

WOUND HEALING PATHOGENESIS CLASSIFICATION OF ULCERS

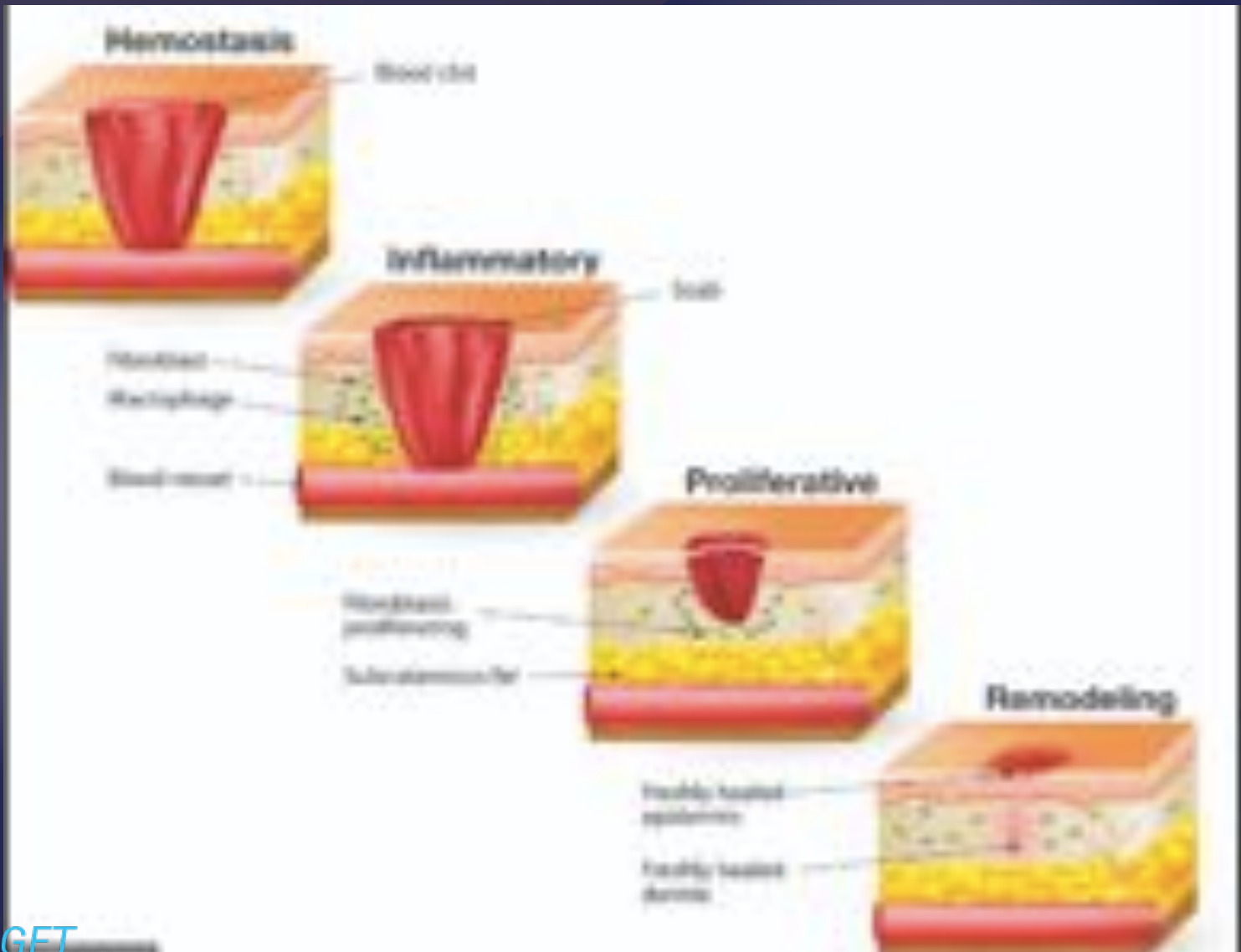
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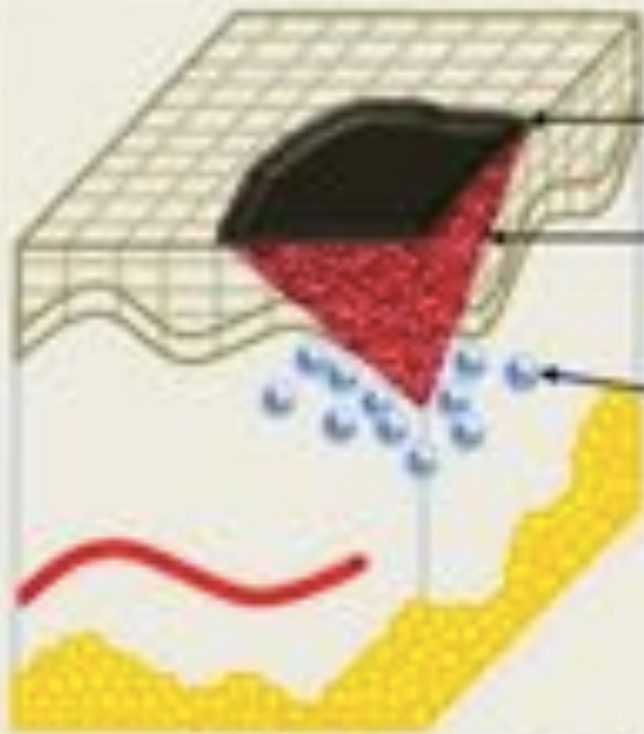
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WOUND:

- A break in the continuity of the skin or the mucous membrane. (ulcer)
- Pathogenesis
- Types of healing
- Types of scars





Scab

(Formation of hard coating on the skin)

Coagulation

(formation of blood clots)

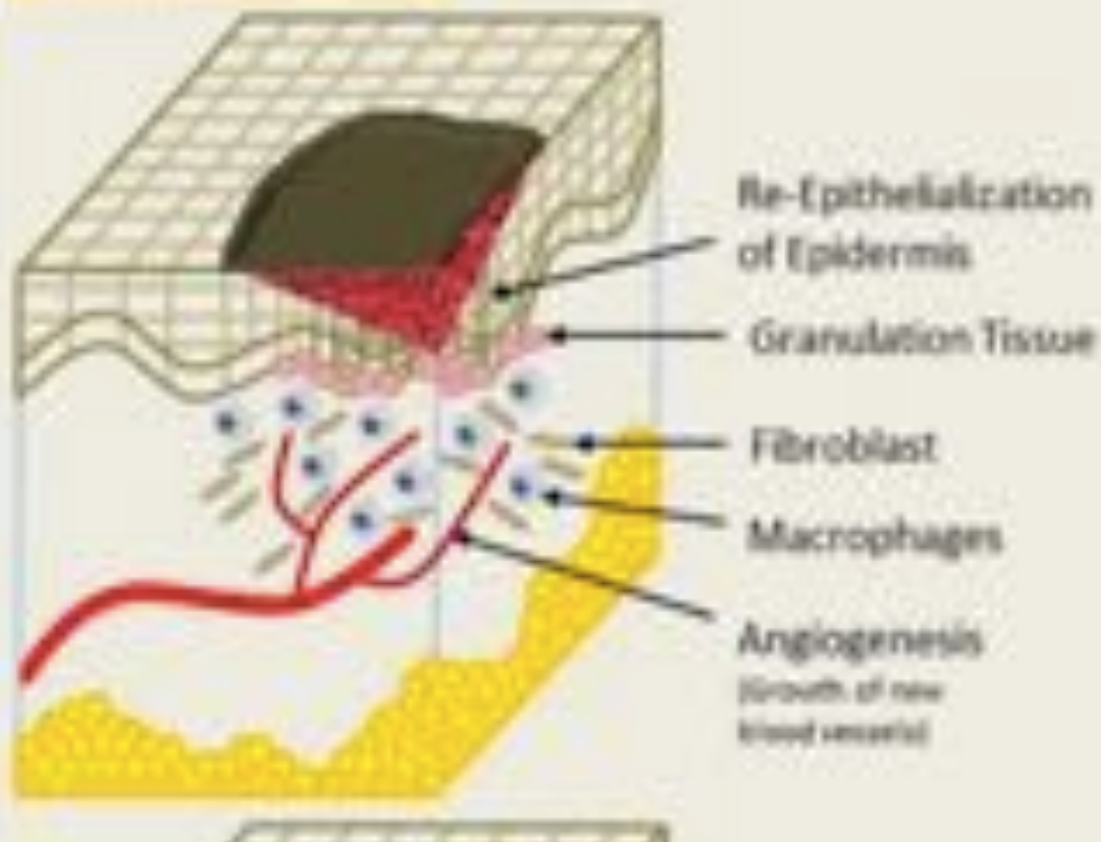
Neutrophil

Granulocytes
(white blood cells)

Inflammatory Phase

After tissue injury, a coagulation cascade is initiated to stop bleeding.

In the presence of infection, the neutrophils increased.



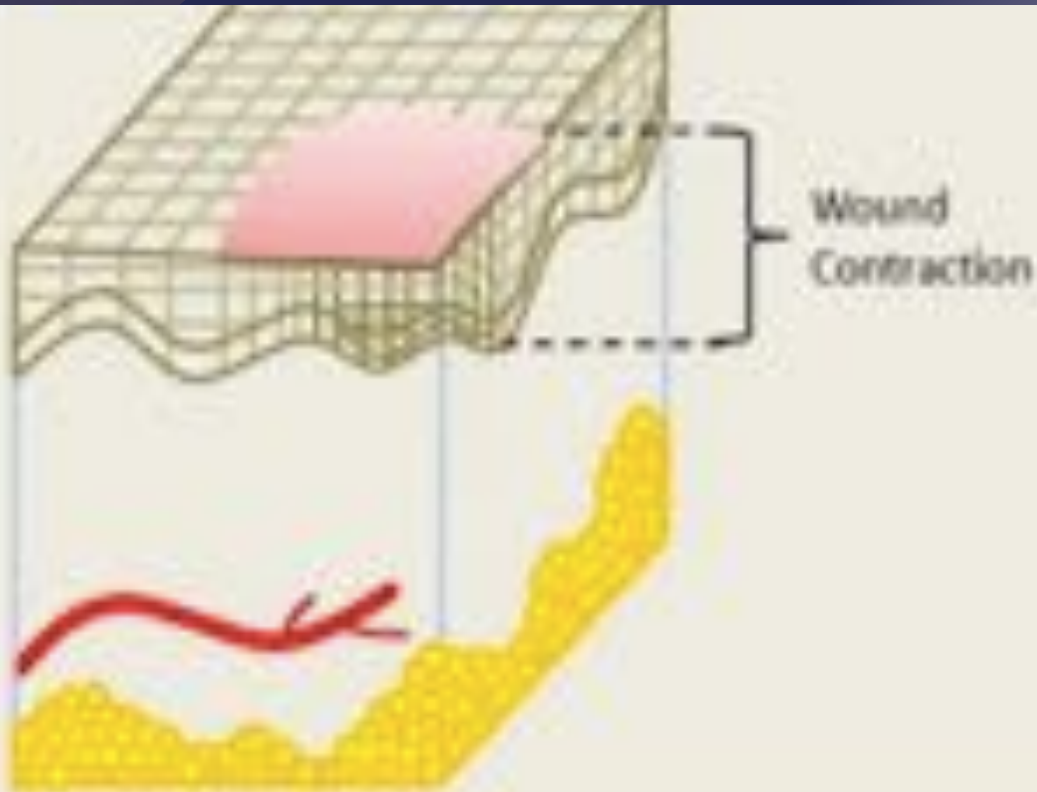
Late-Inflammatory Phase

The macrophages stimulate angiogenesis and re-epithelialization.

Fibroblast activated to deposit excessive amount of collagen for wound repair.

Proliferation Stage

Granulation tissue begins to form and is a loose network of collagen, fibronectin and hyaluronic acid.



Maturation Phase

Further collagen deposition and cross linking of extracellular matrix will occur therefore the scar tissue gains tensile strength.



PRIMARY INTENTION



Clean laceration



Early suture



Suture to be

Secondary Intention



Granulation tissue
around



Granulation



Epithelium grows
over skin

Tertiary Intention



Wound



Increased
granulation



Wound healing
with suture

Hypertrophic Scar



Distinguishing features

- Appear as red raised scar tissue
- Scarring does not extend beyond boundary of original wound
- Nodular structures containing α -SMA-producing myofibroblasts
- Promote scar contractures
- Can regress with time

Keloid



Distinguishing features

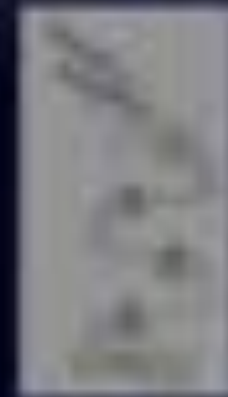
- Often appear as shiny rounded protuberances, color ranges from pink to purple
- Scarring extends beyond boundaries of original wound
- Rarely nodular, no α -SMA producing myofibroblasts
- Do not promote scar contractures
- Do not regress with time

TGF- β down-regulated

Late wound healing events

Collagen synthesis

- 3-5 days post injury
- Primarily by fibroblasts
- Maximum synthesis rate 2-4 weeks
- Declines after 4 weeks
- Type 1 collagen most common (80-90% of skin collagen)
- Type 3- seen in early phases of wound healing

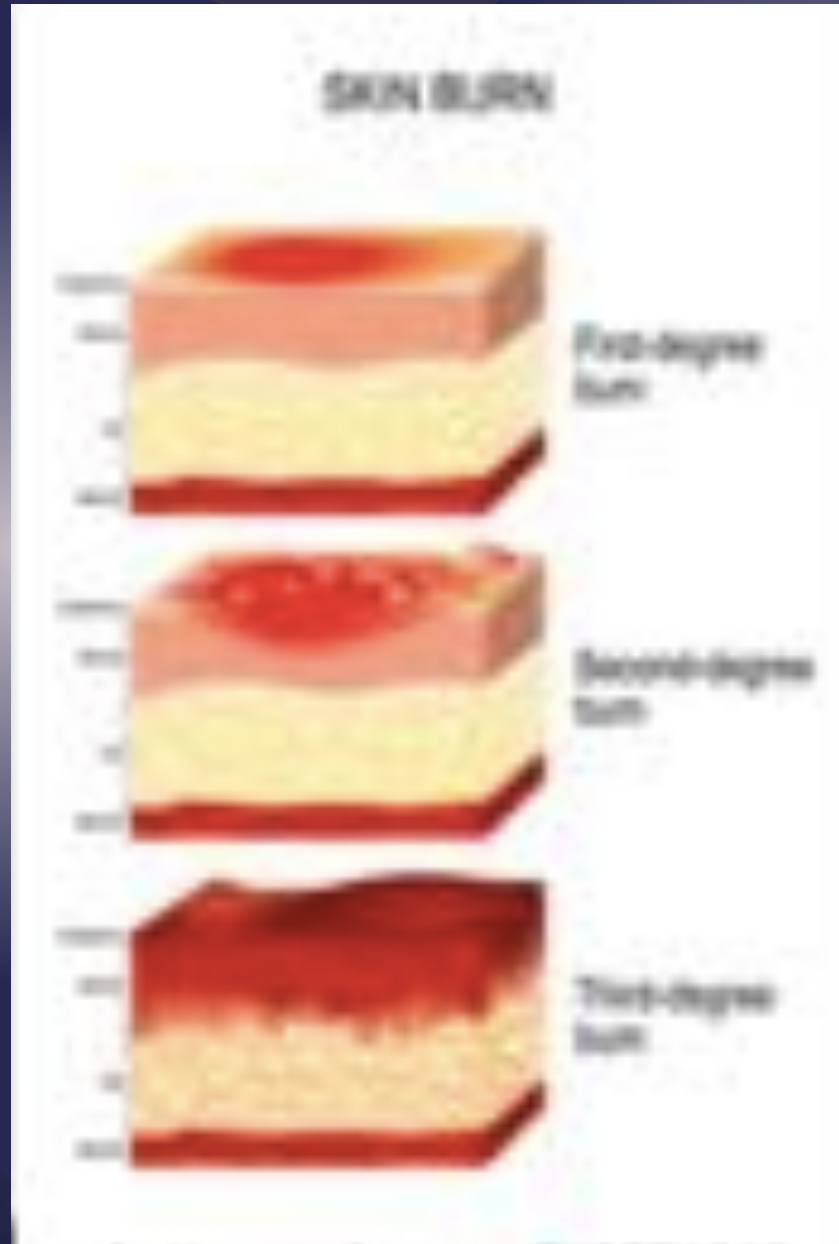


GRANULATION TISSUE: good or bad??

- Deeply red in appearance
- Perfused with capillary loops
- Needed for epithelialization to occur



BURN



BURN

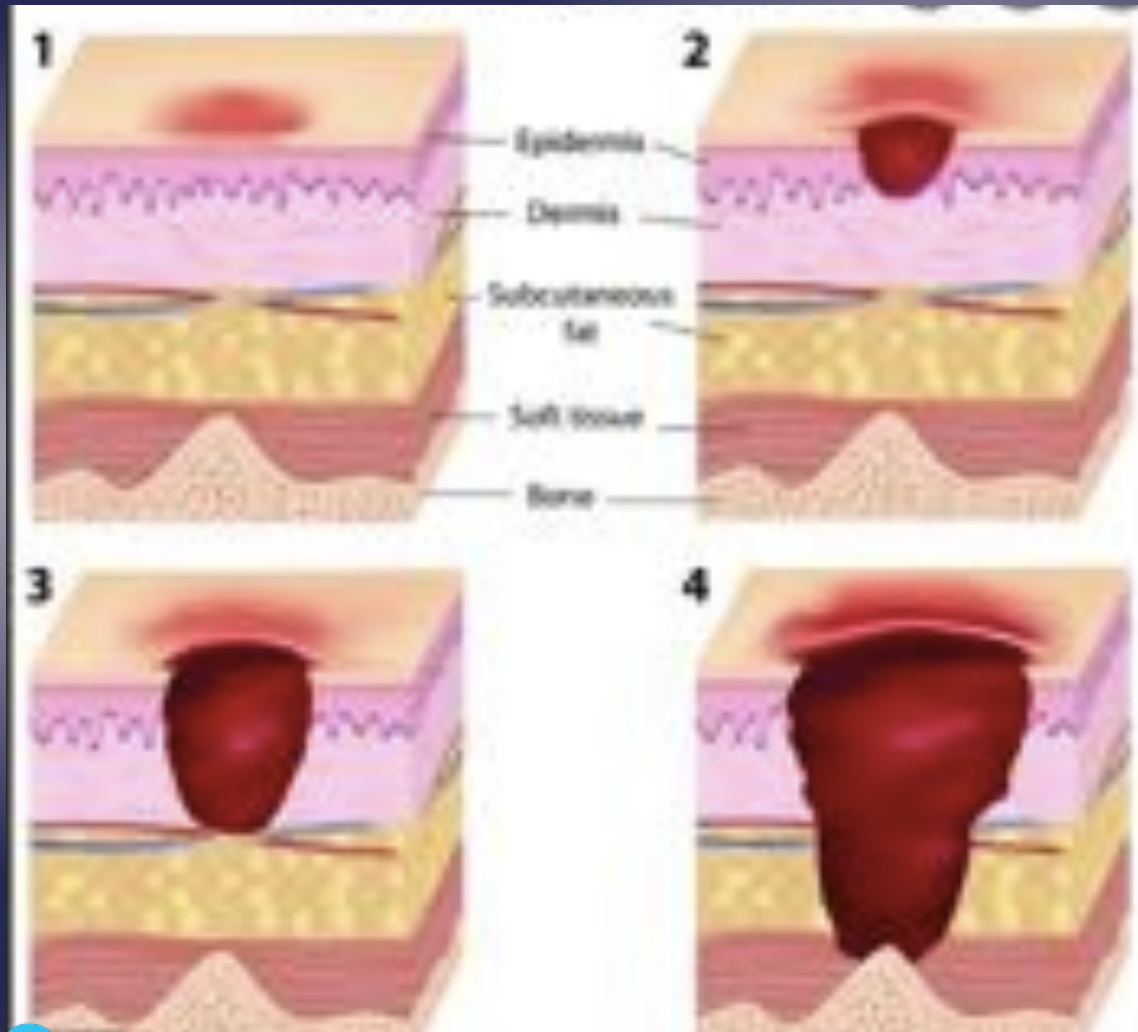
To identify the degree of burns...

DEGREE	EXTENT	COLOUR	BLISTERS	PAIN/SENSATION	HAIR/GLANDS
First	Epidermis	Flush Blanching +	NO	YES	YES
Second Superficial	1/2 and papillary dermis	Flush Blanching +	YES	YES	YES
Second Deep	Full dermis	Pale/Pink peeling Blanching -	NO/ Late	Decreased	MAYBE SEEN
Third	Subcutaneous tissue	Pale Thrombosed veins	NO	Decreased	NO
Fourth	Musculo-tendinous	Black, charred	NO	NO	NO

Schematic representation of Jackson's burn model



PRESSURE SORES



GRADES

The degree of pressure sores varies and are graded depending on their severity

- Grade I – reddening of the skin
- Grade II – blister and abrasion
- Grade III – full skin loss in which depth of the ulcer is obscured by slough
- Grade IV – the sore now exposes bone and tendon

BRADEN SCORE:

- Sensory perception
- Nutrition
- Moisture
- Activity
- Mobility
- Friction and shear

MANAGEMENT:

- Mobilisation
- Nutrition
- Alpha bed
- VAC
- Debridement
- Flaps

VASCULAR ULCERS



Lower Limb Ulcers

Arterial

Sites of trauma
Pressure areas (e.g. heel)

- Hypertension
- Diabetes
- Smoking
- Hyperlipidaemia
- Family history

- Severe pain
- Limb may be cold and have reduced/ absent pulses

Well-defined and regular
Punched out

Deep, sloughing (green) or
necrotic (black)

History of intermittent claudication or
critical limb ischemia

Ankle Brachial Pressure Index (ABPI) to
confirm a form of peripheral vascular disease

Site

Risk factors

Clinical features

Border

Base

Associated features

Investigation



	 Venous
Site	Most commonly found in gaiter region
Risk factors	<ul style="list-style-type: none"> • Increasing age • Varicose veins • Venous thromboembolism • Pregnancy • Obesity
Clinical features	<ul style="list-style-type: none"> • Can be painful, particularly towards end of the day • On examination, may have varicose veins with ankle/ leg oedema
Border	Shallow with irregular borders
Base	Pink, granulating
Associated features	Signs of venous insufficiency e.g. varicose eczema, lipodermatosclerosis
Investigation	Duplex ultrasound to confirm diagnosis. ABPI to assess any arterial component and suitability of compression therapy



NEUROPATHIC ULCER



DIABETIC, weight bearing areas, callous, iceberg phenomenon



THANK YOU!

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Youtube – DrPS