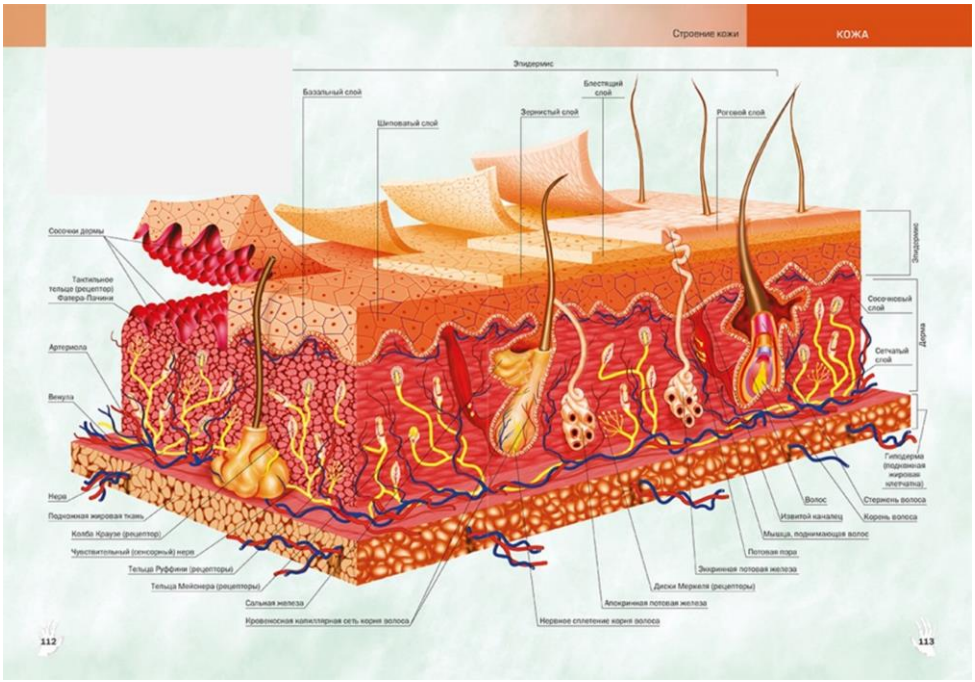
MORPHOLOGICAL ELEMENTS

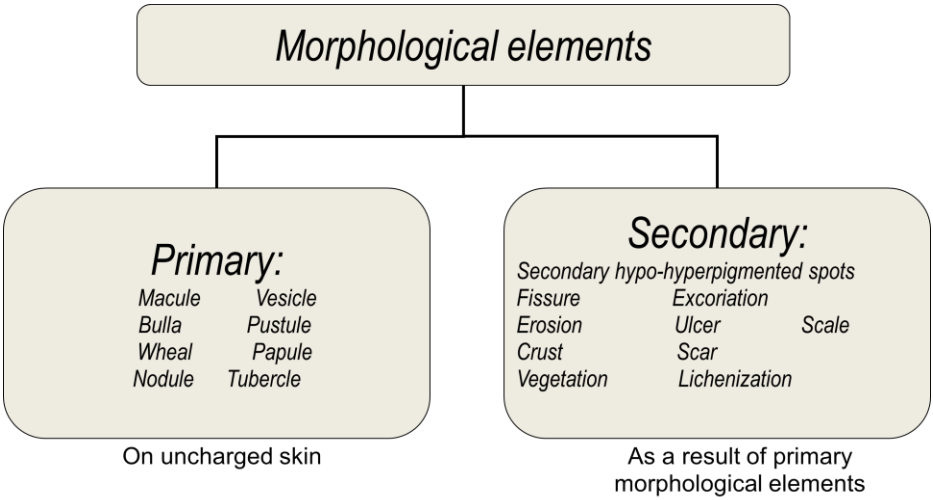
OF SKIN RASHES

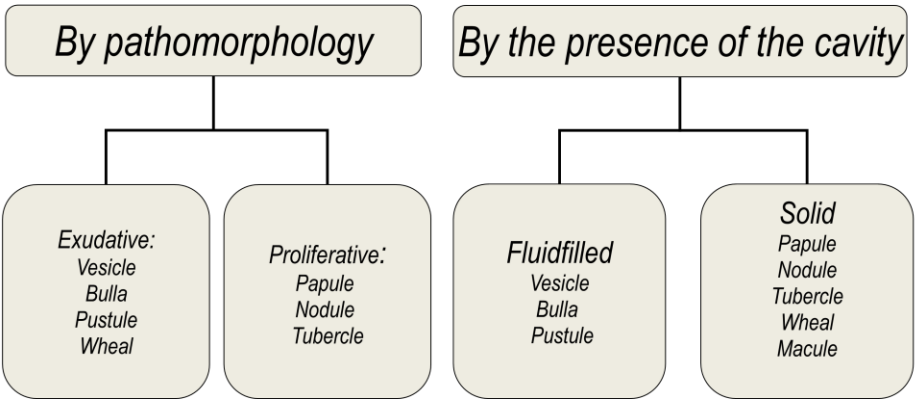


In dermatology, extreme importance is given to the analysis of skin rashes. The skin rash consists of individual components - morphological elements or efflorescences [from the word florens - blooming].

Morphological elements are rashes of a different nature that appear on the skin and mucous membranes with various dermatoses. Analysis of morphological elements is the main criterion for the diagnosis of skin and sexually transmitted diseases.That is why morphological elements are considered as a kind of "alphabet" in dermatovenerology.

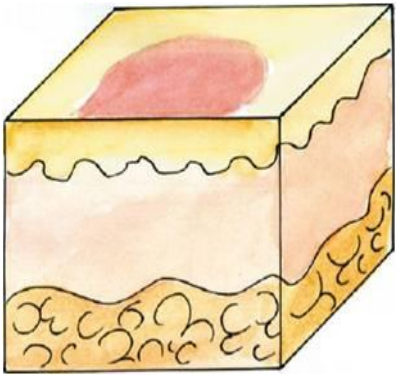
All morphological elements are divided into primary and secondary. *Primary morphological elements* are rashes that appear primarily on unchanged skin. *Secondary morphological elements* are the result of the natural evolution of primary elements due to their reverse development during the course of the disease or under the influence of therapy.





Primary morphological elements. They include: Macule (macula), Papule (papula), nodule (nodus), tubercle (tuberculum), vesicle (vesicula), bulla (bulla), pustule (pustula), wheal (urtica).

The macule



The Macule *(macula)* is characterized by a change in the color of the skin in a limited area of the skin, without changing its relief and texture in a limited area. This most common primary morphological element cannot be attributed to either proliferative or exudative.

The Macules can be vascular, pigmented and artificial (occurring when alien dyes enter the skin).

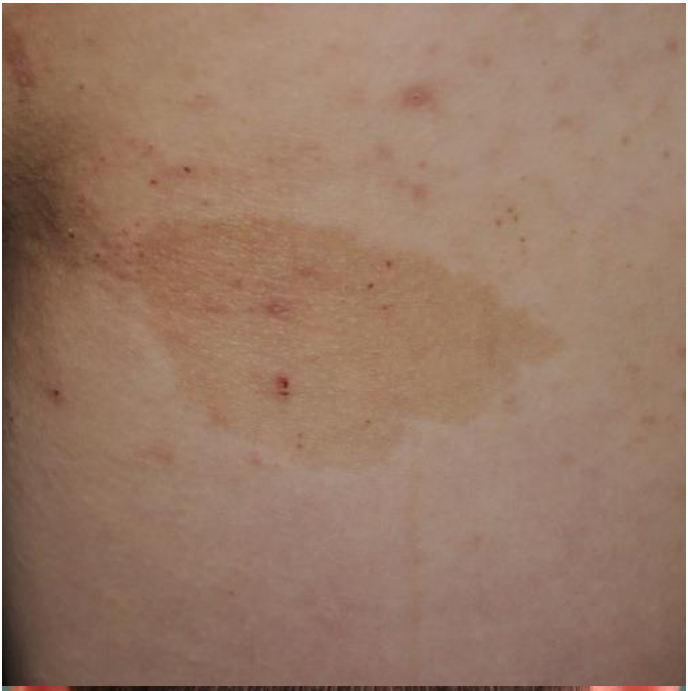
Vascular Macules are divided into acules resulting from the expansion of vessel or its paresis. In the first case, the elements are inflammatory, the color is pink-red, sometimes with a bluish tinge, and disappear with time. Roseola is such inflammatory macules in diameter up to 1.5 cm, erythema - more than 1.5 cm.A classic example of roseolysis is roseole syphilis of the secondary period of syphilis. There are also temporary vascular Macules that are not associated with inflammation - "erythema of embarrassment", Livedo. *Non-inflammatory vascular* macules associated with paresis of the vessel wall can be in the form of red spider veins or cyanotic tree-like branching veins (telangiectasias) and are permanent.Vascular spots associated with the expansion or paresis of the vessel, when pressed, turn pale or disappear, and when the pressure ceases, they restore their color. This is their main difference from other types of macules.

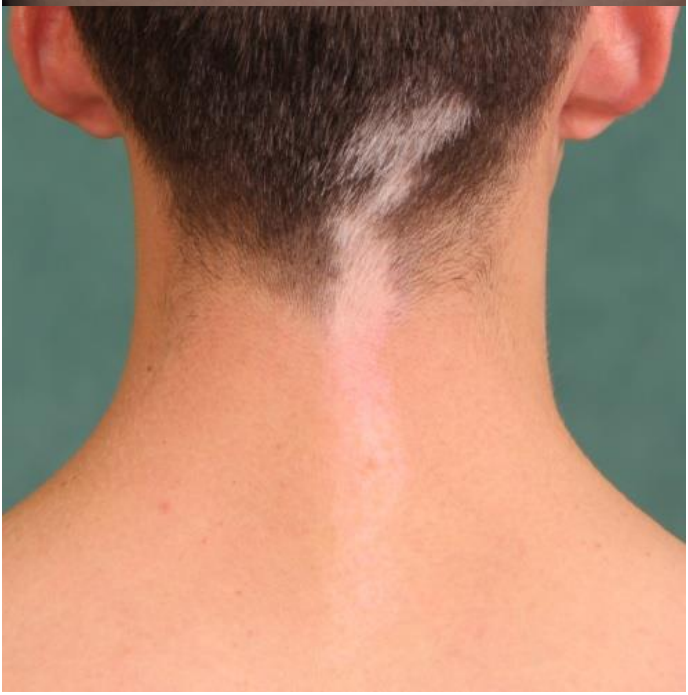
In case of violation of the permeability of the vascular walls or with trauma, *hemorrhagic spots* are formed due to the deposition of hemosiderin. They do not disappear with pressure and change color from red to brownish-yellow (as a “bruise bloom”). Depending on their size and shape, they are divided into *petechiae* (pinpoint hemorrhages with allergic vasculitis), *purpura* (up to 1 cm in diameter with thrombocytopenic purpura), *vibices* (strip-like, linear with

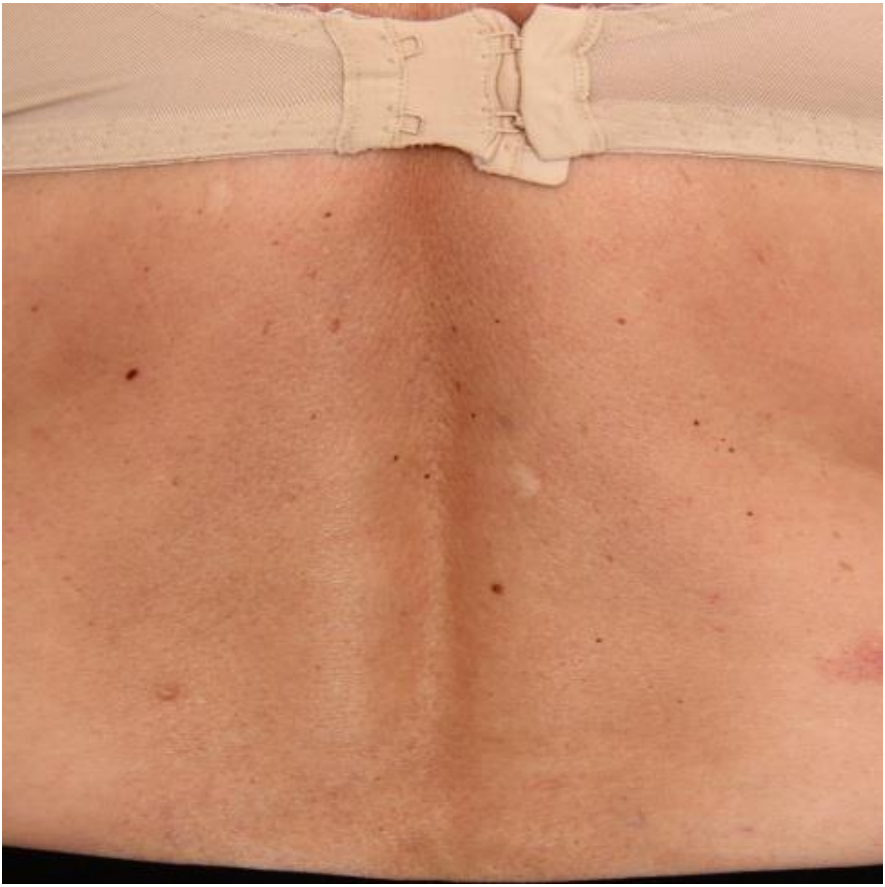
injuries of the vessel during injection), *ecchymoses* and sugillationes - large bruises of irregular shape.

Pigment macules appear mainly with a change in the content of the melanin pigment in the skin: with its excess, *hyperpigmented*, and with a deficiency - *hypopigmented or depigmented*. These elements may be congenital or acquired. Congenital hyperpigmented elements include a birthmark (nevus), the Mongolian spot. Acquired hyperpigmented spots are freckles, chloasma, tan; depigmented - leukoderma, vitiligo. Congenital generalized depigmentation is manifested by albinism.

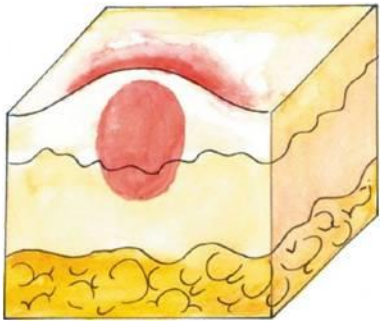
Artificial macules are staining of the skin as a result of the deposition of insoluble dyes in it. They can be professional - due to the introduction of particles of coal, metal or other dust into the skin in the process of professional activity or are introduced into the skin artificially (tattooing, tattoos).







Papule



A papule (papula) is a proliferative cavityless formation that rises above the level of the skin, upon palpation of which an infiltrate is determined.

Papules result from:

- The inflammatory process in the surface layers of the skin with the formation of cellular infiltrate;
- hypertrophy of one or another layer of the skin;
- neoplasms.

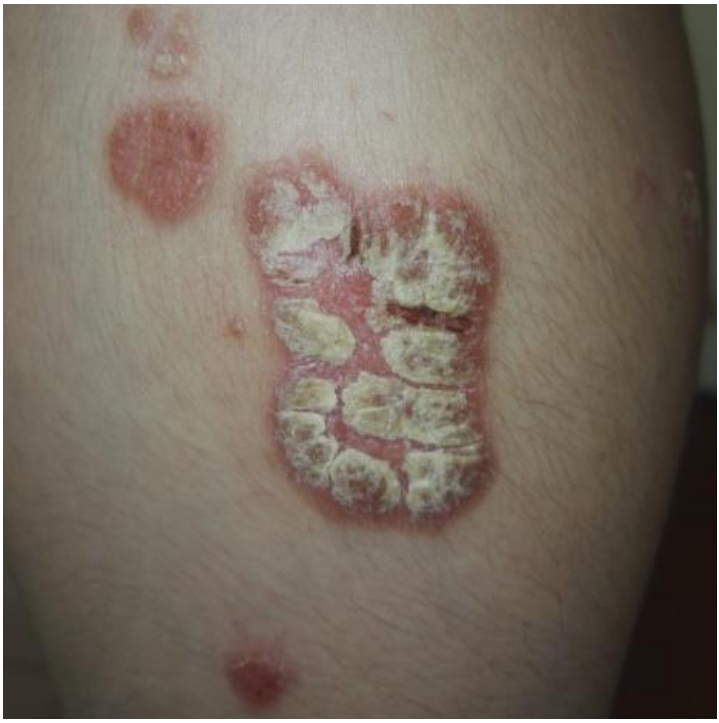
The following papules are distinguished by depth:
- epidermal, located within the epidermis (warts, molluscum contagiosum);
- epidermodermal (psoriasis, lichen planus, atopic dermatitis, eczema);
- dermal, localized in the papillary layer of the dermis (papular syphilis).

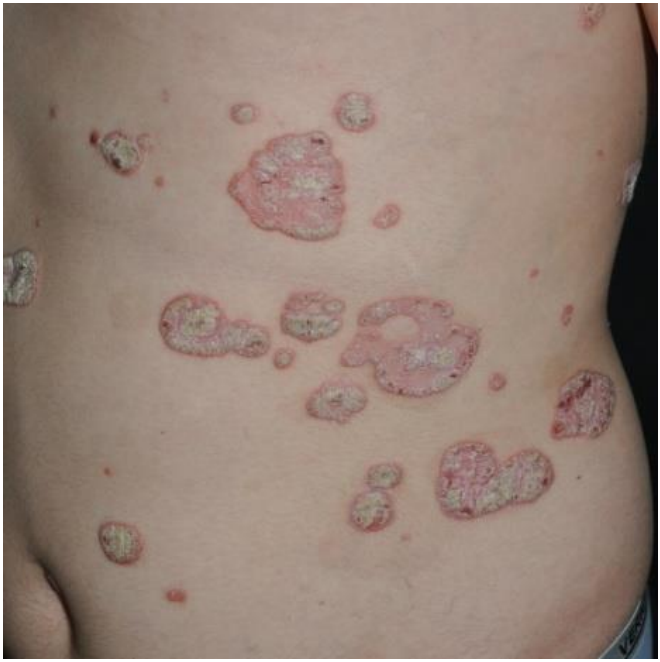
Depending on the size of the papules, there are:
- miliary (1-3 mm indoors);
- lenticular, (0.4-0.7 cm in distance);
- numular, or coin-like (0.7-3 cm in speed);
- plaques (up to 3 cm. to the palm of a newborn baby).

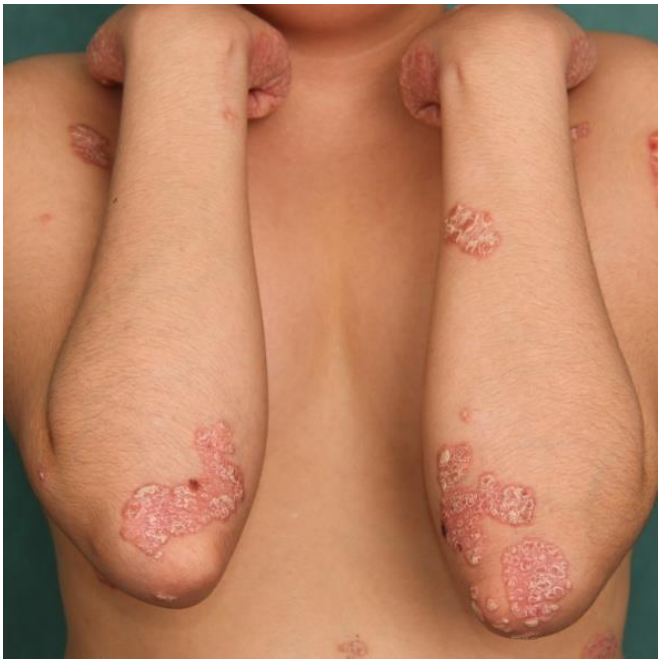
Papules are divided into flat, hemispherical and conical (with a pointed apex) in shape. Flat papules can be round, oval, polygonal.

On palpation papules' consistency can be dense, dense-elastic, pasty, soft. The color of the papules is different (pale pink for psoriasis; copper red for syphilis, lilac for lichen planus, with a yellowish tinge for lichenoid skin tuberculosis).

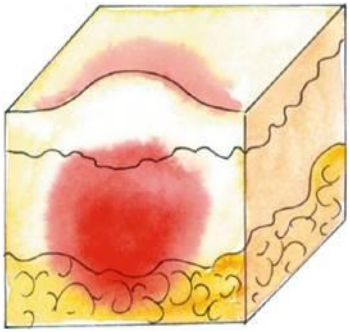
Exodus. Papules can be resolved without a trace or with the formation of temporary secondary hypo- or hyperpigmented spots.







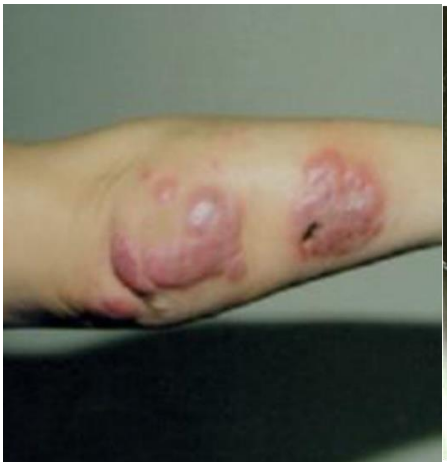
Tubercle

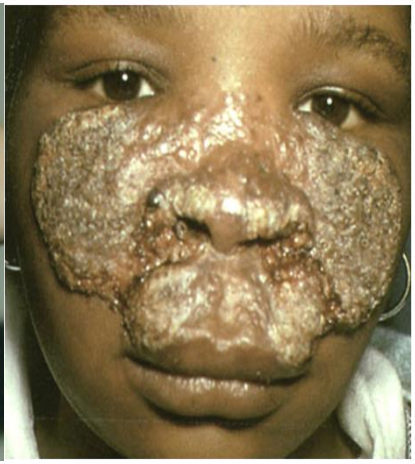


A tubercle (tuberculum) is the primary cavityless infiltrative morphological element lying in the reticular layer of the dermis. It is characterized by small size (from 0.5 to 1 cm in diameter), a change in the color of the skin, its relief and texture.

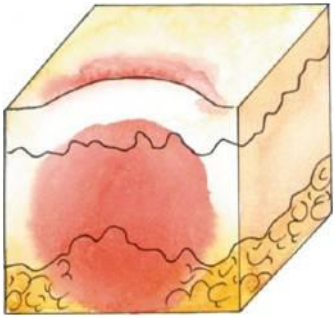
Unlike papules, in the process of evolution, a tubercle can:
- become necrotic with subsequent ulceration and scar formation;
- resolve with the formation of cicatricial atrophy on the skin.

Tubercles are observed with leprosy, skin tuberculosis, leishmaniasis, tertiary syphilis, etc.





Nodule

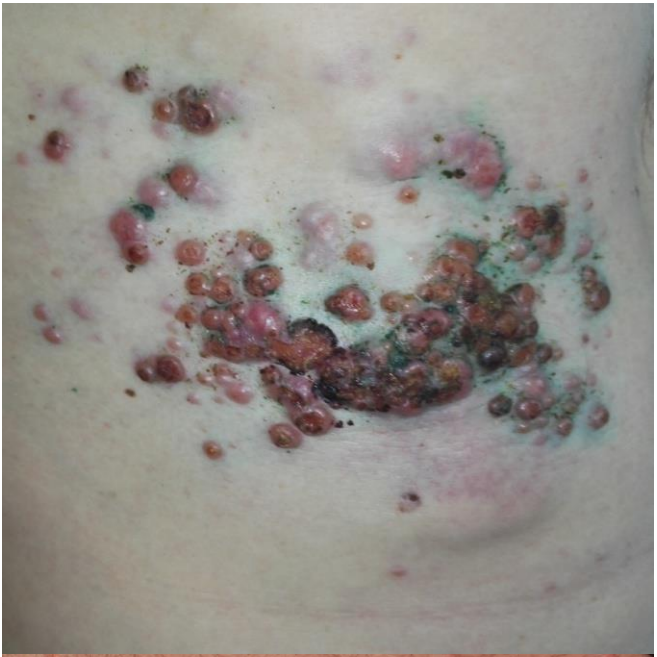


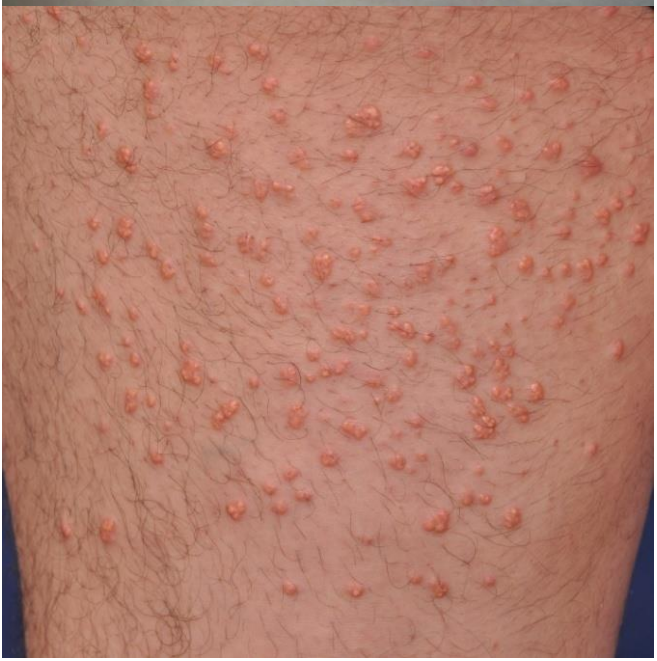
A nodule (nodus) is the primary cavityless infiltrative morphological element that lies deep in the dermis and hypodermis, ranging in size from the bone of a cherry to the head of a newborn baby.

The following types of nodules are distinguished: inflammatory (for example, furuncle, hydradenitis, syphilitic gumma) and non-inflammatory, resulting from deposition of metabolic products in the skin (xanthomas, lipomas, fibromas, etc.).

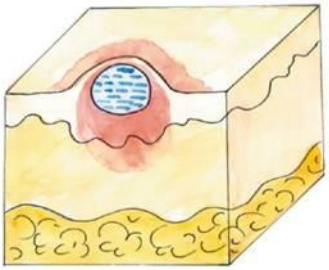
For inflammatory nodules, three options for their evolution and outcomes are possible:

- necrotization with subsequent ulceration and scar formation;
- resorption followed by cicatricial atrophy of the skin;
- calcification.



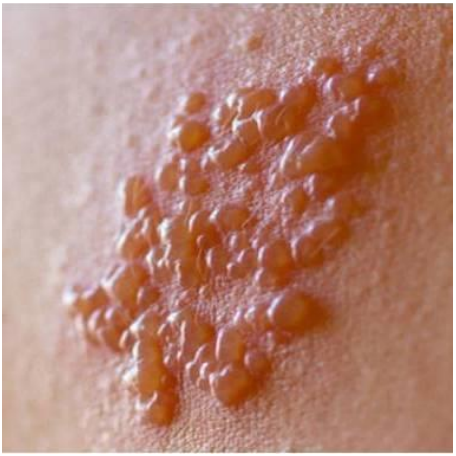


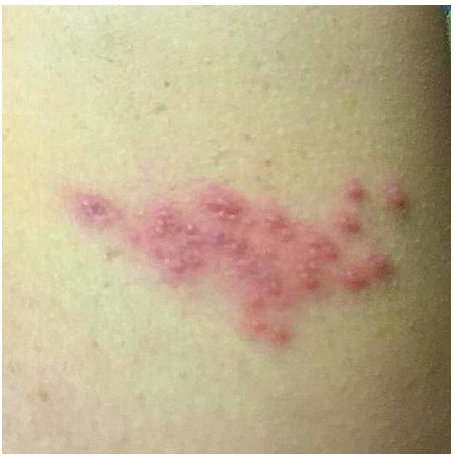
Vesicle



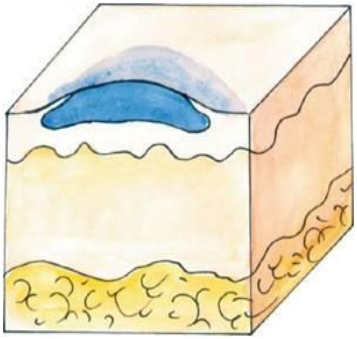
Vesicle*(vesicula)* - the primary exudative morphological element. It is a thin-walled cavity formation, up to 0.5 cm in diameter, filled with serous or serous-hemorrhagic contents.

Vesicles are located in the epidermis (intraepidermally) with eczema, herpes simplex and herpes zoster or under it (subepidermally) with dyshidrotic mycosis of the feet.



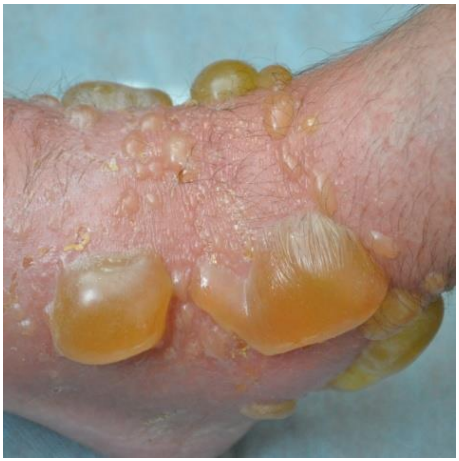


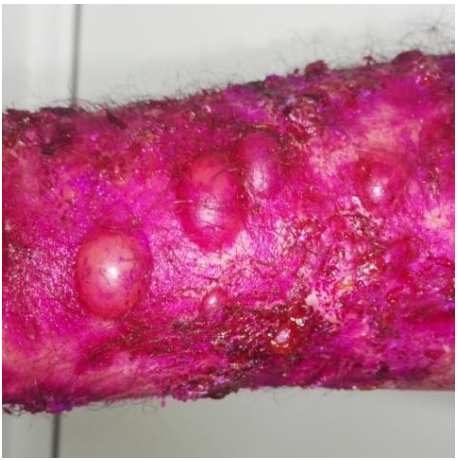
Bulla



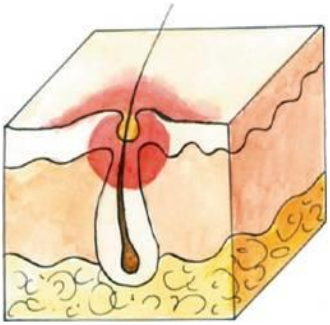
Bulla (bulla) - the primary exudative cavity morphological element, larger than 0.5 cm in diameter, consisting of a bottom, cap and cavity containing serous, hemorrhagic or purulent exudate.

The bulla's cap may be tense or flabby, dense or thin. They occur with pemphigus, bullous form of herpes zoster, Dühring's dermatitis, simple contact bullous dermatitis. Bullae can open with the formation of erosion or shrink into crusts. Moreover, the nature of the crust always corresponds to the type of bulla's exudate.



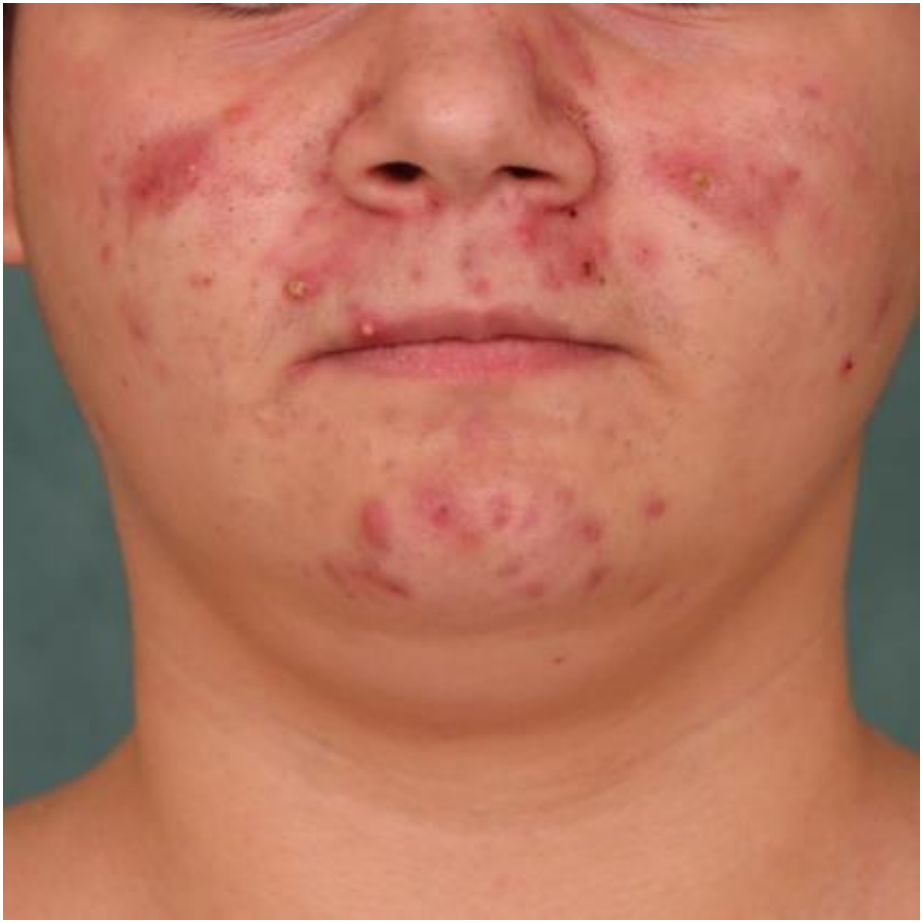


Pustule

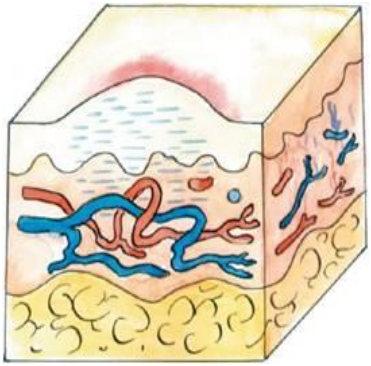


A pustule*(pustula)* is the primary exudative cavity morphological element filled with purulent contents.

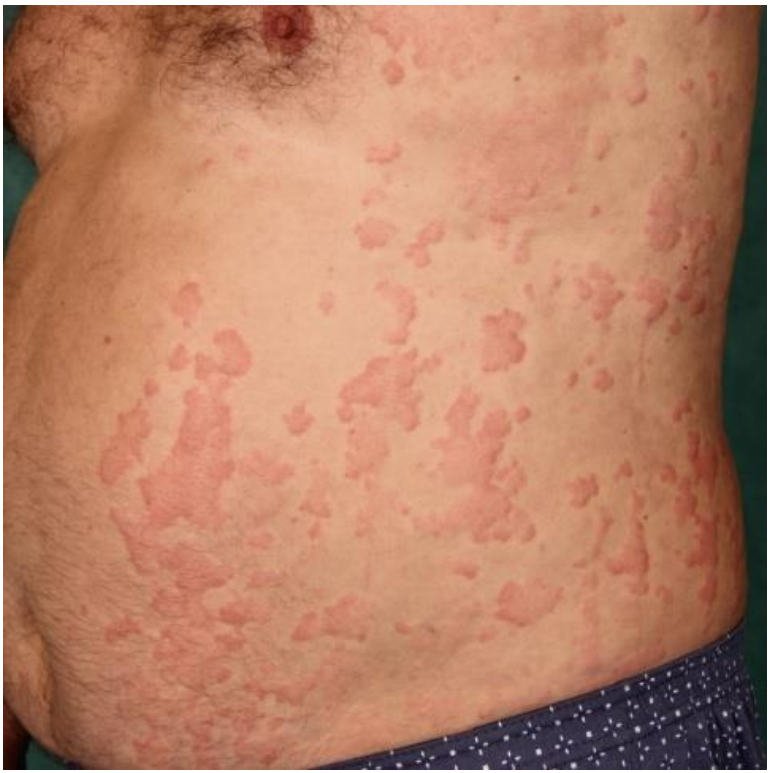
The location in the skin distinguishes between superficial and deep (ectims), *follicular*, i.e. associated with the hair follicle, having a domed shape, a fairly dense cap (usually staphylococcal) and *non-follicular* streptococcal pustules - phlyctena. Phlyctena, unlike staphylococcal pustules, is not associated with the hair follicle, it is a cyst with a flabby cap, serous, then purulent contents. Examples of follicular pustules are ostiofolliculitis, folliculitis. Phlyctena and ecthyma are characteristic of streptoderma.

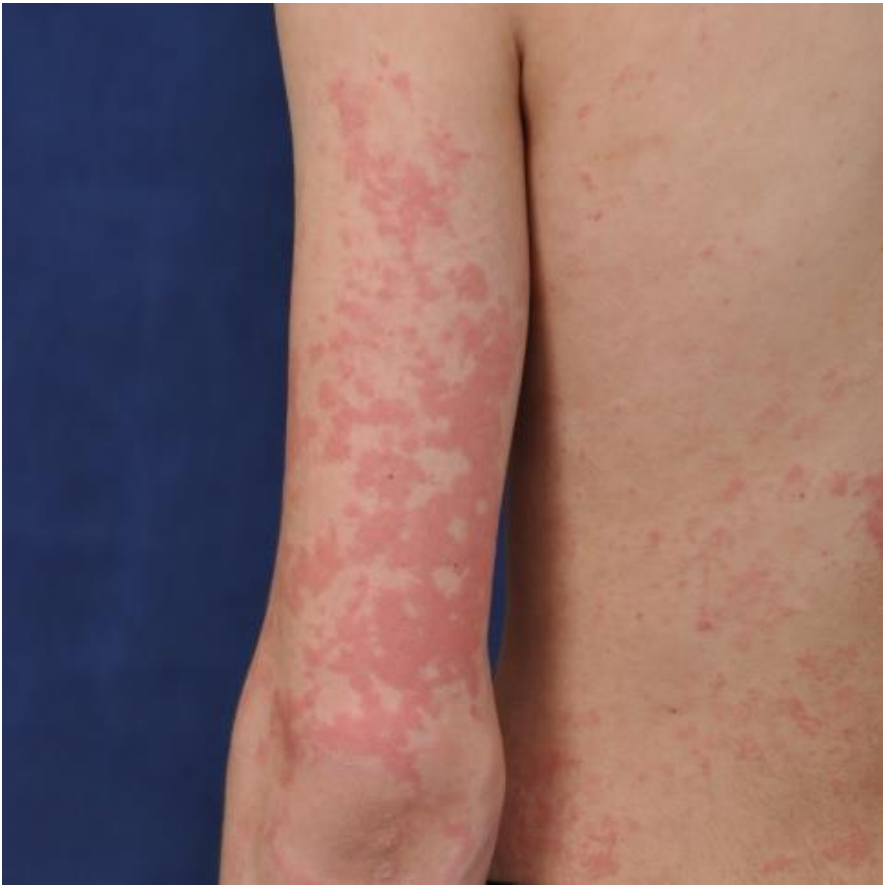


Wheal



A wheal (urtica) is the primary exudative cavity less morphological element that occurs as a result of limited island-inflammatory swelling of the papillary dermis and is characterized by ephemerality (exists from several minutes to several hours). It disappears without a trace. These elements are characteristic of urticaria.

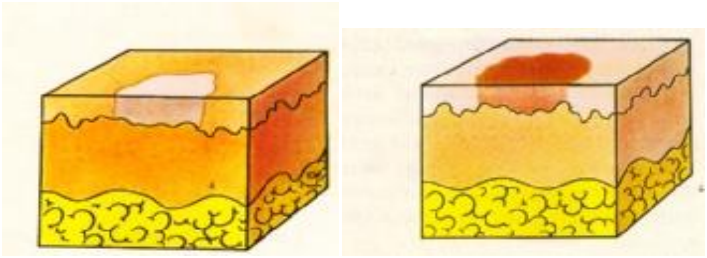




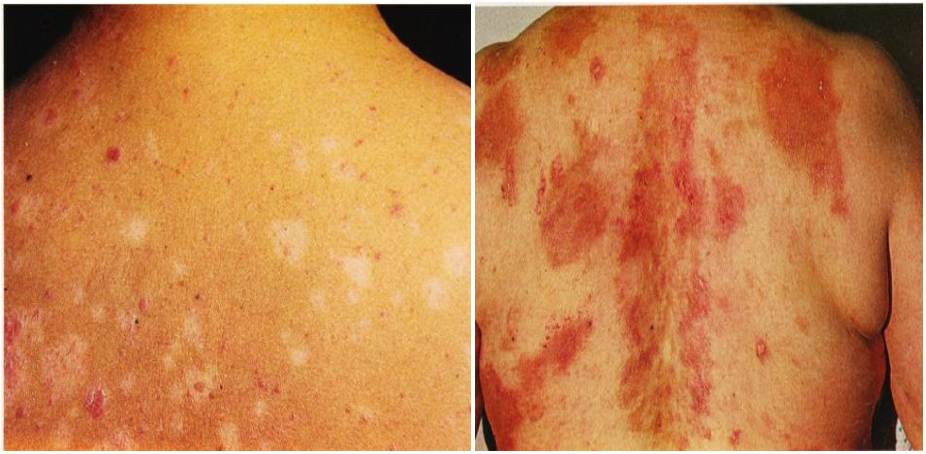
Eruption of skin rash elements can be monomorphic and polymorphic. Monomorphic rashes are always represented by one type of primary morphological elements (for example, papules in psoriasis or lichen planus). If different primary morphological elements are visualized at the same time, that is the polymorphism of the rash. There are two types of polymorphism - true and false (evolutionary). With true polymorphism, the various elements of the rash exist independently of each other (an example is the clinical manifestations of secondary syphilis).False polymorphism is characterized by the transformation of one primary morphological element into another during the course of the disease (for example, eczema, in which macules turn into nodules, nodules, respectively, into vesicles, vesicles open with weeping and dry into crusts, after which peeling remains and then a temporary secondary hypo- or hyperpigmentation).

Secondary morphological elements occur on the skin during the evolution of the primary elements of the rash. There are: secondary hypo- and hyperpigmented spots, fissures, excoriation, erosion, ulcers, scales, crusts, scars, lichenification, vegetation.

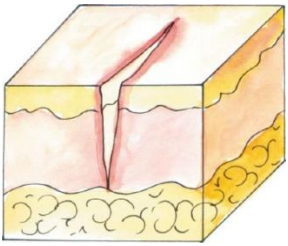
Hypo- and hyperpigmented spots



Hypo- and hyperpigmented spots (hypo hyperpigmentatio) can be a secondary morphological element if it appears on the site of resolved primary elements (papules, pustules, etc.). Example: pseudo-leukoderma in place of resolved psoriatic papules on the back of a patient.

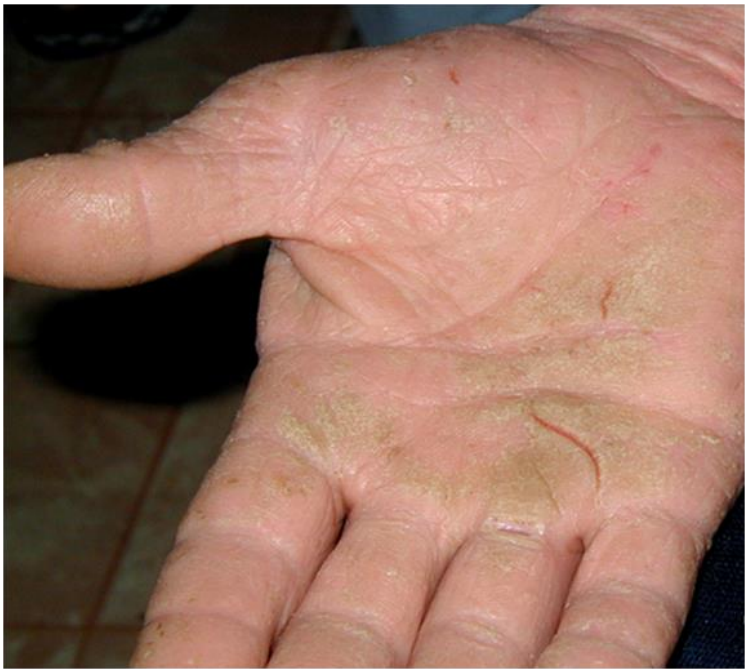


Fissure

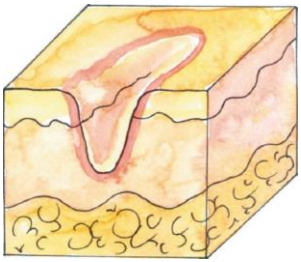


Fissure (fissura) - a secondary morphological element, refers to skin defects, is a linear violation of the integrity of the skin as a result of a decrease in its elasticity.

Fissures are divided into surface (located within the epidermis, epithelialized and regress without a trace, for example, with eczema, neurodermatitis, etc.) and deep (localized within the epidermis and dermis, often bleed with the formation of hemorrhagic crusts, regress with the formation of a scar, for example, with early congenital syphilis).

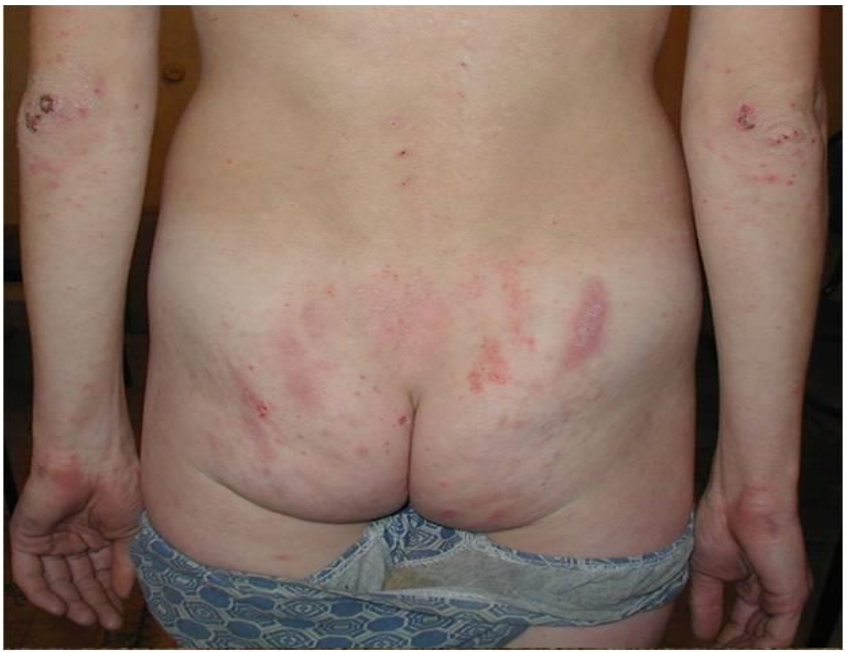


Excoriation

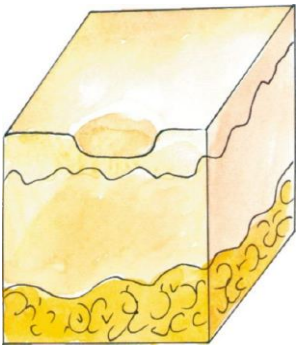


Excoriation, abrasion (excoriatio) manifests in the form of a linear skin defect as a result of its mechanical damage during superficial injuries and combs.

With skin diseases, the presence of excoriation indicates the presence of intense itching in the patient. This morphological element is characteristic of such chronic itchy dermatoses, such as atopic dermatitis, eczema, pruritus, etc., as well as parasitic diseases (scabies, pediculosis, phthiriasis).

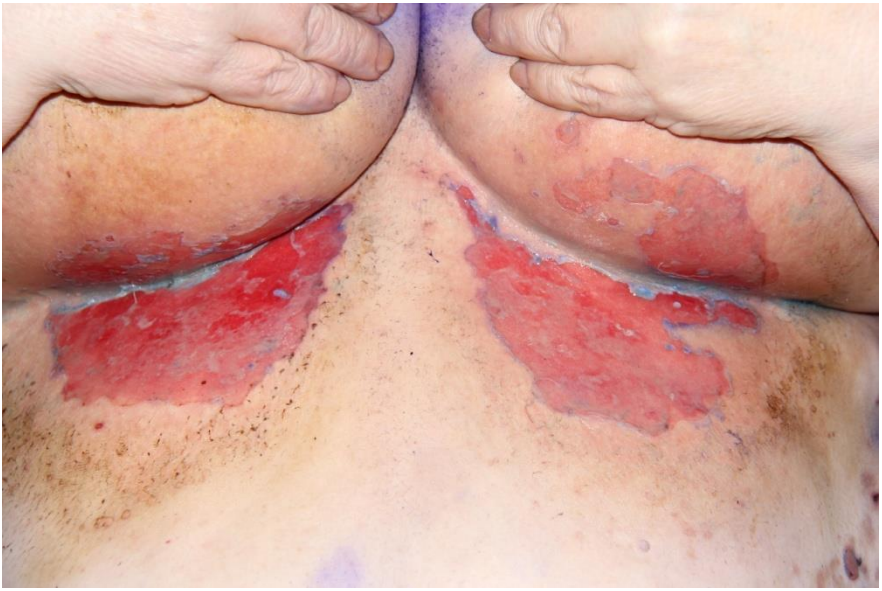


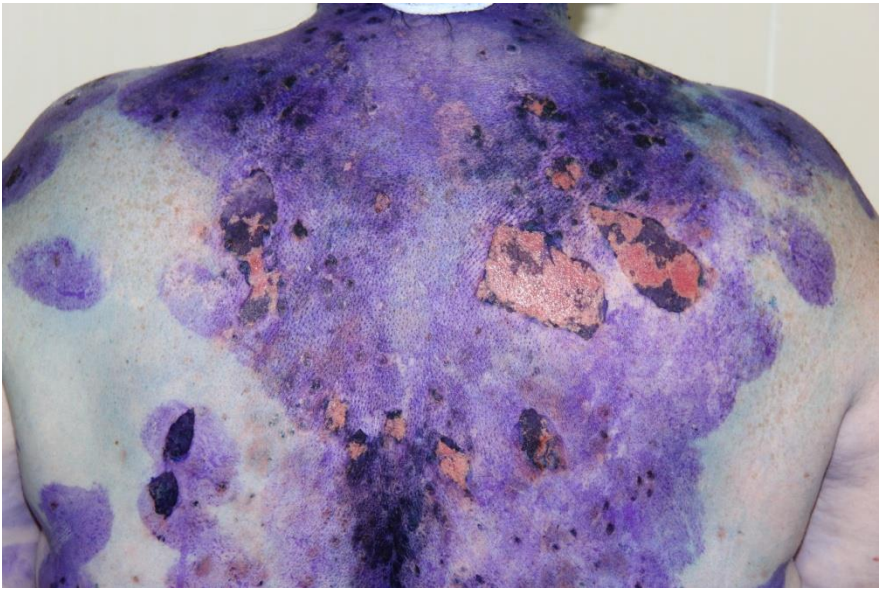
Erosion



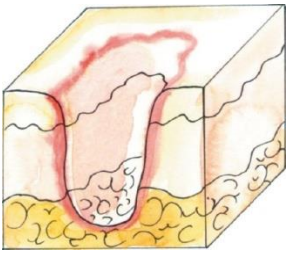
An erosion (erosio) - a violation of the integrity of the skin or mucous membrane within the epidermis (epithelium). Regression of erosion occurs by epithelization and ends without a trace.

At the site of the opened bulla with acantholytic pemphigus, erosion occurs and exceeds the size of the primary morphological element. An example of the appearance of erosion without a previous cavitary element of trophic nature is an erosive solid chancre with primary syphilis.





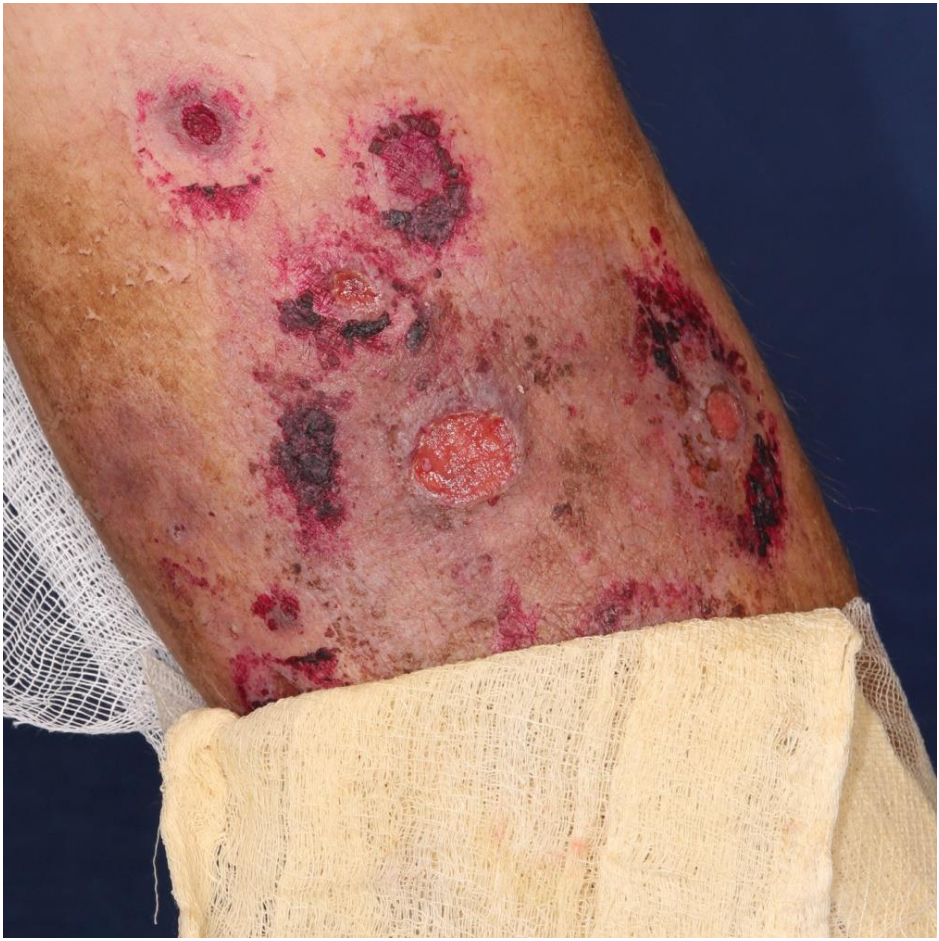
Ulcer



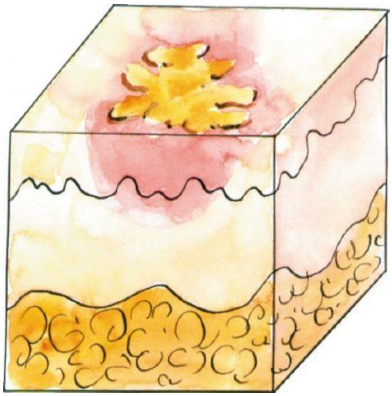
An ulcer (ulcus) is a violation of the integrity of the skin within the connective tissue layer of the dermis, and sometimes even the underlying tissues. It is also found on the mucous membranes.

It occurs as a result of the evolution of a tubercle or nodule (for example, with tertiary syphilis); has a trophic nature (circulatory and lymphatic disorders in case of obliterating atherosclerosis and Raynaud's disease; trophic disorders in case of dorsal dryness), and also occurs with an ulceration of a malignant tumor.

In the ulcer, the bottom and edges are distinguished, which can be soft (tuberculosis) or dense (skin cancer). The bottom can be smooth (hard chancre) or uneven (chronic ulcerative pyoderma), covered with a variety of discharge, granulation or necrotic masses. The edges are undermined, sheer, saucer-shaped. After healing of ulcers, scars always remain.



Scale



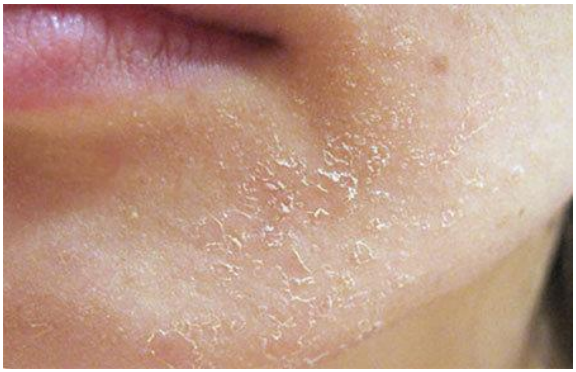
Scale (squama) - torn away cells of the stratum corneum of the epidermis, loosened, having lost a normal strong connection with each other. Physiological rejection occurs continuously and is not accompanied by clinically significant peeling. In pathological cases, peeling increases to a pronounced, detected during examination of the patient.

There are three types of peeling according to the size of the scales:

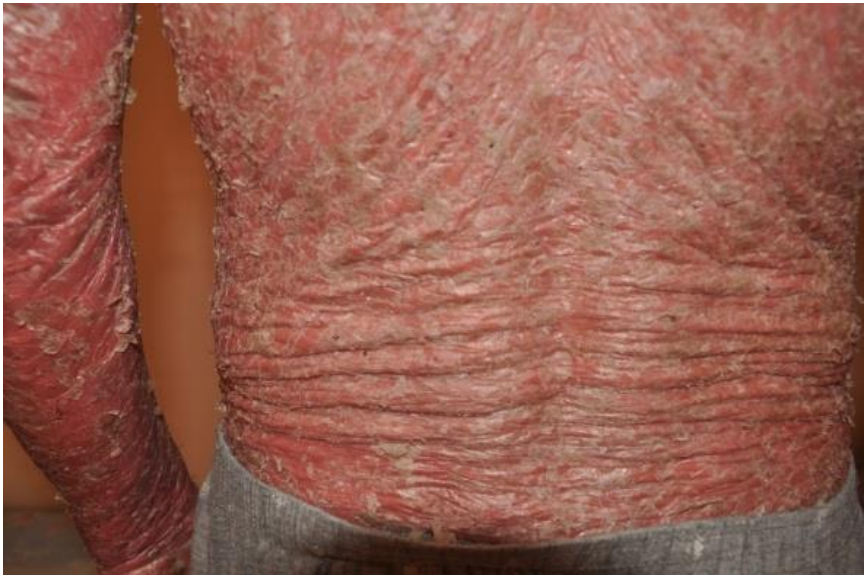
- *pityriasis*, when the skin is covered with tiny scales and resembles powdered flour (squamous mycosis of the feet);

- *small-, medium- and large-plate* (psoriasis, ichthyosis, erythroderma);

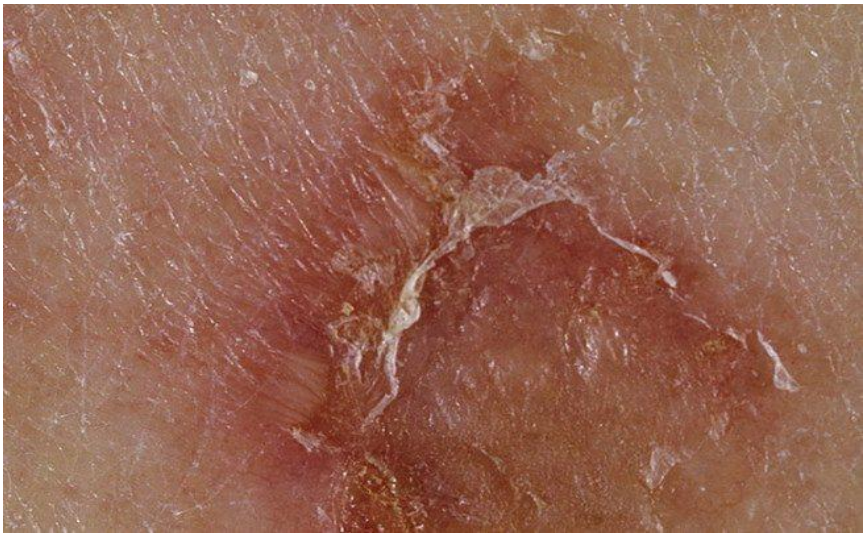
- *leaf-shaped* (leaf pemphigus, lupus erythematosus).



Pityriasis

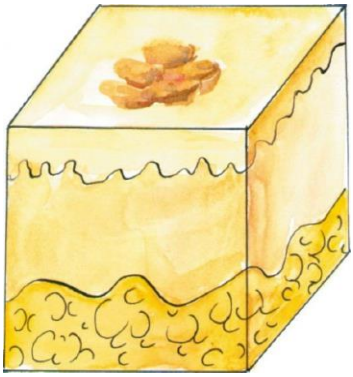


Large-plate peeling



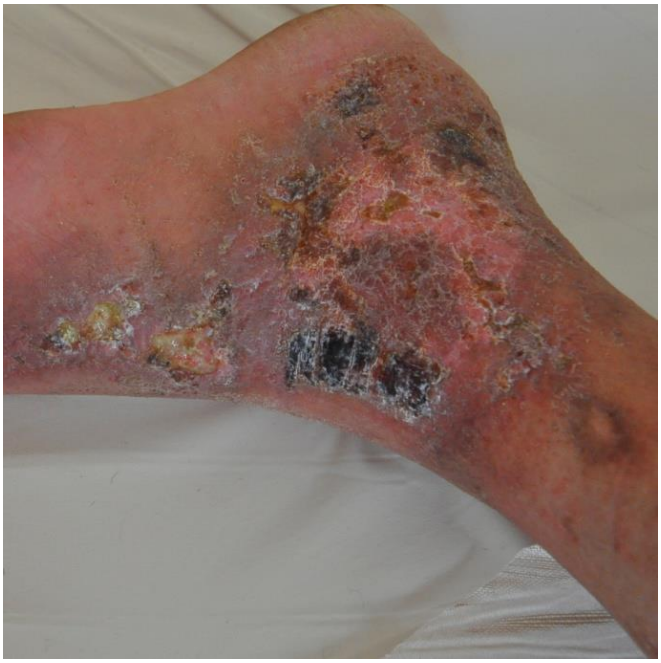
Leaf-shaped peeling

Crust

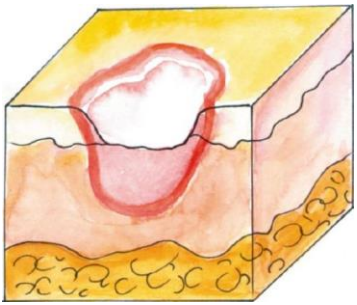


Crust (crusta) - occurs when the serous, hemorrhagic or purulent contents of the cavity elements dry out.

The nature of the crust (serous, hemorrhagic, purulent, mixed) is always determined by the nature of the exudate. The crust may have ocher-yellow (streptoderma), brown or gray (hemorrhagic and serous exudates) color.

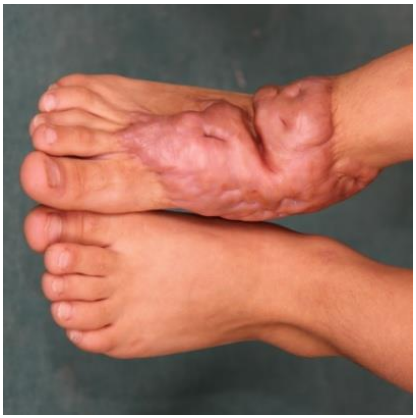


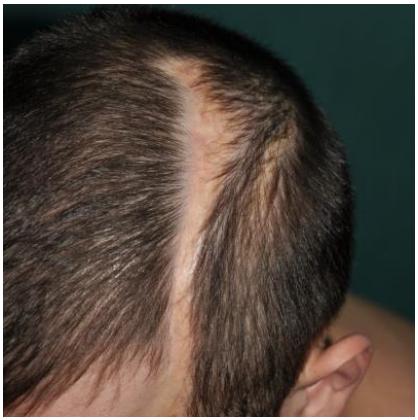
Scar



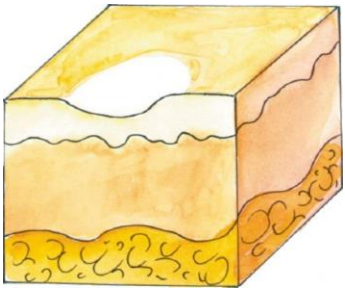
Scar (cicatrix) - occurs during the healing of ulcers, tubercles, nodes, deep pustules. It is a newly formed coarse fibrous connective tissue (collagen fibers).

Scars can be superficial and deep, atrophic, or hypertrophic, keloid. The color of the newly formed scars is red, then pigmented, later white. The epidermis in the scar area is smooth, often shiny, sometimes in the form of tissue-paper. There are no hair follicles within the scar. A star-shaped, retracted scar forms after syphilitic gum. Scrofuloderma is characterized by scars in the form of "suitcase handles".



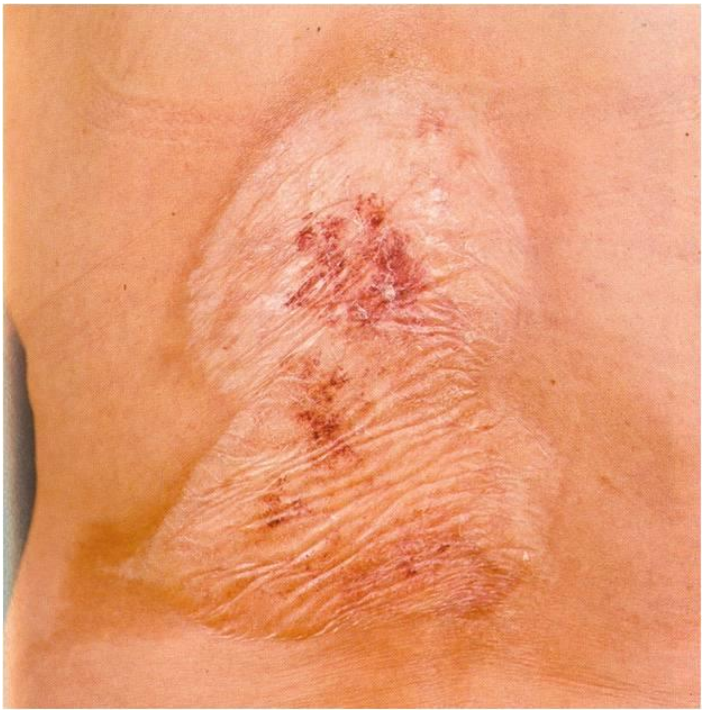


Atrophy

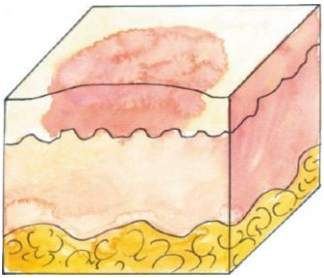


Atrophy (atrofla) - the formation of connective tissue at the site of a tubercle or inflammatory nodule without prior ulceration of these primary elements.

With atrophy, the skin is thinned in the form of a section of retraction. It develops with localized scleroderma, lupus erythematosus, tertiary syphilis.

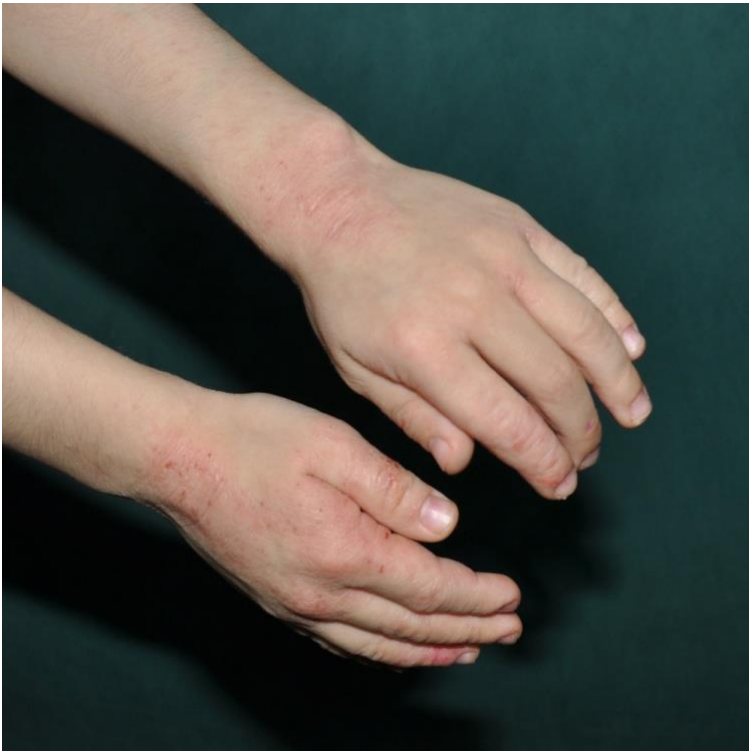


Lichenization

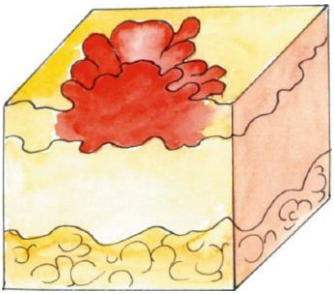


*Lichenization (lichenization)*is characterized by thickening of the skin due to diffuse papular infiltration, accompanied by an increase in skin pattern.

The skin within the foci of lichenification is hyperpigmented, rough, reminiscent of shagreen. It happens with atopic dermatitis, depriving Vidal.

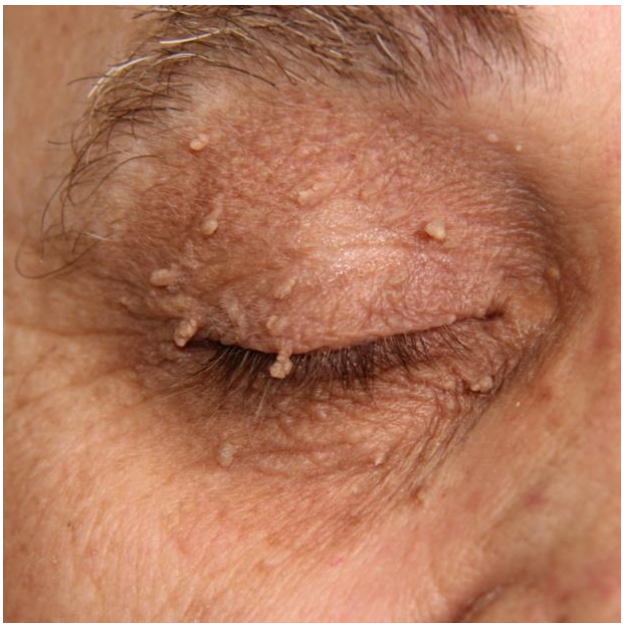


Vegetation



Vegetation (vegetatio) is characterized by the growth of the papillary dermis and thickening of the prickly layer of the epidermis, has a villous appearance resembling cauliflower or cockscombs (genital warts), sometimes they are dry and dense, grayish color (warts).

There are epidermal, epidermo-dermal and dermal vegetations. They can appear on the surface of papules (wide warts), at the bottom of ulcers (ulcerative vegetative pyoderma) and erosion - vegetative pemphigus.



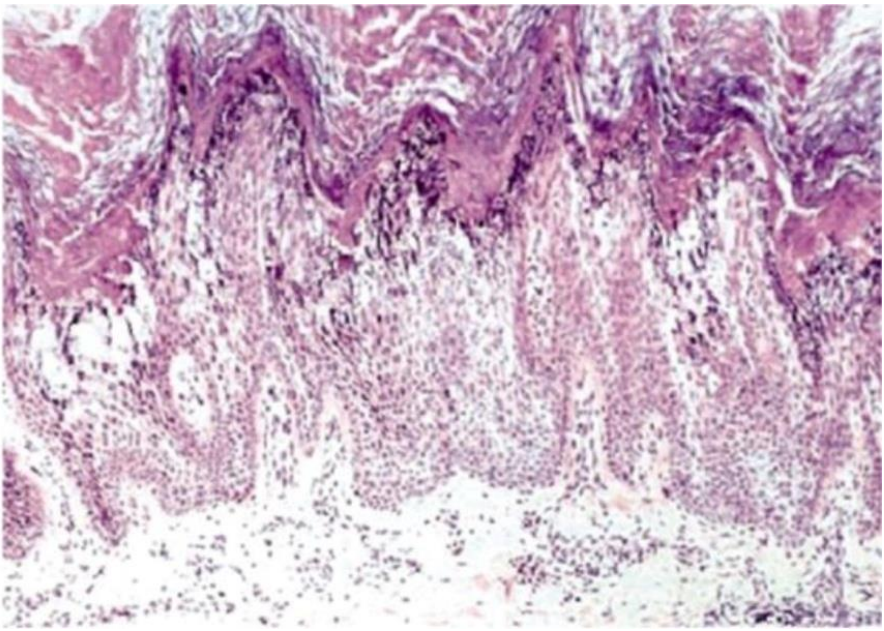
Skin histopathology

The basis of the formation of various rashes on the skin is a variety of pathomorphological processes that occur in the epidermis, dermis, hypodermis, the combination of which may be specific for a particular dermatosis. Histopathological changes in the skin are often the most important studies to make the correct diagnosis.

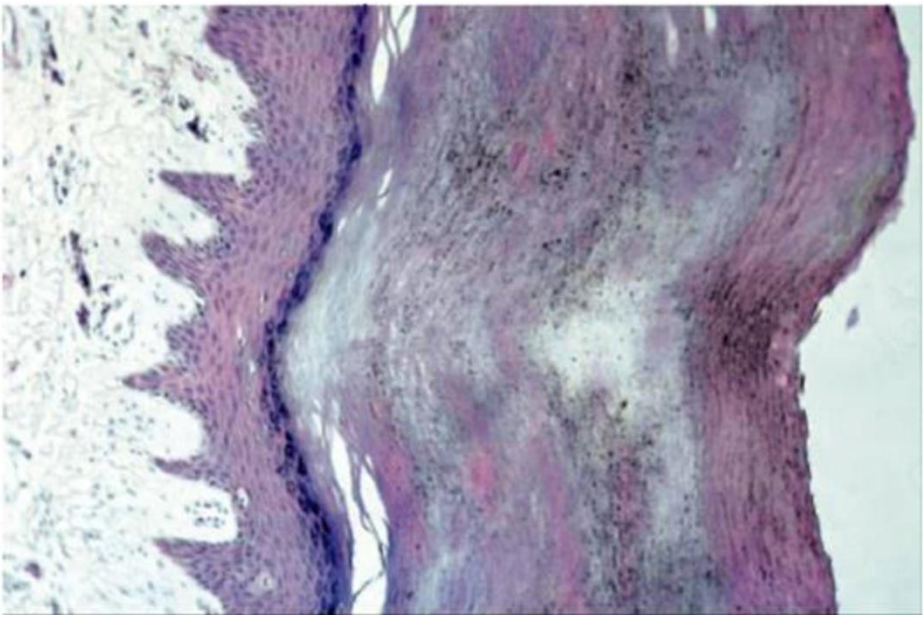
There are histopathological processes observed in the epidermis and dermis.

Histopathological processes in the epidermis. There are processes associated with changes in epidermal kinetics (hyperkeratosis, granulosis, acanthosis), impaired differentiation of epidermal cells (parakeratosis, dyskeratosis), impaired epidermal connections and dystrophic changes in cells (acantholysis, spongiosis, ballooning and vacuole dystrophy).

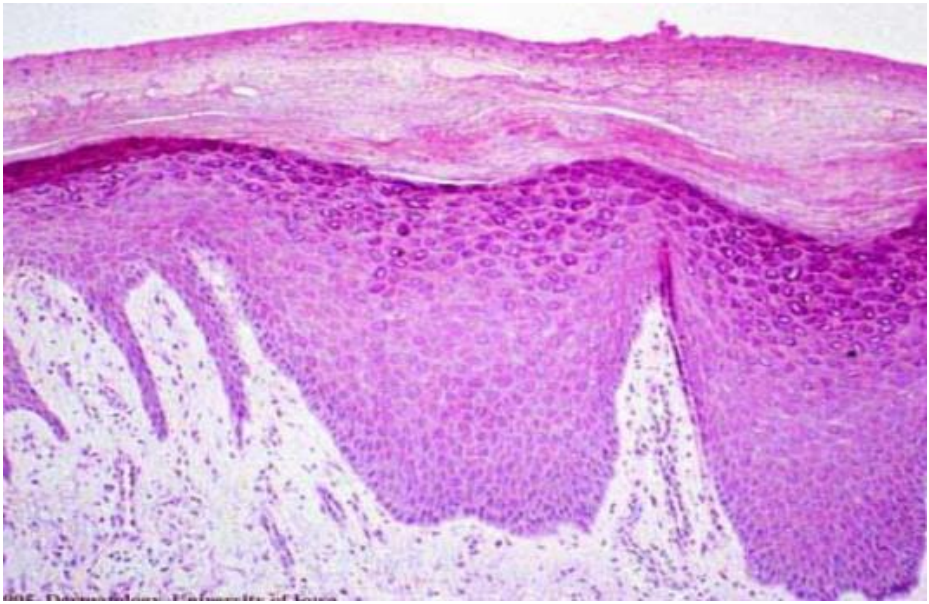
Hyperkeratosis is a thickening of the stratum corneum of the epidermis, which is a disaster for excess keratin. There is proliferative and retention hyperkeratosis. Proliferative hyperkeratosis is formed as a result of an increase in the functional activity of epidermal cells, occurring with thickening of the granular and spinous layers, and is observed with dermatoses such as lichen planus, neurodermatitis, etc. Retention hyperkeratosis is formed as a result of slowing down the process of exfoliation of the stratum corneum cells, which is caused by an increase in the content of glycosaminoglycans in the stratum corneum, which play a cementing role and make it difficult to separate the horn cells and their physiological rejection. The granular layer is thin or completely absent. Retention hyperkeratosis occurs with vulgar ichthyosis.



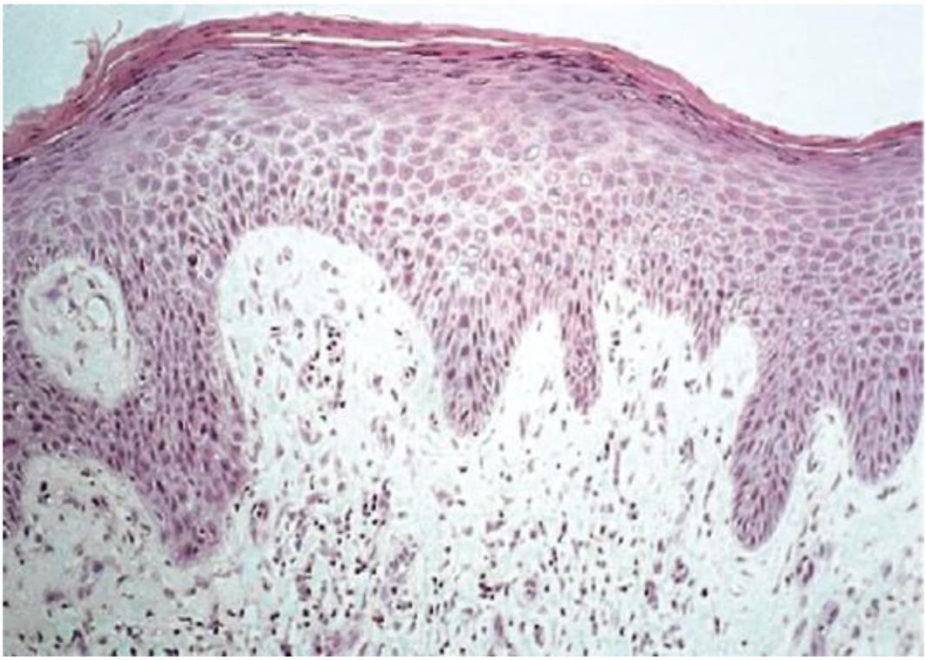
Granulosis is a thickening of the granular layer in which, instead of 1-2 rows of cells, there are 5 or more. Granulosis usually accompanies proliferative hyperkeratosis. The granulosis observed in papules of lichen planus provides a symptom characteristic of this disease - the “Wickham net”, which is formed due to the uneven refraction of light.



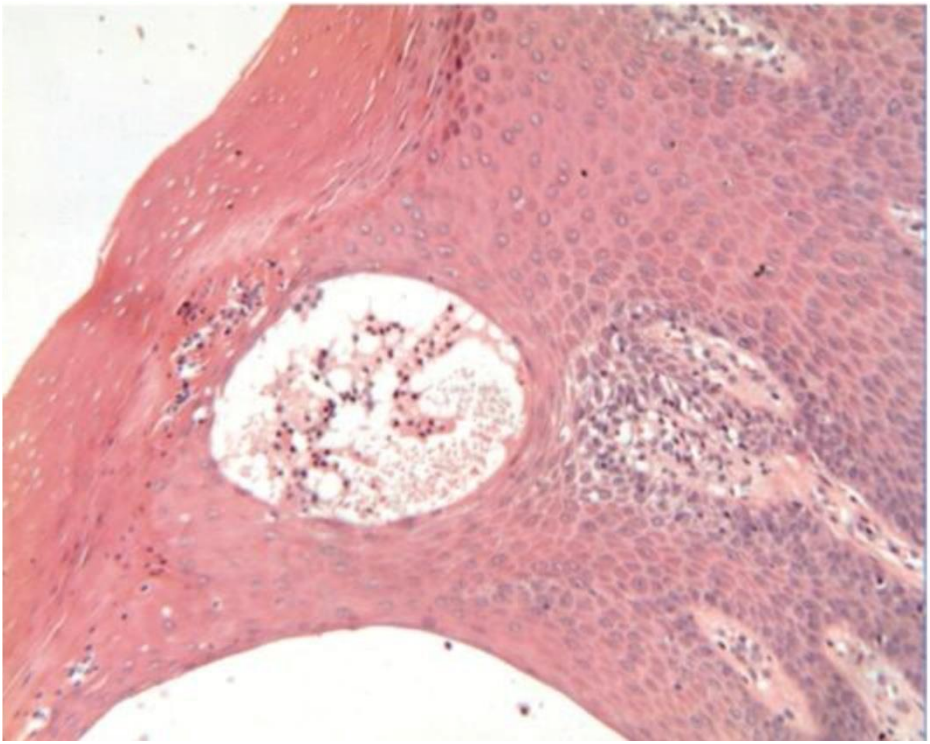
Acanthosis is a thickening of the spinouslayer as a result of an increase in the proliferation rate (proliferative acanthosis) of keratinocytes of the basal and suprabasal layers of the epidermis with an increase in their energy metabolism and mitotic activity. Acanthosis can be uniform and moderately pronounced due to the increase in the rows of cells of the spinouslayer both above and between the papillae of the dermis (eczema, lichen planus) and uneven with a sharp increase in the number of rows of spinouscells mainly between the papilla of the dermis. In such cases, it is combined with papillomatosis (psoriasis).



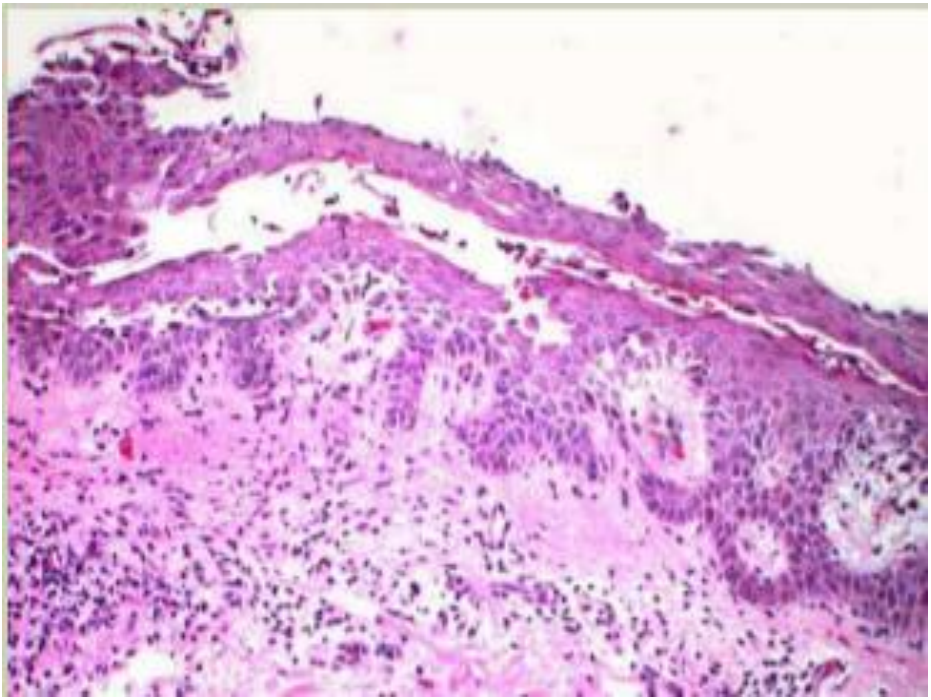
Parakeratosis is a violation of the keratinization process with a loss of the ability of epidermal cells to produce keratogialin, resulting in incomplete keratinization of epidermal cells. Moreover, in the zone of the stratum corneum (which should be compact and nuclear-free), cells with rod-shaped nuclei that do not contain keratogialin are loosely located. The granular layer is often absent or underdeveloped. The basis of parakeratosis is a violation of the relationship between proliferative activity and differentiation of epidermal cells in connection with a violation of tissue homeostasis.



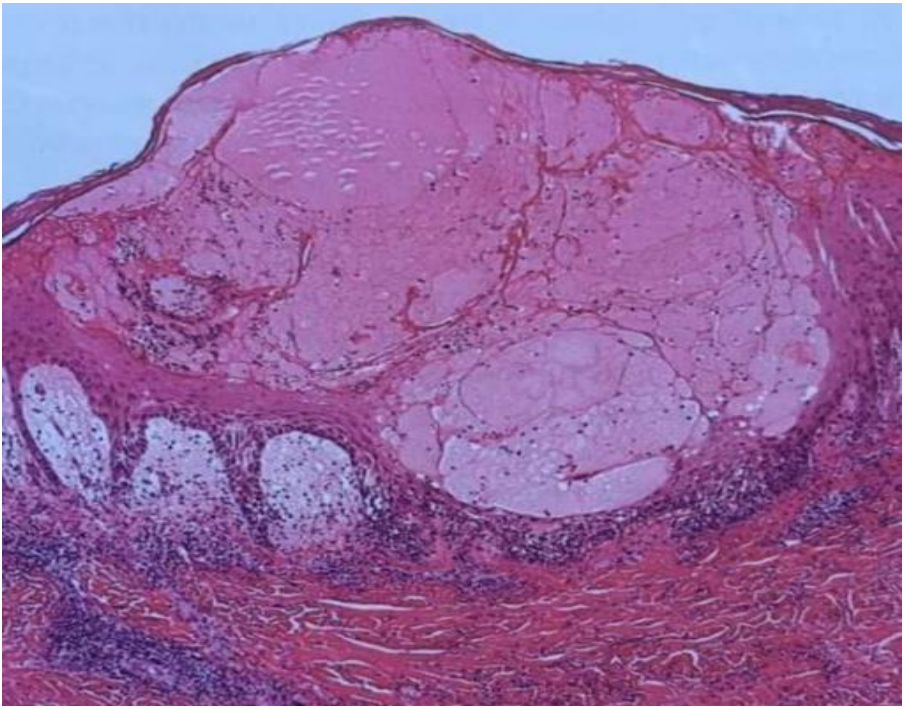
Diskeratosis is a premature autonomic keratinization of individual keratinocytes, which become larger with intensely stained nuclei and a basophilic, slightly granular cytoplasm, are deprived of intercellular bonds, as a result of which they are randomly located in all layers of the epidermis. Diskeratosis is based on a violation of the complex of tonofilaments - desmosomes with dissolution of the contact layer of desmosomes and their aggregation around the nucleus. Further compaction and a decrease in the amount of keratin in these cells lead to the formation of grains. Dyskeratosis is observed with senile keratosis, molluscum contagiosum (benign dyskeratosis), as well as skin cancer (malignant dyskeratosis).



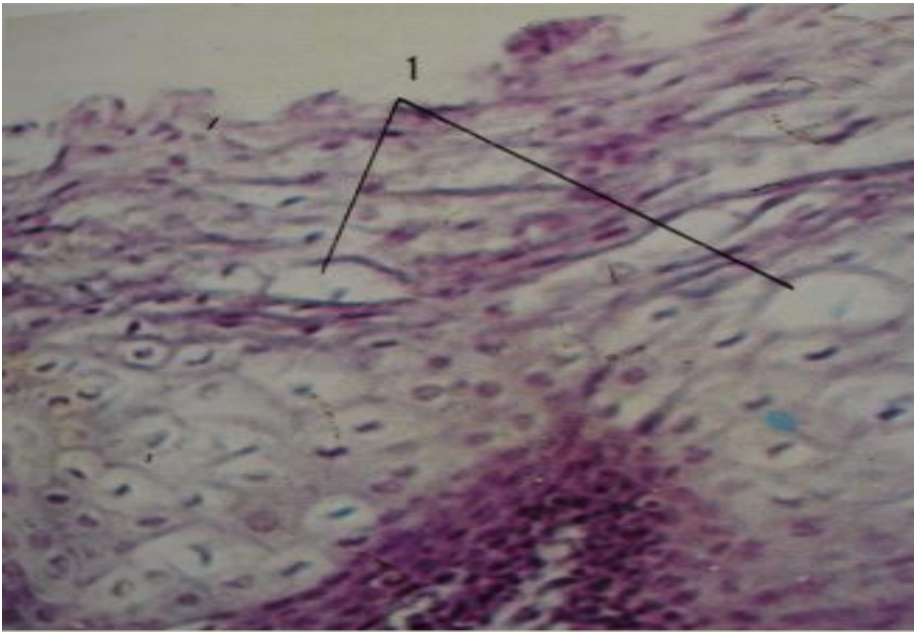
Acantholysis is the process of losing communication between the keratinocytes of the spinouslayer due to damage to their desmosome-tonofilament contacts. This leads to the formation of intraepidermal cavities ("acantholytic bullae") filled with intercellular fluid. The cells of the spinouslayer that have lost contact with each other as a result of acantholysis are called acantholytic cells (Tzank cells). They have a rounded shape, a large nucleus and several small nucleoli around which there is a "zone of enlightenment", and on the periphery - a "zone of concentration" of the cytoplasm. Metabolism in them is minimal, in the future they undergo destruction and die.Acantholysis is a specific process for pemphigus and develops as a result of an autoimmune reaction with the deposition of immune complexes with antibodies against cell membrane structures that destroy intercellular bonds.



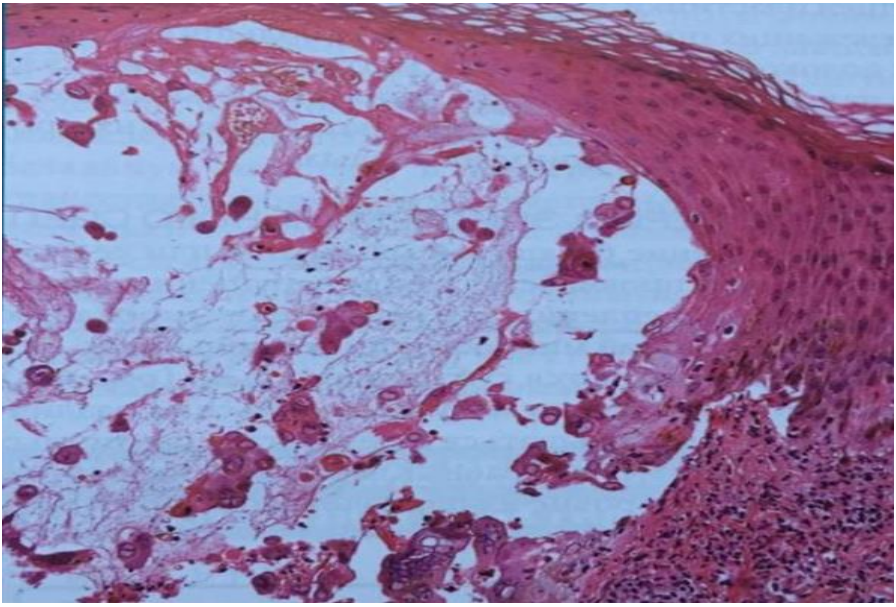
Spongiosis is intercellular edema as a result of penetration of serous exudate from the dilated vessels of the papillary layer into the epidermis. At the same time, the cells move apart under pressure, their intercellular connections tighten and break (secondary loss of connection between keratinocytes). Spongiosis is characteristic of eczema, bullous allergic dermatitis, exudative form of psoriasis.



Vacuum dystrophy is characterized by intracellular edema of keratinocytes with the formation of vacuoles in their cytoplasm, located around the nucleus and pushing the nucleus to the periphery. The core is deformed, becomes pyknotic. Gradually, the edematous fluid dissolves the cell, leading to its death (dyshidrotic form of mycosis of the feet). Vacuolization and atrophy of the cells of the basal layer are observed with lupus erythematosus.



Ballon dystrophy is characterized by pronounced epidermal edema, which has both intercellular and intracellular character, as a result of which edematous keratinocytes in the form of large rounded dystrophically altered cells such as spherical formations float freely in cavities filled with serous-fibrous exudate and resemble balloons filled with liquid. Ballon dystrophy is observed with viral dermatoses (herpes simplex, herpes zoster).



Histopathological processes in the dermis include papillomatosis, microcirculation disorders in the skin, edema, deposition of cellular inflammatory or neoplastic cell infiltrates, dystrophy of the connective tissue, pathology of the skin appendages, etc.

Papillomatosis is an elongation, often with branching, of the papilla of the dermis, unevenly raising the epidermis above itself. It is the morphological basis of the secondary skin element - vegetation (for example, with vegetative pemphigus). Often, papillomatosis is combined with inter-papillary acanthosis, as, for example, with psoriasis, providing a third psoriatic phenomenon - point bleeding when papule psoriasis is grafted.

Disorders of the microcirculation of the skin is one of the most common phenomena that accompany any inflammatory reaction in the skin. The most severe reaction of the vascular complex is manifested in angiitis of the skin and acute inflammatory processes with edema of the skin (eczema, etc.). Vasodilation, thickening and increased permeability of their walls, swelling of the endothelium are observed, which is usually accompanied by the formation of perivascular cell infiltrates from lymphocytes, histiocytes, tissue basophils and other mononuclear elements.Due to the network of developed vascular anastomoses, ischemic infarcts in the skin are rare, although, for example, with allergic angiitis, the death of individual tissue sections with subsequent ulceration of the skin is possible.

Cellular infiltrations in the skin can have a different origin, more often as a result of chronic inflammation, but can be a proliferation of a malignant clone of cells (for example, with lymphomas). Depending on the location, there are perivascular infiltrates surrounding the vessels in the form of couplings, nodular infiltrates, which occupy the entire thickness of the dermis with an almost unaffected papillary layer (syphilitic papules). The formation of granuloma-type infiltrate as a result of granulomatous inflammation, which is based on immune disorders is possible. The appearance of granulomas during the inflammatory process is primarily associated with the failure of mononuclear phagocytes (tuberculosis, syphilis, leprosy). The inflammatory process in these infections has, in addition to the required components (alteration, exudation and proliferation), a number of certain morphological signs with a predominance of a specific productive granulomatous reaction

and the development of coagulation necrosis in the foci of inflammation. The cell composition of granulomas contains macrophages, epithelioid cells, giant Langerhans cells. At the periphery, this conglomerate of cells surrounds a shaft of T-lymphocytes. Necrosis often occurs in the center of a granuloma. A granulomatous reaction underlies the formation of tubercles.

Dystrophy of the connective tissue. Among dystrophic processes in plasma, mesenchymal dysproteinoses, in which protein metabolism in the connective tissue of the dermis and vascular walls is disturbed, are of the greatest importance. Mesenchymal dystrophies include mucoid and fibrinoid changes in connective tissue. Mucoid swelling is the initial phase of the disorganization of collagen and the main interstitial substance of the connective tissue, which consists in their swelling due to the accumulation of acid mucopolysaccharides. Fibrinoid swelling is characterized by homogenization and a change in the tinctorial properties of collagen; fibrinoid necrosis is a phase of disorganization of the connective tissue, in which, in addition to homogenization, a blocky decomposition of collagen, which turns into fibrin, is expressed. These changes in connective tissue are observed with lupus erythematosus, scleroderma, when the action of immune complexes causes damage to the microvasculature and destruction of connective tissue.