Skin and Connective Tissue Overview

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MSII
Goals of this presentation

• Review normal skin histology
• Discuss important dermatological terms
• Provide a very general understanding of the higher yield skin disorders (*main focus*)
• Brief overview of autoimmune connective tissue disorders, and wound healing
• See lots and lots of pictures!
• Q and A
Function of the skin
1. Serve as a barrier
2. Prevent fluid loss

Composition
1. Epidermis
2. Dermis
Layers of the Skin

Which of the following layers of the epidermis is considered to have a spinous appearance due to desmosome connections between cells?

A
B
C
D
E
Layers of the Skin

Which of the following layers of the epidermis is considered to have a spinous appearance due to desmosome connections between cells?

A-Stratum Corneum
B-Stratum Lucidum
C-Stratum Granulosum
D- Stratum Spinosum
E-Stratum Basale
Layers of the Skin

“Californians Like Girls in String Bikinis”

A-Stratum Corneum
B-Stratum Lucidum
C-Stratum Granulosum
D- Stratum Spinosum
E-Stratum Basale
Layers of the Skin
Which 2 layers have been paired with the wrong description?

A-Dense network of keratin
B-Found in palms and soles
C-Stem cell potential
D-Desmosomes b/n cells
E-Granules in cells
Layers of the Skin
Which 2 layers have been paired with the wrong description?

A-Dense network of keratin
B-Found in palms and soles
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E-Granules in cells
Layers of the Skin

Which of the following is not found within the dermis?

A. Lymph vessels
B. Blood vessel
C. Connective tissue
D. Adnexal structures
E. Nerve endings
F. layers of keratinocytes
Layers of the Skin
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F. layers of keratinocytes
Layers of the Skin

Dermis
Layers of the Skin

Dermis

- Papillary dermis
- Reticular dermis
The Language

Macule- A **flat** lesion showing a well circumscribed change in skin color < 5 mm
The Language

Patch- A **flat** lesion showing a well circumscribed change in skin color > 5 mm

Congenital nevus
The Language

Papule- Solid, *elevated skin lesion* < 5 mm
The Language

Plaque- Solid, *elevated skin lesion > 5 mm*

Psoriasis
The Language

Vesicle- Small fluid filled blister $< 5 \text{ mm}$
The Language

Bulla-Large **fluid filled blister > 5 mm**

Bullous Pemphigoid
The Language

Pustule-Vesicle containing *pus*
The Language

Wheal- *Transient* smooth papule or plaque

Hives
The Language
Scale-Flaking off of stratum corneum

Eczema
The Language

Crust-Dry Exudate

Impetigo
The Language
The following describes a ____________

A. Papule
B. Patch
C. Vesicle
D. Macule
E. Bulla
F. Pustule
G. Wheal
H. Scale
I. Crust
The Language
The following describes a ________

A. Papule
B. Patch
C. Vesicle
D. Macule
E. Bulla
F. Pustule
G. Wheal
H. Scale
I. Crust
High yield disorders
High yield inflammatory disorders

Celebrity Case Study #1

Jack Nicholson
High yield inflammatory disorders

Celebrity Case Study #1

Jack shows up to your clinic complaining that after shopping for a new watch on Black Friday, his wrist just has not been the same.
High yield inflammatory disorders

Celebrity Case Study #1

As he pulls up his sleeve, you see exactly what he is talking about. He asks you what is happening to him, and you respond by saying which of the following?

A. “You have a Type 1 HS dermatitis”
B. “You have a Type 4 HS dermatitis”
C. “There is excess keratin blocking some of your hair follicles”
D. “This is associated w/ excessive keratinocyte proliferation”
E. “Do you have chronic HCV Jack?”
High yield inflammatory disorders

Celebrity Case Study #1

Jack has contact dermatitis caused by an allergen (his nickel watch).
Look for: Pruritic, erythematous, sometimes oozing rash
Other causes: Poison ivy, detergents, drugs like penicillin

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High yield inflammatory disorders

Celebrity Case Study #1

A topic dermatitis presents similarly but the Hx will be different. Look for: Pruritic, erythematous, sometimes oozing rash often on face and flexor Surfaces

Associations: Asthma, Allergic Rhinitis

A. “You have a Type 1 HS dermatitis”
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High yield inflammatory disorders

Celebrity Case Study #1

Acne is related to an increase in sebum production, and excess keratin blocking follicles that may eventually lead to infection of that follicle.

Look for: Pustules (pimples), comedones (white and black heads)

Associations: Youth, Propionibacterium acnes, hormones

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High yield inflammatory disorders

Celebrity Case Study #1

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High yield inflammatory disorders
Celebrity Case Study #1

Psoriasis is thought to have an autoimmune etiology, and arises in areas of trauma. Look for: Papules and plaques with silver scaling, especially on knees and elbows. Associations: Acanthosis, parakeratosis, Munro microabcesses, Auspitz sign, **HLA-C***

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High yield inflammatory disorders
Celebrity Case Study #1

Acanthosis- epidermal hyperplasia
High yield inflammatory disorders

Celebrity Case Study #1

Parakeratosis- Hyperkeratosis w/ nucleated keratinocytes in stratum corneum

Nuclei in keratinocytes in the stratum corneum
High yield inflammatory disorders

Celebrity Case Study #1

Lichen planus has an unknown etiology but it is associated with chronic HCV. Look for: 5Ps - pruritic, polygonal, planar, purple, papule like rash with reticular white lines on their surface; usually on wrists, elbows and mucosa

Associations: HCV, Oral manifestations, Saw tooth Histology

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High yield inflammatory disorders

Oral manifestation (wickham striae)

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High yield inflammatory disorders
Dermal epidermal junction inflammation

A. “You have a Type 1 HS dermatitis”
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High yield inflammatory disorders
“**I don’t LICH (like) PLANUS in my MOUTH (wickham striae) it gives me a SAW (sore) TOOTH**”

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High yield inflammatory disorders

Summary

Inflammatory disorders

- Pruritic
  - Red, oozing
  - Dermatitis
- Plaque
  - Purple, planar
  - Lichen Planus
  - Psoriasis
- Pustules
  - acne
High yield blistering disorders
Celebrity Case Study #2

Lenny Kravitz
High yield blistering disorders

Celebrity Case Study #2

Lenny comes to your LA clinic complaining of an acute onset skin rash. He is afebrile, and no oral/mucosal involvement is noted. He is currently on a course of bacterim.
High yield blistering disorders

Celebrity Case Study #2

You notice this targetoid skin rash.
High yield blistering disorders

Celebrity Case Study #2

This targetoid morphology is also found on his hands. He asks you to tell him more about what is going on, and you respond by saying ________?

A. “You have IgG against desmoglein”
B. “You have IgG against BM collagen”
C. “This can resolve w/ a gluten free diet”
D. “Lenny, I love you so much, please show me your tattoos”
E. “The severe form includes fever oral involvement, and resembles a burn”
High yield blistering disorders

Celebrity Case Study #2

Erythema Multiforme is a **hypersensitivity reaction** w/ central epidermal necrolysis surrounded by erythema. Severe form is SJS.

Look for: **Targetoid rash, possible sloughing off of skin (SJS)**

Associations: Cancer, Infection (esp. HSV), drugs (PCNs, Sulfonamides), Lupus

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High yield blistering disorders

Celebrity Case Study #2

What if Lenny came in with skin and oral mucosa bullae that showed dry crusting because of how prone they are rupture (Nikolsky sign), what would you tell him now?

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**High yield blistering disorders**

**Celebrity Case Study #2**

Pemphigus vulgaris is an autoimmune disorder that destroys desmosomes between keratinocytes. Look for: Crusted bullae, oral involvement, IgG that surrounds keratinocytes in a fish net pattern

Associations: type 2 HS

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“My pops and I were VULGAR while FISHing in MEMPHIS (PEMPHigus)”
High yield blistering disorders

Celebrity Case Study #2

Essentially a blister is the separation of layers in the skin (acantholysis). Which skin layer would you expect to be separated in Pemphigus vulgaris?

A
B
C
D
E
High yield blistering disorders

Celebrity Case Study #2

Essentially a blister is the separation of layers in the skin (acantholysis). Which skin layer would you expect to be separated in Pemphigus vulgaris?

A
B
C
D
E
High yield blistering disorders

Celebrity Case Study #2

Pemphigus vulgaris acantholysis of stratum spinosum

Basal cell layer intact
High yield blistering disorders

Celebrity Case Study #2

Bullous pemphigoid is an autoimmune disorder that destroys hemidesmosomes between basal cells and the underlying basement membrane.

Look for: **Solid bullae (no rupture)**, **NO oral involvement**, **IgG in a linear pattern**

Associations: type 2 HS

A. “You have IgG against desmoglein”
B. “You have IgG against BM collagen”
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High yield blistering disorders

Celebrity Case Study #2

Dermatitis herpetiformis is marked by autoimmune deposition of IgA at the tips of the dermal papillae.

Look for: Pruritic vesicles, with bullae, usually on elbows

Associations: Celiac disease

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High yield epithelial tumors

Celebrity Case Study #3

Donald Trump
High yield epithelial tumors

Celebrity Case Study #3

67 yo Mr. Trump presents with this pink, pearl-like papule surrounded by dilated vessels. He threatens to fire you if you do not tell him what the deal is. Although a biopsy is still needed for confirmation, you will most likely tell him?

A. “This is the most common skin malignancy, but metastasis is rare”
B. “Arsenic exposure has been shown to be a risk factor, but metastasis is rare”
C. “This is not common for someone your age”
D. “This is assoc. w/ insulin resistance or gastric carcinoma”
E. “Can present as a discolored plaque that resembles a coin”
High yield epithelial tumors

Celebrity Case Study #3

Basal cell carcinoma is due to proliferation of the epidermal basal cells. It is the most common cutaneous malignancy.

Look for: **Pink, pearl like papule w/ telangiectasia; classically involves upper lip**

Associations: UV exposure, disorders of DNA repair, albinism

A. “This is the most common skin malignancy, but metastasis is rare”
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**High yield epithelial tumors**

**Celebrity Case Study #3**

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Look for: Pink, pearl like papule w/ telangiectasia; classically involves **upper lip**

Associations: UV exposure, disorders of DNA repair, albinism

(1) Peripheral palisading  
(2) Rim of mucin  
(3) Dermal nests of basaloid cells  
(4) Intact epidermis
High yield epithelial tumors

Celebrity Case Study #3

Squamous cell carcinoma is due to proliferation of the squamous cells and it is characterized by keratin pearls.
Look for: **Ulcerated nodular mass, classically involving lower lip**
Associations: UV exposure, disorders of DNA repair, albinism, **arsenic** etc

A. “This is the most common skin malignancy, but metastasis is rare”
B. “Arsenic exposure has been shown to be a risk factor, but metastasis is rare”
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High yield epithelial tumors

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High yield epithelial tumors

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Dysplasia of squamous cells; precursor for SCC; hyperkeratotic plaque
High yield epithelial tumors

Celebrity Case Study #3

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Keratoacanthoma

Cup-like, filled w/ keratin debris; well-Differentiated SCC; develops rapidly, regresses rapidly
High yield epithelial tumors

Celebrity Case Study #3

Both squamous and basal cell carcinomas are more common in older patients, while melanomas are more common in young adults.

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“Skin tumors are BS”
High yield epithelial tumors

Celebrity Case Study #3

Epidermal hyperplasia with skin darkening.
Look for: Darkening in groin, axilla, back of neck
Associations: Insulin resistance, gastric carcinoma

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E. “Can present as a discolored plaque that resembles a coin”
High yield epithelial tumors

Celebrity Case Study #3

Seborrheic keratosis is a benign squamous proliferation found on the face or extremities.

Look for: **Elderly** person, discolored plaque with a ‘stuck on’ coin like appearance

Associations: Multiple seborrheic keratoses may suggest **carcinoma of GI tract**

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Leser-Trelat sign
High yield disorders of melanin & pigmentation

Celebrity Case Study #4

Kim Kardashian
Kim who is pregnant with Kanye West’s baby, comes to your clinic because she is worried about some skin changes that have occurred on her face. She is crying hysterically, and wants to know what is happening to her. Your response to her is?

A. “You have an increased number of melanosomes”
B. “This is due to autoimmune destruction of melanocytes”
C. “This is due to an enzyme defect in tyrosinase”
D. “This is a mole growth with ABCD criteria”
E. “This is likely related to the pregnancy”
High yield disorders of melanin & pigmentation

Celebrity Case Study #4

Melasma is a mask-like hyperpigmentation, often in the cheeks, and it thought to be caused by hormonal stimulation of melanocytes (in sun exposed areas). Look for: Hyperpigmentation in the cheeks

Associations: Oral contraceptives, HRT, pregnancy

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C. “This is due to an enzyme defect in tyrosinase”
D. “This is a mole growth with ABCD criteria”
E. “This is likely related to the pregnancy”
Freckles are small, brown macules that may darken on exposure to the sun. They are usually common on the face. They are not considered a skin disorder!

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High yield disorders of melanin & pigmentation

Celebrity Case Study #4
High yield disorders of melanin & pigmentation
Celebrity Case Study #4

Vitiligo is caused by loss of pigmentation as result of melanocyte autoimmune destruction.

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C. “This is due to an enzyme defect in tyrosinase”
D. “This is a mole growth with ABCD criteria”
E. “This is likely related to the pregnancy”
**High yield disorders of melanin & pigmentation**

**Celebrity Case Study #4**

A congenital lack in pigmentation that is usually due to a tyrosinase deficiency, which inhibits any production of melanin.

Look for: **Hypopigmentation**

Associations: SCC, BCC, melanomas

A. “You have an increased number of melanosomes”

B. “This is due to autoimmune destruction of melanocytes”

C. “This is due to an enzyme defect in tyrosinase”

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High yield disorders of melanin & pigmentation

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High yield disorders of melanin & pigmentation

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Ocular form
High yield disorders of melanin & pigmentation

Celebrity Case Study #4

A melanoma is a malignant neoplasm of melanocytes, and has the worst prognosis of melanocytes. Look for: Mole-like growth

Associations: UV exposure, disorders of DNA repair, albinism, congenital nevus etc

Asymmetry
Borders (irregular)
Color (variegated)
Diameter > 6 mm

A. “You have an increased number of melanosomes”
B. “This is due to autoimmune destruction of melanocytes”
C. “This is due to an enzyme defect in tyrosinase”
D. “This is a mole growth with ABCD criteria”
E. “This is likely related to the pregnancy”
High yield disorders of melanin & pigmentation

Celebrity Case Study #4

A melanoma is a malignant neoplasm of melanocytes, and of the major cutaneous malignancies, it has the **worst prognosis**.

Look for: **Mole-like growth**

Associations: UV exposure, disorders of DNA repair, albinism, **congenital nevus** etc

“The presence of hair is a good distinguishing factor b/n a nevus and a melanoma”.

A. “You have an increased number of melanosomes”
B. “This is due to autoimmune destruction of melanocytes”
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D. “This is a mole growth with ABCD criteria”
E. “This is likely related to the pregnancy”
High yield skin infections
Rapid Review
After recent trauma to the foot a febrile diabetic patient presents with the following rash. Which of the following is most likely true?

A. “May be due to *S. aureus* or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to *S. aureus* or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
D. “Flesh colored papules commonly found in the hands and feet”
E. “Umbilicated papules with histology showing cytoplasmic inclusions”
High yield skin infections

Rapid Review

Cellulitis is infection of the deep tissues (dermal and subcutaneous)
Look for: Pruritic, tender, swollen rash with fever
Associations: Trauma, surgery, etc.

A. “May be due to S. aureus or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to S. aureus or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
D. “Flesh colored papules commonly found in the hands and feet”
E. “Umbilicated papules with histology showing cytoplasmic inclusions”
**High yield skin infections**

**Rapid Review**

A child presents with the following skin lesion. Which of the following is most likely true?

A. “May be due to *S. aureus* or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to *S. aureus* or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
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High yield skin infections
Rapid Review

Impetigo

A. “May be due to *S. aureus* or GAS and its’ complication may potentially lead to a surgical emergency”
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C. “Caused by exfoliative A and B toxins”
D. “Flesh colored papules commonly found in the hands and feet”
E. “Umbilicated papules with histology showing cytoplasmic inclusions”
High yield skin infections
Rapid Review

A sexually active adult presents with the following skin lesion. Which of the following is most likely true?

A. “May be due to S. aureus or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to S. aureus or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
D. “Flesh colored papules commonly found in the hands and feet caused by HPV”
E. “Umbilicated papules with histology showing cytoplasmic inclusions”
High yield skin infections
Rapid Review

Molluscum Contagiosum

A. “May be due to S. aureus or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to S. aureus or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
D. “Flesh colored papules commonly found in the hands and feet”
E. “Umbilicated papules with histology showing cytoplasmic inclusions”
A college student presents with the following skin lesion. Which of the following is most likely true?

A. “May be due to S. aureus or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to S. aureus or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
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High yield skin infections
Rapid Review

Verruca (Wart)

A. “May be due to *S. aureus* or GAS and its’ complication may potentially lead to a surgical emergency”
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High yield skin infections

Rapid Review

A child presents with the following skin lesion. Which of the following is most likely true?

A. “May be due to S. aureus or GAS and its’ complication may potentially lead to a surgical emergency”

B. “May be due to S. aureus or GAS and it may precede glomerulonephritis”

C. “Caused by exfoliative A and B toxins”

D. “Flesh colored papules commonly found on the hands and feet caused by HPV”

E. “Umbilicated papules with histology showing cytoplasmic inclusions”
High yield skin infections
Rapid Review

Staphylococcal Scalded Skin Syndrome

A. “May be due to *S. aureus* or GAS and its’ complication may potentially lead to a surgical emergency”
B. “May be due to *S. aureus* or GAS and it may precede glomerulonephritis”
C. “Caused by exfoliative A and B toxins”
D. “Flesh colored papules commonly Found on the hands and feet caused by HPV”
E. “Umbilicated papules with histology showing cytoplasmic inclusions”
High yield skin infections
Rapid Review

Many others including:
- Herpesviridae family infections
- Rashes of palms and soles
  “Drive CARS with your palms and soles”
  CA- COXSACKIE A
  R- ROCKY MOUNTAIN SPOTTED FEVER
  S- SYPHILLIS
- Childhood exanthemas
  • Measles or rubeola
  • Rubella
  • Varicella (or chickenpox)
  • Fifth disease
  • Roseola
Connective tissue

Quick points
Connective tissue disorders
Match the following autoimmune disorders w/ their description

Lupus
- Deposition of collagen especially in the esophagus; solid & liquid dysphagia; **anti-DNA topoisomerase (Scl-70)**

Sjogren Syndrome
- Patient complains that they can’t chew a cracker, or that there is dirt in their eyes; **anti-ribonucleoprotein** (anti-SS-A/Ro and anti-SS-B/La)

Scleroderma
- Ab against **U1 ribonucleoprotein**

Mixed Connective tissue
- Ab against host damage multiple tissues; butterfly rash; dx confirmed with **anti-dsDNA**
**Connective tissue disorders**

**Match the following**

Lupus, d  
- a. Deposition of collagen especially in the esophagus; solid & liquid dysphagia; **anti-DNA topoisomerase (Scl-70)**

Sjogren Syndrome, b  
- b. Patient complains that they can’t chew a cracker, or that there is dirt in their eyes; **anti-ribonucleoprotein** (anti-SS-A/Ro and anti-SS-B/La)

Scleroderma, a  
- c. Ab against **U1 ribonucleoprotein**

Mixed Connective tissue, c  
- d. Ab against host damage multiple Tissues; butterfly rash; dx confirmed with **anti-dsDNA**
Connective tissue
Wound healing

HAEMOSTASIS AND INFLAMMATION

PROLIFERATION

REMODELLING

PLATELETS
NEUTROPHILS
MACROPHAGES
LYMPHOCYTES

ENDOTHELIAL CELLS
EPITHELIAL CELLS
FIBROBLASTS

FIBROBLASTS

Platelet aggregation and degranulation
Blood clotting
Chemotaxis of inflammatory cells

Angiogenesis
Formation of an epithelial layer
Collagen synthesis
Granulation
Contraction

Scarmaturation
Collagen crosslinking

Injury 3 days 7 days weeks-months
Connective tissue
Wound healing

Key:
- Macrophage
- Neutrophil
- Fibroblast
- Type III collagen
- Epithelial cells
- Type I collagen
- Capillary

1. Wound gap
   a. Fibrin clot
2. Wound gap
   b. Day 1–2: cellular infiltrate, temporary matrix, wound contraction, epithelial migration, clot dissolution
3. Wound gap
   c. Day 3–4: surface intact, new basement membrane, definitive matrix
4. Wound gap
   d. Day 5: scar
Questions?
Resources:

Fundamentals of Pathology: Medical Course and Step 1 Review – Husain A. Sattar MD

First Aid for the USMLE Step 1 2013- Tao Le