Ministry of Education and Science of Ukraine
V. N. Karazin Kharkiv National University

METHODS OF EXAMINATION AND PECULIARITY OF SKIN AND SUBCUTANEUS TISSUE IN CILDREN

Methodical recommendation

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Methodical recommendations are worked out on the basis of the Program of discipline of «Propedeutics of pediatrics» for students of higher medical educational institutions of III–IV accreditation levels, authorized by Ministry of Health of Ukraine. These recommendations are intended for the 3th years English speaking medical students.

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INTRODUCTION

Propaedeutics of pediatrics is an important step in the formation of a future doctor. The study of questions on the examination of the skin, subcutaneus tissue and lymphatic nods in children begins with familiarization with anatomical and physiological features, including the transitory conditions of this system in newborn. It is also important to target the student with the ability to carefully collect complaints from the mother of a toddler or older child, skin rashes, enlargement of lymph nodes, and to pay attention to the clinical symptoms of the disease during an objective examination. In the diagnosis of skin diseases, subcutaneous tissue and lymph nodes, the appearance of the patient and his skin, as well as laboratory and instrumental studies play a dominant role. 3rd year students should have an idea of the most common skin, subcutaneous tissue and lymph nodes in children at different times of life, as well as learn how to analyze, differentiate the results of a clinical examination and use them in diagnosis.

1. ANATOMICAL AND PHYSIOLOGICAL FEATURES OF THE SKIN AND SUBCUTANEUS TISSUE IN CHILDREN OF DIFFERENT PERIODS OF LIFE

Skin is the largest and most important organ of the human body, accounting for approximately 16% of body weight. The skin is closely connected with all the organs and systems of the body. The conception of the skin begins to form at the 3rd week of pregnancy. Differentiation begins with a skin ectoderm that the epithelium lining the nose, eyes, ears, hair and nails. Single-layer epithelium becomes multilayered and begins the process of keratinization with simultaneous laying the rudiments of hair, glands and nails. Also there is a differentiation of mesoderm formation and the dermis of the skin.

The skin of a child, like the adult, consists of the epidermis, dermis and hypodermis.

The epidermis has a very thin, loose horny layer. Its thickness is 2.5–3 times smaller than that of adults. The degree of development of the epidermis is uneven. The horny layer contains a lot of water, a thin, easily injured. A shiny layer is present in the skin of the soles and palms. The basal layer of the epidermis in the newborn contains incomplete melanin formation, which causes a lighter skin clor with a reddish tinge after birth. The granular layer of the epidermis is poorly expressed and absent in newborns.

The derma in children dominates cellular elements, and adults – fibrous structure. The dermis provides skin elasticity and elasticity. The hypodermis or subcutaneous fat layer in infants is greater than in adults. The distribution of subcutaneous fat after birth is uneven. Contains fulvous adipose tissue, the main function of which is heat production, which is not associated with muscle contraction. Subcutaneous tissue is maximally expressed in the first days of life and when cooled, it can protect the baby for two days. A few months after birth, the fulvous adipose tissue disappears. By 5–7 years, children have almost no fatty tissue in the chest and abdominal cavities, retroperitoneal space, which makes it easy to move the internal organs.

The sebaceous glands begin to function as early as the 7th month of pre-natal development of the baby. The secretion of the sebaceous glands, together with the fatty degeneration of epidermal cells, forms the so-called "cheese" oil, which covers the entire body of the newborn and facilitates its passage through the birth canal. The sebaceous glands function actively during the first year of life, which is particularly noticeable in children suffering from exudative diathesis. After the first year of life, their secretion decreases and again increases only during puberty. In adolescents, the sebaceous glands are often clogged with horn plugs, which promotes the development of a local inflammatory process - acne (acne vulgaris). The number of sebaceous glands

after birth does not change, so with age their number per unit surface of the body decreases. The sealing of the sebaceous glands in embryogenesis is connected with the sealing of the hair follicles.

By the time the baby is born, all the sweat glands (miliaria) are already formed and, basically, already capable of functioning. However, the ducts of many of them are poorly developed, the lumps are closed by epithelial cells. The structure of the glands is noticeably improved by the fifth or sixth month of the child's life and reaches full development by the fifth or seventh year of life. Sweating begins at three to four weeks of age, with infants at higher temperatures than older children.

Functional peculiarities of skin

Protective: Protects body tissues from adverse physical, chemical and biological effects, as well as from various types of harmful radiation energy.

Thermoregulatory function: begins its full activity only a few months after birth. Developed poorly in the newborn. Subcutaneous fat and sweat glands regulate the body's heat exchange and constant body temperature.

Excretory function: The sebaceous and sweat glands provide the excretion of vital products to the skin surface. In young children are underdeveloped.

Respiratory function: The skin is permeable to gases and liquids. In infants, the permeability is 8 times stronger than in adults. Respiratory function – the ability of the skin to absorb oxygen and release carbon dioxide, which increases with increasing ambient temperature, during physical work, during digestion, the development of inflammatory processes in the skin, etc.

Secretory function: The skin secretes vitamins (such as vitamin D), enzymes, biologically active substances, and produces melanin.

Receptor function: In the skin are sensitive nerve endings in which a person feels pain, cold, heat, pressure, and so forth.

Reabsorbcion function: It is the ability of the skin to absorb various substances, including medicinal (for example, the action of local compresses, creams, etc.). In young children, it is more intense.

Peculiarities of subcutaneous tissue

Subcutaneous tissue in infants is relatively greater than in adults; this explains the roundness of the body. In newborns and especially in the second month of life it is well developed in all parts of the trunk except the abdomen. The main function of adipose tissue is heat production, which is not associated with muscle contraction. Ma ximum expressed in the first days of a child's life. With age the heat output decreases and a few months after birth, the brown adipose tissue disappears and the baby needs to warm up, especially the deep premature (the room in the body, incubator, etc.). Up to 5–7 years old children

have almost no fatty tissue in the chest and abdomen, retroperitoneal space, making it easy to move internal organs. The thickness of subcutaneous tissue on the inner surface of the thigh is 3–4 mm in children.

Peculiarities of skin in newborns

The skin a newborn has pale-cyanotic color, some oedema, is covered with embrionic lanugo hair in the scapular area. Although this is much greater in after the baby is born, the surface of the dermis is covered with a thick layer of primordial grease (vernix caseosa).

After the birth, the surface of the dermis is covered with a thick layer of primordial grease (vernix caseosa). Vernix caseosa is a white, creamy natural biofilm that covers the skin of the fetus during the last trimester of pregnancy. Covering this film on newborn skin protects the skin of the newborn and promotes pre-natal adaptation of the skin in the first postpartum week, which does not wash off after birth. The biofilm consists of water-bearing corneocytes embedded in the lipid matrix. The strategic location of the biofilm on the skin of the fetus involves participation in the many protective functions required at birth, such as a barrier to water loss, temperature regulation and innate immunity. Vernix caseosa also performs various holistic roles during the transition of the fetus from prenatal to extracurricular life. The skin is cleansed of the oil and becomes reddish a few hours after birth with a slight cyanotic tint (erythema neonatorum).

Physiological erythema (erythema neonatorum) is expressed in the first two days of a child's life and is especially characteristic of premature infants.

Erythema toxicum neonatorum – if purulent lesions (pustules) are formed in areas of pink or red skin. In the newborn's *erythema toxicum neonatorum*, pink spots may have a central blister. Increased levels of immunological and inflammatory mediators (eg, interleukins 1 and 8, adhesion molecule E – selective, water channel proteins aquaforin 1 and aquaforin 3, psoriasis, highly mobile group chromosomal protein, nitric oxide and its isoforms, antimicrobial 37 peptide) that *erythema toxicum neonatorum* newborns can be a reaction of the immune system. The location of the erythema toixicum neonatorum in the first and foremost hairy areas suggests a possible involvement of the hair follicle. In addition, the number of fat cells around the hair follicles in the affected skin increases. The eosinophil infiltrate erythema toxicum neonatorum indicates an etiology associated with allergy or hypersensitivity, but no allergens have been identified. The newborn's skin appears to respond to any injury by eosinophilic infiltrate. Since erythema toxum neonatorum rarely seen in premature babies, is that for the development of this reaction requires mature skin newborn. Contact and mechanical skin irritation are both considered and discarded in etiology.

Dry skin of babies is caused by the fact that it is not yet ripe. Because the baby's skin remains submerged in amniotic fluid, it takes time to adjust to the changing environment. This is why the outer layer of skin dries and begins to peel when exposed to dry air. Sweat glands child developed enough to prevent drying of the skin.

On the second or third day of life in most children, the skin becomes yellowish - icterus neonatorum. Increase of bilirubin in serum to 100–140 mmol /L (170 mmol / L) occurs on the 3rd – 4th day of life (it is an association with the physiological destruction of erythrocytes, the formation of bilirubin from released hemoglobin and the immaturity of enzyme systems). Disappears on the 7th – 10th day of life.

The sebaceous glands are located all over the skin of the newborn, except the palms and feet. Milia – yellow – pink points 1x1 mm in size, resembling grains of millet, the tip of the nose and wings and adjacent cheeks. These are occlusion of sebaceous ducts of the sebaceous glands. They disappear after 2–3 months. Sweating develops within 7 years.

The hair that covers the baby's skin at birth falls out shortly. Instead, they grow permanent hair. Eyelashes for children grow fast, their length at 3–5 years of age remains for life.

A premature newborn baby has wrinkled skin, dark red, vessels are visualized. Subcutaneous tissue is almost completely absent. Big head. Soft auricle. The skin is rich Lanugo, especially on the face, limbs and spine. Belly lower button.

2. CHARACTERISTICS OF SKIN RASH, SUBCUTANEUS TISSUE IN CHILDREN (color, primary and secondary elements of skin rash, subcutaneous tissue characteristics)

Overview of the skin

Skin color depends on the thickness of the skin, the degree of blood vessels in the skin and the presence of pigments in it.

Pallor of the skin can be caused by a spasm of blood vessels (for example: pallor of the skin in aortic heart defects, in hypertensive crisis). It can also occur with a decrease in hemoglobin (with anemia, blood loss), with mucous membranes becoming pale pink. If there is a pallor of the nasal-labial triangle (between the nose and the upper lip) and red cheeks – this is a sign of scarlet fever (Filatov's symptom).

Cyanosis of the skin is the result of pathology of the respiratory system or the cardiovascular system. The reason is hypoxemia (a decrease in the amount of oxyhemoglobin in the bloodstream by 5 % or more). Cyanosis is divided into total (when the entire torso becomes bluish), and regional (local). These include: acrocyanosis (cyanosis of the fingers, nose, legs, lips and ear lobe), perioral (around the lips), periorbital (around the eyes) and cyanosis of the naso-labial triangle.

With a yellowish tint (icteric) – physiological icteric (when the child eats many foods, carotene rich – carrots, citrus, egg yolk, pumpkin); pathological (hemolytic disease of the newborn, hepatitis, cirrhosis, pancreatic cancer).

Skin hyperemia – physiological (as a result of exposure to high or low ambient temperature); pathological (allergic reactions, fever, systemic lupus erythematosus, etc.).

Marbling of the skin (marmoreal) – occurs as a result of significant spasm or obliteration (thrombosis, severe hypothermia, dysfunction of the autonomic nervous system, coagulopathies, etc.). Physiological – in the area of brushes when freezing in winter on a long walk.

Skin rash

Exanthema (rash) – pathological skin rash, its response to the action of the toxins and metabolites of the pathogen.

There is a polymorphic variety of skin rash that can be inflammatory and non-inflammatory. When describing the elements of a rash during the examination of the patient, it is necessary to specify: color, prevalence, localization, shape, size, presence or absence of a clear edge, consistency, stability, tenderness or absence of soreness on palpation, as well as the presence or absence of itching. The rash can be a manifestation of either an independent

skin disease or a manifestation of collagenoses, blood diseases, allergic diseases, and a sign of infectious diseases (measles, smallpox, rubella, scarlet fever, etc.).

All elements of the rash are divided into *primary* elements (occur on unchanged skin and are the beginning of the disease) and *secondary* (occur most often against the background of primary elements).

The procedure for describing skin rash:

type of rash elements: roseola, macula, erythema, papules, tubercle, nodule, urticaria, vesicles, pustules, bull, petechiae, ecchymosis;

sizes: small – up to 2 mm, medium – up to 5mm, large – over 5 mm in diameter;

in the form: correct, incorrect;

homogeneus of rash elements: monomorphic (all elements belong to the same species and have the same dimensions); polymorphic (rash elements vary dramatically in shape, size, or are different types);

localization of elements: symmetrical and asymmetrical, preferably in one or another area of the skin;

multitude of rash: single (up to 10 elements), which is not plentiful (elements can be counted) and plentiful (numerous);

rash metamorphosis: the appearance of an element, its development, often with the transition of an element from one species to another, and the extinction of the rash;

appearance time: early – 1–2, medium – 3–4 and late – after the 5th day of illness. The characteristic of the rash is indicated by the skin background (pale, the presence of hyperemia).

Enantema is a rash of any kind and origin in the mucous membranes, caused by the influence of viruses, bacteria, toxic allergens.

When describing the mucous membranes pay attention to the color, moisture, granularity, rash, bloom, aphtha, necrosis, swelling. In the description of the conjunctiva indicate the color, moisture, edema, follicles, plaque, injection, hemorrhage.

Primmary morphological elements of the rash

The primary morphological elements include: spot (macula), papule, vesicle, pustule, blister, tubercle, nodule, bubble.

Spot (macula) – this change in color or mucosa in a limited area without disturbing the skin of its density. The spots are vascular, pigmented and artificial. Spots of pale pink or pink often occur on the background of inflammatory process or associated with vasodilation. Depending on the sizes, they are divided into: roseola (diameter up to 5mm, if up to 1–2 mm – small dots), finely spotted (5–10 mm), large spotted (10–20 mm), erythema (more than 20 mm). Depending on the sizes, they are divided into: roseola (diameter

up to 5 mm, if up to 1–2 mm - small dots), finely spotted (5–10 mm), large spotted (10–20 mm), erythema (more than 20 mm). The spots that are formed due to the exit of erythrocytes outside the vessels are called hemorrhagic. Small hemorrhagic spots are called petechiae, and large ones are called ecchymoses. Also, spots of inflammatory nature include *vitiligo (vitiligo)* – depigmented areas of healthy skin with a round shape on the extremities, trunk, neck, face. Pigmentation is excess production of melanin (for example, a «coffee-milk» stain with neurofibromatosis, a Mongolian spots or hemosiderin, etc.). *Angioectasia* – vascular formation over the skin with branches. These include: *telangioectasia* (local enlargement of capillaries, for example, in liver disease), *nevus* (congenital vascular birthmarks), *angiomas* (vascular tumors).

Papula – is a node without a cavity rash, slightly rising above the skin. It is characterized by a change in skin color, texture and disappears without scar formation. Papules usually project over the surface of the surrounding skin and can be palpated. It occurs most often in the presence of infection and infiltrate in the epidermis and in the upper layers of the dermis, as well as due to the expansion of blood vessels. There can be non-inflammatory genesis (*xanthoma*) and with the growth of the epidermis (warts). The surface of the papules may be smooth (eg, red lichen) or covered with sqama (eg, psoriasis). In a number of dermatosis, there is a merger with each other and formation of larger elements – plaques (for example, fungal mycosis).

Vesicula – is the primary cavity of the epidermis of the exudative genesis that protrudes over the skin, small in size (up to 0.5 cm), with a clear serous or turbid-serous fluid. In the future, the vesicula may dry up and crust or to be torn (wet erosion). Subsequently, hyperpigmentation may appear in place of the vesicle. If the contents of the bottle become cloudy, then it turns into a *pustule*. This species also includes herpes – a conglomerate of several vesicles.

Pustula – cavity formation with purulent exudate, which occurs as a result of necrosis of epithelial cells on the background of acute inflammatory process. Consists from a large number of leukocytes, albumin and globulins. Depending on the etiology is:

Streptococcal (flictena – phlyctena – flabby, flat, superficial; ectima – ecthyma – deep, closer to the subcutaneous layer, after which the scar remains). Staphylococcus (around the hair follicles – folliculitis – folliculitis, is superficial and deep).

Blister (urtica) – is a rash element, also without cavity, which represents papillary layer edema on the ground of acute inflammatory process. Usually blisters last for no more than a few hours and are accompanied by itching and burning. Appears during allergical dermatosis. They have different shapes – round, oval, irregular. Can be different sizes – from some mm up to more than 10 sm.

Tuberclblum – is an element of rash, without a cavity, limited, protruding above the skin level, dense, with a diameter of 0.5–1 cm. Genesis has an inflammatory infiltrate in the deep layers of the dermis. The tubercle is formed during the inflammatory process not acute course (tuberculosis, syphilis). Occurs in limited areas. The tubercle has different color, texture, shape. Then, in place of the tubercle, necrosis occurs, followed by scar or atrophy. This is the differential sings of the papule and of tubercle.

Nodule – is a rash element, also without a cavity, which in the form of dense cellular infiltrate rises from hypodermic basis rises up to epidermis (determined only by palpation), and neighs above the skin level (sometimes considerably), that is the basic difference of nodule from tubercle. Genesis is non – inflammatory. The node can be different by density, shape, diameter of about 1 cm or more. A node that is painful during palpation, has a large in size, cyanotic-red color is called *erythema nodosum*. The nodes include *furuncul* and *carbuncul*.

Bulla – is a much larger (1–5 cm or more) superficial cavity formation (in the upper layers of the epidermis and below it) of an exudative character that occurs on the skin or mucous membrane. Its content is serous or serosangineous. There is a different shapes. There can be only temporary pigmentation after its resolution.

Secondary morphological elements of the rash

These include: scale, crust, erosion, exoriation, fissure, ulcer, scar, pigmentation, lichenification, vegetation.

Squama (scale) – is an accumulation of horny laminae of epidermis. It is a refractory cell of the stratum corneum, most often resulting from parakeratosis (psoriasis, seborrhea, discoid lupus, etc.). Pathological peels are small as bran and large – lamellar. Different in color, size.

Crust – These are secondary elements, which are formed as a result of drying up of different primary cavitary elements – vesicles, pustules, blisters, ulcers, erosion, cracks, tubercles, and gum. Crust can have different color by their etiological structure – serous – Crusta serosa, sanguine – Crusta hemorrhagica, purulent – Crusta purulenta, seropurulent, etc.

Erosion – is a superficial skin defect at the level of the epidermis with the juicy bottom, and also on mucous membrana of oral cavity. Occurs as a result of the opening of cavity elements (bubbles, blisters, abscesses). After healing, it does not leave scars.

Excoriatio – is damage to the upper layers of the dermis, but it is deeper, arising as a resulting of mechanical injury of skin (cracking, itching, bulla`s scratching, eczema, etc.). Can leave cicatrix. Surface scratches heal without a trace.

Fissure (rhagades – superficial, fissure – deep) – usually formed in the folds of the skin in the area of inguinal and axillary cavities, in the corners of the mouth, between the fingers, behind the ears, etc. with inflammatory infiltration, dryness, hyperkeratosis. Surface cracks heal without trace. Deep cracks leave scars on the body.

Ulcer – is a deep defect of the skin, subcutaneous tissue, sometimes down to the deep organs. It can sometimes develop as a result of tissue necrosis. Occurs after the collapse of tubercles, nodes and always leaves behind a scar. The shapes and edges of the ulcer are different. Cicatrix is formed after the ulcer course, which is the main distinctive attribute of ulcer from erosion sometimes very similar to it.

Scar (cicatrix) – is the presence of a coarse-fibred connective tissue formation as a result of a deep skin defects. The surface and shape of the scars are different. There are flat, hypertrophic, keloid and atrophic scars. There are scars, for example, after deep burns, ulcers, after surgery, etc.

Pigmentation – is the increased formation of melanin pigment in certain areas of the skin. Occurs sometimes after the primary elements of the rash (tubercles, nodules, vesicles, abscesses). Sometimes hyperpigmentation can also be a result of secondary elements of the rash (ulcer, erosion).

Lichenification – is dense, rather dry, thickened skin with non – standard external structure. It is rough shagreen (shagreen leather), hyperpigmented skin. Lichenification develops after chronic inflammation, usually accompanied by itching (neurodermatitis, chronic eczema).

Vegetation – growth of skin in the form of villi and papilla at the bottom of continuing primary or secondary inflammatory character rashes. Similar to cockish comb (cock`s comb). Vegetation can be:

- gray, dry, moderately dense, covered with a thick horny layer;
- pink or red, which releases serous or bloody fluid;
- soft – a sign of the erosion of vegetation;
- hyperemic around, serous-purulent secretion, painful – these are sign of infected vegetation. An example is a vegetative vesicle, sharpened warts, at ulcerative processes.

Hemorrhagic rash: Hemorrhage – bleeding in the skin is a result of the destruction of the vessels. Looks like dots or spots of various sizes and shapes, not disappear when stretching the skin. First is red, purple or violet, and then becomes yellow – green. Elements hemorrhagic rash follows:

Petechiae (petechiae) – point hemorrhages up to 2 mm in size.

Purpura (purpura) – multiple hemorrhage is rounded at a rate of 2 to 5 mm.

Ecchymosis (echymoses) – is irregularly shaped hemorrhages larger than 5 mm. Possible tissue necrosis. Can be observed in typhus, hemorrhagic fever, hemorrhagic vasculitis, etc.

3. METHODS OF CLINICAL EXAMINATION AND SEMIOTICS OF LESIONS OF SKIN, SUBCUTANEUS TISSUE IN CHILDREN

Skin examination and palpation

Inspection of patients carried out in well-lit room. Begin to examine the skin in the baby from the top down (face, torso, limbs, and mucous membranes of the eyes). Determine skin color, fat distribution, hair growth and distribution. Then palpation assess humidity or dryness, tactile sensitivity, tissue elasticity, thickness of the subcutaneous fat layer and tissue turgor. Normally, the baby's skin should be pink, and the mucous membrane of the throat – pale pink, free of rash.

Additional methods of investigation include the determination of ***dermographysm*** – the reaction of skin capillaries in response to mechanical irritation. The doctor quickly performs several line irritations on the skin of the anterior surface of the breast from top to bottom with a blunt object (handle of the hammer, match, handle, etc.). By the time of the appearance of the skin reaction distinguish early (less than 30 seconds from irritation) and late (after 50 seconds from irritation) dermographism (acceptable terms "fast", "slow"). By color distinguish white, red, pink, mixed dermographism. In terms of severity distinguish limited and spilled dermographism (an individual feature of vegetative regulation may be a roller – coated dermographism). In time, the distinction between unstable (disappears within 2–3 minutes) and persistent dermographism (lasts more than 5 minutes). White, rapid, unstable dermographism, as a rule, indicates an increase in the sympathetic nervous system tone in the autonomic regulation of vascular tone, and pronounced red dermographism – an increase in the parasympathetic nervous system. The nature of local dermographism also depends on the degree of pressure on the skin.

Humidity and dryness, heat should be determined by touch. Be sure to inspect the palms and soles. Normally, the skin should be moderately moist and warm. Increased skin moisture indicates the presence of autonomic dysfunction, thyroid pathology and overheating in young children. Skin dryness can be a sign of dehydration, with hypotrophy, hypothyroidism, some allergic conditions, and diabetes.

To determine the elasticity of the skin, the doctor uses his thumb and forefinger to grasp only a layer of skin near the navel and on the back of the hand. And having let go off the fold formed during this procedure, observes, how quickly it is strainghtened out. In this case, the elasticity is normal. If the fold of skin is straightened out after a while (from some seconds up to 1–2 minutes) – decreasing of elasticity. Reduced elasticity is observed in dehydration, significant hypotrophy, severe infectious diseases.

METHODS OF CLINICAL EXAMINATION OF SUBCUTANEUS TISSUE IN CHILDREN

The thickness of the subcutaneous tissue is indicated under angles of scapulas in several sites (m. Pectoralis major along the middle-clavicular line, on the abdomen, on the thighs, etc.). The first finger of the hand, which is on top, and the second finger capture the layer of skin and subcutaneous tissue. Estimate the width of the formation of folds, which is normally equal to 1–2 cm. In infants this size is formed in a cheek area; on the internal surface of thighs – it is up to 3–4 cm. This is normal fat deposition. If determined excess fat deposits – sings of paratrophy, obesity; the second arises at hypotrophy.

Calyperometry – determination of the thickness of the fatty fold with the help of a special caliper device. Assessment of the development of adipose tissue can be performed either according to the measurement data of any one fold, or the sum of several folds measured in different parts of the body. In advanced assessments of physical development use special tables and nomograms that allow the sum of the thickness of several skin folds to accurately calculate the total fat content and active (fat-free) body weight of the body.

Tissue turgor is determined by the compression of two fingers of the skin, subcutaneous tissue and muscle on the upper third of the thigh from the inside. Normally, there is a subjective feeling of density, resiliency resists layers of skin. Such tissue turgor is satisfactory. If slackness is defined at palpation of specifies place, one can tell about tissue turgor decreasing which is the display of lipomatoso-edematic type of paratrophy, significant hypotrophy, atrophy, paresis, paralysis, etc.

When examining the oral cavity and the throat, the color of the mucous membranes should be taken into account (pink, pale, hyperemia, cyanotic, jaundice), their cleaness (rash on mucous membranes, or enantema), presence of thrush, aphthous changes, moisture. Assess the condition of the gums (hyperemia, bleeding), teeth (their number, the presence of caries, bite change). Note the color, humidity, purity of speech, expressiveness of its papillae (sufficient, hypertrophy, atrophy), possible presence of "geographical" picture. When examining the tonsils take into account the increase in their size, hyperemia, presence of scar changes, raids, caseous plugs.

4. METHODS OF CLINICAL EXAMINATION AND SEMIOTICS OF LESIONS OF LYMPH NODES IN CHILDREN

The lymph nodes are located along the lymphatic vessels and together with them make up the lymphatic system. All lymph nodes are divided into 2 groups: peripheral (parietal) – located subcutaneously in different parts of the body and visceral, through which the lymph from the internal organs. When examining and palpating the patient, the condition of the peripheral lymph nodes can be determined. If visceral lymph nodes are significantly enlarged in size, then they can be identified in the abdominal cavity.

The groups of peripheral nodes by location are as follows:

- occipital;
- posterior ctrvical and anterior cervical accordingly behind and in front of m. sternocleidomastoideus from top to bottom);
- parotid superficial and deep;
- submandibular, submental;
- supraclavicular, infraclavicular;
- axillary;
- thoracic (located inside from an anterior axillary line under the bottom edge of m. pectoralis major);
- cubital;
- popliteal, inguinal.

Criteria for assessment of lymph nodes

Criteria	Indicators of normal
localisation	Palpable only in the submandibular, axillary and inguinal areas
Sizes	Not more than 0,5 sm
Quantity	Not more than 3–4 in one area
Mobility at the palpation	Movable
Conglomerate nodes among themselves	Not conglomerated. conglomerates are absent
Elastic or tight	Elastic
Painful on palpation	Painless
Skin temperature at the site of palpation of lymph nodes	Normal
External appearance of the skin in the place of palpable nodes	Not changed

General rules of palpation of lymph nodes

- Palpation is carried out by soft light round-shaped movements of the phalanx of 2–3 fingers of both hands or one hand.
- On palpation, the lymph nodes are pressed against bone or muscle tissue.
- Begin palpation from the occipital lymph nodes, then from top to bottom.

5. THE MAIN PATHOLOGICAL CONDITIONS OF SKIN, SUBCUTANEUS TISSUE IN CHILDREN

Atopic dermatitis

Atopic dermatitis (allergic diathesis) – it is a genetically determined immune chronic inflammatory skin disease characterized by recurrent course with relevant clinical and morphological features.

Etiology: food allergens (cow milk, eggs, chocolate, honey, citrus products), vaccines, antibiotics, chemical and other factors causing allergic reactions in children.

Main clinical symptoms include:

- *Milk crust (crusta lactea)* – hyperemic fine papula rash, like vesicles on cheeks with the clear border wich brust later, dry up; are rough when touched.
- *Crable cap(seborrhea)* – fatty squamaes covered with a crust on a head, forehead, supraciliary arches; it is one of first sings of atopic dermatitis on the first months of a child`s life.
- *Erythema*, i.e. reddening*, and intertrigo* as irritation, located in the places of the greatest friction of skin: axillary and inguinal regions, perineum, behind ears and neck.

The *exema* can arise at the infection of some skin sections, but then the *lichenification* becomes a characteristic display of the skin rash.

Pyoderma – a group of acute and chronic skin inflammatory processes, caused more often by coccal flora (streptococci, staphylococci). One of its kinds in children is *vesiculopustulosis* – staphylococcal lesion of the excretory ducts of sweat glands. A lot of pustules 1–2 mm appear in newborns on the skin, regions with increased sweating (axillary and inguinal areas, the trunk, hairy part of the head), they are limited by an inflammatory torus.

Sclerema

Sclerema – is a consistent violation of the skin and subcutaneous layer resulting in their consolidation. It is determined by palpation (pressing on a child`s skin with the third phalanx of finger) – the affected areas are dense like wood, do not make folds (sites). Pits do not remain after pressing. It arises more frequently during the first week of a newborn`s life. The skin of the face is affected in the mild cases. At severe cases – hips, buttocks, trunk and hands. Etoilogy: overcooling, dehydration and preterm.

Scleredema

Scleredema – is a disease at which a skinnn and subcutaneous layer induration is simultaneously accompanied by edema. The presence of hypostases is determined by pressing on the skin of the damaged site. Thus, the pit remains. It arises more frequently on the areas of the calf muscles and thighs. The skin of palms and feet is affected in severe cases. The etiology of the disease is similar to the sclerema`s one.

Children's infectious diseases with rash

Chickenpox

Chickenpox (varicella) caused by the varicella-zoster virus. The disease is not harmful to most children. The incubation period is 7–21 days. Usually, the symptoms last two weeks and can make the baby very uncomfortable. The first days – fever. Then, as a rule, during the day, a classic rash appears, itch, it usually starts at the head and torso and then extends outward to the arms and legs. The rash begins with reddening of small spots that quickly turn into a superficial bubble, then – in the surface blister in the center (vesicle). After one or two days, the blisters burst and erosion is formed at the site of damage, then – exorcization, a crisp scab that disappears in two to three days. The total duration of the rash is 7 to 10 days. Sometimes this disease can be serious and can lead to complications, especially in high-risk people.

Complications include:

- Bacterial infections of the skin, soft tissues, bones, joints or bloodstream (sepsis);
- Pneumonia;
- Inflammation of the brain (encephalitis);
- Toxic shock syndrome;
- Reye's syndrome for people who take aspirin during chickenpox.

Measles

Measles is an acute viral disease characterized by fever, cough, coryza, otitis media bronchopneumonia, laryngotracheobronchitis (croup) and diarrhea occur commonly in young children. The incubation period is 8–21 days. Shortened prodrome of this symptoms precedes exanthema by 2 to 4 days. During of prodromal period pathognomonic enanthems (Koplik spots) appear and disappear 2–3 days after exanthema onset. White or blue – gray punctuate papules superimposed on an erythematous base, located on buccal mucosa, often adjacent to molars. Exanthem begins behind the ears and at the scalp margin, rapidly spreading downwards to involve most of the body. Rash similar spots. Itching is rare. Eruption lasts 4 to 7 days before fading, often with fine

desquamation. Generalized adenopathy and splenomegaly may occur with the examination. Modified measles may occur in infants with residual maternal antibody. There may also be complications that are mainly associated with the attachment of a secondary infection: otitis media, measles pneumonia, encephalitis, laryngotracheitis.

Rubella

Rubella characterrstic by mild fever of 102 F (38.9 ºC) or lower, headache, nasal congestion or runny nose, inflamed, red eyes, enlarged, tender lymph nodes. The incubation period is 15–24 days. *Classic rubella:* Mild lymphadenopathy may precede exanthema by several days. Typical enlargement of occipital and posterior of ear lymph nodes. The rash appears on the face as a faint pink spot for 24 hours and spreads throughout the body. Diagnostics tests available include:

- viral culture from nasal mucosa swabs, from urine, pharyngeal swabs in congenital rubella; serologic testing for rubella IgM antibodies, polymerase chain reaction-based assays available.

Scarlet fever

Scarlet fever is a inflectional streptococcal disease (group A β-hemolytic streptococcal). The incubation period is 2–12 days. Red rash. The rash looks like a sunburn and feels like sandpaper. It typically begins on the face or neck and spreads to the trunk, arms and legs. If pressure is applied to the reddened skin, it will turn pale. Red lines are present. The folds of skin around the groin, armpits, elbows, knees and neck usually become a deeper red than the surrounding rash. Flushed face. The face may appear flushed with a pale ring around the mouth. Strawberry tongue. The tongue generally looks red and bumpy, and it's often covered with a white coating early in the disease. The rash and the redness in the face and tongue usually last about a week. After these signs and symptoms have subsided, the skin affected by the rash often peels. Other signs and symptoms associated with scarlet fever include: Fever of 101 F (38.3 ºC) or higher, often with chills. Very sore and red throat, sometimes with white or yellowish patches. Difficulty swallowing. Enlarged glands in the neck (lymph nodes) that are tender to the touch. Nausea or vomiting. Headache. Rash appears 12–72 hours after the fever. Generally starts on the chest, armpits, and behind the ears. The scarlet fever rash begins to fade three to four days after onset and desquamation (peeling) begins. This phase begins with flakes peeling from the face. Peeling from the palms and around the fingers occurs about a week later. Peeling also occurs in axillaris, groin, and tips of the fingers and toes.

Meningococcemia

Meningococcemia Caused by Neisseria meningitidis. Transmission via respiratory droplets or direct/indirect oral contact. At the outset, symptoms may mimic a viral illness (fever, myalgias, headache, malaise). The incubation period is from 2 to 10 days. Typical fever in the first day of the disease up to 39–40 degrees. There are complaints of chills, headaches. From the first days of severe hypersensitivity skin, tachycardia, dyspnea. The main symptom – haemorrhagic skin rash with necrosis and scab in the center. Purpur rash irregular shape in the form of stars and different size can be occurs. The conjunctiva and retina may have petechiae. Patients may develop complications: deep hypotension and shock and also disseminated intravascular coagulation. In the most severe cases develops gangrene of the extremities.

6. THE MAIN PATHOLOGICAL CONDITIONS OF LYMPH NODES IN CHILDREN

Lymphadenopathy is an enlargement of the lymph nodes, which is triggered by the course of various pathological processes in the body. Lymphadenopathy can be a sign of chronic infection (CMV, VEB, toxoplasmosis, cat scratch disease, tuberculosis, etc.), systemic connective tissue diseases (systemic lupus erythematosus, etc.), as well as hematopoietic diseases and immune diseases. Signs of lymphadenopathy: enlargement of lymph nodes; weight loss, may be fever; increased sweating; enlargement of the liver and spleen. Lymph nodes on palpation can have different sizes, consistency, soldered or not soldered to the surrounding tissues, and are usually painless.

Lymphadenitis is an acute inflammation of the lymph nodes, accompanied by an accumulation of pus. Signs of lymphadenitis: swelling of the lymph nodes at the site of inflammation, painful on palpation, local redness and itching at the site of inflammation, fever. The reasons lymphadenitis – various viral and bacterial infections streptococcal, staphylococcal nature or other origin. The patient has complaints of pain, enlargement and redness of the lymph node, may be increase the body temperature from subfebrile to febrile numbers, intoxication. On examination of the child there is a pronounced local hyperemia of the skin, edema, pain on palpation, lymph node hot to the touch.

The main pathological conditions in which lymph nodes increase. Differentiation by group

Groups of lymph nodes	Palpation	Possible pathology
Occipitalis	In the occipital bone can be palpated single up to 3 mm	Local infectious process rubella
Parotid	Behind the ears on the mastoid processes and in front of the goat ear. Normally not palpable	ENT organ infections rubella
Rear-cervical	Between the posterior margin of the m.Sternocleidomastoideus and the trapezius muscles. Normally single 4–6 mm or multiple small 2–3 mm	Tuberculosis Lymphoma Malignant neoplasms of the head and neck
Anterior cervical	Along the leading edge of the m.Sternocleidomastoideus. Normal – single 4–6 mm or multiple small 2–3 mm	Pharyngitis Tonsillitis Epstein Barr virus Cytomegalovirus infection Toxoplasmosis

Tonsillary	At the angle of the mandible, palpations are available with the baby's head slightly tilted forward. Normal – single up to 6mm	Chronic tonsillitis Angina Paratonsillary abscess
Mandibularis	Under the mandibularis. The baby's head is tilted forward. Move easily forward to the edge of the mandible and remove beyond it. Normal – single to 5–7 mm.	Head and neck lesions Sinusitis Pathology of eyes, teeth, skin and pharynx
Supraclavicular	In the supraclavicular fossa. Normal – not palpable	On the right – lung damage, esophagus Left – lymphoma, cancer of the abdominal cavity
Infraclavicular	In infraclavian pits along the course of the 1st rib	Same as the supraclavicular
Axillary	Hands patient dropped down. In the armpits. Can be palpated single up to 2–3 mm	Infections Cat scratch disease Breast cancer Brucellosis Melanoma
Thoracic	On the anterior surface of the chest below the lower edge of the large pectoralis muscle. Normally not palpable	Oncological diseases
Cubital	Palpated with finger pads when the arm is bent at the elbow. Normally not palpable	Infections Cat scratch disease Lymphoma Tularemia Syphilis
Popliteal	In the popliteal fossa. The leg is bent at the knee and hip joint. Normally not palpable	Chronic infections Cancer of the pelvic organs
Inguinal	In the course pupartovoyi connections in the supine position with legs outstretched. Normally – small singles	Lower extremity infections Genital infections (genital herpes, gonorrhea, syphilis, etc.) Granuloma Lymphoma Pelvic cancers (colon, female and male genitals)

ALGORITHM FOR THE INSPECTION OF THE SKIN, SUBCUTANEUS TISSUE AND LYMPHATIC NODES IN CHILDREN

Skin – color and its disorders (pallor, ictericity, hyperemia, marbling, cyanosis).

Elasticity (normal, reduced) and ***turgor*** (normal, reduced).

Moisture (high, dry skin).

Rash – hemorrhage, pigmentation, (quantity, size, localization), itching, scarring, blistering, hemorrhage, vascular asterisks.

Hair – (brittle hair, diffuse or focal hair alopecia).

Nails (Type, color, thinning, thickening, striations, brittleness, peeling, elasticity).

Mucous membranes – (lips, mouth, eyelids), color (pale pink, pale, cyanotic, yellow, red), the presence of rash (enanthema), hemorrhage, plaque, their localization, character.

Subcutaneous tissue: stage of development, the distribution, cachexia. The presence of edema, their localization, spread, consistency, pastositi. Presens of crepitations (subcutaneous emphysema).

Lymph nodes: (increased, not increased), localization, size, texture, soldered, not soldered to surrounding tissues, conglomerates (present, absent), consistency, painful, painless.

Example entries in case history of the child: The skin is clear, moderately moist, normal in color, free of rash. The subcutaneous tissue is evenly distributed. Skin elasticity and turgor is normal. Lymph nodes are single submandibular, anterior-cervical, up to 0.5 mm in diameter, elastic, painless, not soldered to surrounding tissues.

7. QUESTIONS FOR SELF-CONTROL

Peculiarity of skin in newborn.

1. Main functions of skin.
2. Basic morphological primary elements of the rash.
3. Basic morphological secondary elements of the rash.
4. Name the main groups of lymph nodes.
5. Features of subcutaneous tissue in children in different periods of life.
6. Skin examination and palpation (color definition, adipose tissue distribution, hair growth, moisture or dryness).
7. Technique for determination of skin elasticity and turgor of soft tissues.
8. Features of skin lesions in the presence of pyodermia.
9. Features of a rash character in a child who is sick with chicken pox.

Control tests

1. What week of pregnancy does the skin begin to form?
   a) on the 1 week; b) in the 3–4th week; c) at 5–6 weeks; d) at 8–9 weeks; e) at 12–15 weeks.
2. What are the main functions of the skin listed here?
   a) protective function; b) thermoregulation function; c) receptor function; d) excretion resorptioni; e) all of the above is true.
3. Which element of the rash is primary?
   a) erythema; b) crust; c) keloid; d) erosion; e) all of the above.
4. Which element of the rash is secondary?
   a) papula; b) pustule; c) vesicullar; d) ulcus; e) macula.
5. During the study, the doctor squeezes the soft tissues of the child of 5 months on the inner surface of the thigh with his fingers. In this way, the doctor determines:
   a) turgor of soft tissues; b) tissue elasticity; c) turgor and tissue elasticity; d) reveals the presence of a tumor; c) all of the above is true; e) all of the above is incorrect.
6. The thickness of subcutaneous tissue on the inner surface of the thigh should be normal:
   a) 3–4 sm, b) 1–2sm, c) 2–3 sm, d) 5–6sm, e) 0–2sm.
7. What is lichenification?
   a) dense, rather dry, thickened skin with non-standard external structure (shagreen – like leather); b) congenital macula; c) deep defect of skin integument sometimes up to the deeper placed organs; d) tumor; e) normal skin condition.
8. What are the combined elements of hemorrhagic rash are true?

a) petechiae, purpura, and ecchymoses; b) papule, purpura and pustule; c ecchymoses, angiectasia and purpura; d) petechiae, purpura and blister; e) pustule, erosion and petechiae.

9. At what element of a rash can be observed if present circumscribed fluid-filled lesions that are greater than 1 sm in diameter?
   a) pustule; b) petechiae; c) pigmentation; d) erosion; e) bulla.
10. What elements rise above the skin less than 1 cm in diameter and are filled with transparent liquid:
    a) vesicles; b) pustule; c) papule; d) erosion; e) macula.

Situational tasks

1. The child 5 y. has a fever 39 ºC (101 F), red line around the armpits, elbow, chest and red rash on the face, neck and trunk was appeared from 12 hours after the fever. Objectively: General condition of moderate severity. Face is red color. Difficulty swallowing. Strawberry tongue. Circumoral pallor. Punctate rash, sometimes a confluent. What is your probable diagnosis?
   a) Scarlet fever; b) Rubella; c) Allergic rash; d) Measles; e) Acute tonsillitis.
2. Girl 12 y.o. was admitted to the hospital with complaints of fever up to 38 °C, pain in the right neck, throat irritation and moderate paifulness when swallowing.

Objectively: Local hyperemia of the skin in the neck region to the right is noted, the anterior-cervical lymph node in diameter is increased to 1.5 cm, hot to the touch, sharply painful, no conglomerates with surrounding tissues. Pharynx hyperemic and granulosis of the rear wall of the pharynx. The skin is clean, normal color. The rash is absent. Your preliminary diagnosis:
   a) acute tonsillitis; b) acute lympadenitis; c) urinary tract infection; d) all of the above is true; e) chronic lymphadenopathy.

STANDARD ANSWERS TO QUESTIIONS

1. – b; 2. – e; 3. – a; 4. – d; 5. – a; 6. – a; 7. – a; 8. – a; 9. – e; 10. – a.

STANDARD ANSWERS TO SITUATION TASKS

1. – a; 2. – b.

8. LITERATURE

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FOR NOTES

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