

**Chapter 4**  
**Skin and Body Membranes**

1

**Membranes**  
**Epithelial or Connective**

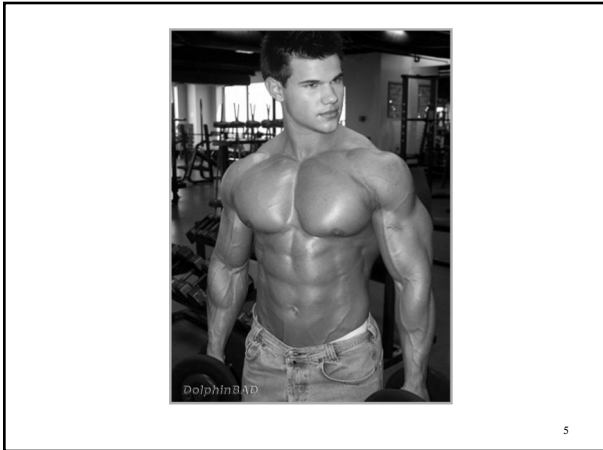
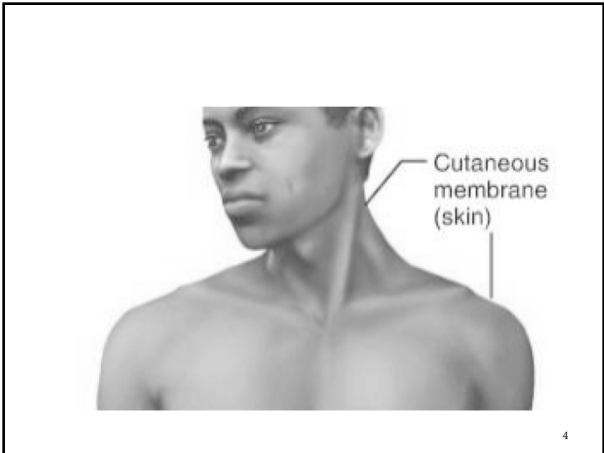
- ❖ Cutaneous
- ❖ Mucous
- ❖ Serous
- ❖ Synovial

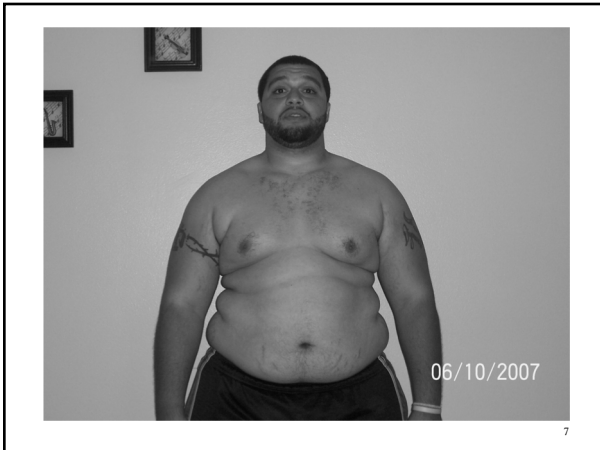
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**Cutaneous Membrane**

- ❖ Epithelial
- ❖ Includes your skin.
- ❖ Exposed to the air-”dry membrane”
- ❖ Functions to protect the insides of the organism.

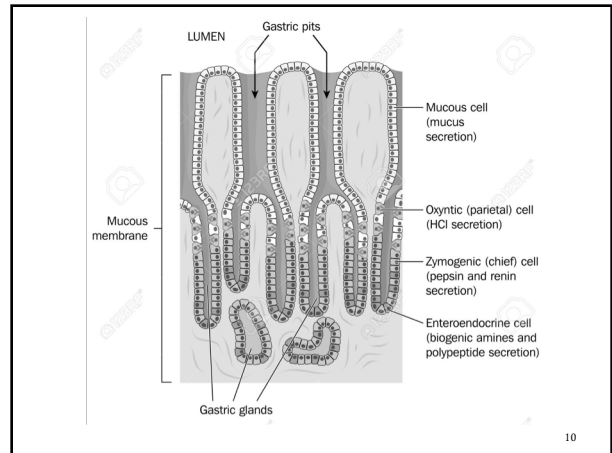
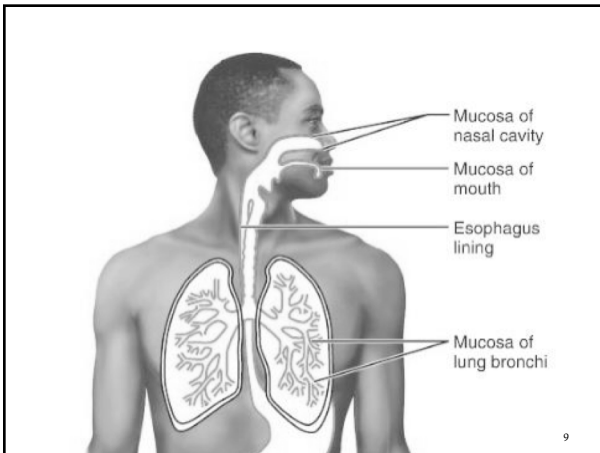
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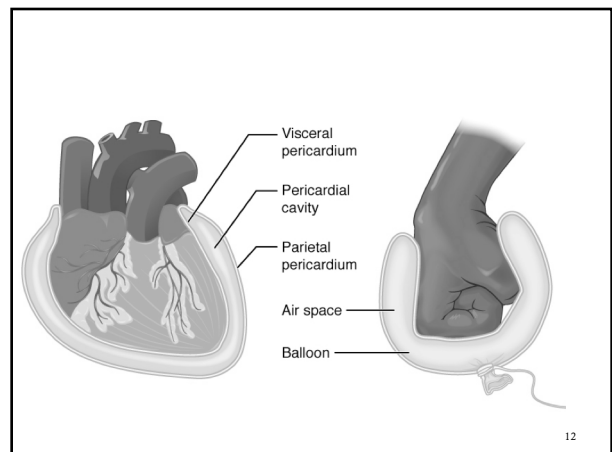
## Mucous Membrane

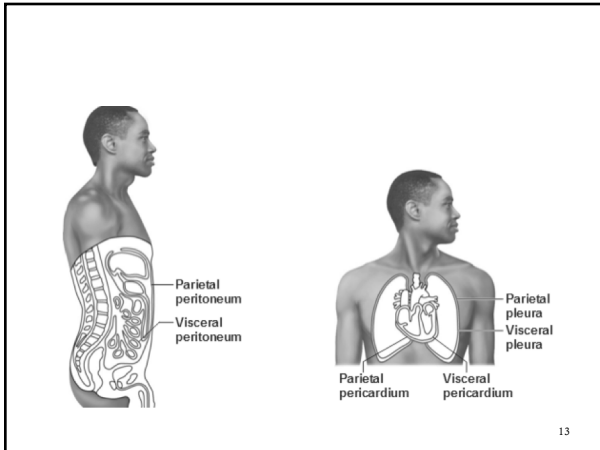
- ❖ Epithelial
- ❖ Line body cavities that are open to the outside, including the respiratory, digestive, urinary and reproductive systems.
- ❖ Wet or moist membranes.
- ❖ Adapted for absorption or secretion.



## Serous Membrane

- ❖ Epithelial
- ❖ Line areas that are closed to the external environment.
- ❖ Imagine your hand in a balloon with an internal and an external side, your hand represents the organ. The organ is suspended in a clear fluid called serous fluid.
- ❖ Examples includes a pumping heart or churning stomach.

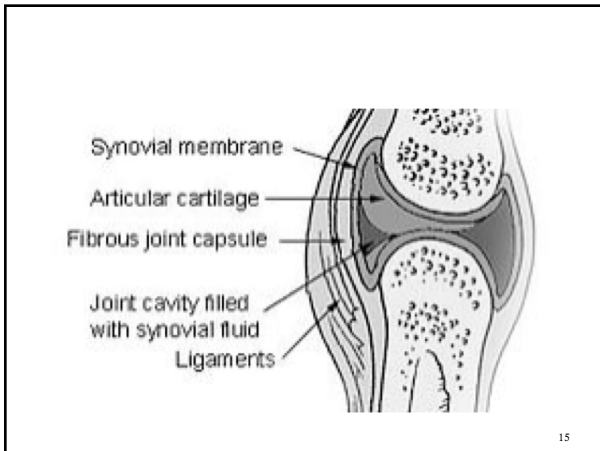




## Synovial Membrane

- ❖ Connective
- ❖ Synovial Membranes line joints.
- ❖ Cushion organs during muscle activity.

14



## Integumentary System

### SKIN

16

## Skin

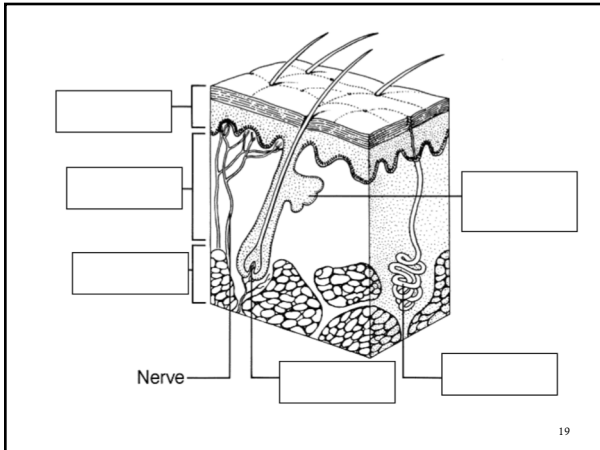
- ❖ Waterproof
- ❖ Stretchable
- ❖ Washable
- ❖ Able to repair itself (minor injuries)
- ❖ Protects the inside of the body

17

## Skin's Appendages

- ❖ Sweat Glands
- ❖ Oil (Sebaceous) Glands
- ❖ Hair
- ❖ Nails
- ❖ Receptors

18



19

## Protection

- ❖ Keeps water out or in depending on the situation-keratin.
- ❖ Insulates and cushions the body.
- ❖ Thermal/UV damage.
- ❖ Bacteria.

20

## Functions

- ❖ Sweat regulates body temperature.
- ❖ Synthesis vitamin D.
- ❖ Touch, pressure and pain receptors.

21

## Structure

- ❖ Outer layer called the epidermis
- ❖ Underlying layer called the dermis.
- ❖ Tightly connected but can become undone by friction causing a blister.
- ❖ Hypodermis found beneath the dermis composed of adipose tissue.

22

## Epidermis

- ❖ Composed of 5 layers.
- ❖ No blood supply of its own, explains why normal shaving does not bleed.
- ❖ Contains keratin-a tough protein.
- ❖ Contains melanin (skin color) produced by special cells called melanocytes.

23

## Where do skin cells go?

- ❖ As new cell divide, older cells move farther from the dermis.
- ❖ Water proofing substances like keratin limit the amount of nutrients that can be absorbed and the cells die and fall off.

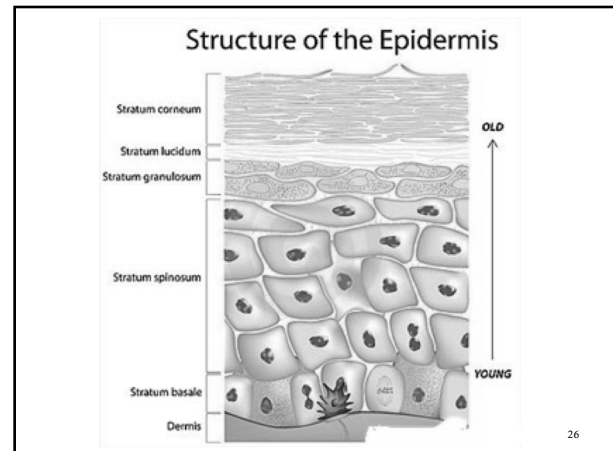
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## Skin Regeneration

- ❖ The regeneration of the skin takes about 4 weeks and is controlled by the action of skin producing cells called keratinocytes or corneocytes
- ❖ The shedding of skin cells is called desquamation and happens at a rate of 30,000 -40,000 cells a minute.

25



26

## Stratum corneum

- ❖ Corneocytes are surrounded by a protein envelope filled with water-retaining keratin proteins.

27

## Stratum lucidum

- ❖ Only found on the palms and soles of the feet.

28

## Stratum granulosum

- ❖ Keratinocytes lose their nuclei and their cytoplasm appears granular. Lipids, contained in these keratinocytes are released into the extracellular space to form a lipid barrier.

29

## Stratum spinosum

- ❖ Immunologically-active cells are located in the middle of this layer.

30

## Stratum basale

- ❖ Composed mainly of proliferating and non-proliferating keratinocytes, attached to the basement membrane. Melanocytes (skin coloration cells) are present in this layer. Merkel cells are also found in the stratum basale.

31

## Merkel Cells

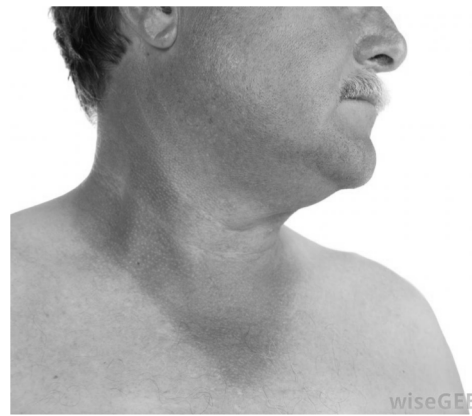
- ❖ Oval receptor cells found in the skin of vertebrates that have synaptic contacts with somatosensory afferents. They are associated with the sense of light touch, discrimination of shapes, and textures.

32

## What is a Sunburn

- ❖ A sunburn is the skin's response to extreme ultraviolet (UV) exposure and indicates severe damage. In as little as 10 minutes of intense UV exposure, the skin sets into motion a system of defense against this enemy. The face, neck, and trunk are two to four times more sensitive than the limbs.

33



wiseGEEK 34

## What is a Sun Tan?

- ❖ Following the initial sunburn and redness, the skin responds by producing melanin, which gives the appearance of a tan. This is a protective function to help prevent UV damage to the DNA of your cells. Imagine your skin making little pigment umbrellas that sit over the cell nucleus and that's a tan. The process dramatically increases aging. Sun exposure also alerts the body to create more cells, which can cause increased breakout activity; tumors, follicles can get plugged and oil production will increase in an attempt to nourish a dehydrated surface.

35



36

## How does Sunscreen Work?

- ❖ Sunscreen helps filter out UV radiation using a combination of inorganic and organic ingredients. Titanium oxide and zinc oxide form a barrier reflecting or scattering the UV waves. Organic ingredients absorb the UV radiation and release the energy as heat.

37

## What does SPF mean?

- ❖ SPF stands for Sun Protection Factor and refers to the theoretical amount of time you can stay in the sun without getting sunburned. For example, an SPF of 15 would allow you to stay in the sun 15 times longer than you could without protection.

38

## Dermis

- ❖ Referred to as your “hide”
- ❖ Dense fibrous connective tissue.
- ❖ Thicker in the hands and feet and thinner along the eyelids.
- ❖ Sweat glands, oil glands and hair roots.
- ❖ Blood supply and cannot regenerate.
- ❖ Fingerprints originate in the dermis.
- ❖ Ink from tattoos remain here for many years.

39

## Importance

- ❖ If body temperature rises, blood vessels become swollen and the skin turns “red”
- ❖ More blood can flow and cool the body faster.

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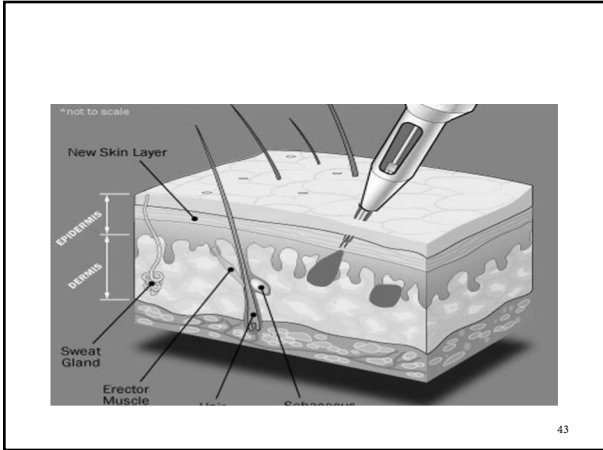
## Tatoos



41



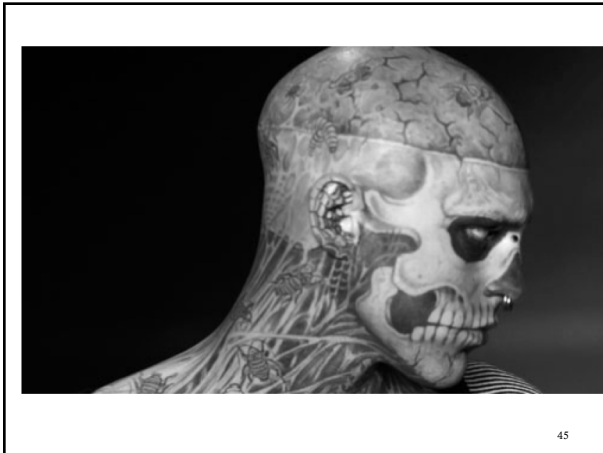
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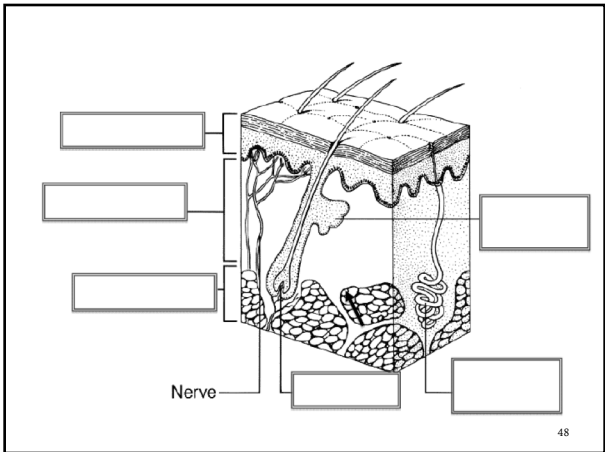
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**Appendages of the Skin**

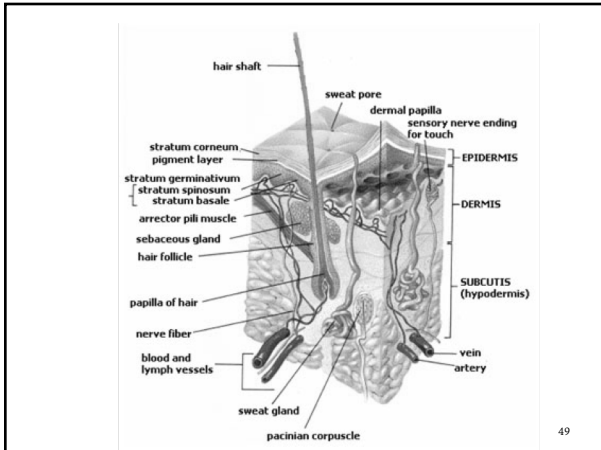
46

- Cutaneous glands**
- ❖ Sebaceous glands
  - ❖ Sweat glands
  - ❖ Hair
  - ❖ Nails

47



48



## Sebaceous (oil) Glands

- ❖ Found throughout the skin except palms and soles of the feet.
- ❖ Duct empty into the hair follicle or directly on the skin surface.
- ❖ Lubricant keeps the skin soft and moist and keeps hair from becoming brittle.
- ❖ Kills some bacteria on the skin surface.
- ❖ Infections called pimples or dirt/oil deposits called black heads.

## Eccrine Sweat Glands

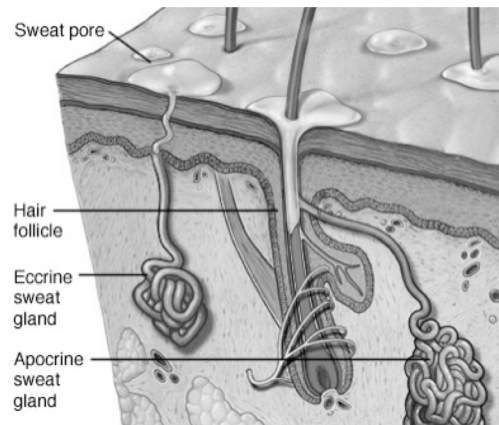
- ❖ Found all over the body.
- ❖ 2.5 million per person (most numerous on the body).
- ❖ Produce salt water solution.
- ❖ Regulate heat, the sweat evaporates from the skin surface causing body temperature to decrease.
- ❖ Become more active after puberty.

## Apocrine Sweat Glands

- ❖ Are larger and found in the genital region.
- ❖ Favors bacterial growth and may have an odor.
- ❖ Become more active after puberty.

## Other Locations

- ❖ Found in the mammary glands and produce milk.
- ❖ Found in the ear canals and produce wax.
- ❖ Found in the armpits.



## Hair

- ❖ Minor protective function-ex. Eyelashes.
- ❖ Produced by a hair follicle.
- ❖ Sheath composed from a combination of epithelial and connective tissue.
- ❖ When cold or scarred, hair stands up creating goose bumps via muscles called arrector pili.

55

## Hair

- ❖ Found all over the body except the palms of the hand, bottom of the feet or the lips.
- ❖ Consist of dead keratinized cells.

56

## Hair Parts

- ❖ Hair Follicle-Tube that holds the hair root.
- ❖ Hair Root-The part of the hair implanted in the follicle.
- ❖ Hair Shaft-The portion of the hair that protrudes from the skin.

57

## Nails

- ❖ Scale-like modification of the epidermis.
- ❖ Nearly transparent but appear pink from the rich blood supply below them in the dermis.

58



59

## Infections and Allergies

- ❖ Cold sores
- ❖ Athlete's foot
- ❖ Boils
- ❖ Contact dermatitis
- ❖ Impetigo
- ❖ Psoriasis



60

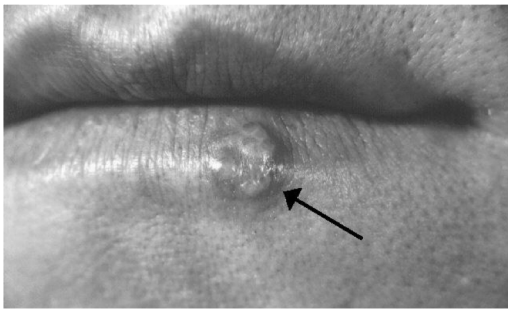
## Cold Sore

- ❖ Cold sores, sometimes called fever blisters, are groups of small blisters on the lip and around the mouth, but can be found around the body. The skin around the blisters is often red, swollen, and sore. The blisters may break open, leak a clear fluid, and then scab over after a few days. They usually heal in several days to 2 weeks.

61

- ❖ Cold sores are caused by the herpes simplex virus (HSV). The herpes simplex virus usually enters the body through a break in the skin around or inside the mouth. It is usually spread when a person touches a cold sore or touches infected fluid—such as from sharing eating utensils or razors, kissing an infected person, or touching that person's saliva.

62



63



64

## Athlete's Foot

- ❖ Athlete's foot is a common contagious fungal infection of the skin that causes scaling, flaking, and itch of affected areas. This condition is also known as ringworm of the foot. The disease is typically transmitted in moist communal areas where people walk barefoot, such as showers or bathhouses, and requires a warm moist environment, (e.g., the inside of a shoe) to incubate.

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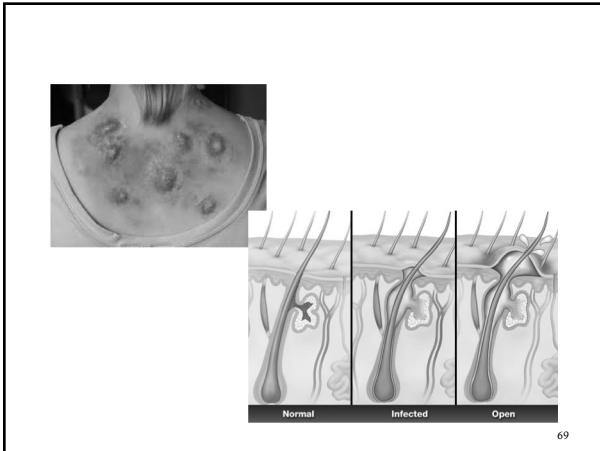


67

## Boils

- ❖ A boil is a deep infection of the hair follicle. It is most commonly caused by infection by the bacterium *Staphylococcus aureus*, resulting in a painful swollen area on the skin caused by an accumulation of pus and dead tissue. Individual boils clustered together are called carbuncles.

68



69

## Contact Dermatitis

- ❖ Contact dermatitis is a localized rash or irritation of the skin caused by contact with a foreign substance. Inflammation of the affected tissue is present in the epidermis and the outer dermis. Contact dermatitis takes days to fade away. Even then, contact dermatitis fades only if the skin no longer comes in contact with the allergen or irritant. Contact dermatitis results in large, burning, and itchy rashes, and these can take anywhere from several days to weeks to heal.

70

## From a temporary tattoo



71

## Impetigo

- ❖ Impetigo, one of the most common skin infections among kids, usually produces blisters or sores on the face, neck, hands, and diaper area.
- ❖ This contagious superficial skin infection is generally caused by one of two bacteria: *Staphylococcus aureus* or *Streptococcus pyogenes*. Impetigo usually affects preschool and school-age children. A child may be more likely to develop impetigo if the skin has already been irritated by other skin problems, such as eczema, poison ivy, insect bites, and cuts or scrapes due to minor trauma.

72

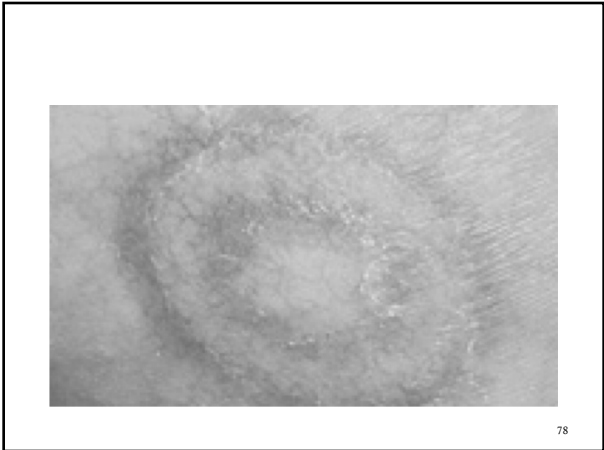
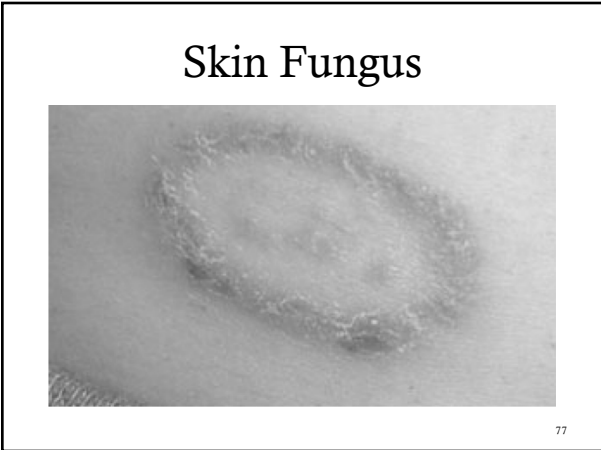




## Psoriasis

- ❖ Psoriasis, meaning "itching condition" or "being itchy", is a common, chronic immune-mediated skin disease that varies in severity from minor localized patches to complete body coverage and may also involve the joints. The condition affects 2–4% of the general population.
- ❖ Psoriasis is characterized by scaly, reddened patches, papules, and plaques, which usually itch.

74



## Toe Nail Fungus



79

## There is Hope



80

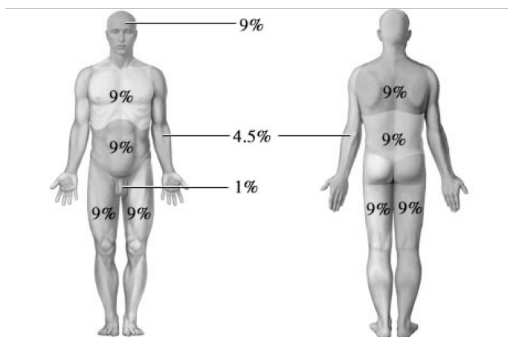
## Burns

81

## Burns

- ❖ Tissue damage and cell death caused by intense heat, electricity, UV or chemicals.
- ❖ Body is in trouble because fluids seep from the burn area and dehydration can lead to the shutting down of the kidneys.
- ❖ Use the rule of nines to determine fluid loss. (11 areas representing 9% of the body)
- ❖ This can allow doctors to estimate how much fluid was lost and needs to be replenished.

82



83

## Dangers

- ❖ Burned skin remains sterile for 24 hours.
- ❖ Beyond that time period, pathogens invade the body and the immune system becomes depressed.

84

## Severity of the Burn

- ❖ First-degree
- ❖ Second-degree
- ❖ Third-degree

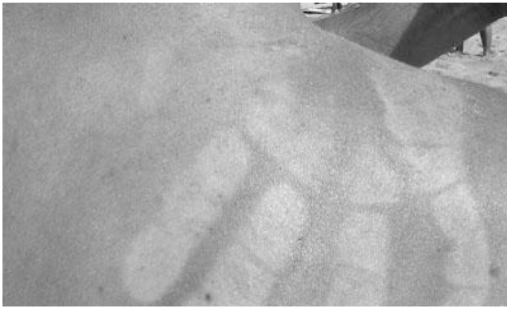
85

## First-Degree Burns

- ❖ Only epidermis is damaged.
- ❖ Temporary discomfort and heals within a few days.
- ❖ Sunburn
- ❖ Redness

86

## Sunburn



87

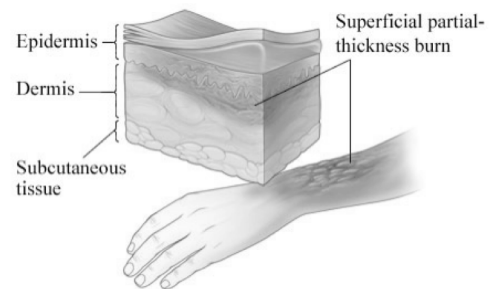


88

## Second-Degree Burns

- ❖ Damage to the epidermis and the upper layers of the dermis.
- ❖ Red and painful blisters.
- ❖ If taken care properly, no scarring occurs.
- ❖ Regeneration is possible.

89



90



91



92

## Third-Degree Burns

- ❖ Destroy the entire thickness of the skin (epidermis and dermis).
- ❖ Burn area is grey to black.
- ❖ Not painful
- ❖ Regeneration is not possible.

93



94



95

## Critical Burn Situations

- ❖ 25% of the body second degree burns
- ❖ 10% of the body third degree burns
- ❖ Third degree burns on the hands, feet or face.

96

## Skin Cancer

97

## Benign or Malignant

- ❖ Most blemishes are benign and do not spread.
- ❖ Malignant tumors can spread throughout the body and lead to death.

98

## Types of Skin Cancer

- ❖ Basal Cell Carcinoma
- ❖ Squamous Cell Carcinoma
- ❖ Malignant Melanoma

99

## Basal Cell Carcinoma

- ❖ Cells of the lowest level of the epidermis invade the dermis and hypodermis.
- ❖ Exposed areas develop ulcer and are slow to metastasize.

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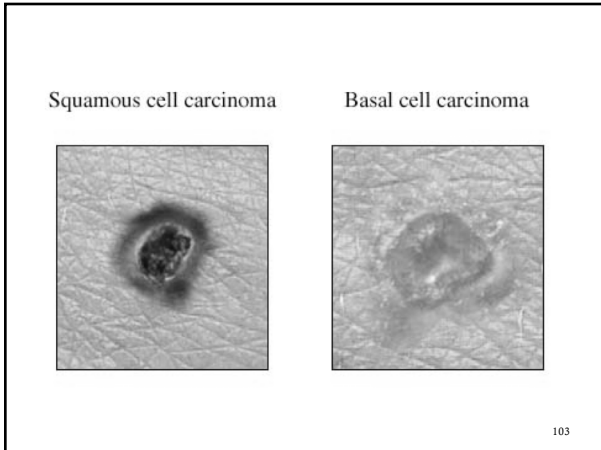


101

## Squamous Cell Carcinoma

- ❖ Epithelial cells are not in contact with the basement membrane.
- ❖ Develop lesions and metastasizes.

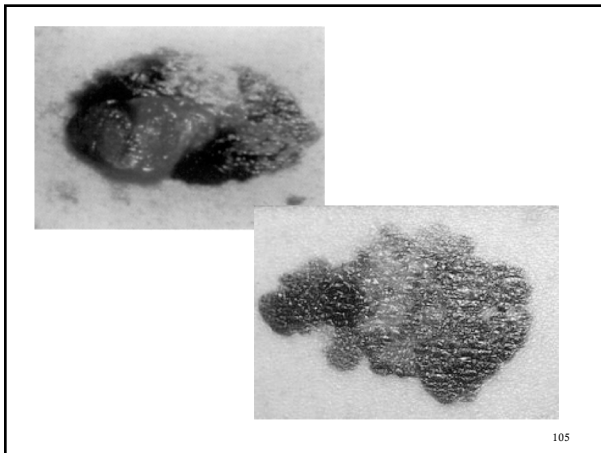
102



## Malignant Melanoma

- ❖ Melanoma is rare and the most serious and potentially deadly form of skin cancer. Melanoma is a malignant tumor caused by an uncontrolled growth of pigment cells, called melanocytes.

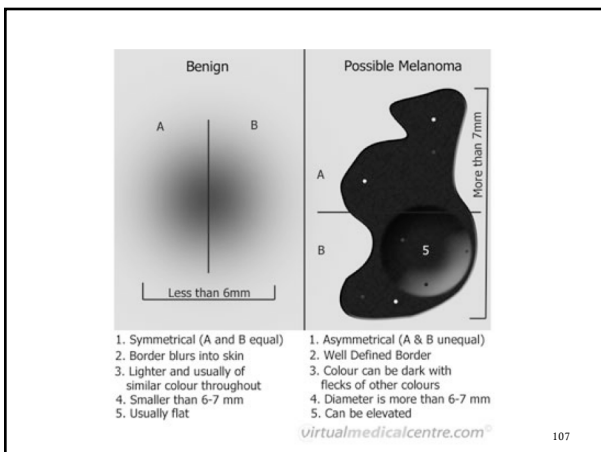
104



## ABCD Rule

- ❖ (A) Asymmetry-Two sides of the mole do not match.
- ❖ (B) Border Irregularity-Borders of the lesion are not smooth.
- ❖ (C) Color-Pigmented area contains different colors.
- ❖ (D) Diameter-Spot is larger than 6 mm.

106



Normal Mole	Melanoma	Sign	Characteristic
		Asymmetry	when half of the mole does not match the other half
		Border	when the border (edges) of the mole are ragged or irregular
		Color	when the color of the mole varies throughout
		Diameter	if the mole's diameter is larger than a pencil's eraser

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108

