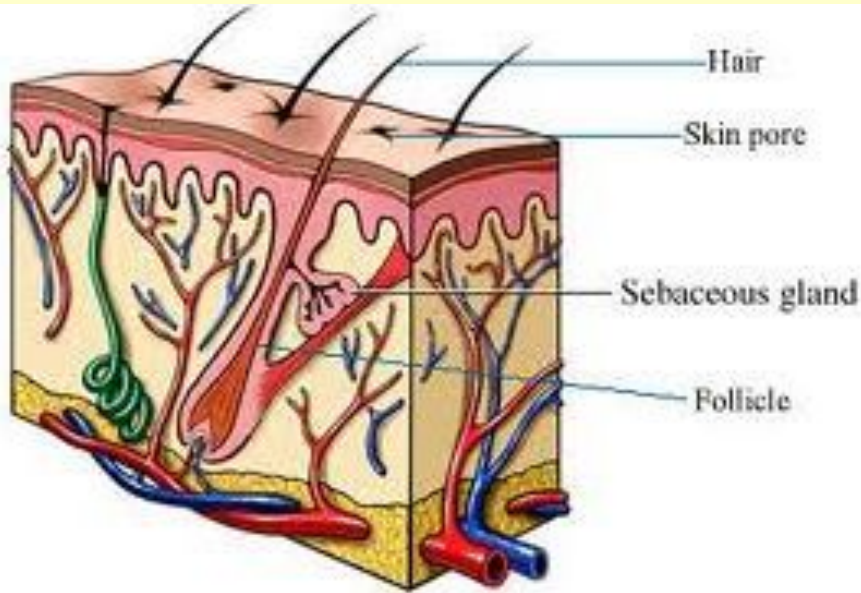




**Zaporozhye State Medical University
Propedeutics of Pediatrics Department**



**Lecture
The Skin**

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Plan of lecture

- **Functions of the skin.**
- **Structure of the skin.**
- **The features of the skin in infants.**
- **Evaluation of the skin: inspection and palpation (*color change, texture, moisture, temperature, lesions*).**
- **Clinical manifestations of some skin disorders in children.**

Purposes of the skin

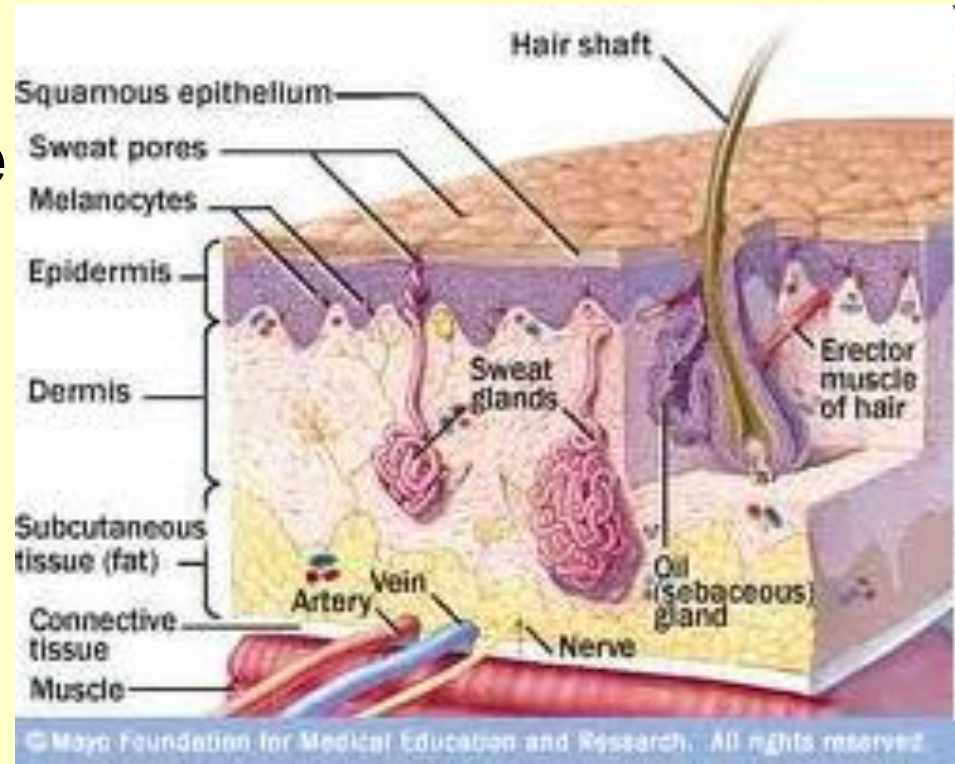
- **Protection:** mechanical barrier; the oily and slightly acid secretions of sebaceous glands limit the growth of bacteria
- **Impermeability:** seals and protects against loss of essential body constituents
- **Heat regulation:** through functioning of cutaneous blood vessels and sweat glands
- **synthesizes** vitamin D
- **a sensory organ**, these perceptions (touch, pain, heat, and cold)

Structure of the skin

- Epidermis
- Dermis
- Subcutaneous tissue

Appendages of the skin:

- Hair
- nails
- sebaceous glands
- sweat glands

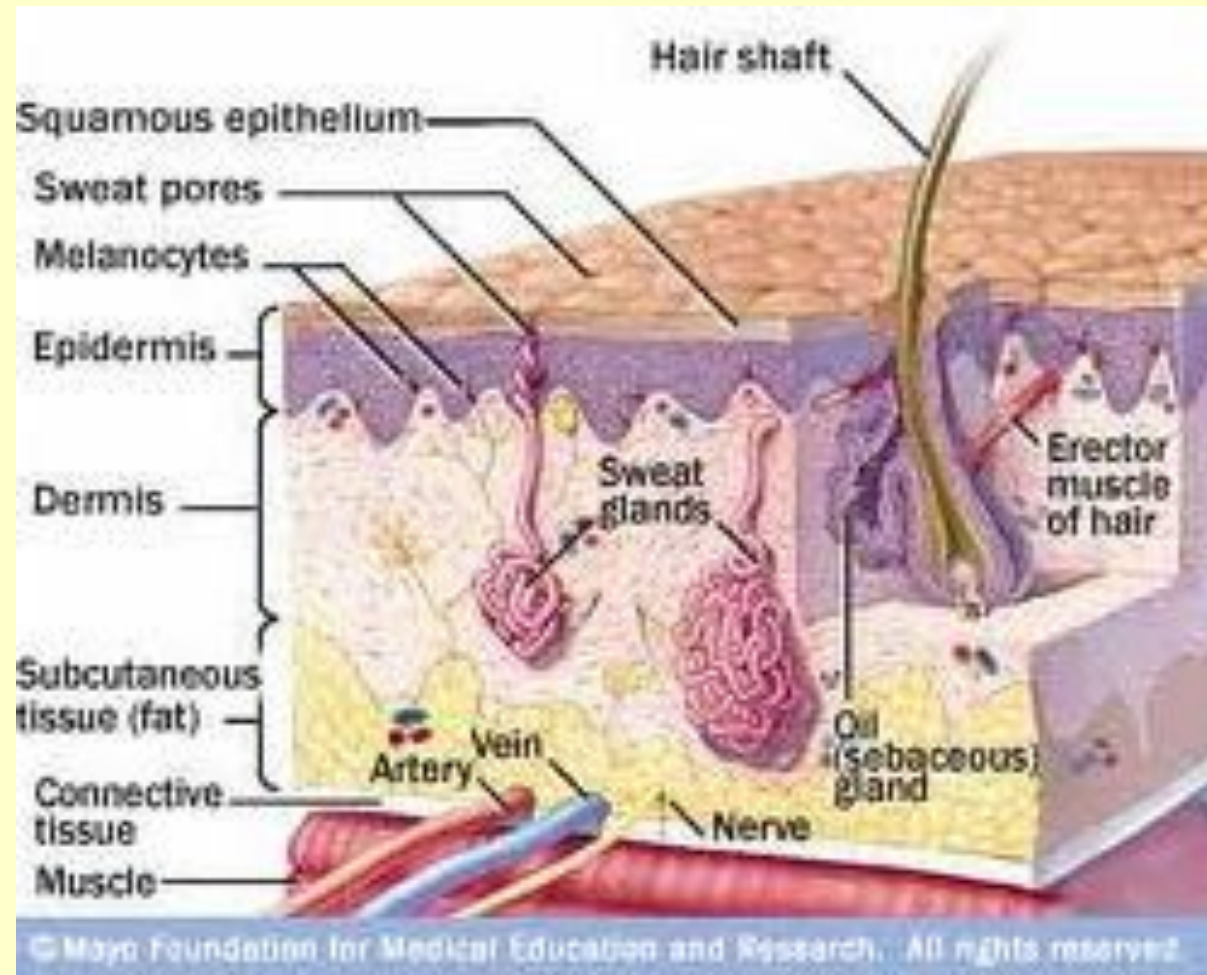


Epidermis

the outermost
cellular
membrane

of relatively
uniform
thickness;

Diseases of the
skin focus
mainly on the
epidermis



Appendages of the skin

- **The types of hair** are fetal lanugo, terminal, and vellus.
- **Sebaceous glands:** occur in all areas except the palms and the feet, most numerous on the face, upper chest, and back; **depend on hormonal stimulation** and are activated by androgens at puberty.
- Fetal sebaceous glands are stimulated by maternal androgens, and their lipid secretion, together with desquamated stratum corneum cells, constitutes the **vernix caseosa**.



Appendages of the skin

- **Eccrine sweat glands** are distributed over the entire body surface; **respond to thermal stimuli** and serve *to regulate body temperature* by evaporation; in contrast, sweat glands on the palms and soles respond mainly to **psychophysiologic stimuli**.
- **Apocrine sweat glands** are located in the axillae, areolae, perianal and genital areas. They **response to adrenergic stimuli**, usually the result of emotional stress.

The skin of the infant

- far more susceptible to superficial bacterial infection
- more likely to have associated systemic symptoms with some infections
- more apt to react to a primary irritant than to a sensitizing allergen
- more often show blistering (bullous) reactions
- are frequently affected by chronic atopic dermatitis (eczema)
- much more prone to develop a toxic erythema
- is subject to maceration, infection, and the sweat retention associated with diaper rash



**Infant with
staphylococcal
scaled skin
syndrome**

**Newborns more often show blistering
(bullous) reactions caused by the poor
adherence between epidermis and dermis**

Evaluation of the skin: inspection and palpation

- **Skin is assessed** for colour, turgor, texture, temperature, and moisture.
- **Hair and nails** is also inspected for the growth, color, texture, quality, distribution, and elasticity, calibre, and lustre.
- **Skin lesions** should be palpated, inspected, and classified on the bases of morphology, size, colour, texture, firmness, configuration, location, and distribution.

Factors influencing assessment of color



Genetic:

- From a milky-white and rosy color to a more deep-hued pink color
- brown, red, yellow, olive-green, and bluish tones

Physiologic:

- **Edema** decreases the intensity of skin color
- **Exposure to sunlight** increasing the color
- **the amount of adipose tissue** does not markedly affect skin color

The skin of the newborn

- is velvety smooth and puffy
- At birth the skin is covered with a grayish-white, cheeselike substance called ***vernix caseosa***
- ***lanugo*** (a fine, downy hair) is present on the skin



The skin of the newborn



- ***Milia***, distended sebaceous glands, appear as tiny white papules on the cheeks, chin, and nose
- ***Sudamina*** are distended sweat glands that cause minute vesicles on the skin surface, especially on the face

The skin of the newborn



Acrocyanosis



Cutis marmorata



Erythema toxicum



Harlequin color change

The skin of the newborn



- **Mongolian spots** - irregular areas of deep blue pigmentation, usually in the sacral and gluteal regions



- **Telangiectatic naevus, ("stork bites")** - flat, deep pink localized areas usually seen in back of neck.

Skin color change

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graph TD; A[Skin color change] --- B[Cyanosis]; A --- C[Pallor]; A --- D[Redness]; A --- E[Jaundice]; A --- F[Brownness]; A --- G[Loss of pigmentation];
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Cyanosis

Pallor

Redness

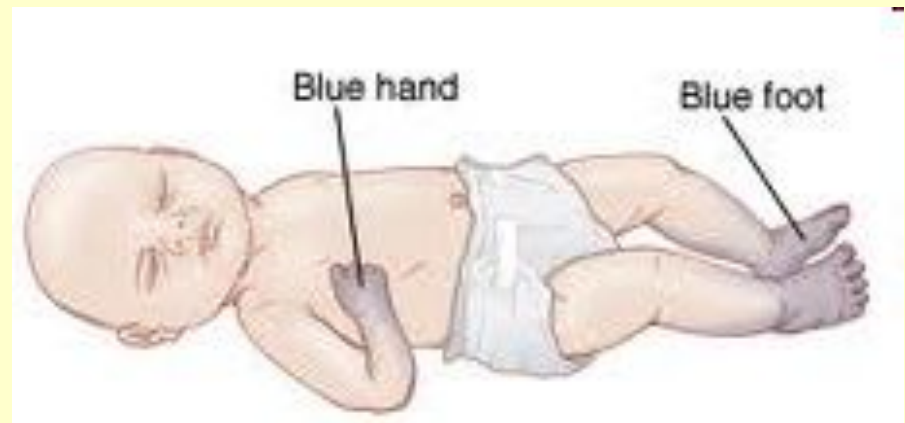
Jaundice

Brownness

Loss of pigmentation

Cyanosis

- **Reduced (deoxygenated) hemoglobin reflects a bluish tone through the skin, called cyanosis, which is evident when reduced hemoglobin levels reach 5 mg/dl of blood or more, regardless of the total hemoglobin.**



Cyanosis

```
graph TD; Cyanosis --> Oxygen[Oxygen level in arterial blood]; Oxygen -- low --> Central[central]; Oxygen -- normal --> Peripheral[peripheral]; Central --> CentralList[Advanced lung disease, Congenital heart disease, Abnormal hemoglobin]; Peripheral --> PeripheralList[Congestive heart failure, Response to anxiety or a cold environment];
```

Oxygen level in arterial blood

low

normal

central

peripheral

- **Advanced lung disease**
- **Congenital heart disease**
- **Abnormal hemoglobin**

- **Congestive heart failure (cutaneous blood flow decreases and slows)**
- **Response to anxiety or a cold environment**

Pallor

- Pallor, or paleness, is evident as a loss of the rosy glow in light-skinned individuals, an ashen-gray appearance in black-skinned children, and a more yellowish brown color in brown-skinned people.
- It may be a sign of anemia, chronic disease, edema, or shock.

Erythema

Erythema, or redness of the skin, may be the result of:

- **increased temperature from climatic conditions**
- **local inflammation, or infection**
- **a sign of skin irritation**
- **allergy**
- **dermatoses**
- **Plethora (increased numbers of RBC)**

Erythema



Dermatomyositis



Erythema nodosum

Jaundice, a yellow staining of the skin, usually caused by bile pigments



Jaundice

Causes:

- **Physiologic in newborn**
- **Excessive hemolysis of RBC (hemolytic disease of the newborn)**
- **Liver disease (hepatitis)**
- **Obstructive disease (biliary atresia)**
- **Infectious
(cytomegalovirus, toxoplasmosis)**
- **Metabolic (galactosemia)**

Palpation of the skin

- Texture (roughness, smoothness)
 - Moisture (dryness, sweating, oiliness)
 - Temperature (warmth, coolness)
 - Turgor
- Normally the skin of young children is smooth, soft, slightly dry and warm to the touch, not oily or clammy.
 - Common problems: cradle cap, eczema, diaper rash.

Moisture of the skin

Excessive dryness (xeroderma):

- Ichthyosis
- Vitamin-A deficiency
- Hypothyroidism

Sweating:

- Heart diseases
- Hyperthyroidism
- Hypoglycemia



Turgor



- Tissue turgor refers to the amount of elasticity in the skin.
- Determined by grasping the skin on the abdomen between the thumb and index finger.
- **Skin** turgor test is a **quick way of assessing dehydration.**

Causes of edema:

- kidney disease,
- protein deficiency,
- allergic disease,
- inflammation,
- heart failure,
- endocrine disease.



EDEMA: PITTING OR NONPITTING?

To differentiate pitting from nonpitting edema, press your finger against a swollen area for 5 seconds, and then quickly remove it.

With *pitting edema*, pressure forces fluid into the underlying tissues, causing an indentation that slowly fills. To determine the severity of pitting edema, estimate the indentation's depth in millimeters: +1 (2 mm), +2 (4 mm), +3 (6 mm), or +4 (8 mm).

With *nonpitting edema*, pressure leaves no indentation because fluid has coagulated in the tissues. Typically, the skin feels unusually tight and firm.



Testing for pitting edema



Pitting edema

To determine the severity of edema estimate the indentation's depth in mm: +1 (2 mm), +2 (4 mm), +3 (6 mm), +4 (8 mm).

Hair



- **Alopecia** is hair loss: diffuse, patchy, or total.
- **Alopecia** can be a sign of various skin disorders, such as tinea capitis; severe toxic state

Unusual hairiness



- The pigmented, hairy patch on the right midback

- Tufts of hair anywhere along the spine, especially over the sacrum, are significant because they can mark the site of **spina bifida occulta**.





Candidal onycholysis

Candida infection of the nail involves lifting of the distal nail plate and a characteristic opaque white discoloration of the affected nail.



Koilonychia associated with iron deficiency anemia



Clubbing of the nails (proliferation of tissue about the terminal phalanges) usually is associated with chronic cyanosis.

Lesions of the skin

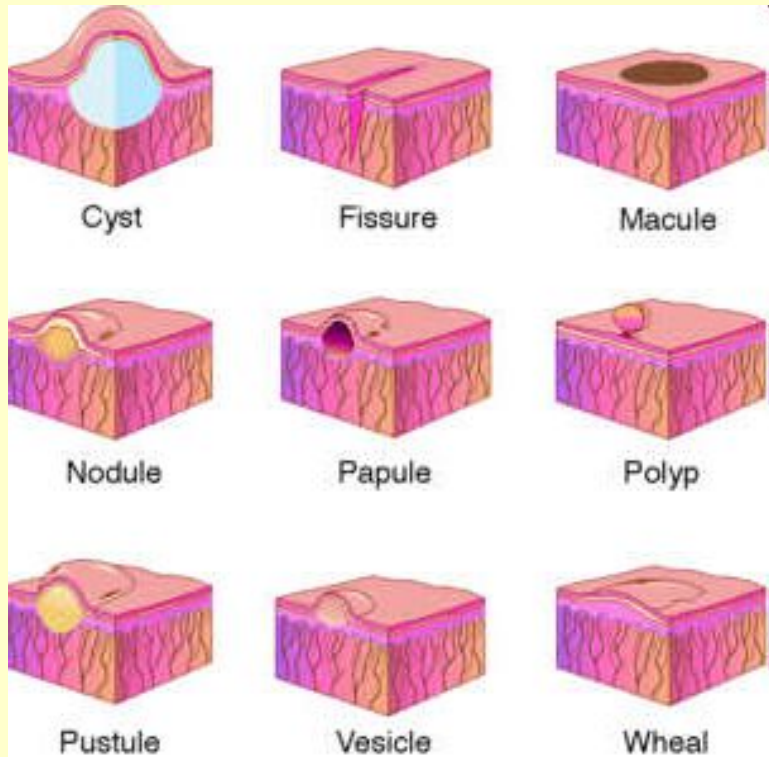
In general skin lesions originate from

- (1) **contact** with injurious agents such as infective organisms, toxic chemicals, and physical trauma,
- (2) **hereditary** factors, or
- (3) some external factor that produces a **reaction** in the skin, for example, allergens.

Observe any lesions of the skin, noting their **characteristics**:

- Their anatomic location and ***distribution*** over the body
- Their ***arrangement***
- The ***type(s) of skin lesions***
- Their ***color***

The type(s) of skin lesions:



Primary lesions are skin changes produced by some causative factor; may arise from previously normal skin;

secondary lesions are result from changes in primary lesions.

Primary lesions

Circumscribed, flat, nonpalpable changes in skin color

**Macule
Patch**

Palpable elevated solid masses

**Papule
Nodule
Tumor
Wheal**

Circumscribed superficial elevations of the skin formed by free fluid in a cavity within the skin layers

**Vesicle
Bulla
pustule**

Primary lesions

- A ***macule*** represents an alteration in skin color but cannot be felt.
- When larger than 1 cm, the term ***patch*** is used.
- ***Papules*** are palpable solid lesions smaller than 0.5–1 cm, whereas ***nodules*** are larger in diameter.
- ***Tumors*** are usually larger than nodules
- ***Wheals*** are flat-topped, palpable lesions of variable size and configuration that represent dermal collections of edema fluid.

Primary lesions

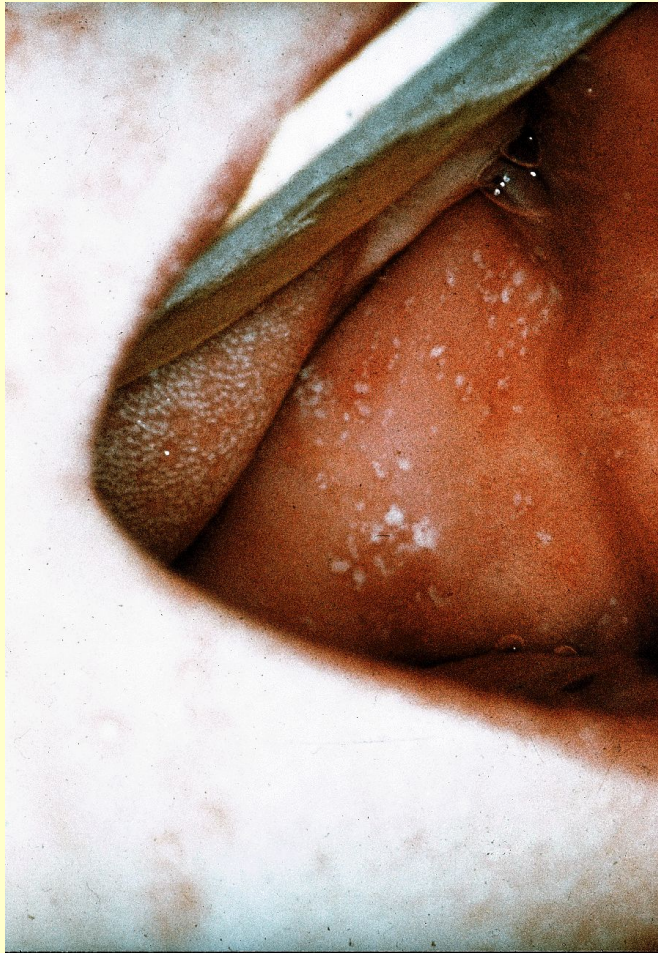
- ***Vesicles*** are raised, fluid-filled lesions less than 0.5 cm in diameter; when larger, they are called ***bullae***.
- ***Pustules*** contain purulent material.
- ***Cysts*** are circumscribed, thick-walled lesions that are located ***deep*** in the skin; are covered by a normal epidermis; and contain fluid or semisolid material.
- Aggregations of papules and pustules are referred to as ***plaques***.

Measles



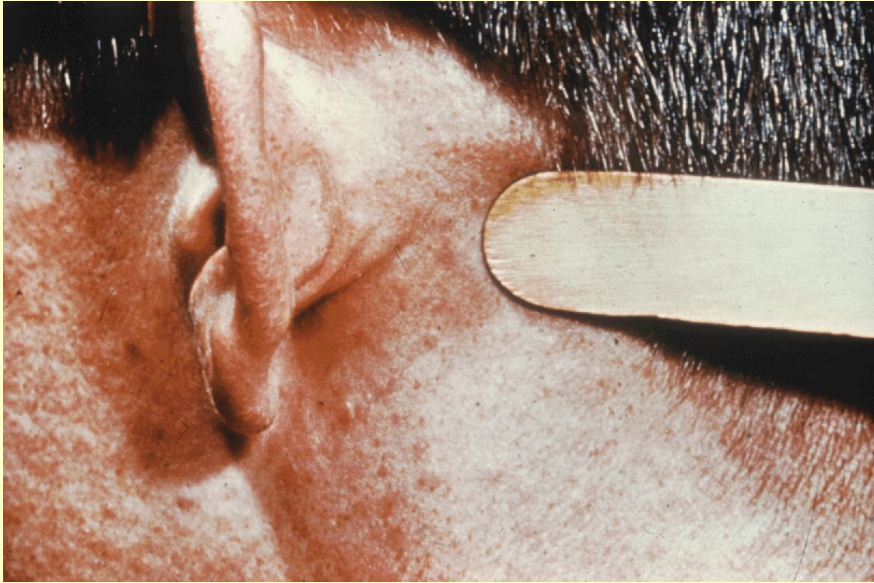
- An **erythematous maculopapular rash** erupts about 5 days after the onset of symptoms. The rash begins on the head and spreads downward, lasting about 4-5 days and then resolving from the head downward.

Measles



- **Koplik spots** – grayish-white dots with reddish areola starting over **buccal mucosa** opposite lower molars are early marker of measles (appear within 2 or 3 days of disease).

Rubella



- The exanthema begins on the face and extends over the body as **fine, light-pink discrete macules**
- Suboccipital and posterior auricular lymphnodes may be slightly enlarged and tender (**lymphadenopathy**)

Scarlet fever



The rash is **erythematous**, finely punctate, it appears on the trunk and becomes generalized within a few hours. There is **increased erythema in the skin folds** (Pastia lines).

Scarlet fever



The skin rash fades over 1 week followed by **desquamation**, which may last for several weeks.



A strawberry tongue (rough, erythematous, swollen tongue) may be present

Chickenpox



The varying stages of development
(**macules, papules, and vesicles**)
present at the same time



Vesicular eruption



- **Zoster** - vesicles confined to a dermatome area.
- **Herpes** - vesicles are located in the junction of the skin and mucosal membranes.



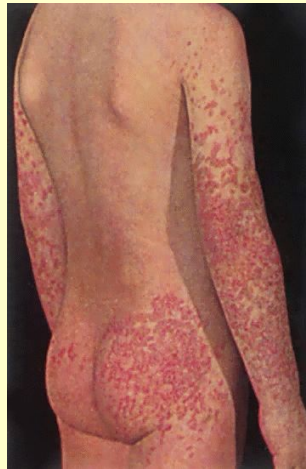
Hives (urticaria)



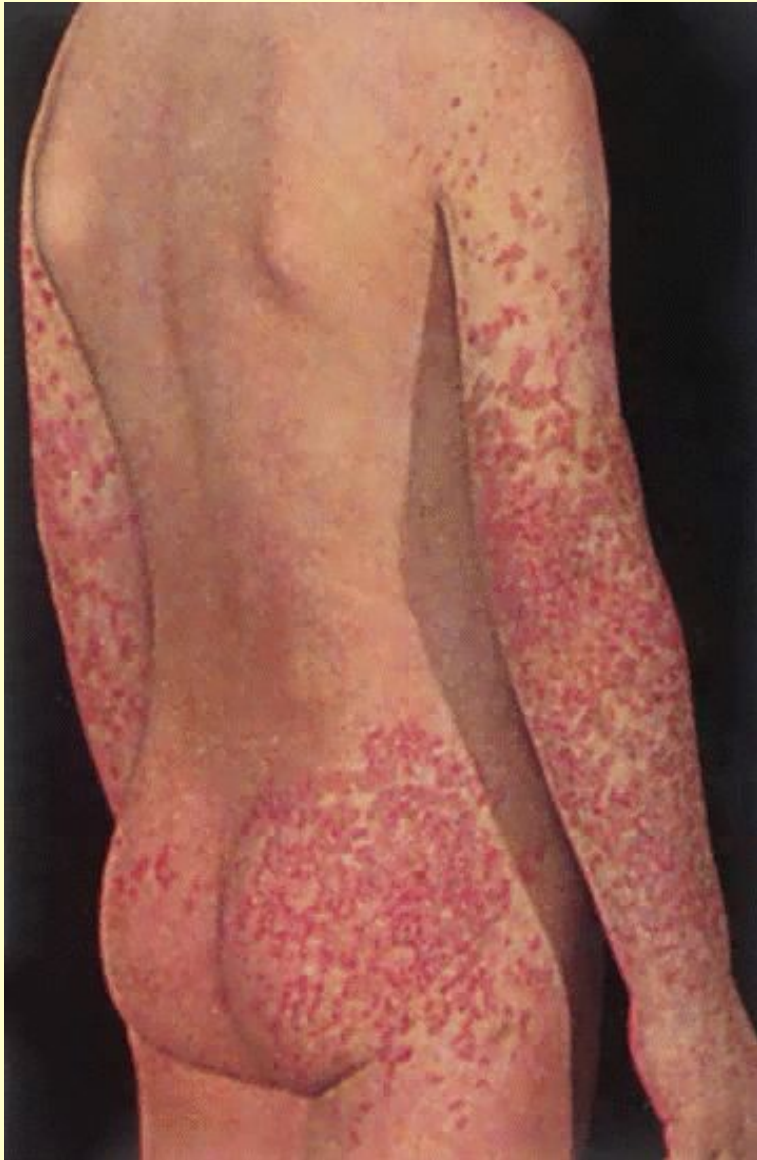
- is **allergic** disorder; the lesions are transient, well-circumscribed erythematous **wheals** of varying size affecting the superficial layers of the epidermis and mucous membranes.

Hemorrhagic rash

- **Petechiae** - small, distinct pinpoint hemorrhages 2 mm or less in size
- **Purpura** – hemorrhages up to 1.0 cm
- **Ecchymosis** - large, diffuse areas, usually black and blue in color



Henoch-Schonlein purpura



The characteristic **purpuric rash** is slightly raised above the surface, the rash is distributed over the extensor surfaces of legs, buttocks and elbows

Hemorrhagic rash

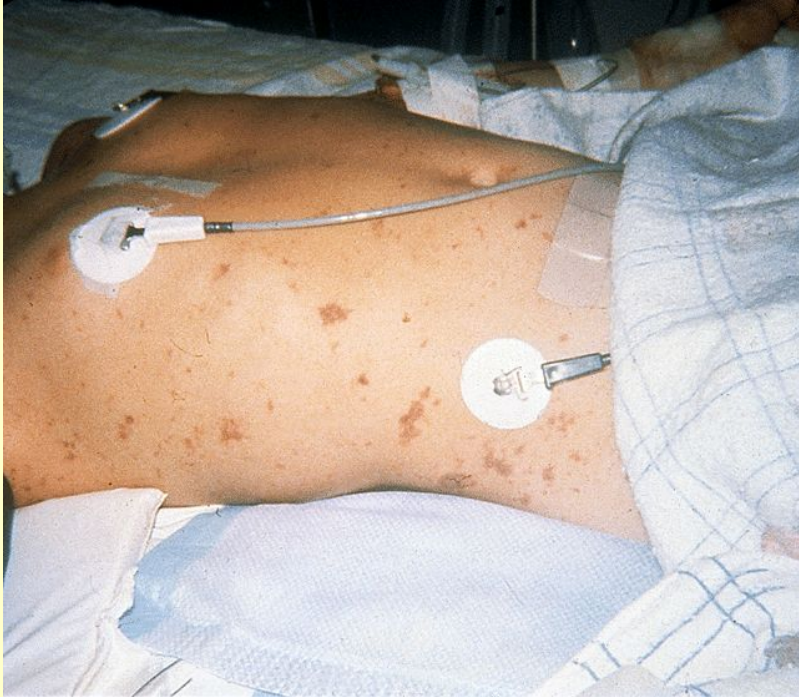


- ***Thrombocytopenic Purpura:*** Patients with this disease present with a diffuse, nonpalpable petechial/purpuric rash.



- **Hemophilia** associated with bleeding and hemorrhagic rash (ecchymosis, hemarthrosis).

Menigococemia- infection with *Neisseria meningitidis*



- **typical irregular purpuric and gangrenous skin rash over the trunk, legs, buttocks**

Secondary lesions

Loss of skin surface

**Erosion
Ulcer
fissure**

Material on the skin surface

**Scale
Crust**

Miscellaneous lesions

**Scar
Lichenification
Excoriation**

Secondary lesions

- ***Scales*** consist of compressed layers of stratum corneum cells that are retained on the skin surface.
- ***Ulcers*** are excavations of necrotic or traumatized tissue.
- Ulcerated lesions inflicted by scratching are often linear or angular in configuration and are called ***excoriations***.

Secondary lesions

- ***Fissures*** are caused by splitting or cracking; they occur usually in diseased skin.
- ***Scars*** are end-stage lesions that can be thin, depressed and atrophic; raised and hypertrophic, or flat and pliable; they are composed of fibrous connective tissue.

Secondary lesions

- ***Crusts*** consist of matted, retained accumulations of blood, serum, pus, and epithelial debris on the surface of a weeping lesion.





Lichenification is a thickening of skin with accentuation of normal skin lines that is caused by chronic irritation (rubbing, scratching) or inflammation.

**Atopic
dermatitis**

Distribution

The pattern is a useful aid in diagnosis. It may be:

- **generalized or localized;**
- **widespread,**
- **symmetric,**
- **involve the exposed surfaces,**
- **the intertriginous areas (skin fold),**
- **or specific areas, such as extensor or flexural surfaces.**

Many skin diseases have typical distributions.

Distribution



- **Atopic dermatitis** involves the flexor surfaces of the body, such as the antecubital and popliteal areas of the arms and legs (bloody excoriated erythema).



- The butterfly rash of systemic **lupus erythematosus**

Distribution



- **Seborrheic dermatitis (cradle cap)** is a chronic, recurrent, inflammatory reaction of the skin. It occurs most commonly in the scalp. The lesions are characteristically thick, adherent, yellowish, scaly, oily patches.



- **Diaper dermatitis**
-Inflammatory process primarily the areas in which skin surfaces are touching, such as the skin folds (intertriginous).

Distribution



Uncovered areas that allow exposure to sun or noxious agents such as poison ivy - **contact dermatitis**

Arrangement

- **Clustered** (grouped) - **herpes**
- **Annular** (in a ring) - vascular reactions such as **urticaria**
- **Arciform** (in an arc)- **ringworm**
- **Dermotomal** (covering a skin band that corresponds to a sensory nerve root) - **herpes zoster**

Subjective symptoms

- Itching
- Pain or tenderness
- Alterations in local feeling or sensation:
 - absence of sensation (*anesthesia*),
 - excessive sensitiveness (*hyperesthesia*),
 - diminished of sensation (*hypoesthesia*).

Lecture is over

Thank you for attention

