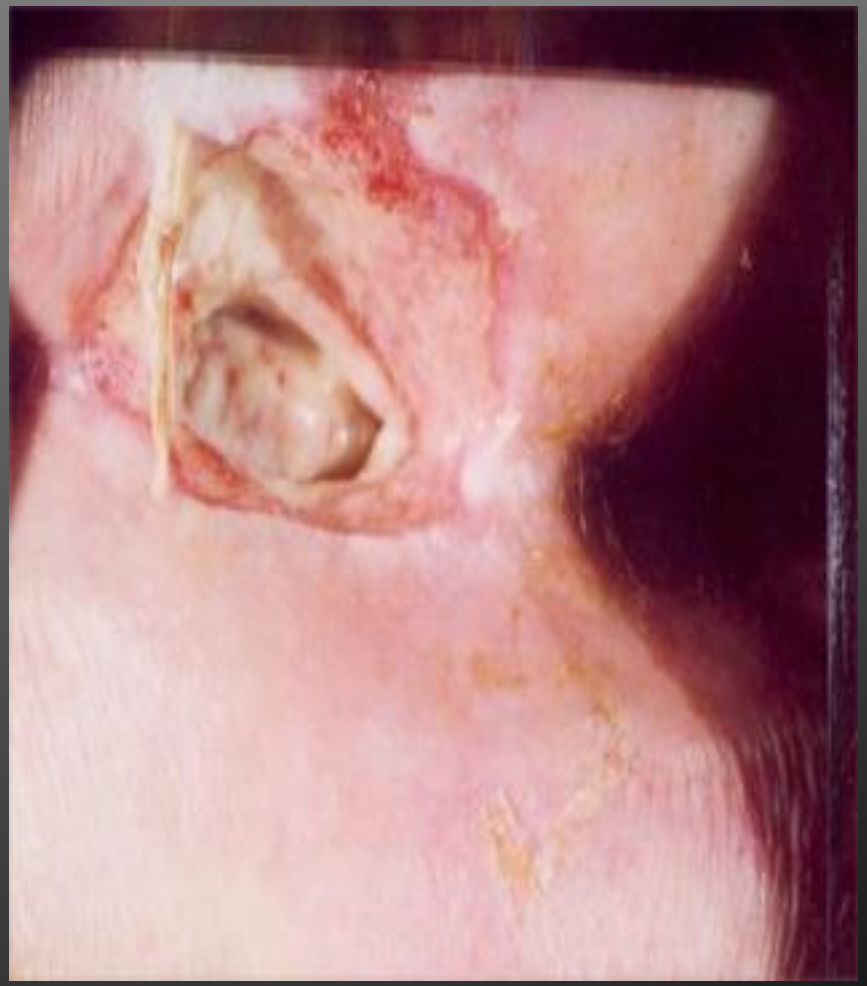


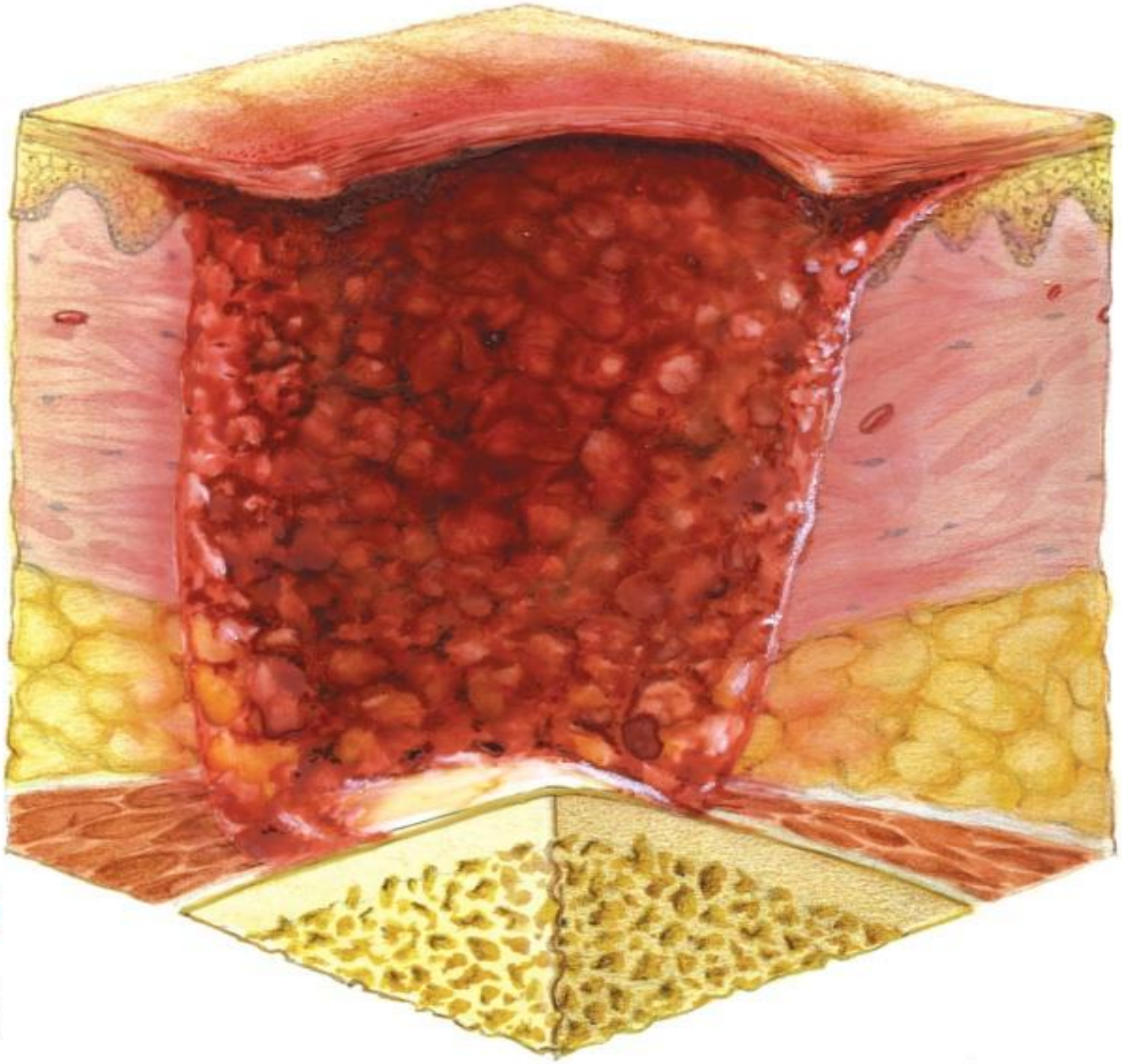
Stage IV

Full-thickness tissue loss with exposed bone, tendon or muscle.

Slough or eschar may be present on some parts of the wound bed.

Often include undermining and tunneling.

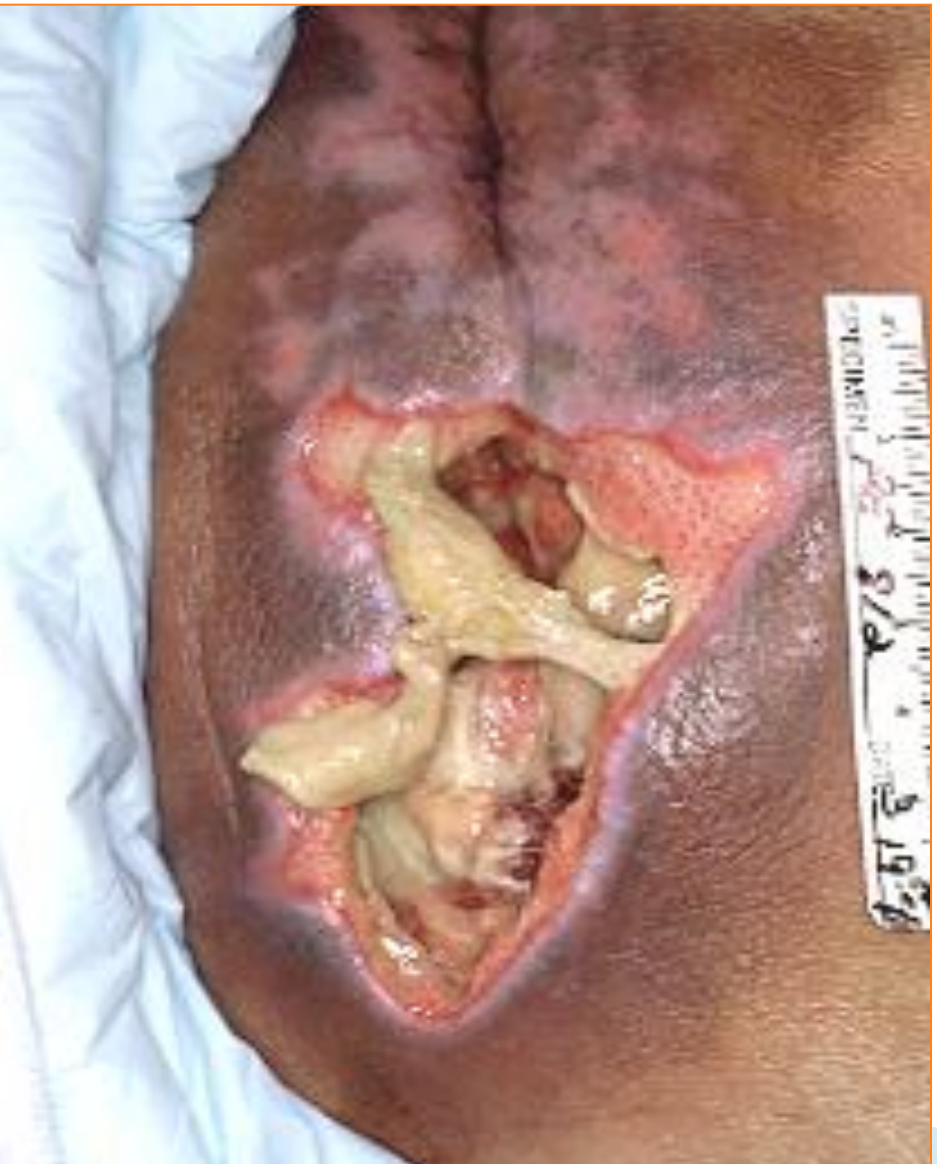


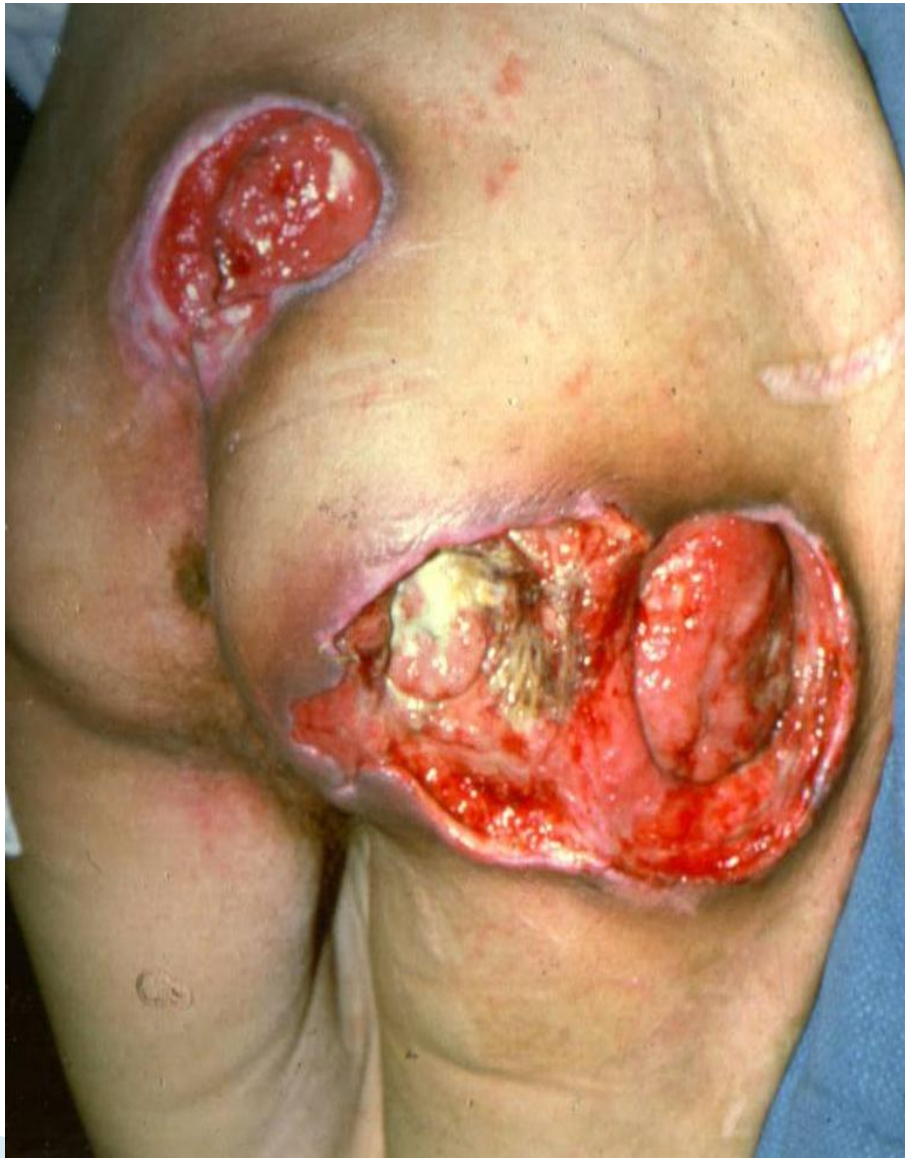


NATIONAL PRESSURE ULCER ADVISORY PANEL

STAGE 4

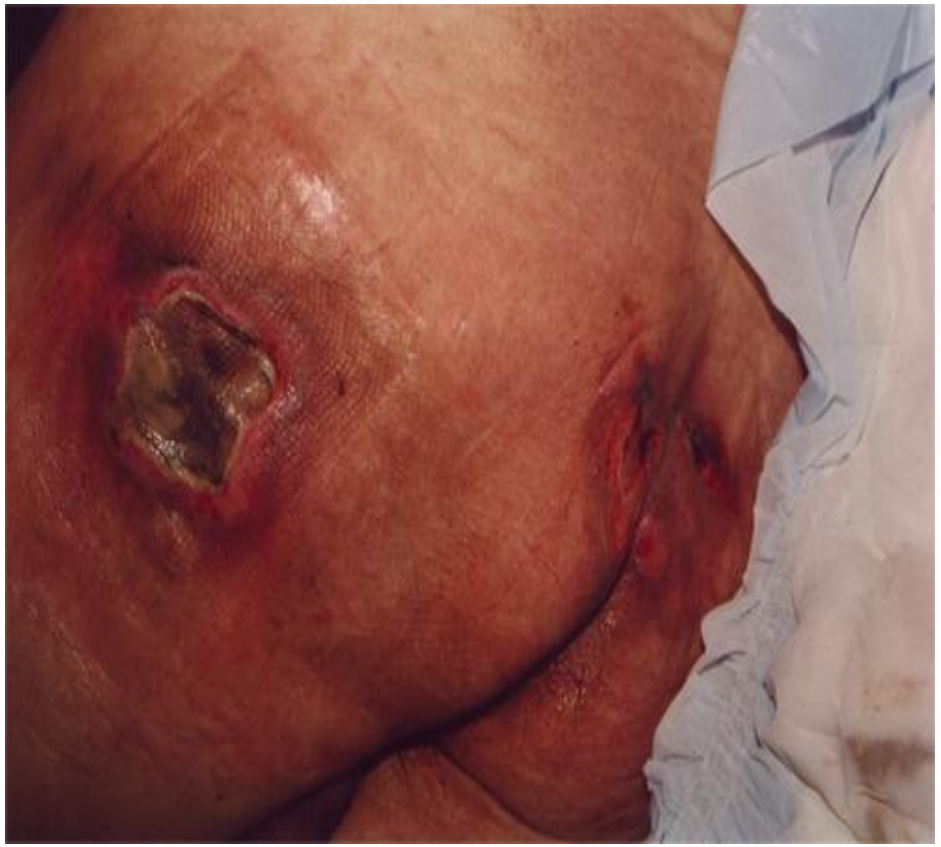
Should appear to have depth and go down into bone, tendon or muscle.

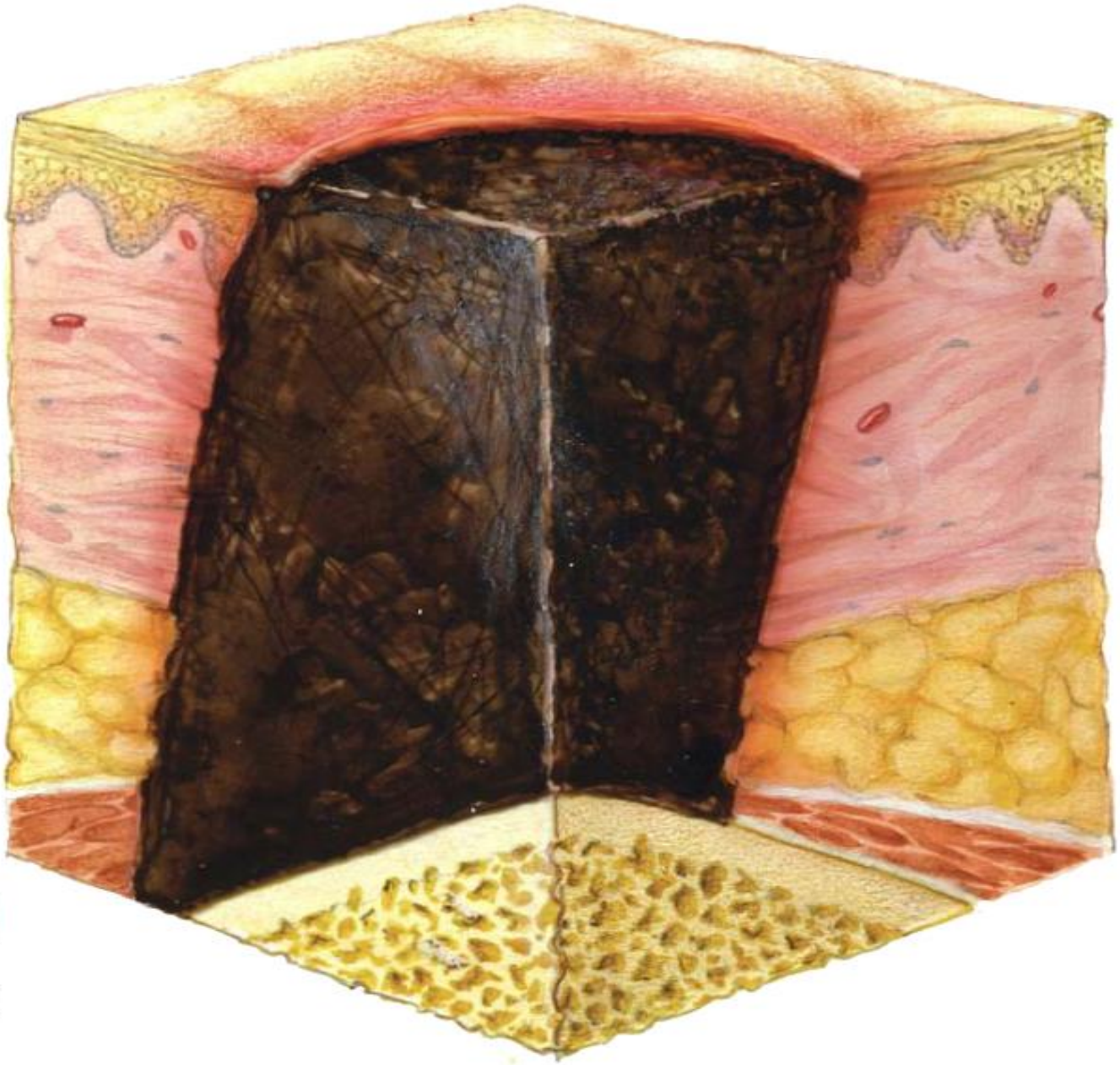




Unstageable

Full-thickness tissue loss in which the actual depth of the ulcer is ***completely*** obscured by **slough** (yellow, tan, grey, green or brown) **and/or eschar** (tan, brown or black) in the wound bed.

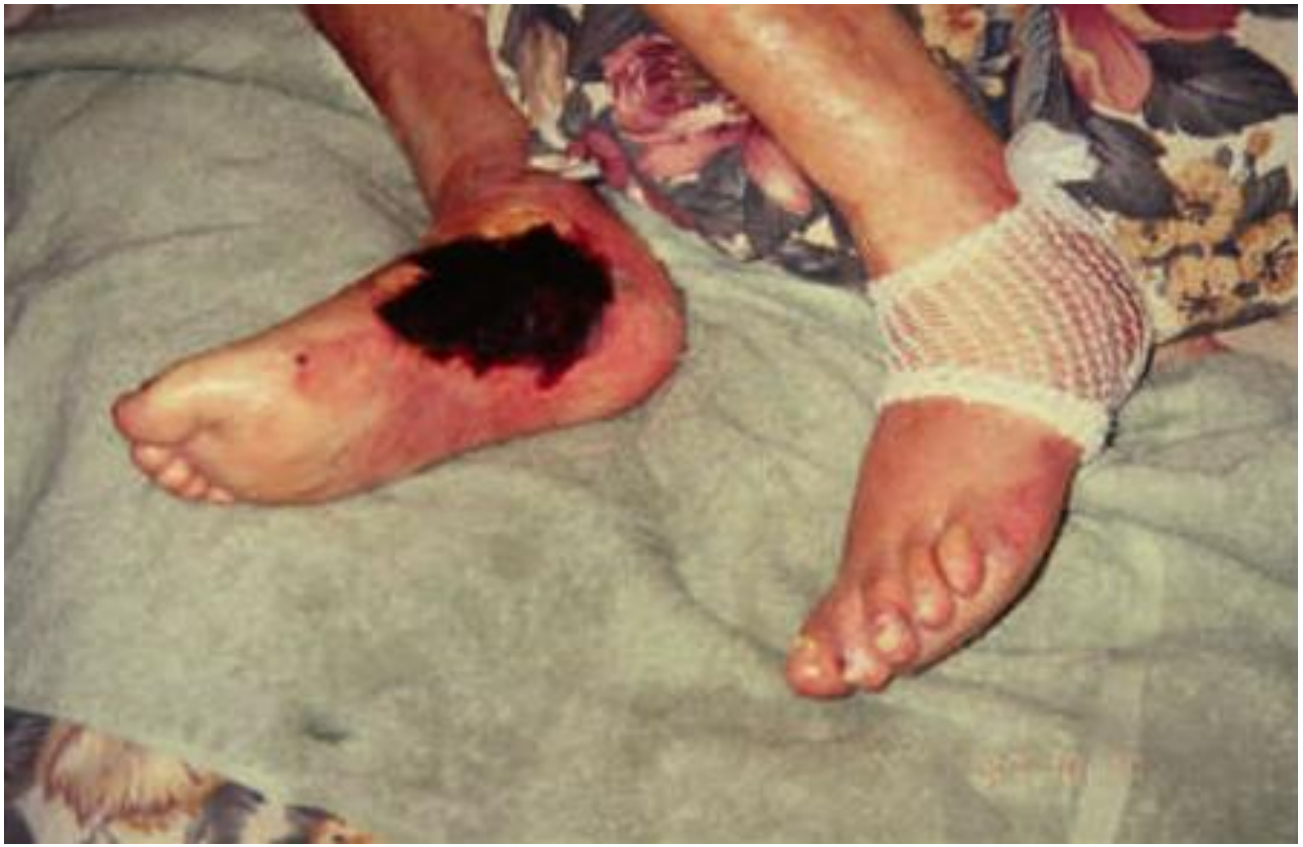




NATIONAL PRESSURE ULCER ADVISORY PANEL

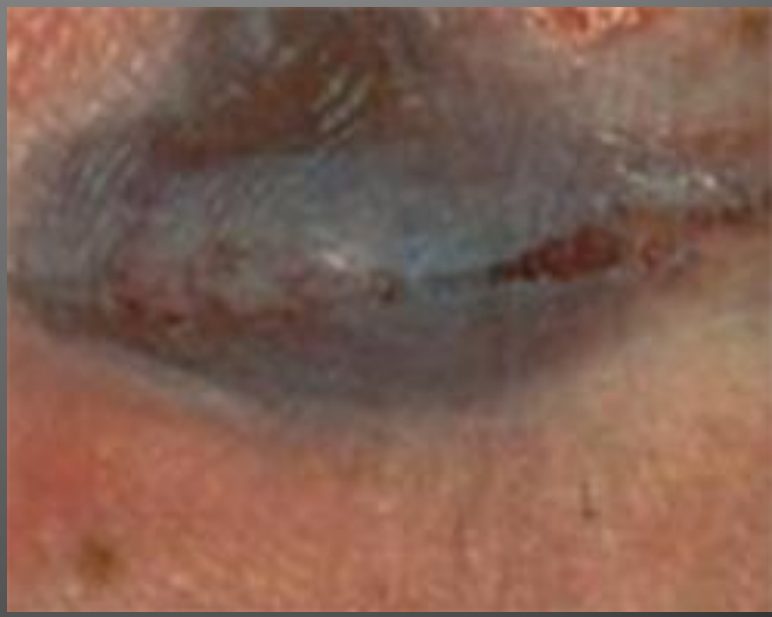
UNSTAGEABLE

Evaluator cannot determine the depth due to necrotic tissue covering the ulcer. This can be either black (eschar) or yellow (yellow).



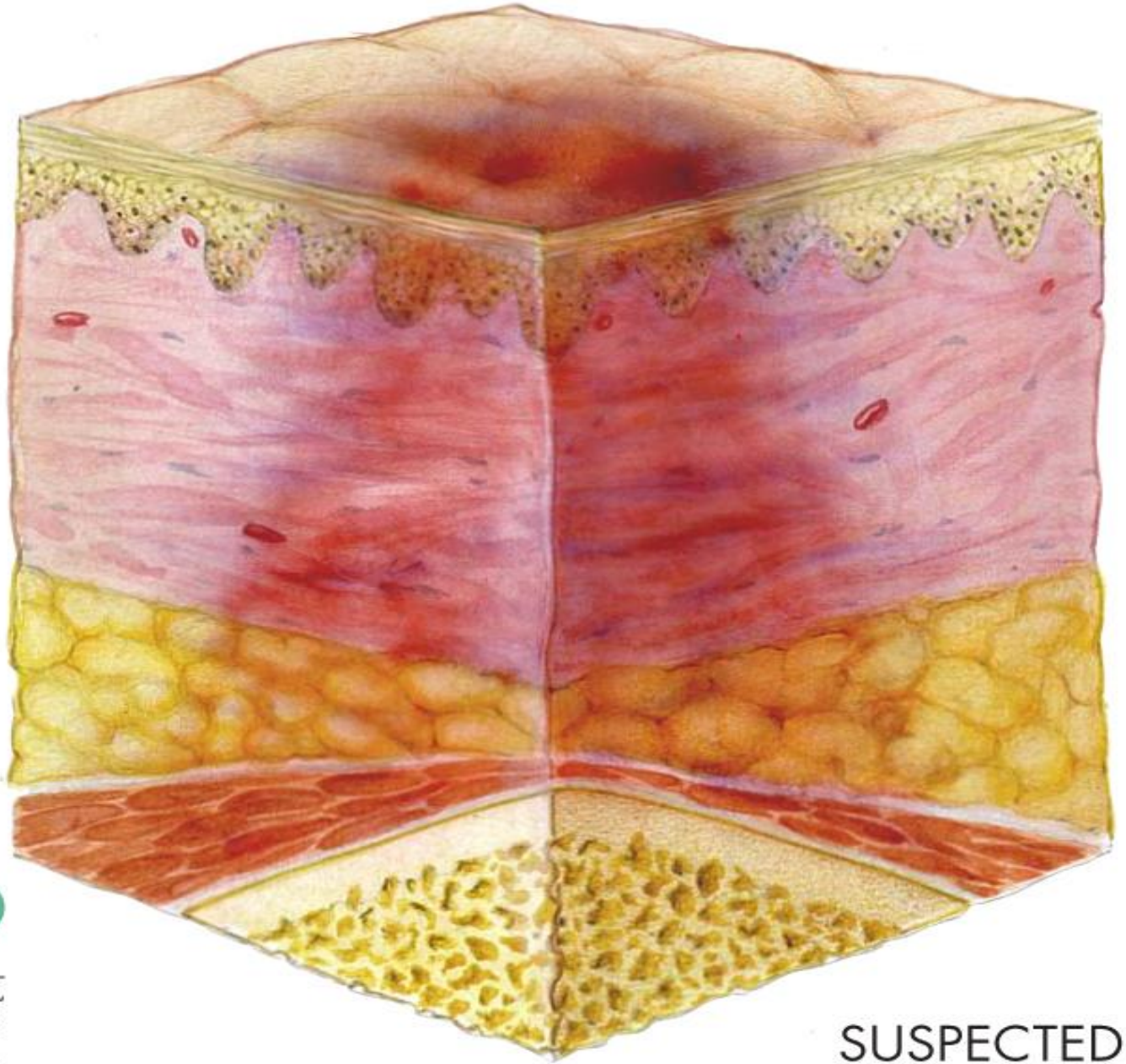
Deep Tissue Injury (DTI)

Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear.



The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

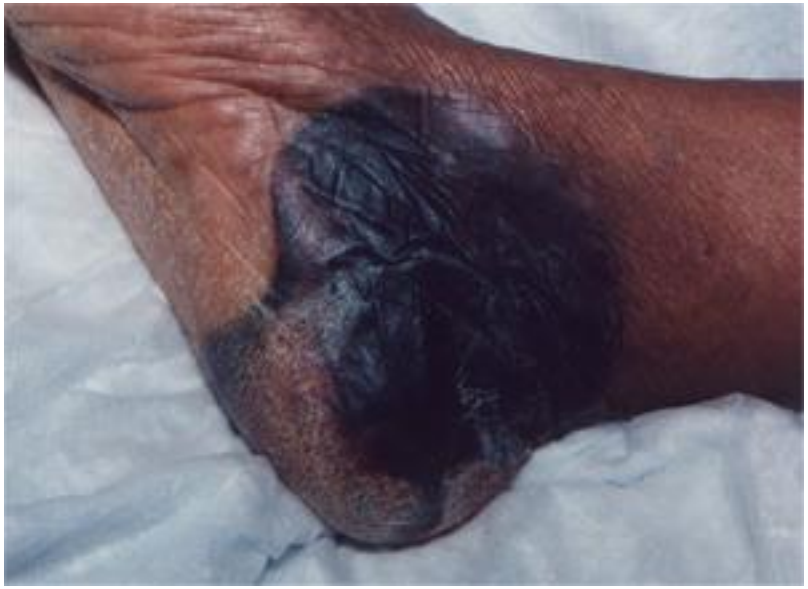
Deep tissue injury may be difficult to detect in individuals with dark skin tones.



NATIONAL PRESSURE ULCER ADVISORY PANEL

SUSPECTED
DEEP TISSUE INJURY

DTI may appear initially as a bruise but it connects as “cause and effect” to a pressure-related injury



ASSESSMENT

Assessment

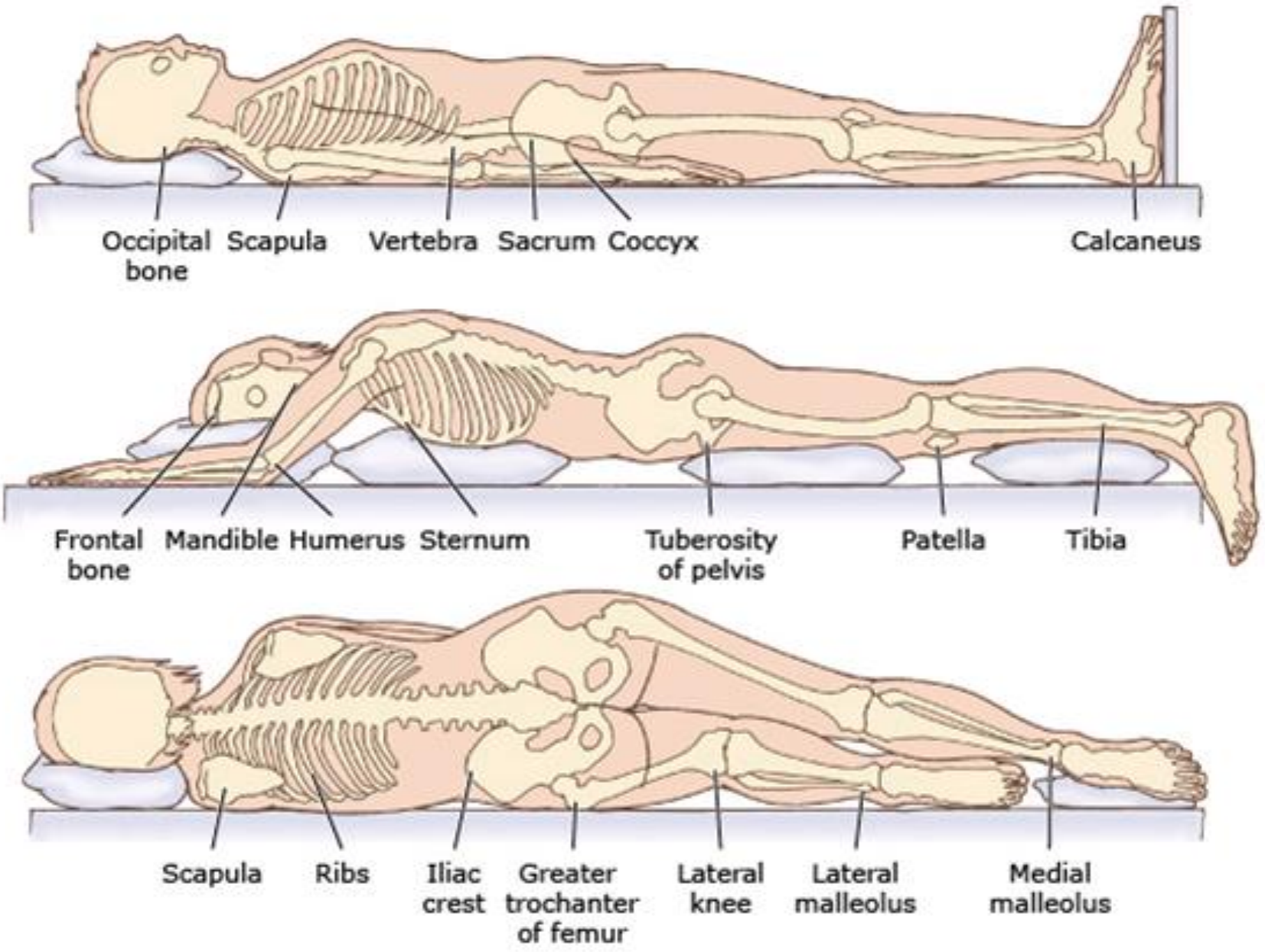
- **Educate health care professionals -**to achieve risk assessment(documentation, regular check up of patient in high risk, use of scales)
- **Nutritional indicators -** anemia, Hb and albumin levels, measures of nutritional intake, and weight
- **Factors affecting perfusion** - include diabetes, cardiovascular, instability/norepinephrine use, low blood pressure, ankle brachial index, and oxygen use
- **Skin assessment -** dry skin, excessive skin moisture, regular skin inspection

RE-ASSESSMENT !!!!!!

Assessment

- Co morbid conditions (e.g., anemia, CHF, DM, edema, immune deficiency, malignancies, peripheral vascular disease, thyroid disease)
- Complications (e.g., cellulitis, osteomyelitis)
- Pain
- Presence of contractures
- Dementia, Depression, Terminal illness

Pressure ulcer sites



POSSIBLE COMPLICATIONS

- **Sepsis** (aerobic or anaerobic bacteremia)
- **Localized infection, cellulitis, osteomyelitis**
- **Pain**
- **Depression**

Mortality rate = 60% in older persons who develop a pressure ulcer within 1 year of hospital discharge

RISK ASSESSMENT TOOLS

BRADEN SCALE

Provides method for assessing a patient's pressure ulcer risk by evaluating:

- Sensory perception: ability to respond to pressure-related discomfort
- Moisture: degree to which skin is exposed to moisture
- Activity: degree of physical activity
- Mobility: ability to change and control body position
- Nutrition: usual food intake

Braden scale for predicting pressure sore risk*

Sensory perception	Moisture	Activity	Mobility	Nutrition	Friction & shear
Ability to respond meaningfully to pressure-related discomfort	Degree to which skin is exposed to moisture	Degree of physical activity	Ability to change and control body position	Usual food intake pattern	
1. Completely limited	**1. Constantly moist**	**1. Bedfast**	**1. Completely immobile**	**1. Very poor**	**1. Problem**
Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation **OR** Limited ability to feel pain over most of body	Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	Confined to bed	Does not make even slight changes in body or extremity position without assistance	Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement. **OR** Is NPO and/or maintained on clear liquids or IV's for more than 5 days	Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.
2. Very limited	**2. Very moist**	**2. Chairfast**	**2. Very limited**	**2. Probably inadequate**	**2. Potential problem**
Responds only to painful stimuli Cannot communicate discomfort except by moaning or restlessness **OR** Has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body	Skin is often, but not always moist. Linen must be changed at least once a shift.	Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently	Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. **OR** Receives less than optimum amount of liquid diet or tube feeding	Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or good position in chair or bed most of the time but occasionally slides down.
3. Slightly limited	**3. Occasionally moist**	**3. Walks occasionally**	**3. Slightly limited**	**3. Adequate**	**3. No apparent problem**
Responds to verbal commands, but cannot always communicate discomfort or the need to be turned **OR** Has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities	Skin is occasionally moist, requiring an extra linen change approximately once a day	Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	Makes frequent though slight changes in body or extremity position independently	Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered. **OR** Is on a tube feeding or TPN regimen which probably meets most of nutritional needs	Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.
4. No impairment	**4. Rarely moist**	**4. Walks frequently**	**4. No limitation**	**4. Excellent**	
Responds to verbal commands Has no sensory deficit which would limit ability to feel or voice pain or discomfort	Skin is usually dry, linen only requires changing at routine intervals	Walks outside room at least twice a day and inside room at least once every two hours during waking hours	Makes major and frequent changes in position without assistance	Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.	
Score: _____	**Score:** _____	**Score:** _____	**Score:** _____	**Score:** _____	**Score:** _____

* To calculate the Braden scale score, rank the patient in each of the subscales; sensory perception, mobility, activity, moisture, nutrition and friction and shear. Add the six subscale scores to yield a total Braden scale score. Lower scores are associated with a higher risk of developing pressure scores. A score of 18 or less indicates high risk. See www.bradenscale.com.

NORTON SCALE

Provides method for assessing a patient's pressure ulcer risk by evaluating:

- Physical condition
- Mental condition
- Level of physical activity
- Mobility
- Continence or incontinence

Norton scale for predicting pressure sore risk*

Physical condition	Mental condition	Activity	Mobility	Incontinent
4 = Good	4 = Alert	4 = Ambulant	4 = Full	4 = Not
3 = Fair	3 = Apathetic	3 = Walk/help	3 = Slightly limited	3 = Occasional
2 = Poor	2 = Confused	2 = Chairbound	2 = Very limited	2 = Usually/urine
1 = Very bad	1 = Stupor	1 = Bed	1 = Immobile	1 = Doubly
Score: _____	**Score:** _____	**Score:** _____	**Score:** _____	**Score:** _____

* Calculated as the sum of the scores in all five areas. A score less than 14 indicates a high risk of pressure ulcer development.

Adapted from: Norton D, Decubitus 1989; 2:24.

PREVENTION

An evidence-based approach to preventing pressure ulcers focuses on:

PREVENTION IMMOBILITY

SKIN CARE

MECHANICAL LOADING

SUPPORT SURFACE

NUTRITION ASSESSMENT AND SUPPORT

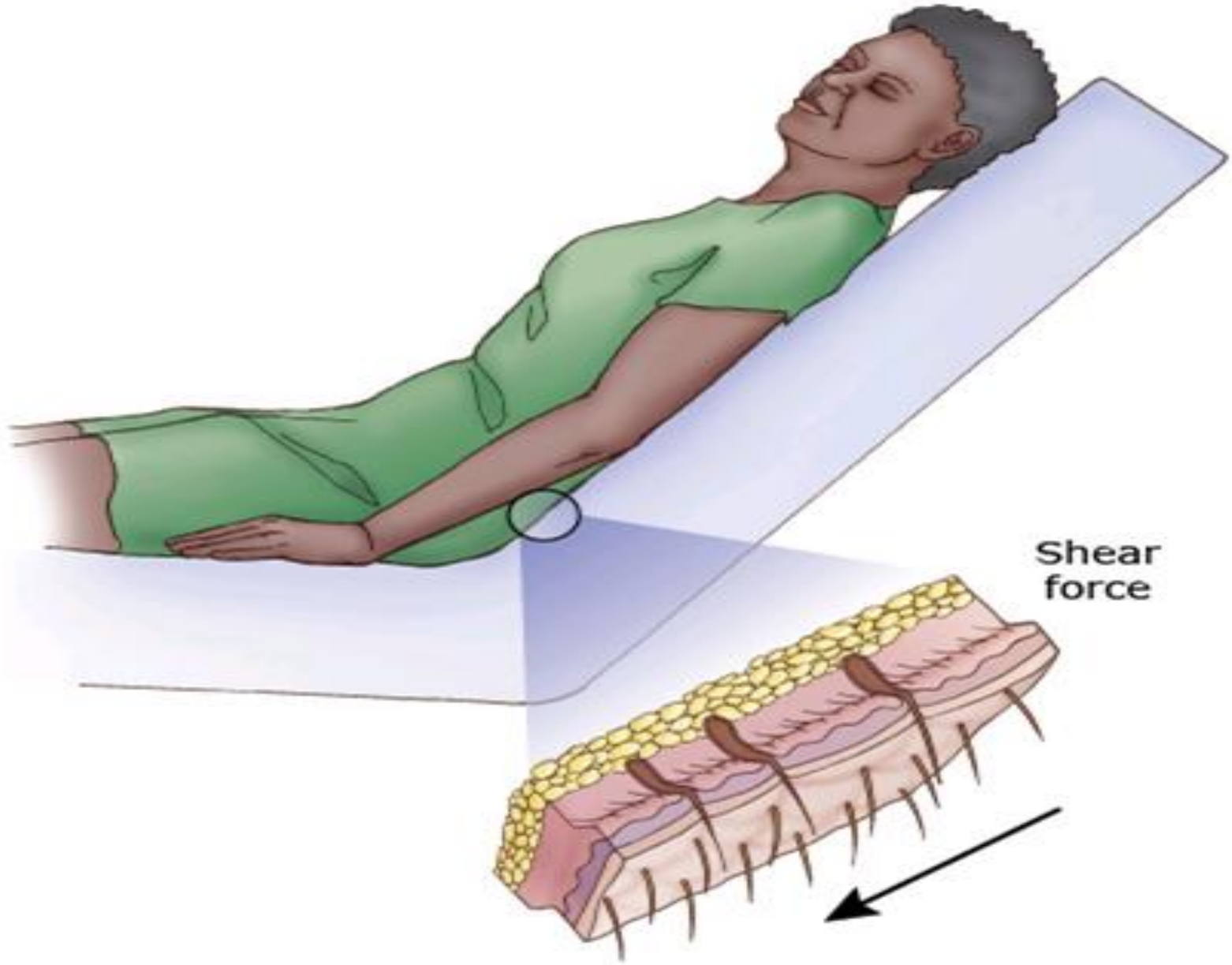
PREVENTION: IMMOBILITY

- Immobilized patients may benefit from physical therapy.
- Severe spasticity may be relieved with muscle relaxant drugs or a nerve block.
- Medications contributing to immobility, such as sedatives, should be stopped

PREVENTION: SKIN CARE

- Daily systematic skin inspection and cleansing
- ↓ factors that promote dryness
- Avoid massaging over bony prominences
- ↓ moisture (manage incontinence, perspiration, drainage)
- **Minimize friction and shear**

Shearing forces and pressure ulcers



PREVENTION: MECHANICAL LOADING

- Reposition at least every 2 hours (may use pillows, foam wedges)
- Keep head of bed at lowest elevation possible
- Use lifting devices to decrease friction and shear
- Remind patients in chairs to shift weight every 15 min

"Doughnut" seat cushions are *contraindicated*, may *cause* pressure ulcers

- Pay special attention to heels (heel ulcers account for 20% of all pressure ulcers)

PRESSURE-REDUCING SUPPORT SURFACES

Use for all older persons at risk for ulcers

- Static
  - Foam, static air, gel, water, combination (less expensive)
- Dynamic
  - Alternating air, low-air-loss, or air-fluidized
  - Use if the status surface is compressed to <1 inch or high-risk patient has reactive hyperemia on a bony prominence despite use of static support
  - Potential adverse effects: dehydration, sensory deprivation, loss of muscle strength, difficulty with mobilization

NUTRITION ASSESSMENT AND SUPPORT

- Each individual with nutritional risk and pressure ulcer risk need **minimum of 30-35 kcal per kg body weight per day, with 1.25-1.5 g/kg/day protein and 1ml of fluid intake per kcal per day**

- **Offer high-protein nutritional supplements** (in addition to usual diet) to individuals with nutritional and pressure ulcer risk because of acute or chronic diseases, or following a surgical intervention

TREATMENT

“ Effective

pressure ulcer treatment

best achieved through

interdisciplinary team approach “

MONITORING

Pressure Ulcer Scale for Healing (PUSH)*

Assessments	Instructions	Assign a subscore (cm^2)	Total the subscores
Size (length x width)	Measure the greatest length and width using a centimeter ruler. Multiply the two measurements to obtain an estimate of surface area.	0 - 0	**Subscore**
		1 - <0.3	
		2 - 0.3-0.6	
		3 - 0.7-1.0	
		4 - 1.1-2.0	
		5 - 2.1-3.0	
		6 - 3.1-4.0	
		7 - 4.1-8.0	
		8 - 8.1-12	
		9 - 12.1-24.0	
		10 - >24	
Exudate	Estimate the amount of drainage after removal of the dressing.	0 - None	**Subscore**
		1 - Light	
		2 - Moderate	
		3 - Heavy	
Tissue type	Assess the presence of sloughing or necrosis	0 - Closed	**Subscore**
		1 - Epithelial tissue	
		2 - Granulation tissue	
		3 - Slough	
		4 - Necrotic tissue	
Add together all subscores =			**Total score**

- **Nutrition status repair -** minimum of 30-35 kcal per kg body weight per day,
- 1.25-1.5 g/kg/day protein and
- 1ml of fluid intake per kcal per day

- **Pain management**

- **Repositioning**

- **Support devices**

- **Cleansing the ulcer and surrounding area with water or normal saline**

Debridement :

- mechanical debridement
- sharp/surgical techniques
- enzymatic debridement
- autolysis
- biosurgical debridement

MANAGE PAIN BEFORE AND AFTER !!!

ULCER TREATMENT BY STAGE

1. **Stage 1** – preventive measures, transparent films for ptorection
2. **Stage 2** – occlusive or semipermeable dressing (moist wound environment), wet to dry dressings are avoided

3. **Stage 3 and 4** – Tx of wound infection, debridement of necrotic tissue, surgery for some full thickness ulcers.

- **Desiccated ulcers** (dry) **-** saline moistened gauze, transparent films, hydrocolloids, and hydrogels

- **Ulcers with heavy exudate -** alginates, foams, and hydrofibers

High index of suspicion of wound infection:

- Long time
- Recurrent contamination of ulcer- anus area
- **no signs of healing for 2 weeks**
- Foul odor
- Increased pain or heat in or around ulcer
- Increased drainage from the wound
- New onset of bloody or purulent drainage
- Increased necrotic tissue in the wound bed, pocketing, or bridging is present.

WOUND INFECTIONS DIAGNOSIS

1. tissue culture

   or

1. Levine quantitative swab technique (consider a diagnosis of pressure ulcer infection if the culture results indicate bacterial bioburden of > 10*5 CFU/g of tissue and/or the presence of beta hemolytic streptococci).

DRESSING

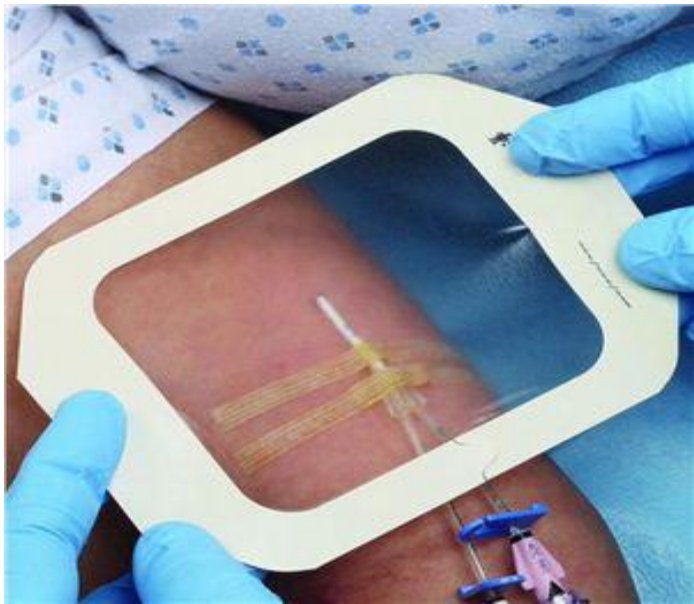
- Assess pressure ulcers
  at every dressing change

- Follow manufacturer
  recommendations, especially
  related to frequency of dressing change

- Choose a dressing to keep the wound bed moist

Transparent Film Dressings
(Tegaderm ; Hydrofilm)

- …to protect body areas at risk for friction injury or risk of injury from tape.
- secondary dressing for ulcers treated with wound fillers
- for autolytic debridement
- Do not use with moderately to heavily exudating ulcers



Hydrocolloid Dressings

(Granuflex ; Comfeel; Askina)

- for clean Stage II pressure ulcers, to protect body areas at risk for friction injury
- noninfected, shallow Stage III pressure ulcers
- using filler dressings beneath hydrocolloid dressings in deep ulcers to fill in dead space

Hydrogel Dressings and Gels

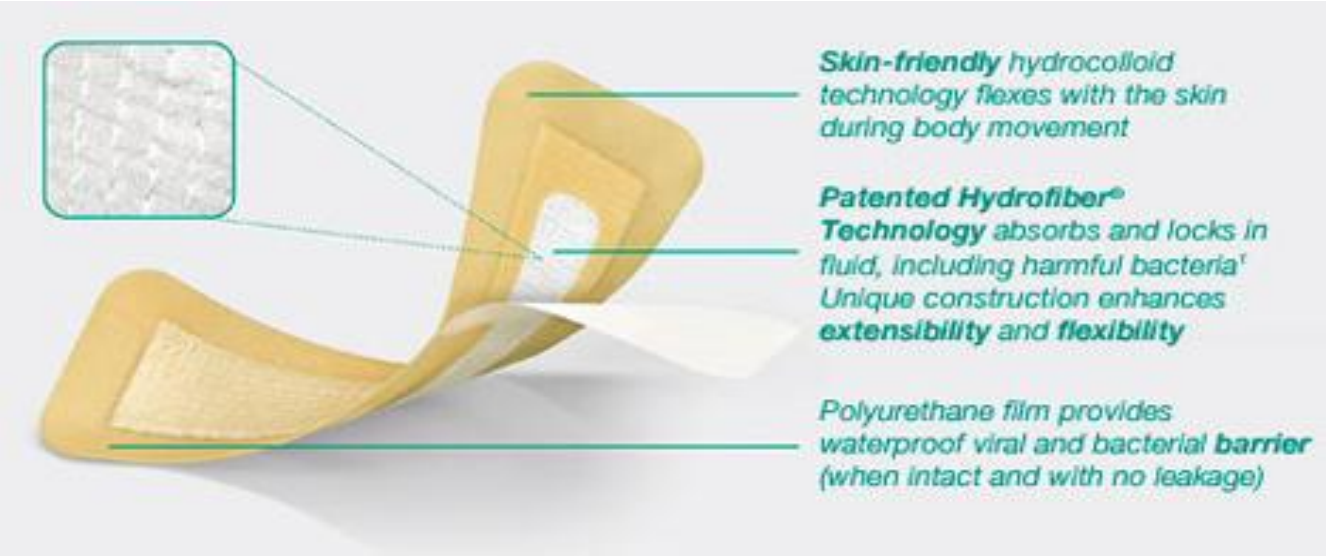
(Askina gel, Dermagran Hydrogel ; GranuGel ; Flaminal, Aquaform)

- for shallow, minimally exudating pressure ulcers
- for treatment of dry ulcer –
  gel can moisten the ulcer bed
- for pressure ulcers that
- are not granulating
- for painful pressure ulcers

Alginate and Hydrofiber Dressings

(Kaltostat, Comfeel Seasorb, Curasorb, Aquacell)

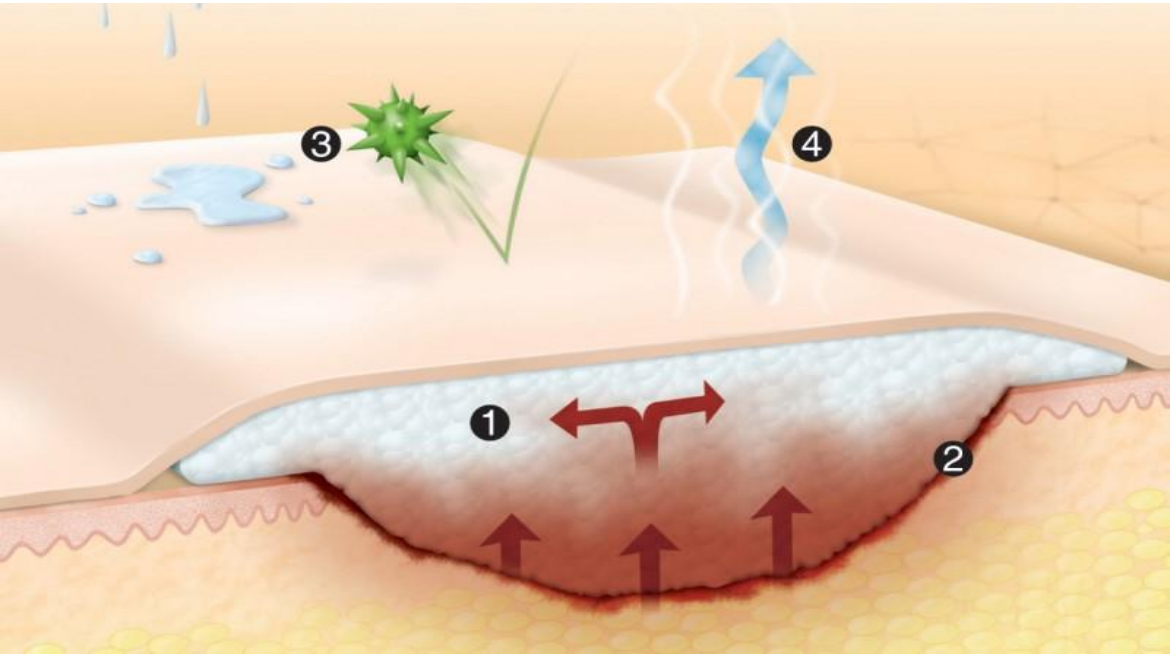
- for the treatment of moderately and heavily exudating ulcers.
- in infected pressure ulcers when there is proper concurrent treatment of infection



Foam Dressings

(Tielle/Tielle Plus, Polymem, Askina Foam)

- High exudative Stage II and shallow Stage III/ IV pressure ulcers
- Placing foam dressings on body areas and pressure ulcers at risk for shear injury



Odor Absorbing

(Actisorb, Carboflex)

- antimicrobial, activated charcoal dressing for protecting the wound from infection and trapping wound malodour
- Needs secondary dressing

Silver impregnated dressing

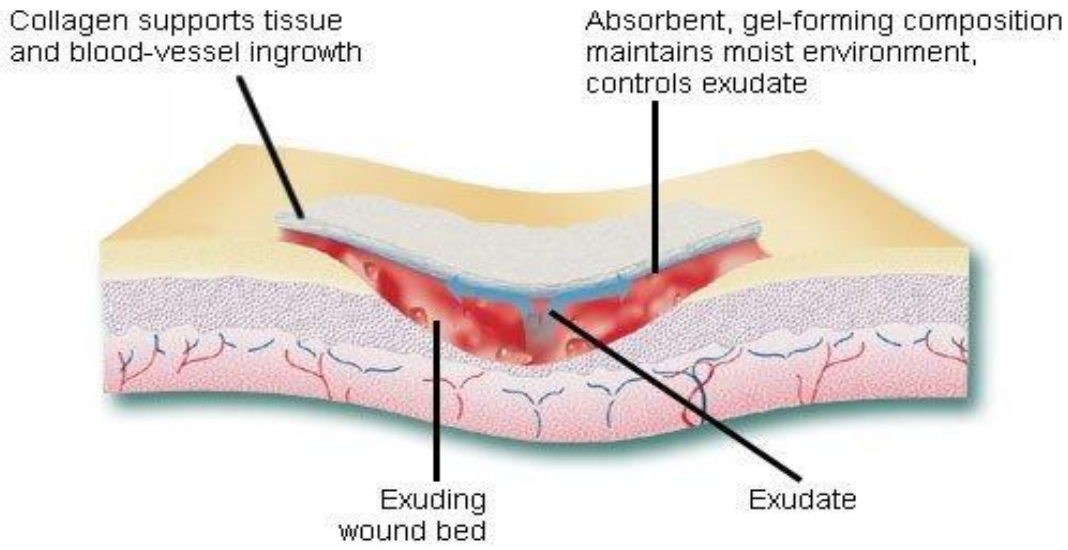
- For infected or heavily colonized ulcers
- Avoid prolonged use of silver dressings; discontinue when the infection is controlled

- **Alginate+silver** – SILVERCEL HYDROALGINATE
- **Hydrofiber+silver** – AQUACELL AG, ALGICELL SILVER

- **Foam + silver-** POLYMEM SILVER, BIATAIN AG

Collagen Dressing
(PROMOGRAN,FIBRACOL, BIOPAD)

- topical collagen stimulates the skin's own collagen activity
- collagen-based dressings produce a significant increase in the skin's fibroblast production



Wound fillers

(Dermagran, Hydrogel, Tegagel, Flaminal Gel)

- Filling of wounds, provide a moist wound healing environment
- Needs secondary dressing

ADDITIONALS

- Honey-Impregnated Dressings - Stage II and III pressure ulcers
- Cadexomer Iodine Dressings - in moderately to highly exudating pressure ulcers

- Gauze Dressings
- Silicone Dressings
- Composite Dressings - POLYMEM

Negative Pressure- VAC Tx

Adjunctive Therapy

Hyperbaric Oxygen

Ultrasound

Hydrotherapy

Electrical Stimulation

Electromagnetic agents

Therapeutic Light- Phototherapy

Biological Therapy

MANAGEMENT : SURGICAL REPAIR

May be used for stage III and IV ulcers

Direct closure, skin grafting, skin flaps, musculo-cutaneous flaps, free flaps

Risks and benefits of surgery must be carefully weighed for each patient:

- Many stage III and IV ulcers heal over a long time with local wound care
- Rate of recurrence of surgically closed pressure ulcers is high

REFERENCES:

- The European Pressure Ulcer Advisory Panel (EPUAP) and National Pressure Ulcer Advisory Panel (NPUAP) 2010

- Up to Date – Pressure Ulcers


Thanks