The main symptoms in diseases of the blood. Symptomology and diagnosis of anemia. Symptomology and diagnosis of leukemia. Hemorrhagic syndrome (hemorrhagic diathesis).

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Blood – a fluid connective tissue with matrix (plasma) and formed elements (cells) involved in:

1. Transport of dissolved substances (gases, nutrients, hormones, wastes)
2. Regulation of pH and ion composition
3. Restriction of fluid losses at injury sites (clotting)
4. Defense against toxins and pathogens (leukocytes)
5. Stabilization of body temperature

Hemopoiesis

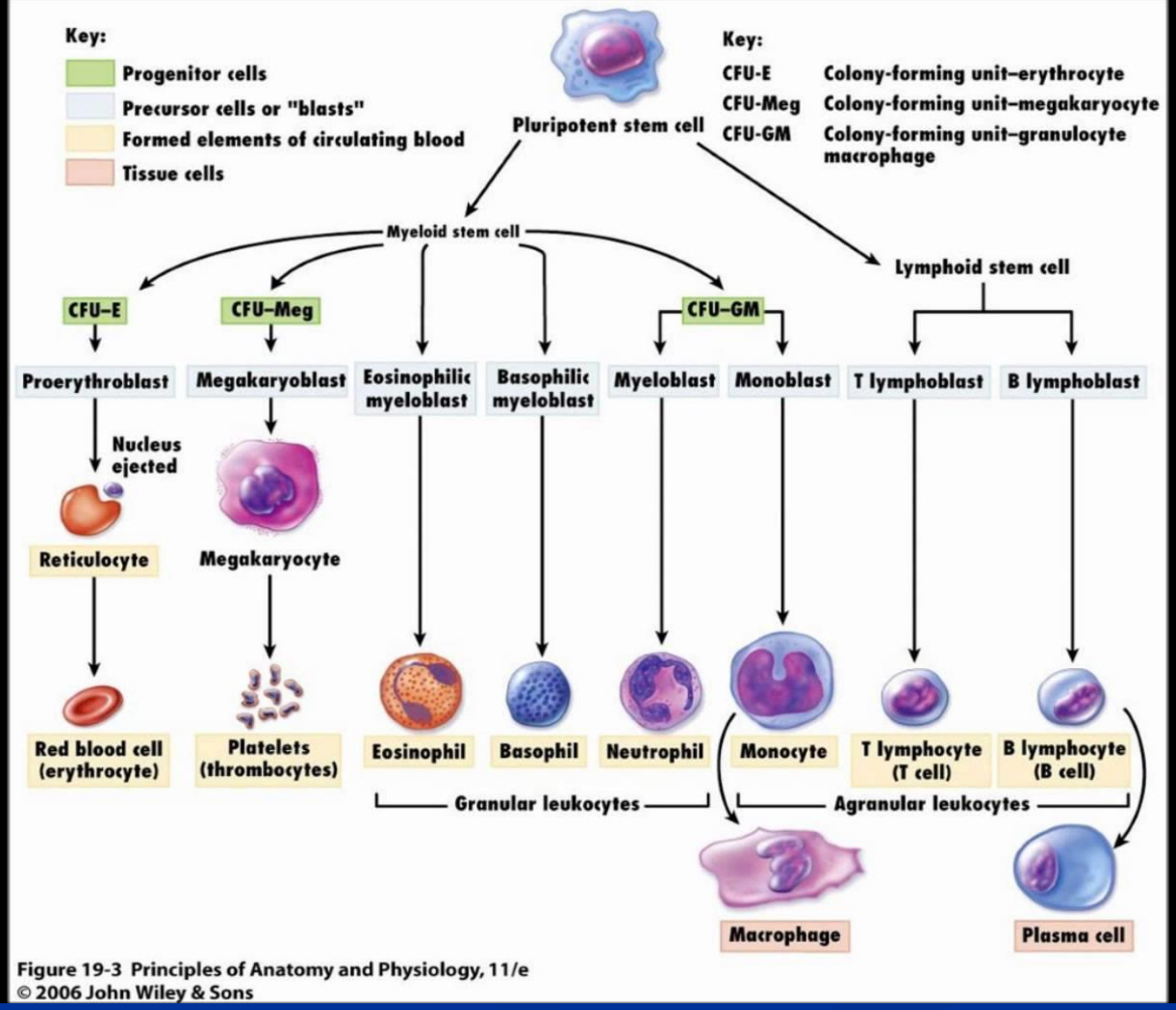
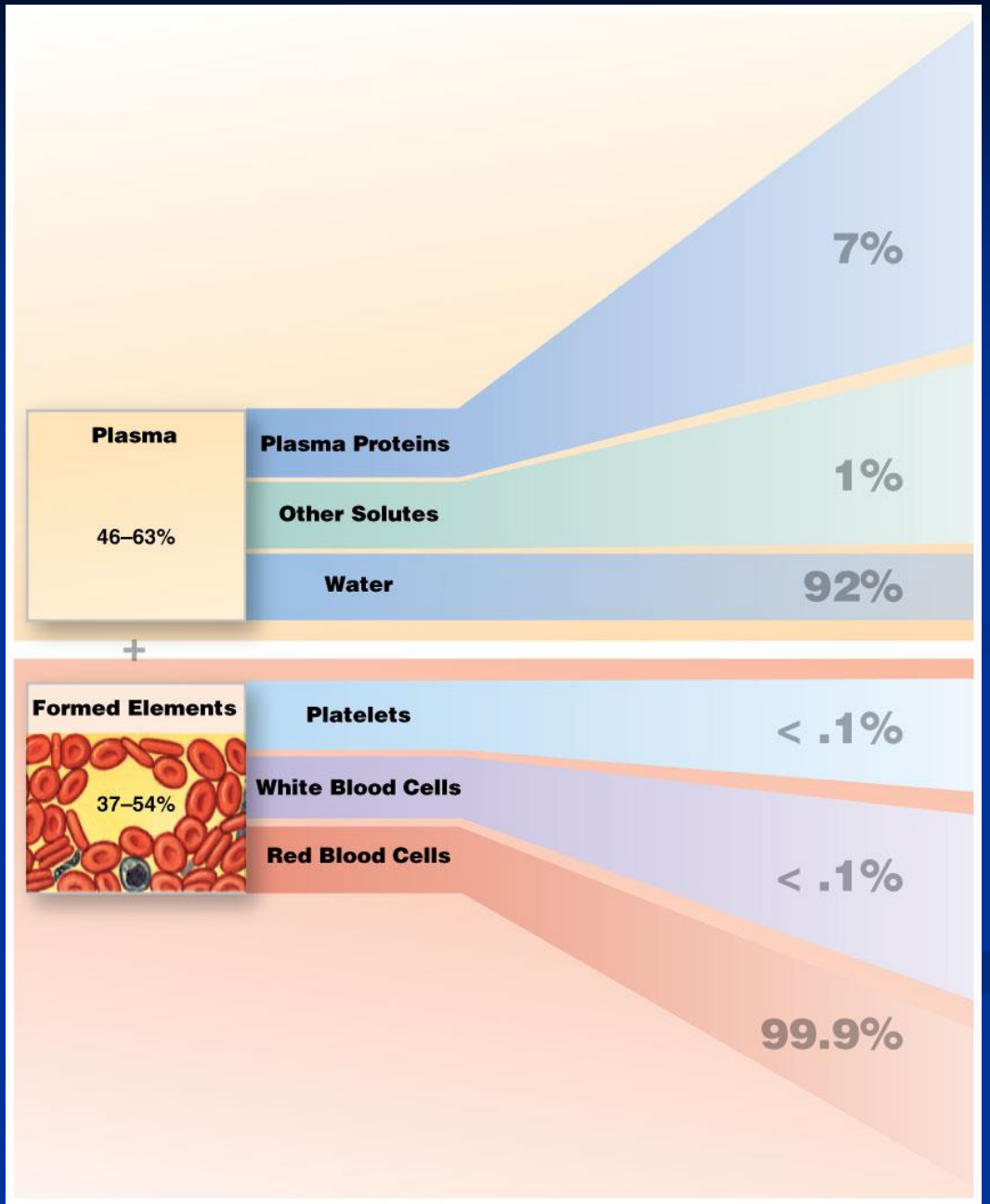


Figure 19-3 Principles of Anatomy and Physiology, 11/e

Physical Characteristics of Blood

pH = 7.4
Temp. = 38ºC
Vol. = 4 - 6 liters
(~7% body wt.)
High viscosity



Clinical manifestation of blood diseases

- Syndrome of anemia
- Hemorrhagic syndrome
- Myelodysplastic syndrome (syndrome of hemoblastosis)

Symptoms of Blood Disorders

- Blood disorders can cause various symptoms in almost any area of the body. Most commonly, symptoms are caused by decreases in the blood components.
- Decreased red blood cells and hemoglobin can cause symptoms of anemia, such as fatigue, weakness, and shortness of breath.
- Decreased white blood cells or immune system proteins can cause recurrent fever and infections.
- Decreased platelets or blood clotting factors can cause abnormal bleeding and bruising.

Occasionally, symptoms may relate to increases in blood components.

- Increased red blood cells can cause thickening of the blood (increased blood viscosity) and thereby cause headache and a red complexion (plethora).
- Increased immune system proteins also can cause thickening of the blood (increased blood viscosity).
- Increased platelets or blood clotting factors can cause inappropriate excessive blood clotting (thrombosis).

- Blood disorders can make any bleeding worse. People with blood disorders may experience excessive bleeding following dental procedures or have very heavy menstrual periods.

Some symptoms are more suggestive of a blood disorder.

- Blood clot (phlebitis), usually in a leg (most often causing swelling, redness, and/or warmth of the leg or shortness of breath)
- Petechiae (a fine pin-point red skin rash) caused by too few platelets
- Blood blisters in the mouth (caused by too few platelets or clotting problems)
- Swollen lymph nodes caused by white blood cell cancers (such as leukemias or lymphomas)
- Pallor (pale skin) caused by anemia
- Pica (eating of ice, dirt, or clay) suggests iron deficiency anemia

Red blood cell parameters evaluated by CBC include

- Number of red blood cells (red blood cell count, RBCs)
- Proportion of blood made up of red blood cells (hematocrit, Hct)
- Amount of hemoglobin (the oxygen-carrying protein in red blood cells) in the blood (hemoglobin, Hb)
- Average size of red blood cells (mean cellular volume, MCV)
- Variability of size of red blood cells (red cell distribution width, RDW)
- Amount of hemoglobin in an individual red blood cell (mean cellular hemoglobin, MCH)
- Concentration of hemoglobin in an individual red blood cell (mean cellular hemoglobin concentration, MCHC)

White blood cell parameters evaluated by the CBC include the

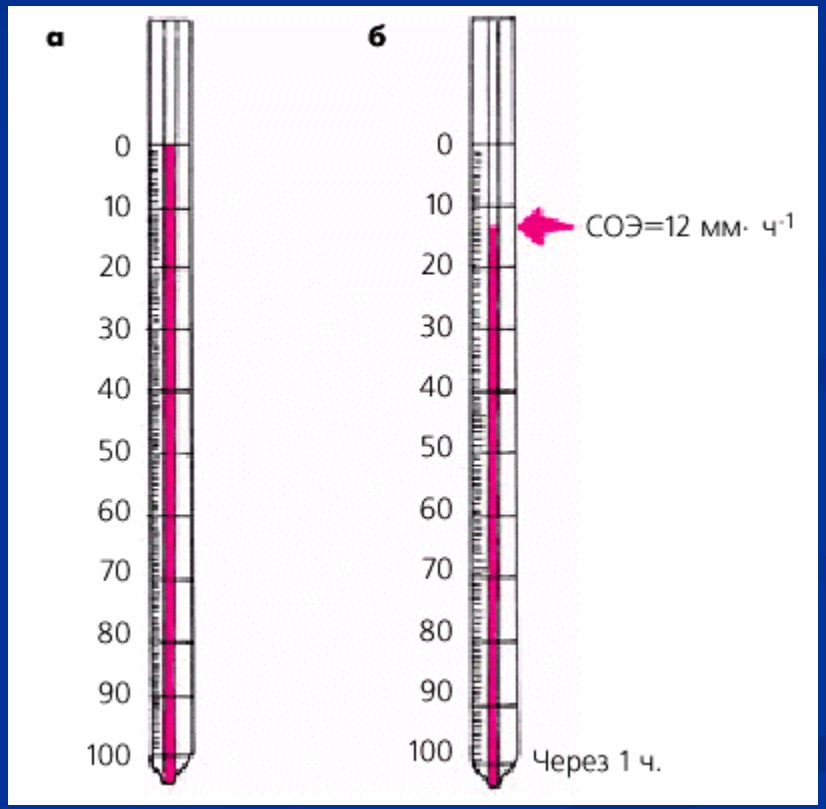
- Total number of white blood cells
- Percentages and numbers of the different types of white blood cells
- Counting the number of white blood cells of each type (differential white blood cell count) can suggest to a doctor possible causes of a change in the total white blood cell count.
- To provide more information about the white blood cells, the doctor can examine these cells under a microscope. The microscopic examination can identify features of the cells that are characteristic of certain diseases. For example, large numbers of white blood cells that have a very immature appearance (blasts) may indicate leukemia (cancer of the white blood cells).

Platelets are also counted as part of a CBC.

- The number of platelets is an important measure of the blood's ability to form blood clots (forming blood clots is the body's protective mechanism for stopping bleeding). Too few platelets may impair blood clotting. A high number of platelets (thrombocytosis) can lead to excessive blood clotting in small blood vessels, especially those in the heart or brain. However, in some disorders, a high number of platelets may paradoxically result in excess bleeding.

Erythrocyte sedimentation rate (ESR)

- Men 2–10 mm/h
- Women 4–15 mm/h



Measures of proteins and other substances

- For example, in multiple myeloma, certain bone marrow cells, called plasma cells, become cancerous and produce unusual antibody (immunoglobulin) proteins (including Bence Jones proteins) that can be measured in blood and urine.
- Erythropoietin is a protein made in the kidneys that stimulates the bone marrow to produce red blood cells. The level of this protein can be measured in the blood. Levels of iron and certain vitamins (for example, B12 and folate) that are necessary for the production of healthy blood cells also can be measured.

A doctor can take two different types of bone marrow samples:

- Bone marrow aspirate: Removes fluid and cells by inserting a needle into the bone marrow and sucking out (aspirating) fluid and cells
- Bone marrow core biopsy: Removes an intact piece of bone marrow using a coring device (similar to a large diameter needle)

The bone marrow aspirate shows

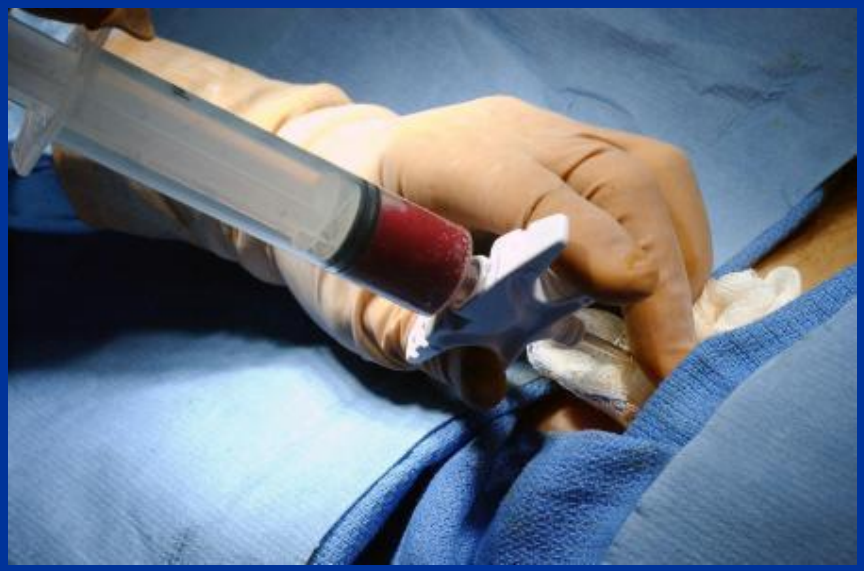
- what cells, normal and abnormal, are present in the bone marrow and provides information about their size, volume, and other characteristics. Special tests, such as cultures for bacteria, fungi, or viruses, chromosomal analysis, and analysis of cell surface proteins can be done on the sample.

- The core biopsy removes an entire piece of bone marrow and shows not only what cells are present but also how full the bone marrow is with cells and where the cells are located within the marrow.

(A small core of intact bone marrow is removed with a special bone marrow biopsy needle and sliced into thin sections that are examined under a microscope.)

Although the aspirate often provides enough information for a diagnosis to be made, the process of drawing the marrow into the syringe breaks up the fragile bone marrow. As a result, determining the original arrangement of the cells is difficult.

When the exact anatomic relationships of cells must be determined and the structure of the tissues evaluated, the doctor also does a core biopsy.



Blood typing must be done before blood can be transfused

Blood type is determined by whether certain antigens (complex sugar or protein molecules that can trigger an immune response) are present on the surface of red blood cells. Blood cell antigens include blood group antigens A and B and Rh factor.

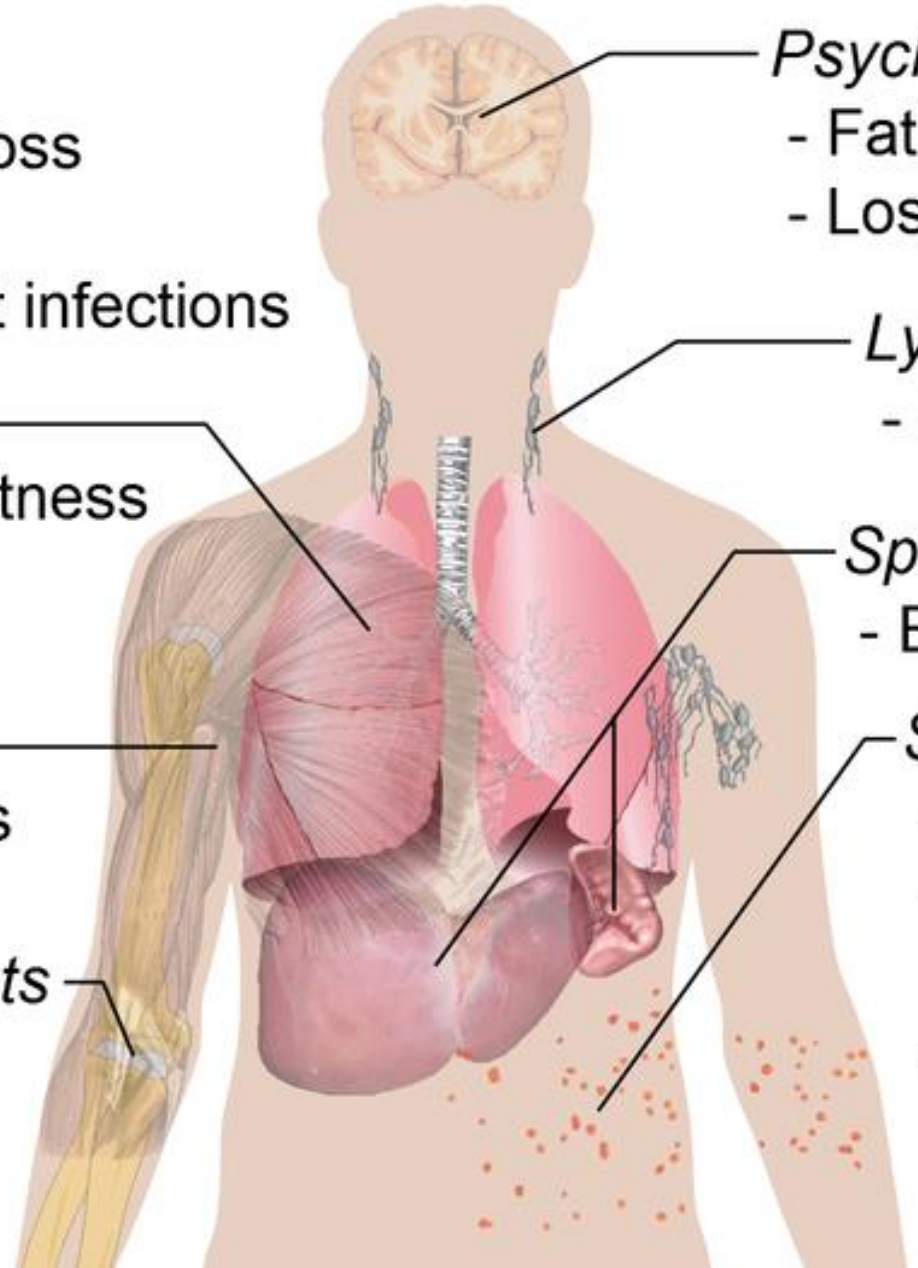
The four main blood types are A, B, AB, and O (distribution in general population)

- A: Antigen A (but not B) is present. (40%)
- B: Antigen B (but not A) is present. (10%)
- AB: Antigens A and B are present. (5%)
- O: Neither antigen A nor B is present. (45%)

Also, blood may be Rh-positive (Rh factor is present on the surface of the red blood cells, 85% of people) or Rh-negative (Rh factor is absent, 15% of people).

Common symptoms of

Leukemia



Systemic
- Weight loss
- Fever
- Frequent infections

Psychological
- Fatigue
- Loss of appetite

Lymph nodes
- Swelling

Lungs
- Easy shortness of breath

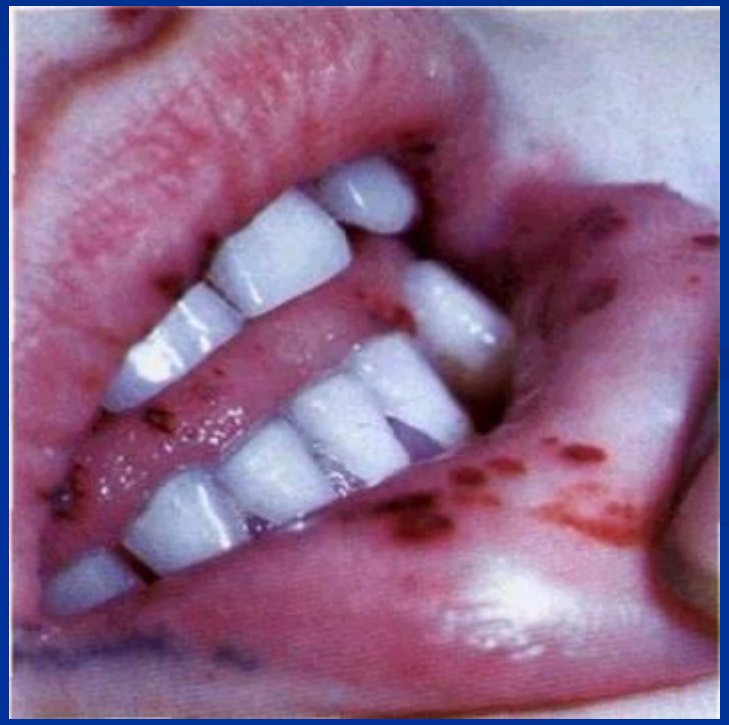
Spleen and/or liver
- Enlargement

Muscular
- Weakness

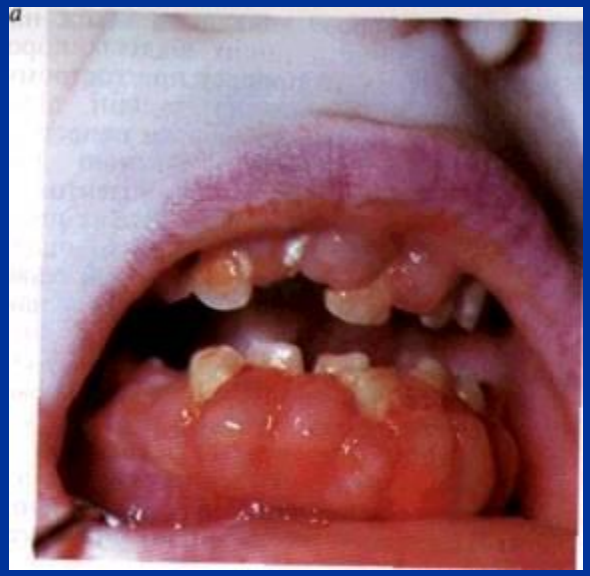
Skin
- Night sweats
- Easy bleeding and bruising
- Purplish patches or spots

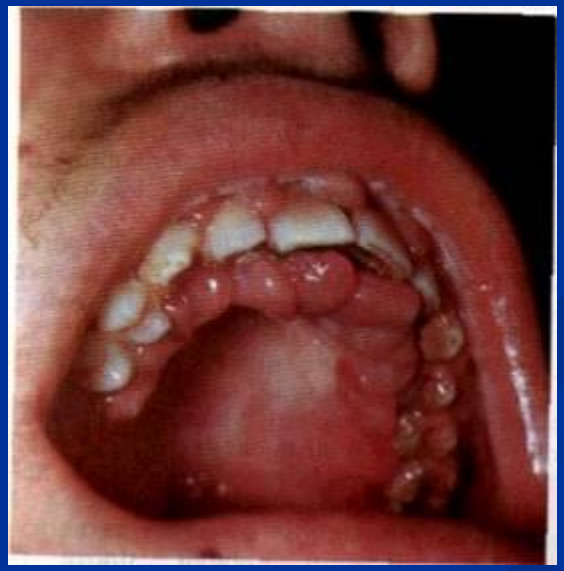
Bones or joints
- Pain or tenderness

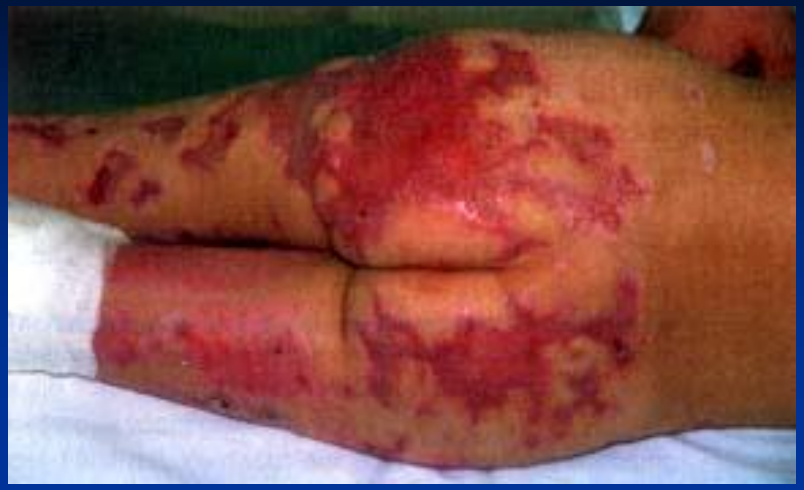
Acute leucosis, haemorragic syndrome

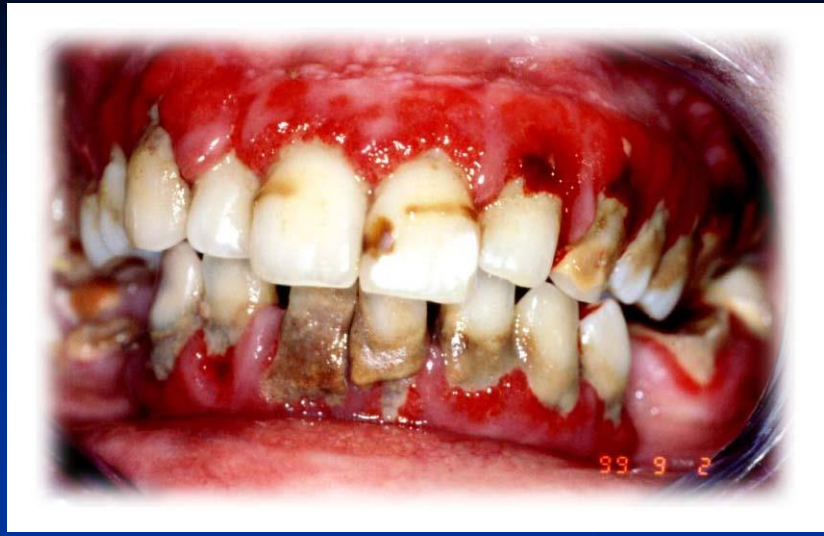


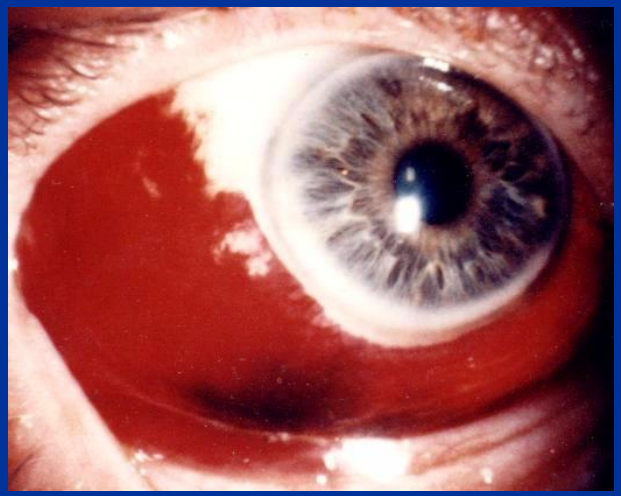
Acute leucosis, hyperplasia syndrome

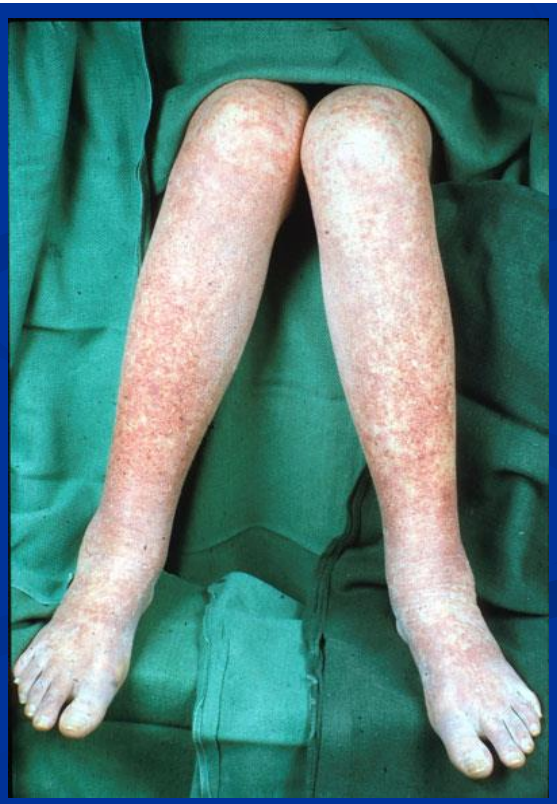


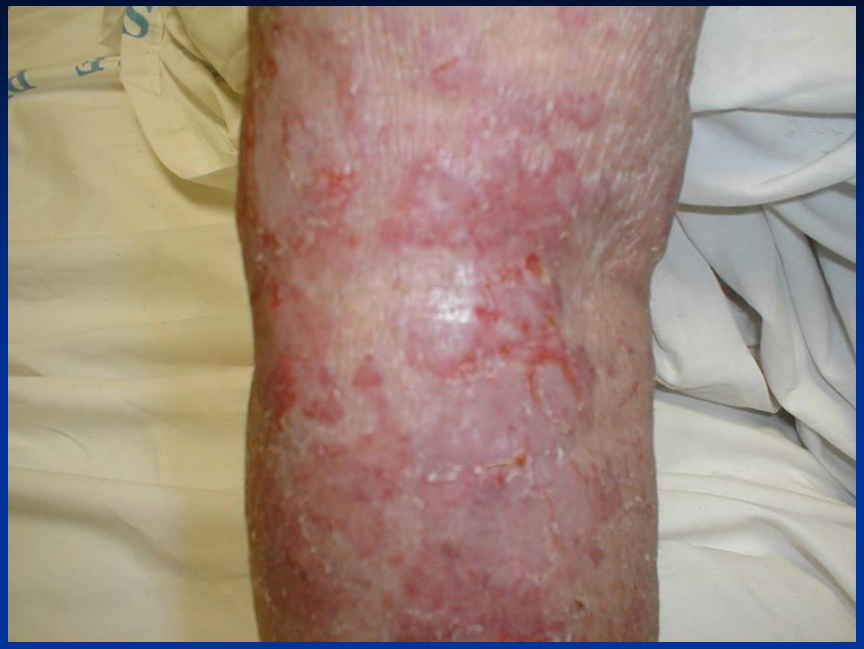


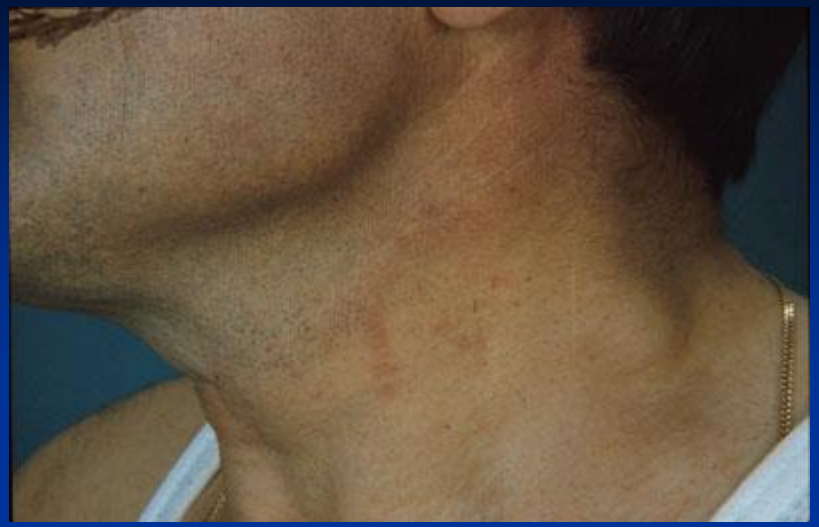


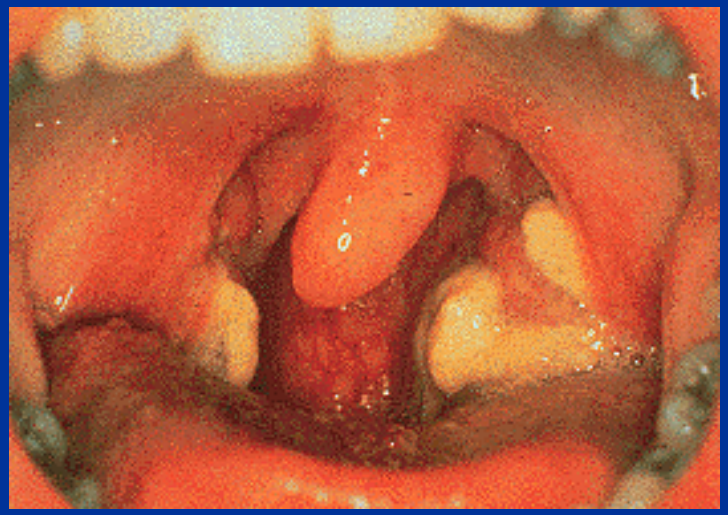


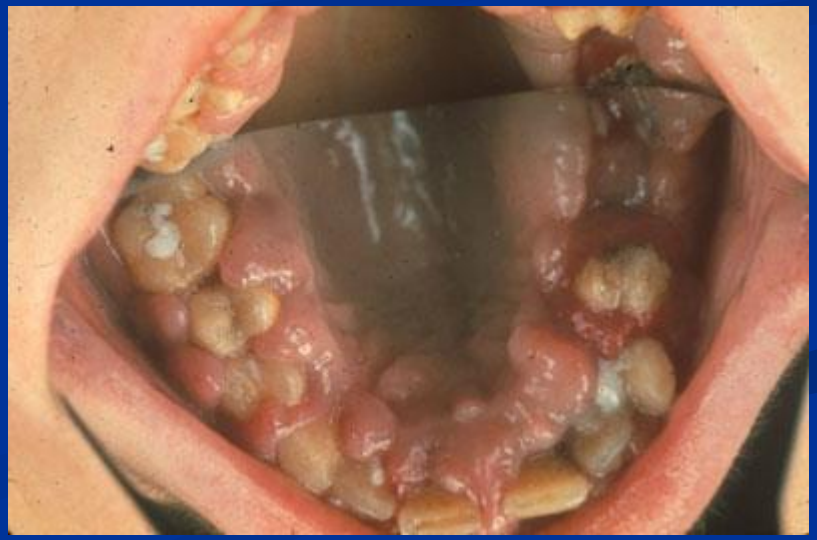




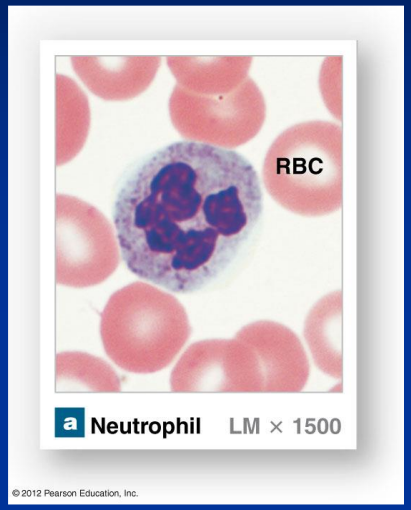


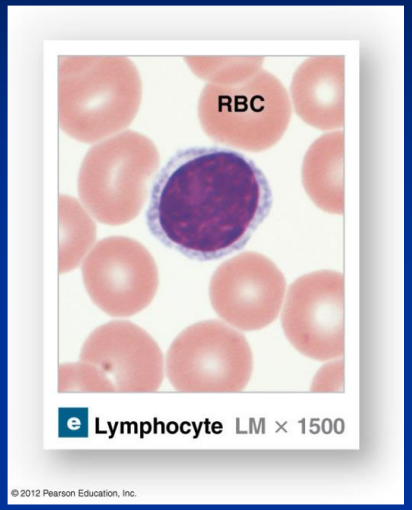


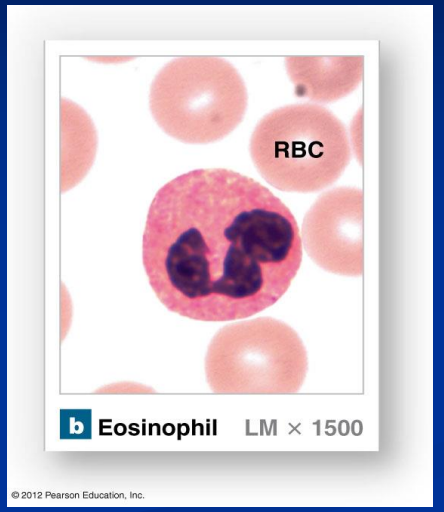


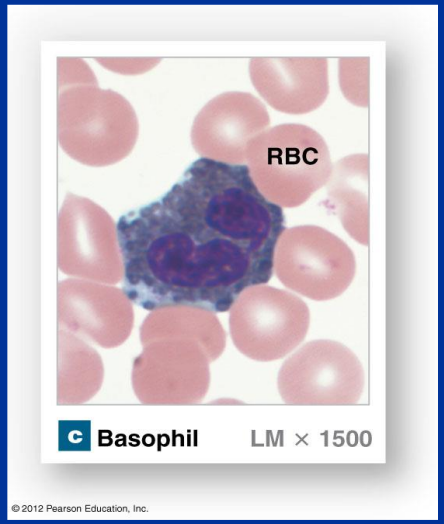


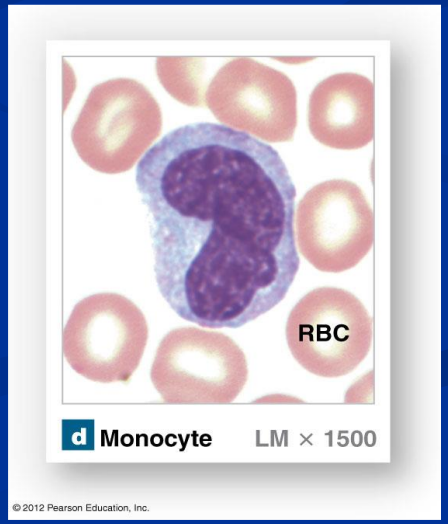
Types of Leukocytes











DEFINITION

- **Hemoblastosis – neoplastic clonal diseases of hemopoetic system.**

- Them subdivide on two big groups — leucosis and hematosarcomas.
- **Leucosis (leukemias) - tumors of hemopoetic system with primary localization in a bone marrow**
- **Hematosarcomas — tumours of hemopoetic system with primary extramarrow localization**

Leukemias are subtyped into:

- Lymphoid (affectinglymphoid progenitor cells);
- Non-lymphoid (affecting all non-lymphoid lineages (erythroid, granulocytic, monocytic, and megakaryocytic)).

- **Myeloproliferative diseases**, in which is the pronounced ability of abnormal bone marrow hemopoetic cells to differentiate is still preserved (include chronic myeloleukemia etc.).
- **Myelodysplastic syndromes**, belonging to the group of clonal disorders of stem cells and declare themselves by defects of maturation, which in turn result in the ineffective hemopoiesis and increase risk of the development of acute myeloblastic leukemia.

Mielo- and lymph proliferative syndrome (hemoblastosis)

Chief complains:

- High fever
- Profuse sweating
- Chills
- Pronounce weakness
- Pain in bones, hypochondrias
- Pain in throat (necrotic tonsillitis)
- Skin itching
- Enlargement of lymph nodes

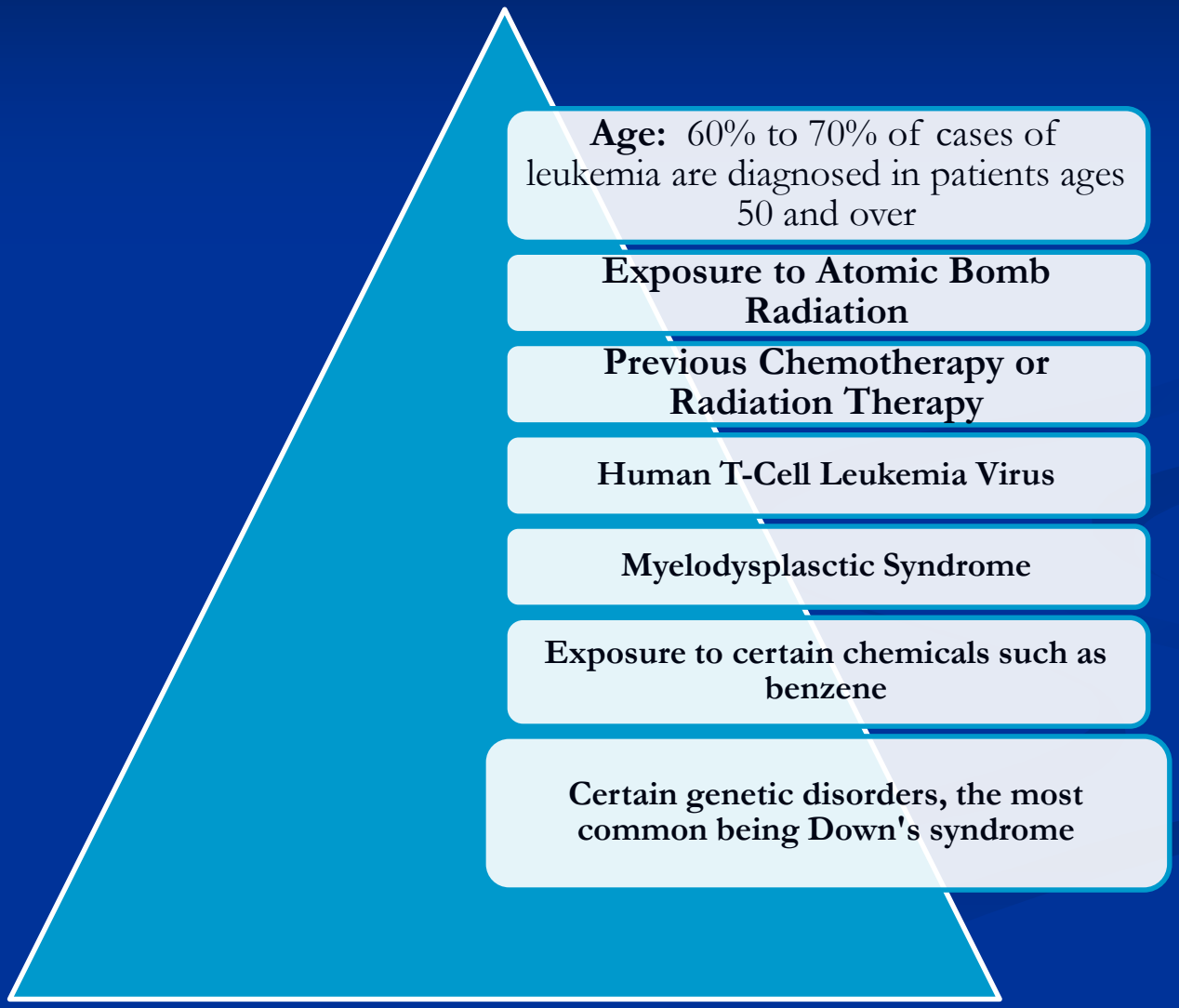
In the course of the disease, there are three stages:

1) Starting - diagnosed retrospectively.

2) Stage of the developed clinical picture.

3) End-stage.

Causes and Risk Factors for Leukemia



Pathogenesis

- Now the clonally theory of hemoblastosis pathogenesis, as well as tumors in general, is conventional (Leucosis cells represent a clone - posterity of one mutatived cells)
- For tumor development including hemoblastosis, the combination of a mutation of cells and easing of immune protection is necessary
- HB occur from cells of 1st and 2nd classes of the hemopoesis scheme

  (I.e., the ancestor of tumoral process of hemopoetic system is the cell-predecessor of myelopoesis or lymphopoesis more often)

Pathogenesis (continuation)

- **Important pathogenetic feature of many HB is «the tumoral progression» - gradual malignisation of tumoral process which is characterized:**

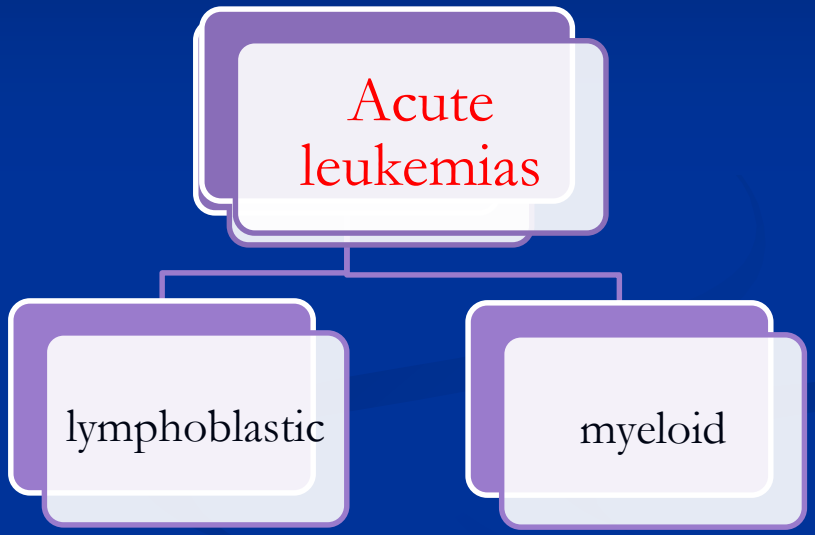
1) oppression of normal hemopoesis;
2) approach of "blast crisis» (change of the differentiated tumoral cells with not differentiated);
3) occurrence of leucosis cells ability to grow out of hemopoesis system;
4) leaving leucosis cells from under control of cytostatic preparations;

- Leucosis divide on acute and chronic on the basis not the clinical characteristic, but morphological features of the tumoral cells making a substratum of leucosis.
- At acute leucosis a tumor substratum are so-called blast cells, at chronic — ripen and mature cells.

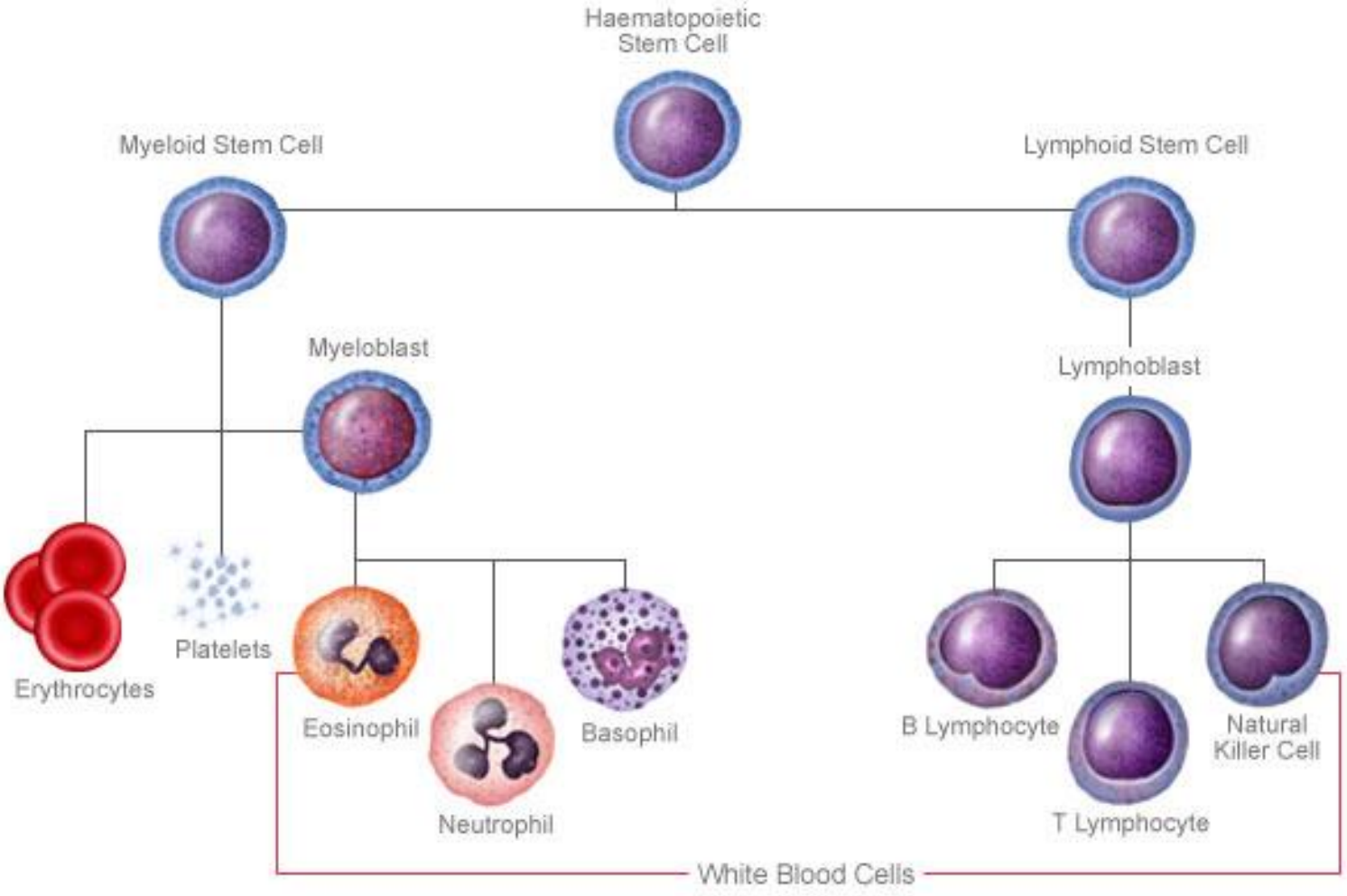
In peripheral blood in acute haemoblastosis blast cells are also found.

For acute leukemia characterized by the absence of transitional forms between unripened blasts and mature elements (so called leukemic blast crisis or failure).

Acute leukemias are malignant course.



Leukemia Blood Cells



The process of blood formation, or "hematopoiesis," takes place in the bone marrow. Self-renewing cells called "stem cells" are responsible for making all the blood cells for the body. As these cells multiply, they develop into one of two types of cells: myeloid cells or lymphoid cells. When leukemia develops in the lymphoid cell line, it is called "lymphocytic leukemia; when the myeloid cell line is affected, the disease is known as "myelogenous leukemia.

Leukemia Features

	Acute	Chronic
Onset	Rapid	Gradual
Cell type	Immature (Blast)	More Mature
Survival	Fatal if no Rx	Long survival
Treatment	Amenable to chemotherapy	May be resistant

leukemia degree distinguish:

- Leucemic - are characterized by substantial growth of leukocytes quantity in peripheral blood (ten and hundred thousand in blood). (The Most frequent form)
- Sub leucemic - quantity of leukocytes a little above norm (15-25 thousand in 1 mkl of blood) (in blood tumoral cells are defined)
- Aleucemic - quantity of leukocytes within norm, in blood tumoral cells are not defined. It is observed seldom, usually arises on an early stage
- Leucopenic - quantity of leukocytes below norm, but there can be the qualitative changes caused by occurrence leucosis cells.

Acute lymphocytic leukemia (ALL)

* Affects children and adults
* More common among children
* Accounts for slightly more than half of all cases of childhood leukemia

Acute myelogenous leukemia (AML)

(also called Acute nonlymphocytic leukemia: ANLL)

* Affects children and adults
* Accounts for just under half of cases of childhood leukemia

Chronic lymphocytic leukemia (CLL)

* Affects adults
* Almost twice as common as CML

Chronic myelogenous leukemia (CML)

* Affects mostly adults: very rare in children
* About half as common as CLL

Statistic

- AL takes the basic place in disease structure of HB (about 37 %)
- AL it is marked two peaks of disease: at the age of 3 — 4 and 60 — 69 years (men is more often are ill)
- At in due time begun treatment AL in most cases (20 — 40 %) are possible to reach full remission which can last more than 5 years

Classification is based on three types:

- Morphological (microscopic appearance).
- Immunological (surface markers).
- Cytogenic (chromosomal analysis).

Classification

1. AL first of all divide on :

- **Acute lymphoblast leucosis (ALL) – nearby 15%**
- **Acute myelogenous leukemia: not differentiated (M0), myeloblastic - 60 % (M1), AML with differentiation (M2) acute promyelocytic L(3), myelomonoblast – 20 %(M4), monoblastic (M5), erithromyelosis(M6), megakaryoblastic leukemia (M7)**

2. ON STAGES - initial, developed, terminal

Clinical picture (the developed stage)

I. Hyperplastic syndrome:

Caused by tumoral growth in a marrow, and out of it (metastasis):

Increase of spleen, liver, lymph nodes (peripheral, in mediastinum, abdominal cavity), tonsils;

Skin defeats (skin leukemic infiltrations — nonspecific hemodermia, or leukemides),

Brain covers (neuroleukosis or neuroleukemia), kidneys, myocardium, lungs.

II. Anemic syndrome

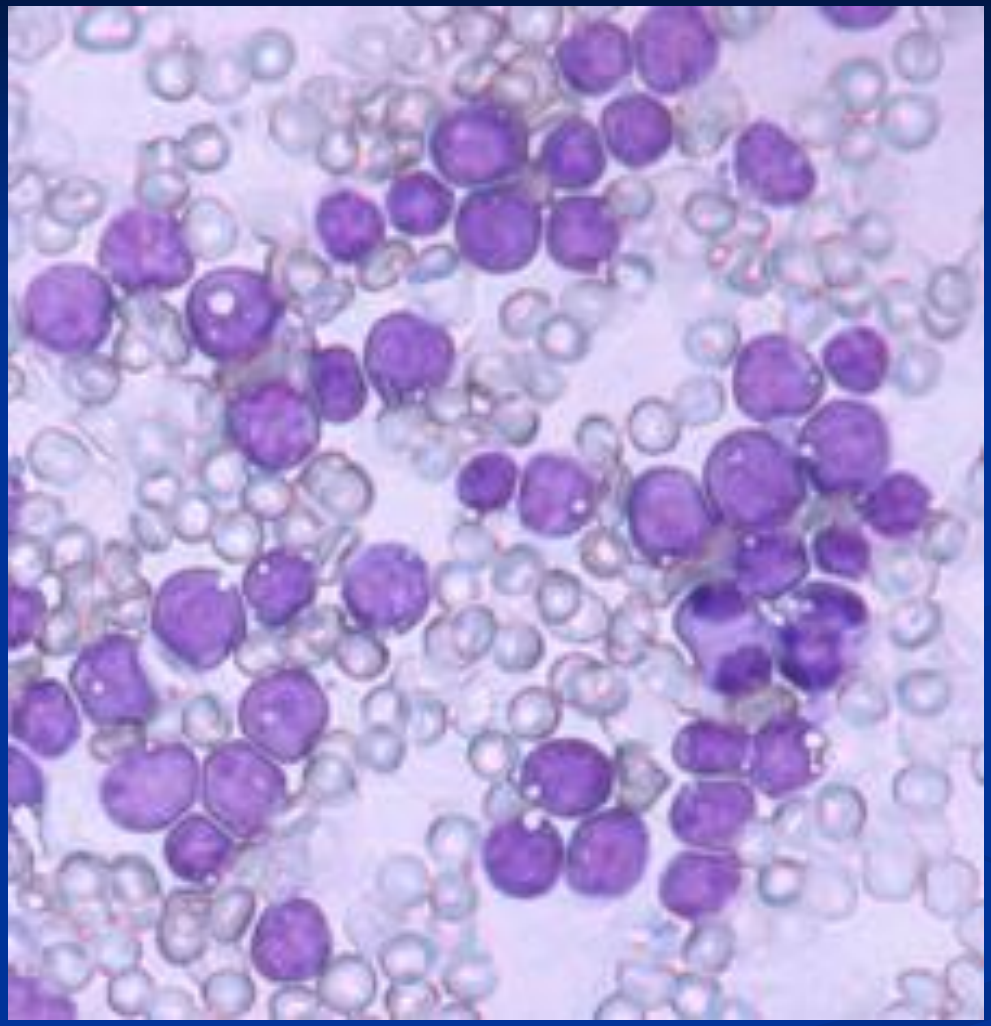
III. Hemorrhagic syndrome

VI. Intoxication syndrome

Infections: These are dangerous, due neutropenia caused by the disease and treatment.

Research of peripheral blood

- The number of leukocytes can fluctuate from low figures to high (in 50 % of cases can be observed leucopenia)
- **Presence in blood tumoral blasts cells (blastemia – from 5 to 90 %)**
- **leukemic failure-hiatus leukemicus: (very small quantity of mature granulocytes — segmented and practically total absence of stab, young, metamyelocytes)**
- **Anemia (usually normochromic type)**
- **Thrombocytopenia**



Puncture of a bone marrow

- The increase in sternal puncture of blasts cells more than 30 % completely confirms diagnosis of AL

Treatment

- **The basic maintenance of acute leukosis treatment is the chemotherapy directed on destruction of leukemic (blasts) cells in an organism of the patient**
- Symptomatic treatment (blood transfusion, antibiotics, intoxication elimination)

Chemotherapy of AL

The program of AL treatment includes two stages:

- **1. A remission induction - the chemotherapy directed on the maximum destruction of leukemic cells, for the purpose of achievement of full remission**
- **2. The chemotherapy after achievement of remission provides the prevention of AL relapse (consolidation, intensification, supporting therapy)**

Chronic leukemias are characterized by the growth of differentiated (mature) cells, a relatively benign course.

They are divided into myeloid and lymphoblastic.

During chronic leukemia using **two stages**:

1) benign or monoclonal - it lasts years and is easy to drug correction;

2) or a malignant polyclonal - chronic leukemia transformed into sharp blasts appear. Transition to another stage occurs suddenly and is called blast crisis.

Chronic myeloleukosis

- Chronic myeloleukosis (CML) it is characterized of monocytar and granulocytar origins cells proliferation at increase of quantity of leukocytes in peripheral blood to $50x10^9/l$ and above

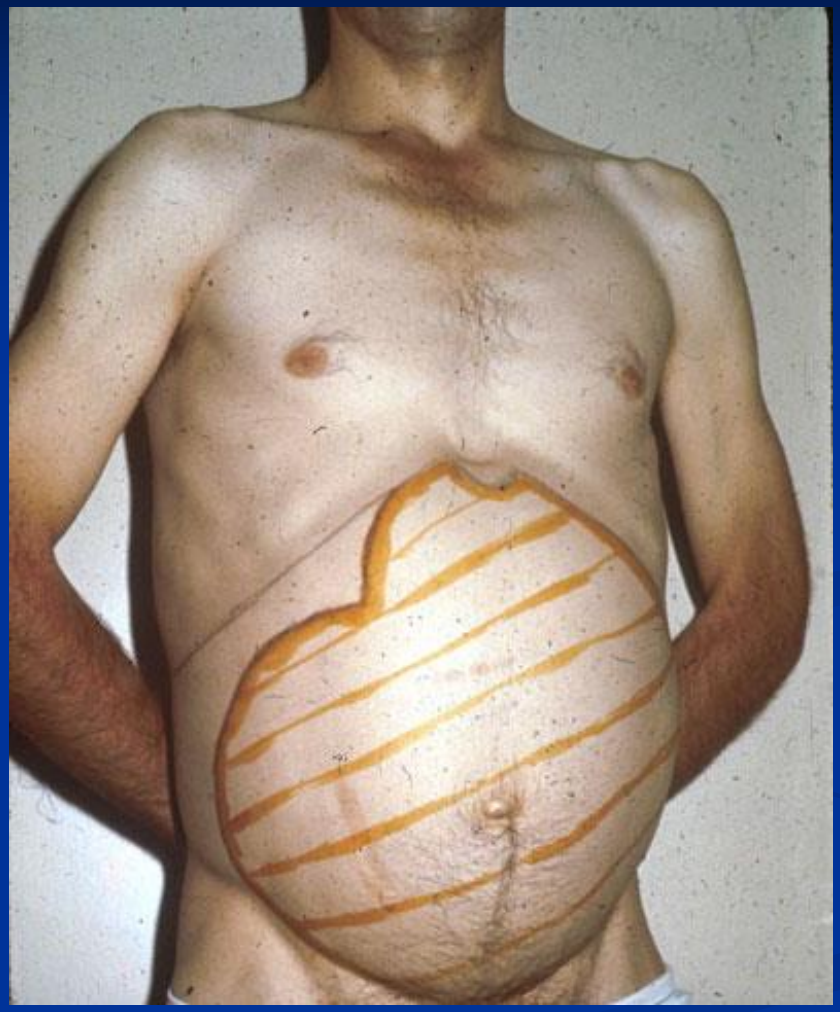
- At CML except segmented neutrophils smear of peripheral blood contain myeloblast, promyelocytes, myelocytes, metamyelocytes, stab and also basophilic leukocytes.
- The myeloid clone arises from the transformed precursor cells.
- Approximately at third of patients arises blast crisis

Stages

- 1 (initial) – myeloid proliferation of marrow in a combination to little changes of blood without the intoxication phenomena
- 2 (developed) - expressed clinical hematologic displays
- 3 (terminal) - corresponds to development of polyclonal HB and to occurrence of blasts crises, refractory to therapy with cytostatics

Clinical picture

- proliferative syndrome
  - hepatosplenomegaly
  - hemorrhagic diathesis
- anemic syndrome
- leukemic infiltration in a skin (leukemides)
  - Bones-articulate syndrome (ossoalgias, arthralgias)
  - intoxication syndrome
  - expressed weakness
  - decrease in weight of a body
  - purulent-inflammatory changes



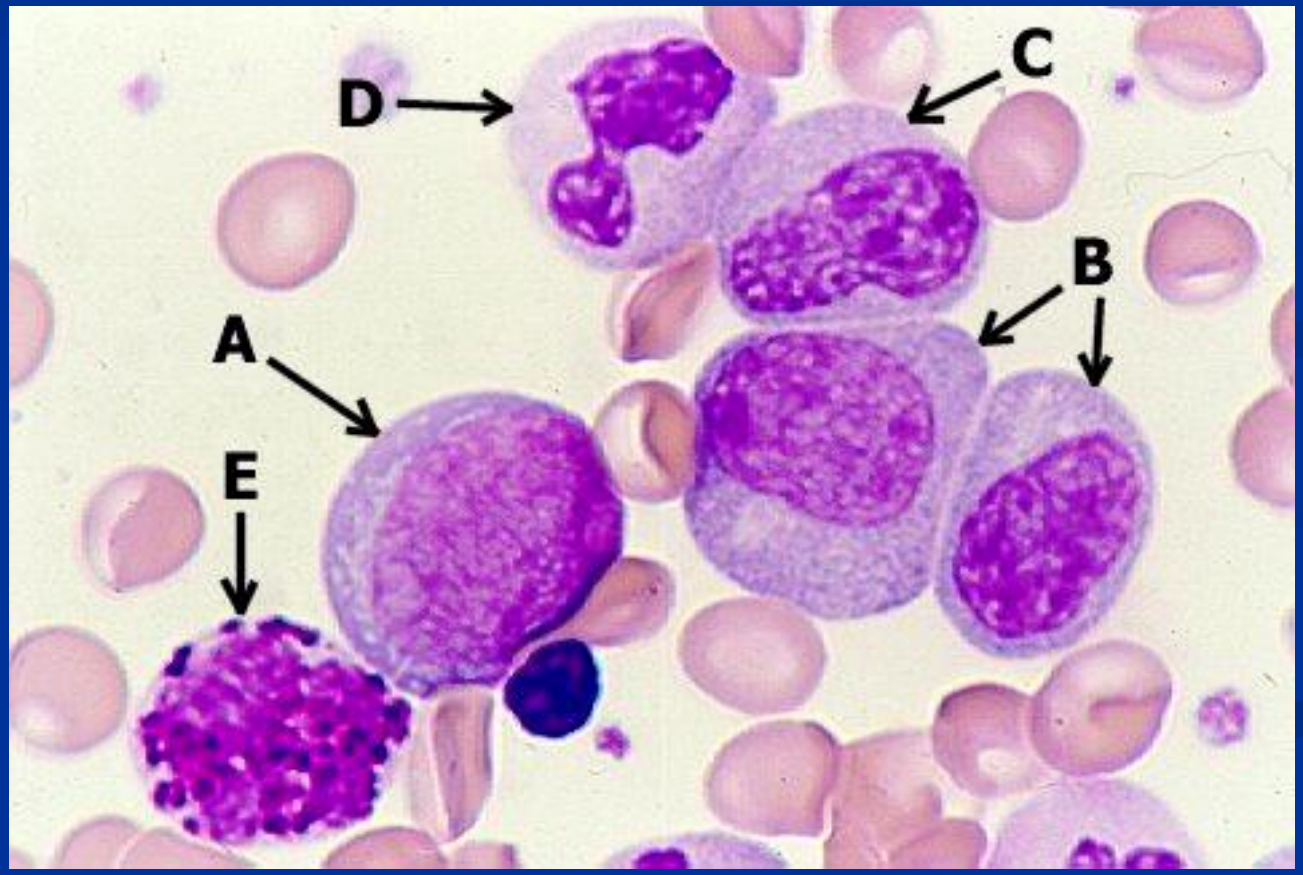
Diagnostics

- ***The signs, allowing to suspect disease*** **:**
- hepato - and splenomegalia.
- hyperleucocytosis
- In smear of peripheral blood prevalence mature granulocytes, eosinophilia, basophilia (eosinophil-basophil association); an anemia of slight degree

The diagnosis is confirmed with following signs:

- Myeloid hyperplasia of marrow in an initial stage
- blastosis in a stage of crisis (at research of myelogram)
- Presence of abnormal chromosome-marker (Philadelphia chromosomes) in marrow cells-predecessors

(A) Myeloblasts. (B) Neutrophilic Myelocyte, (C) Neutrophilic Metamyelocyte, (D) Band neutrophil, (E) Basophil



Treatment

- **Chemotherapy .**
- **At an inefficiency of chemotherapy or at expressed splenomegalia - an irradiation of area of a spleen**
- In some cases – transplantation of bone marrow
- At blasts crises – therapy like AL

Chronic lympholeukosis

- CLL – lymphoproliferative disease which substratum are mature lymphocytes

- Makes 30 % from number of all leucosis (a great bulk of patients – persons of advanced age)
- In 95 % of cases has the B-cellular origin

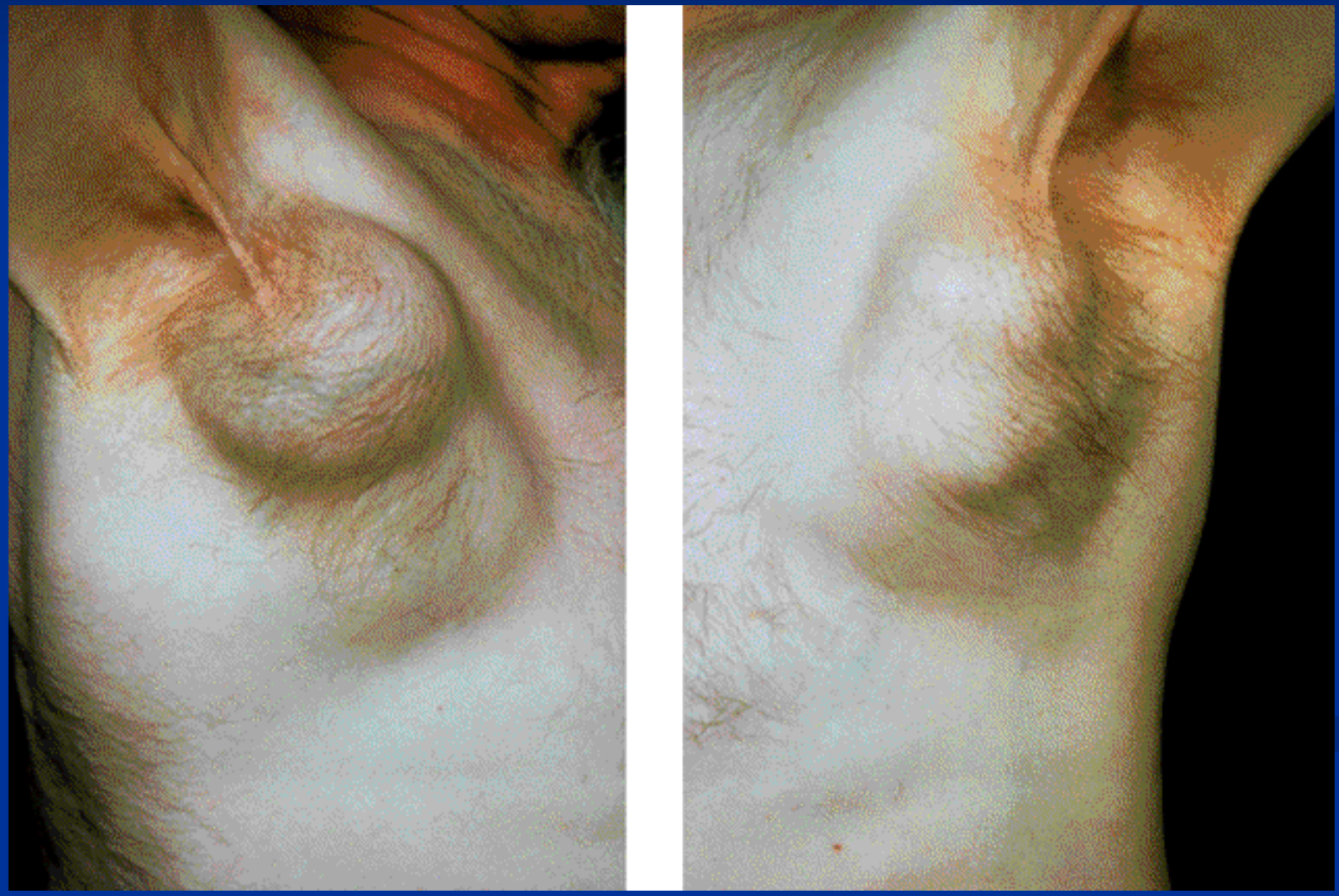
Pathogenetic features of CLL

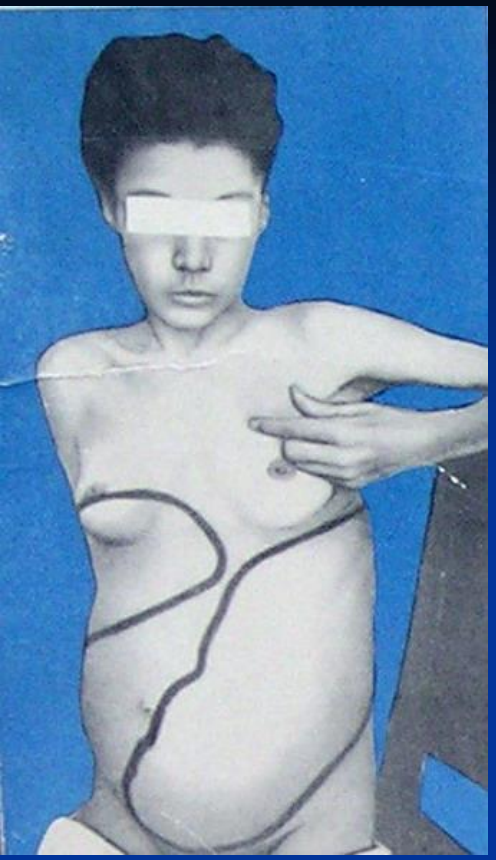
- There are no signs of a tumoral progression (are very rare blasts crises);
- Is not present morphological atypism of tumoral cells;
- There is no communication with mutagen factors;
- Disease has hereditary character;

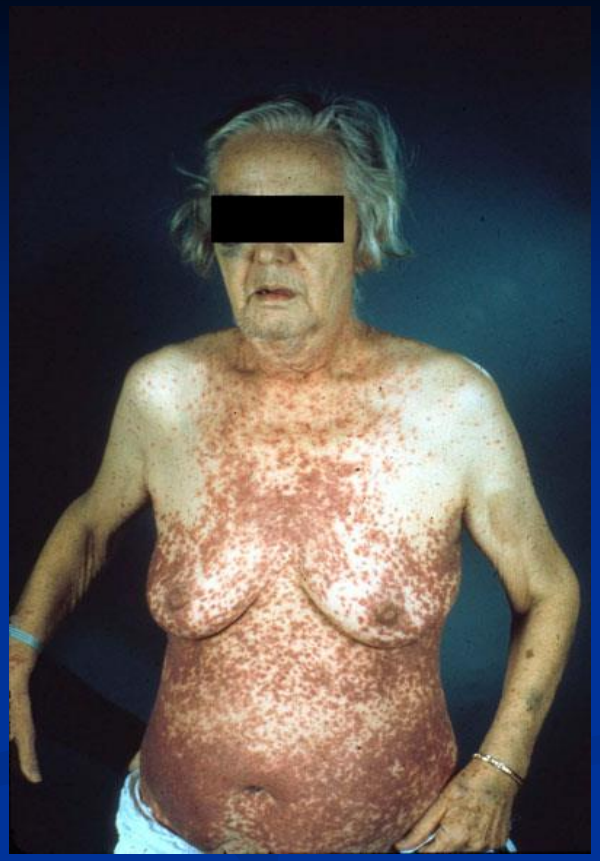
Clinic

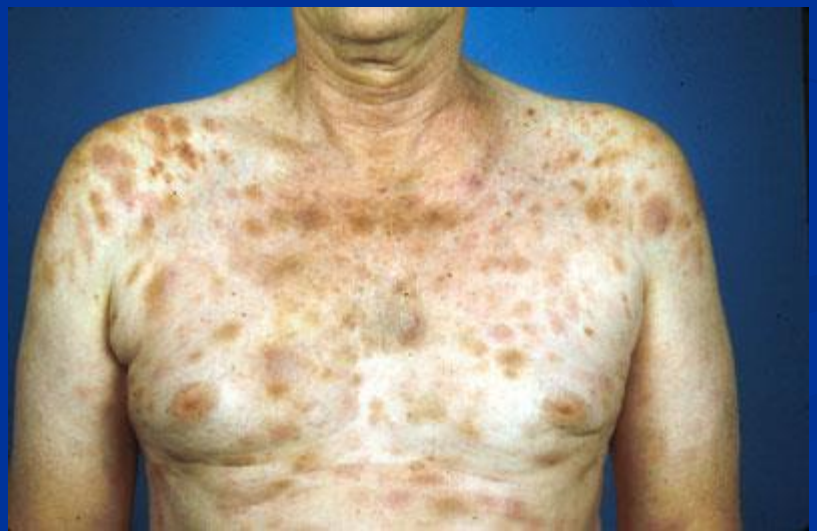
- Lymphoproliferative syndrome: lymphadenopathy, splenomegaly, lymphoid proliferation of marrow, leukemic infiltrates in skin (leukemides)
- Syndrome of complications: purulent-inflammatory, autoimmune (autoimmune hemolytic anemia, thrombocytopenia)

ChLL Physical Findings

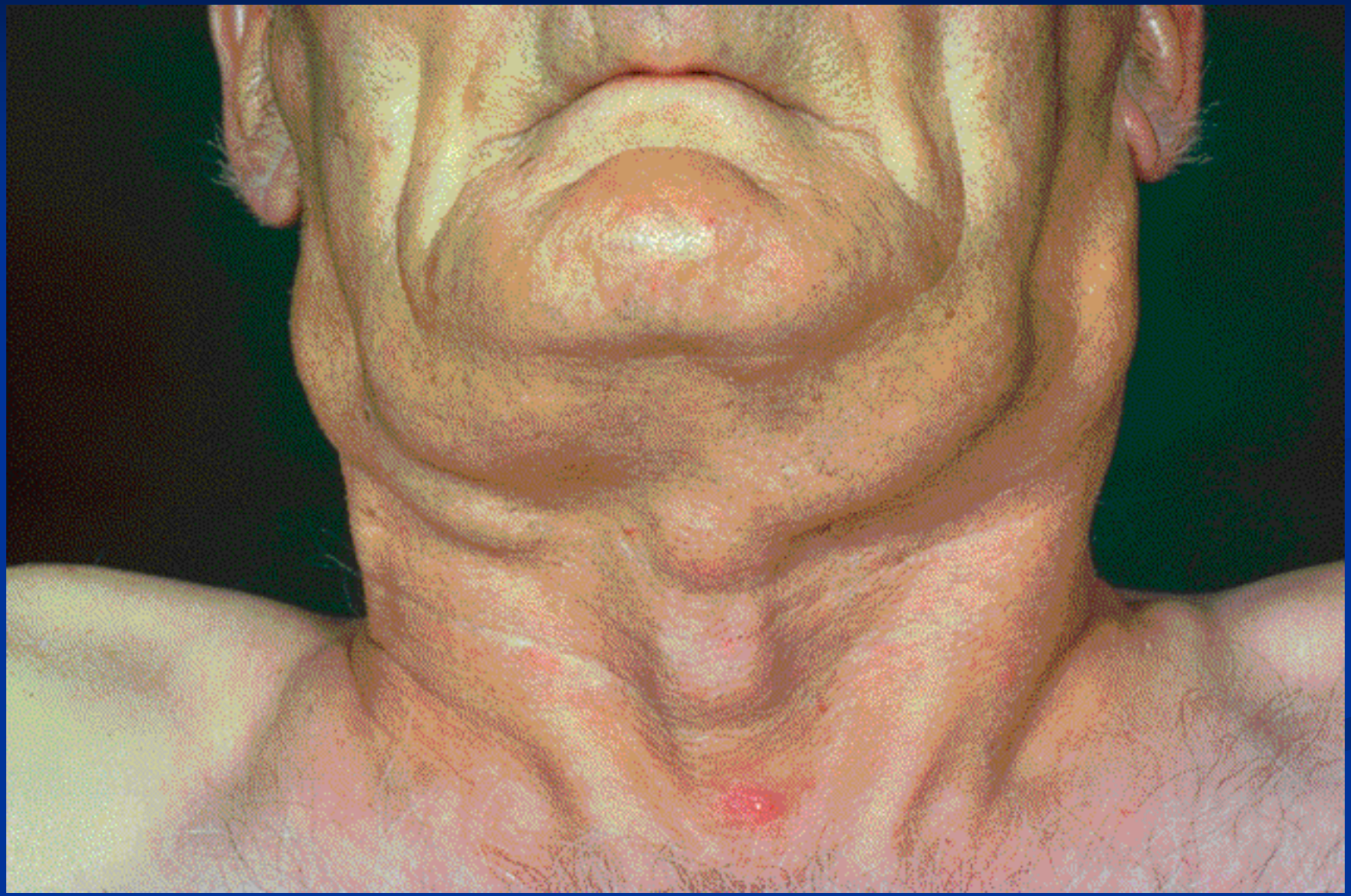




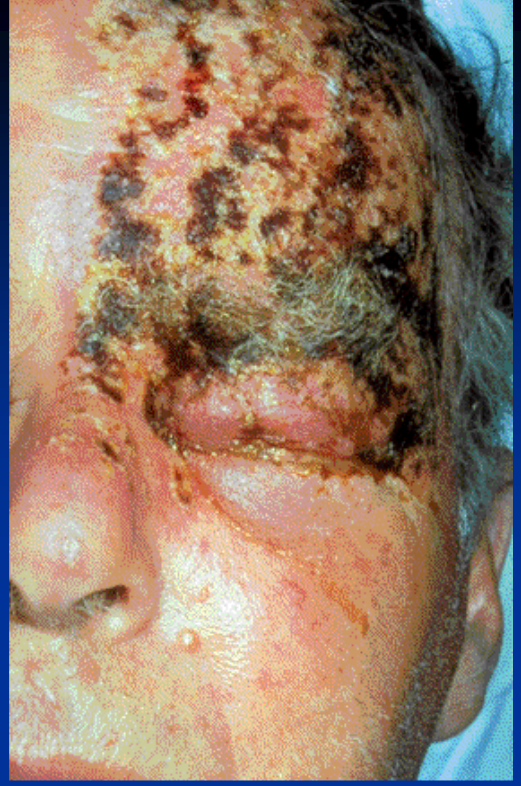


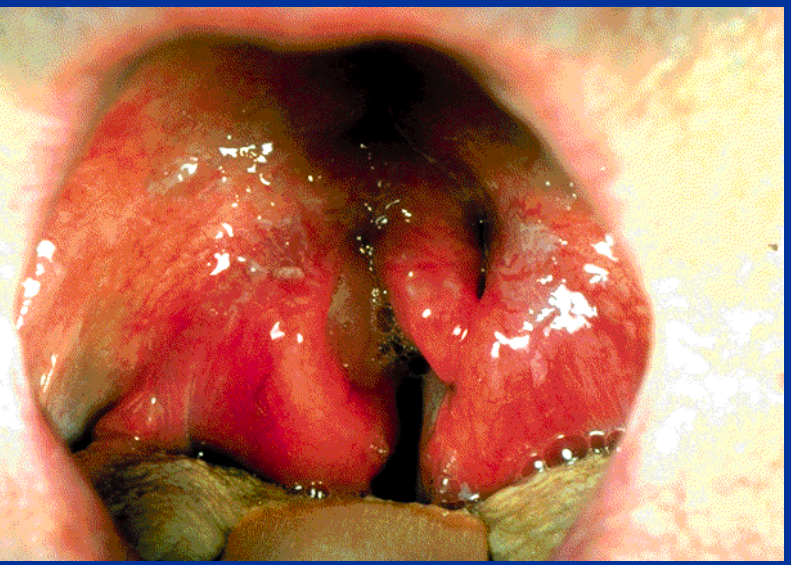


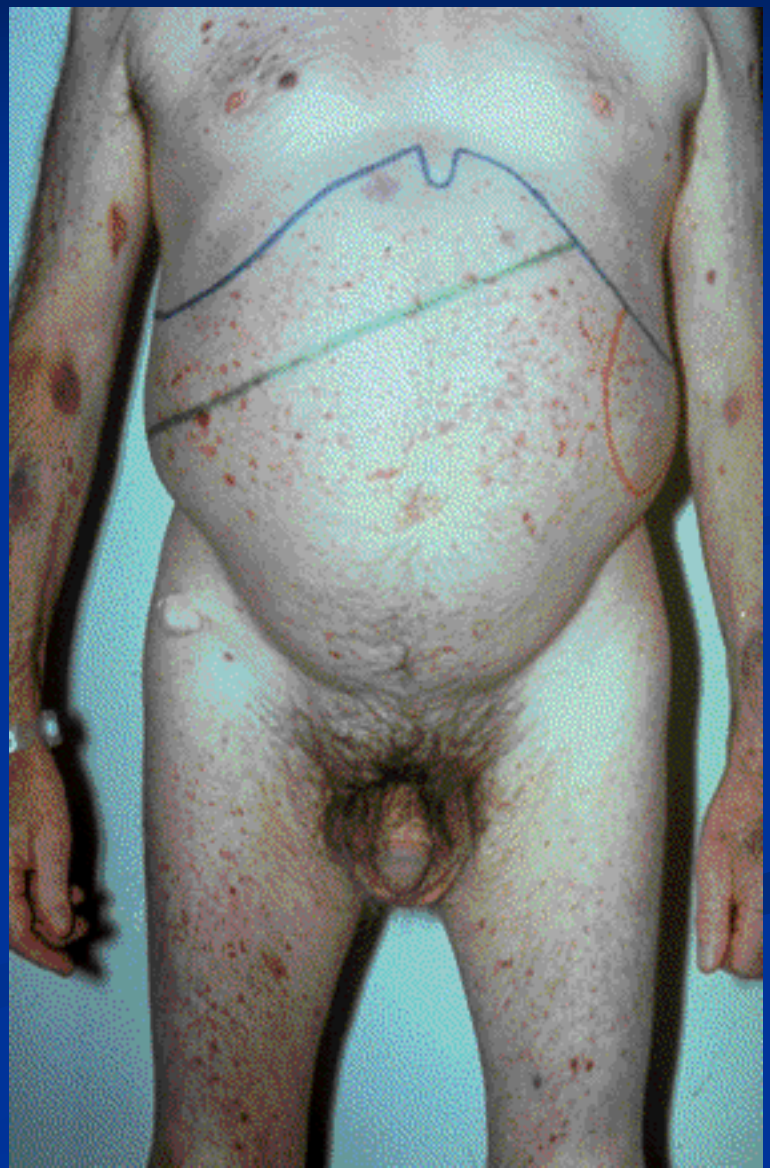
ChLL Physical Findings



CLL – Physical Findings

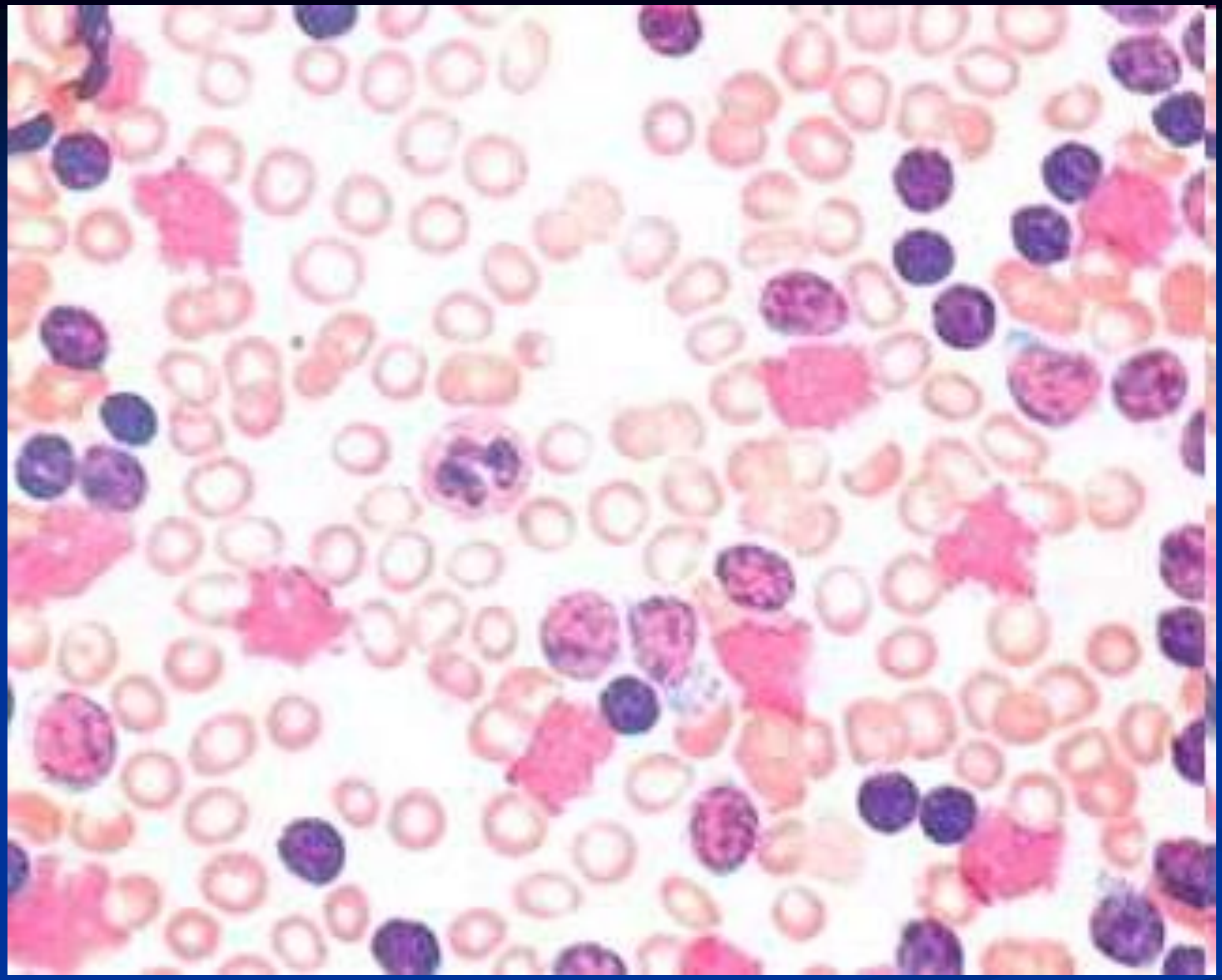






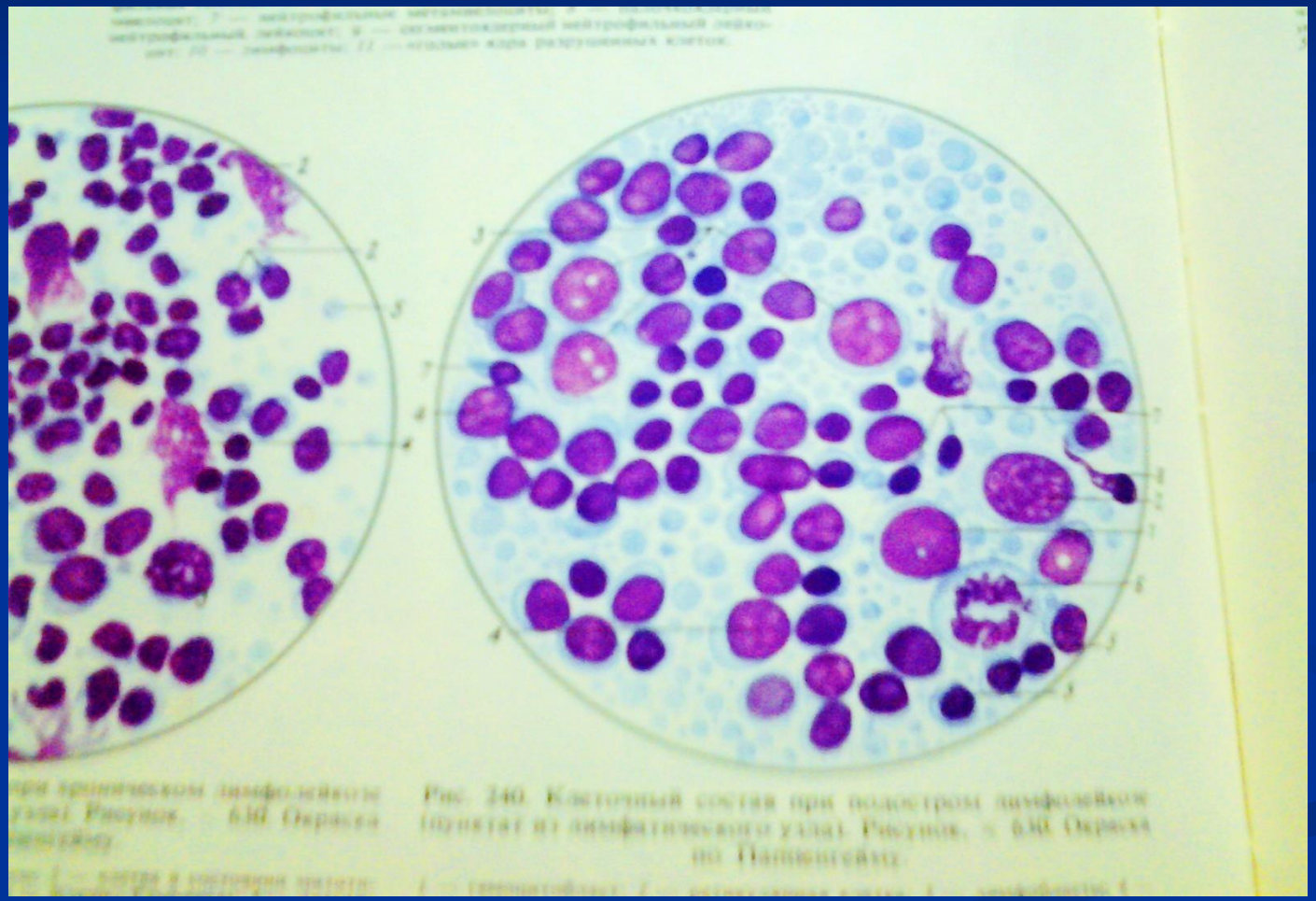
Blood picture

- Leukocytosis
- **Lymphocytosis (to 80-90 %)**
- Presence in smear of blood little bodies - shadows of Botkin-Gumprecht (the rests of broken up lymphocytes)
- The anemia and thrombocytopenia appear in a terminal stage



chronic lymphocytic **leukemia**

Botkin – Gumprecht shadows



Treatment

- Therapy of tumoral process – initially-constraining, course or supporting chemotherapy (leukeran)
- Treatment of autoimmune conflicts (hormones, splenectomia)
- Treatment of infectious complications (antibiotics)
- Stimulation of immune system

  (α - interferon, γ - globulin)

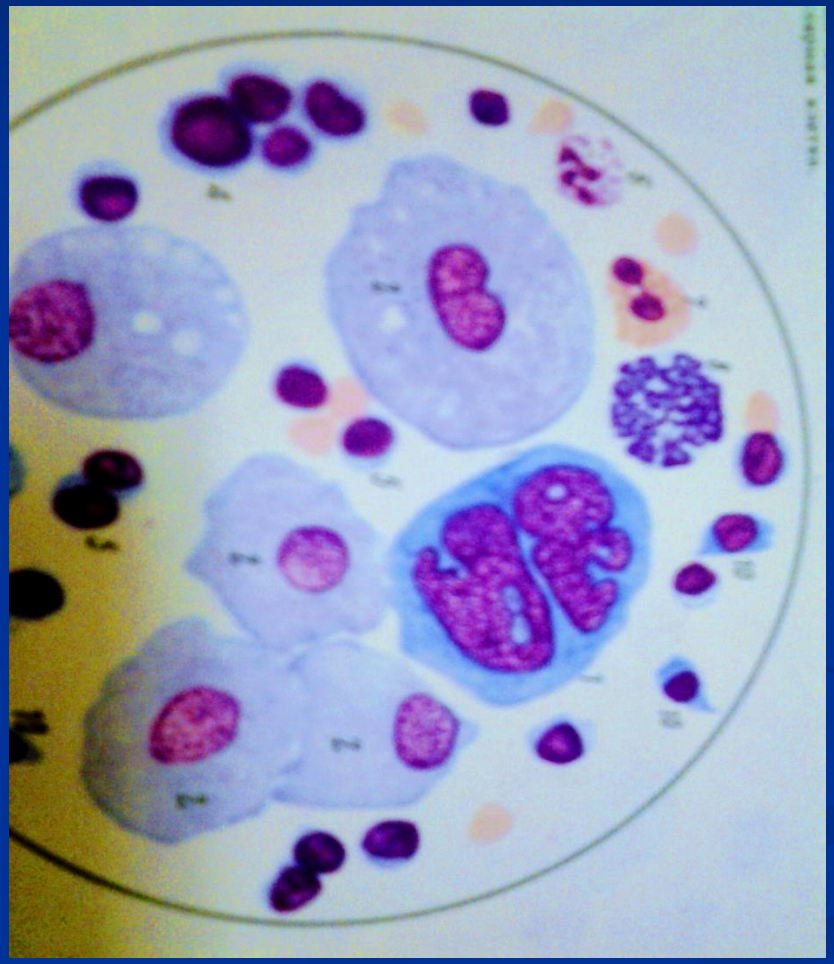
Hematosarcomas depending upon type of the cells making a tumor, divide on :

- lymphogranulomatosis (with obligatory presence of cells of Berezovsky — Sternberg and Hodgkin)
- nonlymphogranulomatosis (no Hodgkin) lymphomas.

Lymphogranulomatosis (LG)

- LG (illness of Hodgkin) is characterized of malignant hyperplasia of lymphoid tissue with formation in lymph nodes and an internal organs of lymphogranulomas.
- meat in 1-2 cases on 100000 population

Berezowsky – Sternberg cell



Distinguish

- The peripheral form (defeat of superficial lymph nodes)
- mediastinal
- abdominal
- pulmonary-pleural
- gastrointestinal
- And also rare variants of bone, skin and nervous forms

Clinic

- The semiology of LG develops of local and general displays
- To the first carry increase of lymph nodes densely-elastic consistence, forming a package
- From the general symptoms typical for LG consider periodic rises in temperature, an itch of skin, profuse sweat and accruing weakness, and also specific changes from blood (leucocytosis or leucopenia, monocytosis, anemia, etc.).

Diagnostic

The diagnosis put taking into account of clinical pictures

- Blood changes
- The data of radiological research
- Biopsy of lymph nodes (the diagnosis establish only on the basis of presence at histological researches of lymph nodes typical ("diagnostic") cells of Read-Sternberg

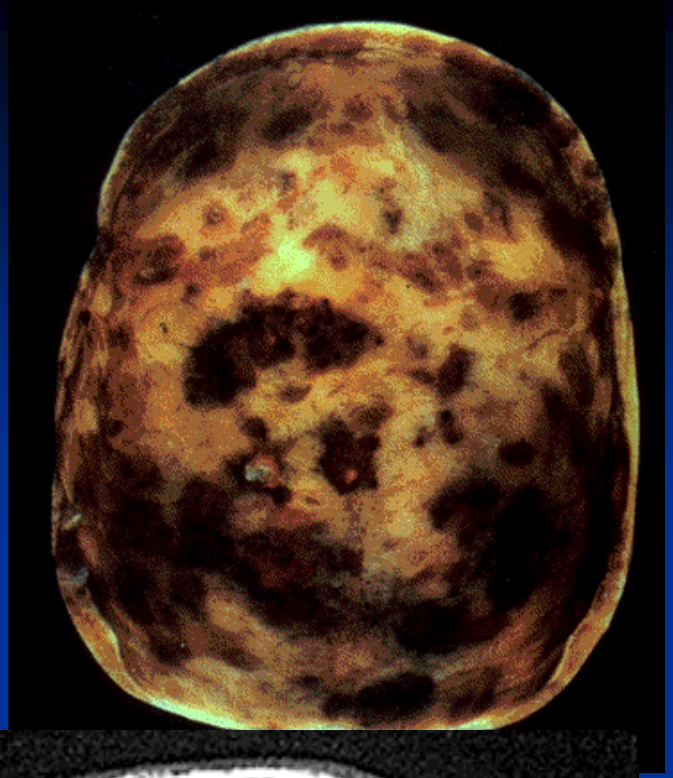
Treatment

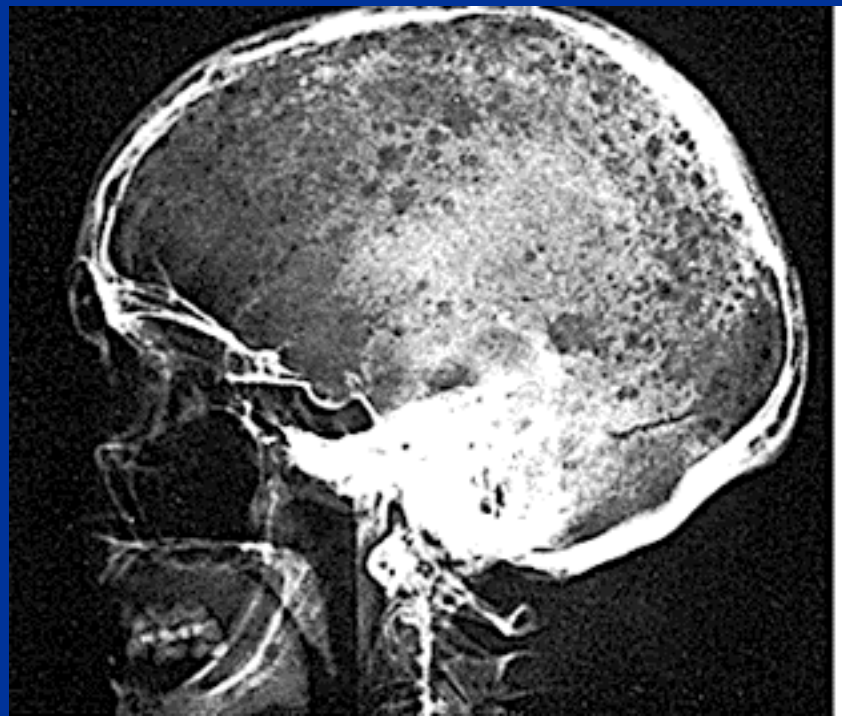
- Treatment of LG basically spend beam methods (remote gamma therapy or X-ray therapy), irradiating not only obviously amazed zones, but also other groups of lymph nodes

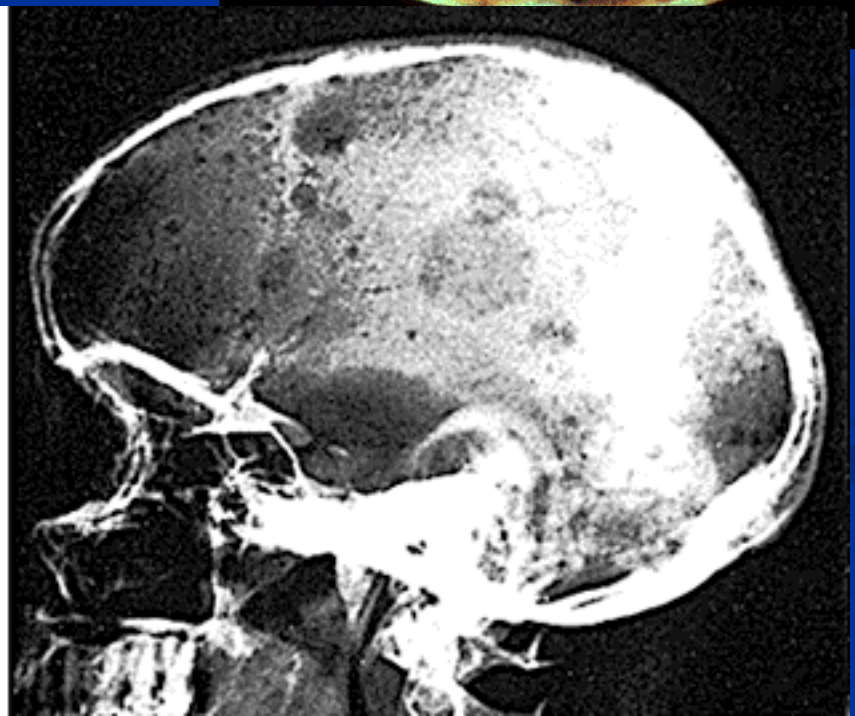
Multiple Myeloma

- Cancer of plasma cells
- Disease of older men and women (> 60 years)
- Produce abundant useless monoclonal Ig (paraprotein, M-protein)
- Decreased normal Ig, infections occur
- Lytic bone lesions , bone pain, pathologic fractures, hypercalcemia
- Timorous masses of plasma cells (spine, skull, ribs, pelvis)
- Renal failure may develop

Multiple Myeloma







Diagnosis of Multiple Myeloma

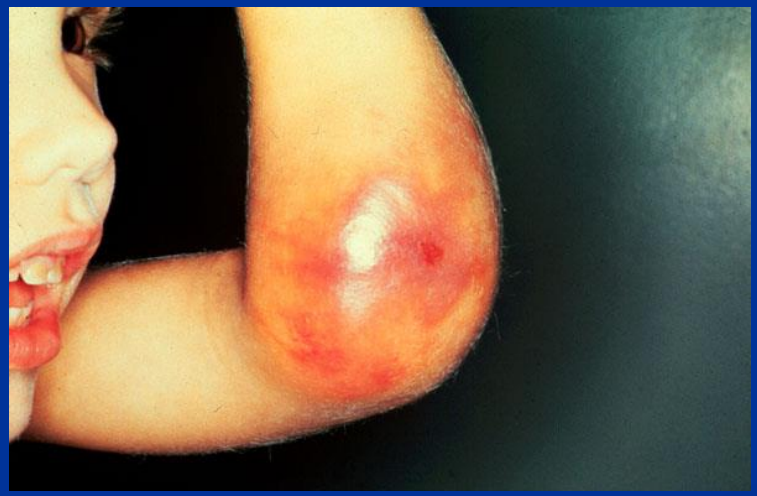
- Demonstrate Monoclonal Protein
  Serum protein Immunoelectrophoresis (SPEP)
  Urine protein Immunoelectrophoresis (UPEP)
  Immunofixation
- IgG - 55%, IgA - 25%, light chains only - 20%, IgD or IgE - 1%
- Skeletal survey
  Punched out lesions
- Bone Marrow Aspirate
  Plasma cells

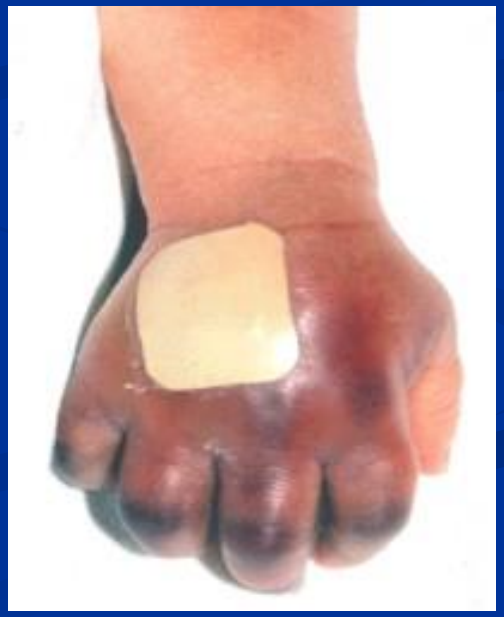
- **Hemorrhagic diathesis (HD) –** group of the diseases characterized of higher bleeding without expressed damage of a vascular wall or insignificant it traumatization.

Classification of hemorrhages types (1975, Barkagan)

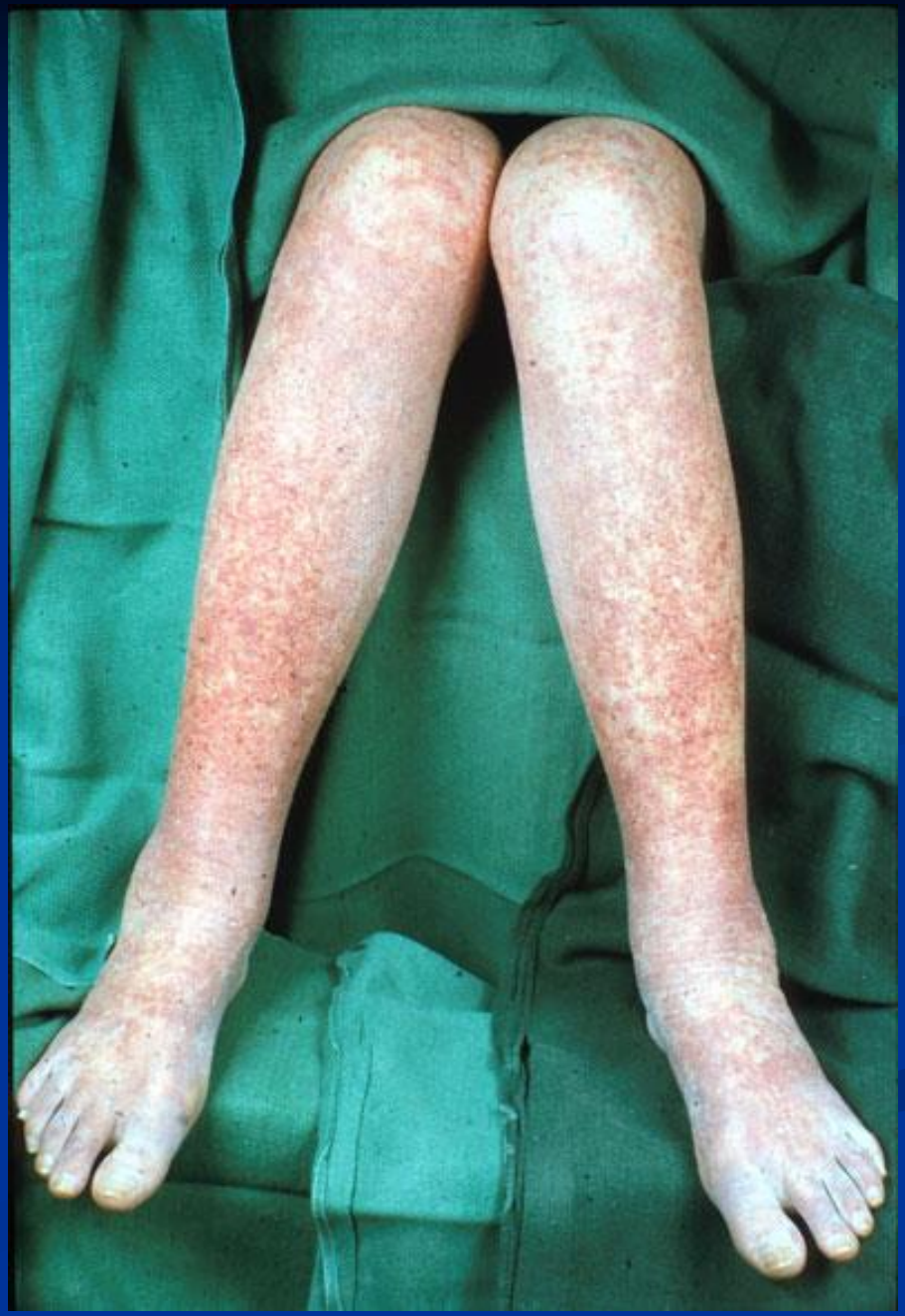
- Microcirculatory (petechial –spotty)
- Hematomas
- Mix (microcirculatory – hematomas)
- Vasculit –purpural
- Angiomatous

- Hematoma type: massive hypodermic hemorrhages, under aponeurosis, hemarthrosis. It is long, difficult for stop bleeding during operation, can be if small traumas.

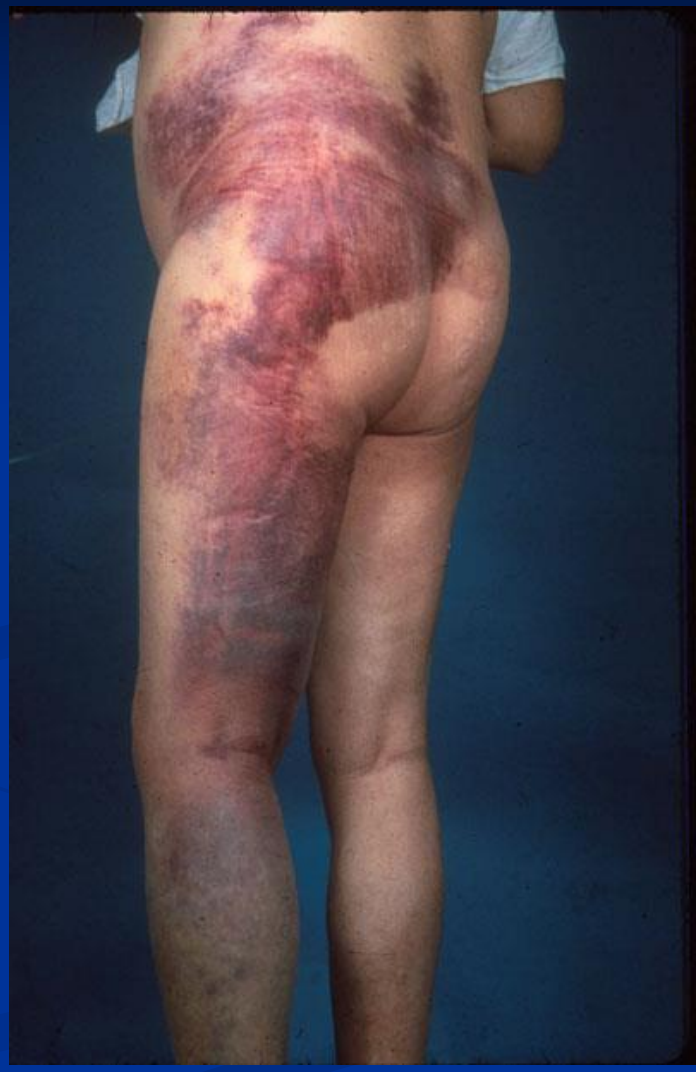




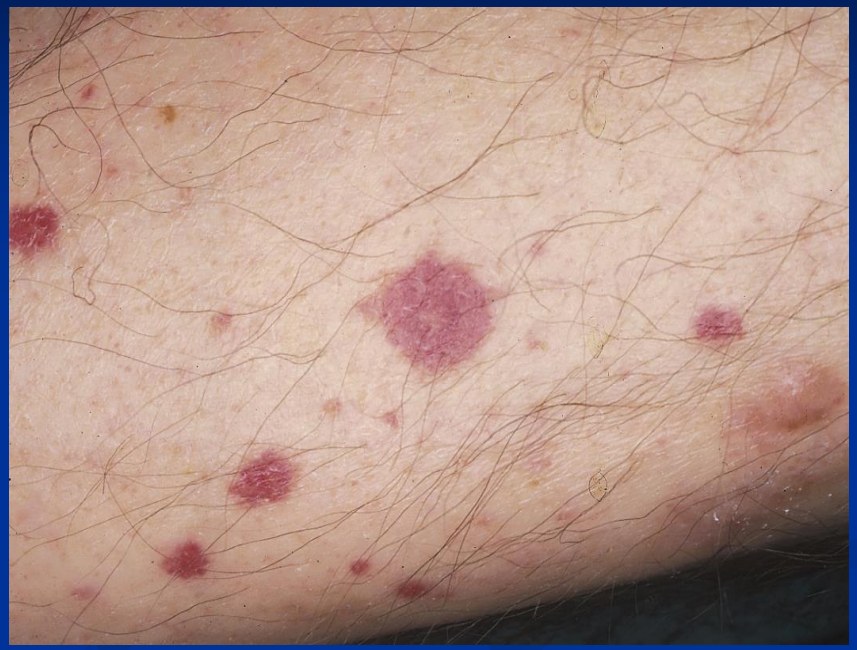
- Petechial-spotty (microcirculatory) symmetric character, on extremities and in places of bigger traumatization



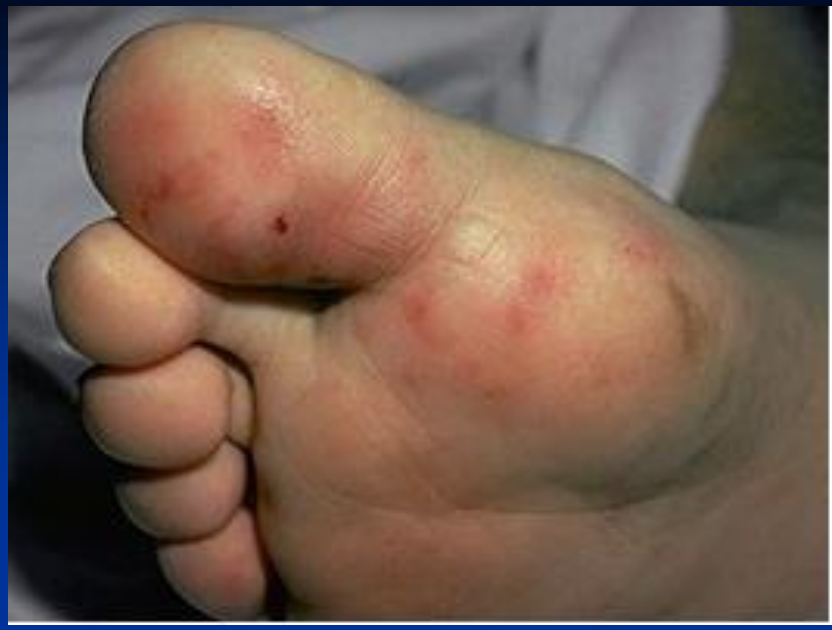
The mixed type (bruise-hematomas) - Degree of hemorrhages is more petechial, but hematomas not such big (is not present hemarthrosis). Are damaged thrombocytes and plasma factors.

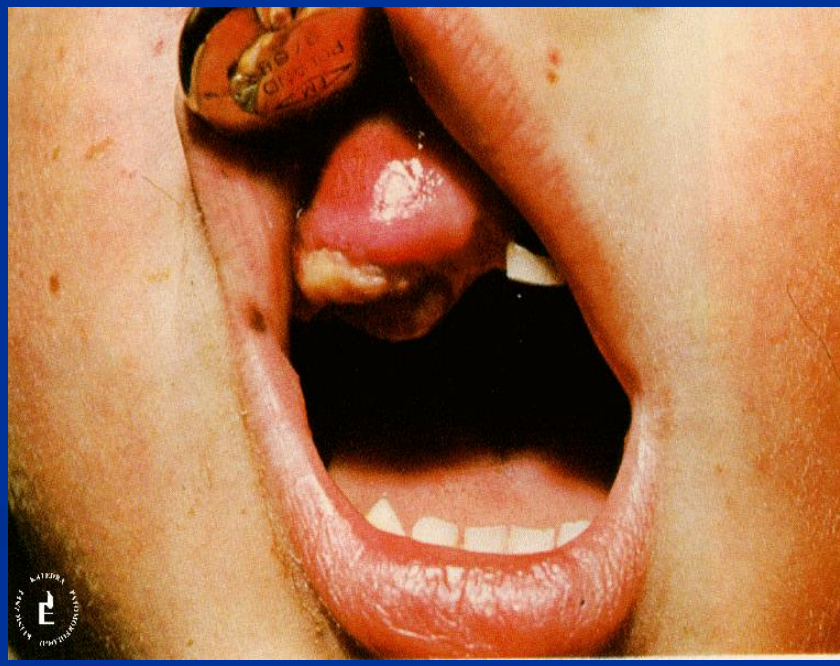


- Vasculit - purpural (vascular) small dot hemorrhages, protrude over a surface of a skin (in a basis lies vasculitis). An example - illness of Shonlein-Henoch



- The angiomatous type - at a pathology of a wall of a vessel – there is defect of subendothelial structures or collagen structures of a wall of a vessel. Nasal bleedings, bleedings in abdominal cavity. Thus almost there are not enough changes in plasmocytar and thrombocytar link (in humoral link a few pathology – illness of Rendu - Osler).





Estimation of system of a hemostasis
1. Vascular-thrombocytar

- Thrombocytes 180 - $320 \times 10^9/l$
- Bleeding time (method of Duke) 2 - 5 min
- Retention (adhesion) of thrombocytes 20 - 55 %
- Aggregation of thrombocytes 10 - 60 sec

Permeability of capillars

Konchalovsky test (plait symptom)

Occurrence 0 - 10 petechia on a site of a forearm in width of 5 cm at compression of a shoulder with cuff at pressure 50 mm Hg within 15 minutes.

Test of Rumpel-Leede

Absence of petechia after 5-minute imposing of a cuff on shoulder at pressure is no more 10-20 mm Hg

Rumpel-Konchalovsky test

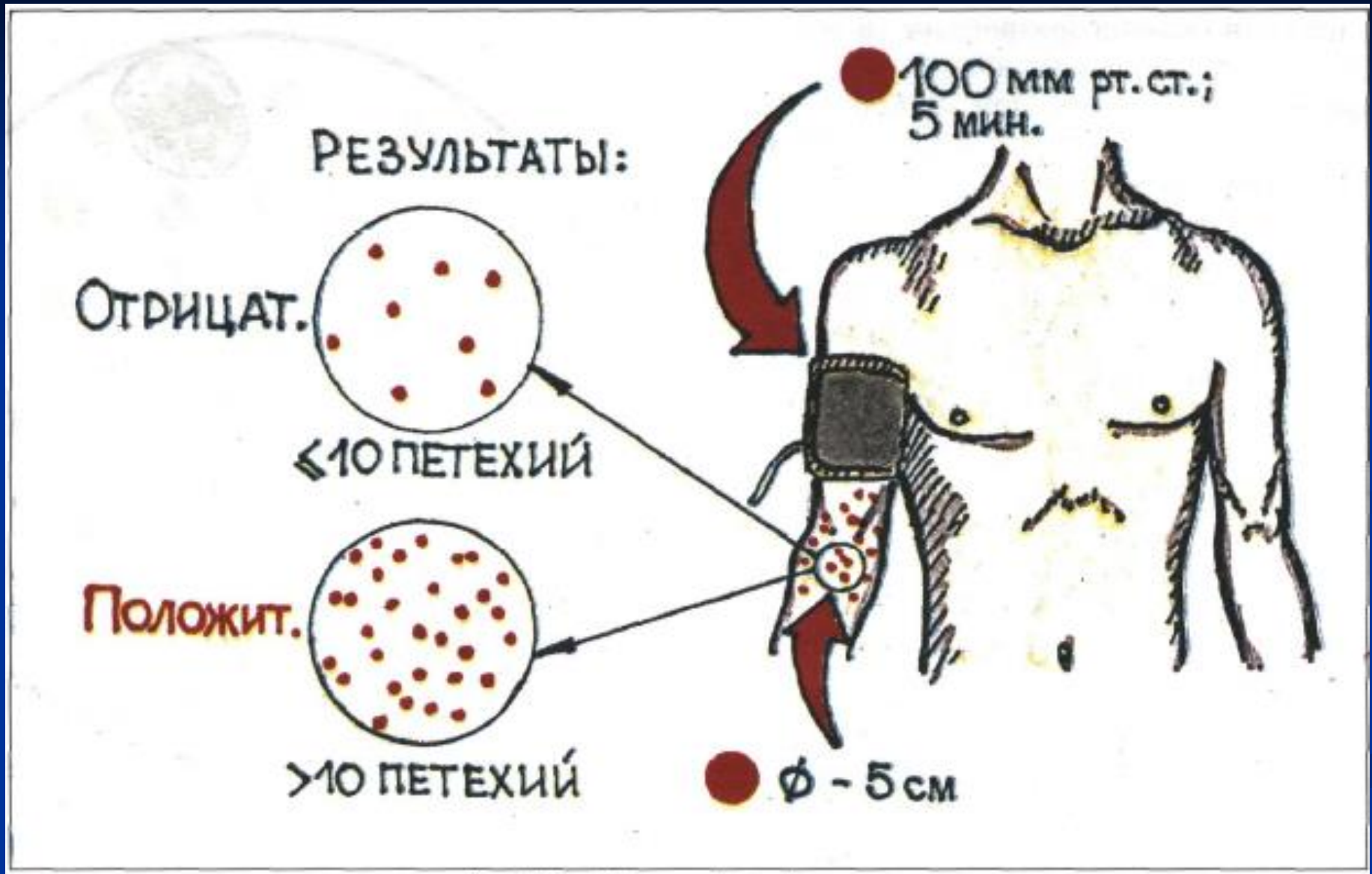


Рис. 6.13. Проба Румпель – Лееде – Кончаловского.

2. Coagulative (plasmatic)

- (Lee-White) time of coagulation 6 - 8 min
- Fibrinogen 2 - 4 g/l
- Thrombin time 30 sec
- Activated time of blood recalcification 50 - 70 sec
- Activated partial thromboplastin time 30 - 40 sec

Classification

- Thrombocytopenia
- Thrombocytopathy (Willebrand's disease)
- Coagulopathy (hemophilia)
- Angiopathy (vasopathy)
- Superfluous fibrinolisis (at treatment with thrombolytics, defect of plasmin inhibitor or surplus of the plasminogen activator)
- Syndrome of DIC

Thrombocytopenic purpura (illness of Werlhoff)

- **TP – it is hemorrhagic diathesis caused by decrease in blood of thrombocytes number (signs of hemorrhage arise at falling of thrombocytes number below 130 thousand in 1 mkl)**

- On 100000 thousand population it is 11 sick of this disease, and women suffer it almost twice more often.

Ethiology of TP

- Allocate hereditary and acquired forms of TP
- The acquired arise owing to immune-allergic reactions, a radioactive radiation, toxic influence (including medical products)

Pathogenesis

- Basic element of pathogenesis of TP is sharp shortening of life expectancy of thrombocytes - till several hours instead of 7-1O days.

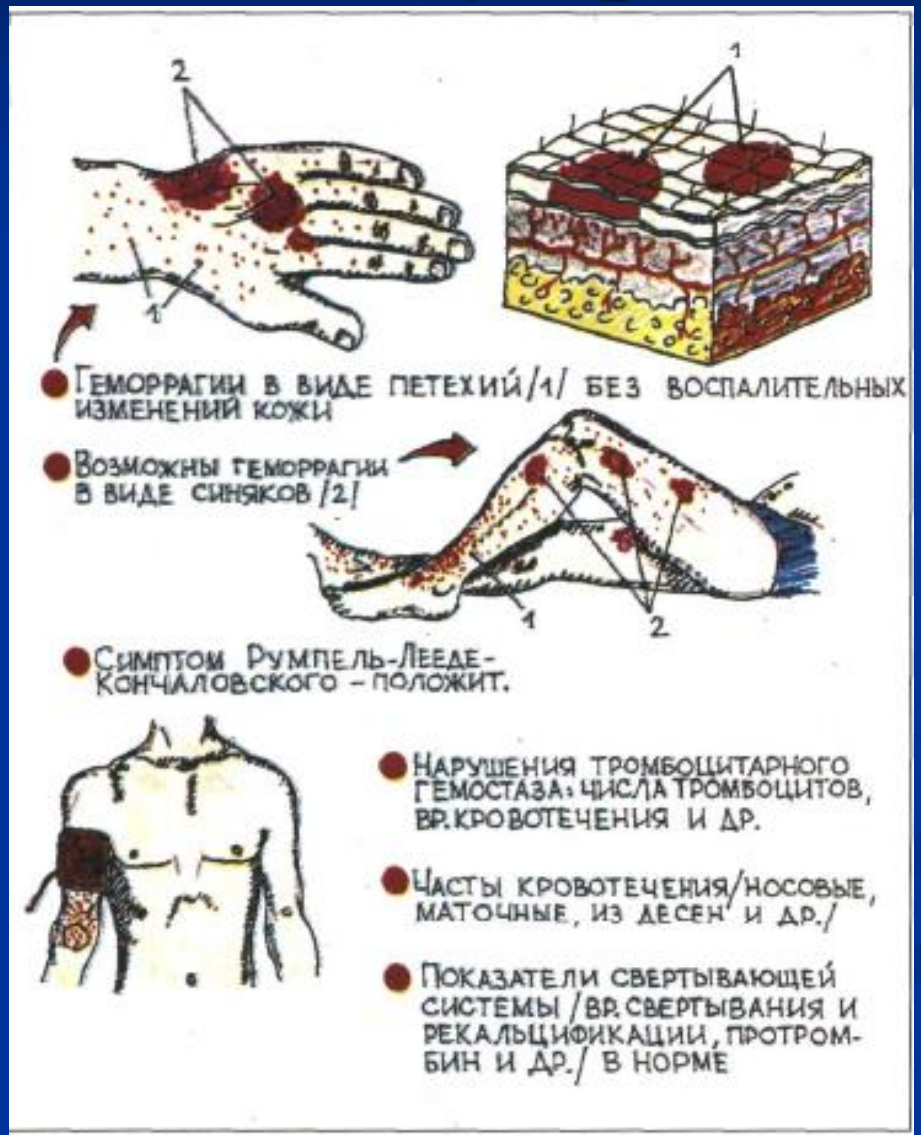
Clinical picture

Complaints are:

1.rise on a skin and mucous membranes plural rashes: in a kind of small dot hemorrhages and the bruises arising spontaneously or under the influence of easy injury and pressure. Thus one hemorrhage disappear, but there are new.

2. Increased hemorrhage of gums
3. Nasal bleedings
4. At women are observed long uteral bleedings.

Hemorrhagic syndrome of thrombocytopenia



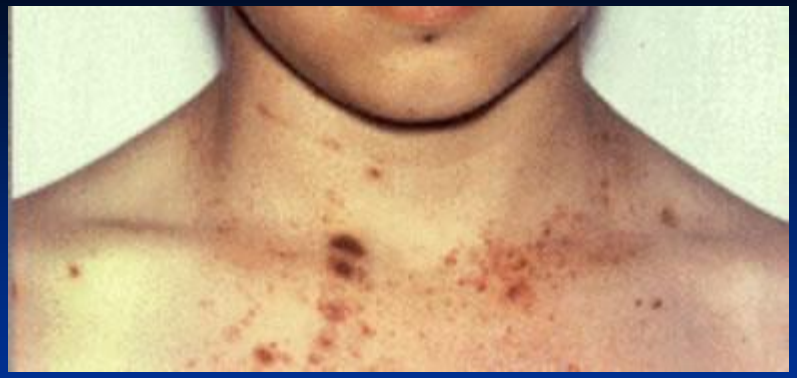
Physical data:

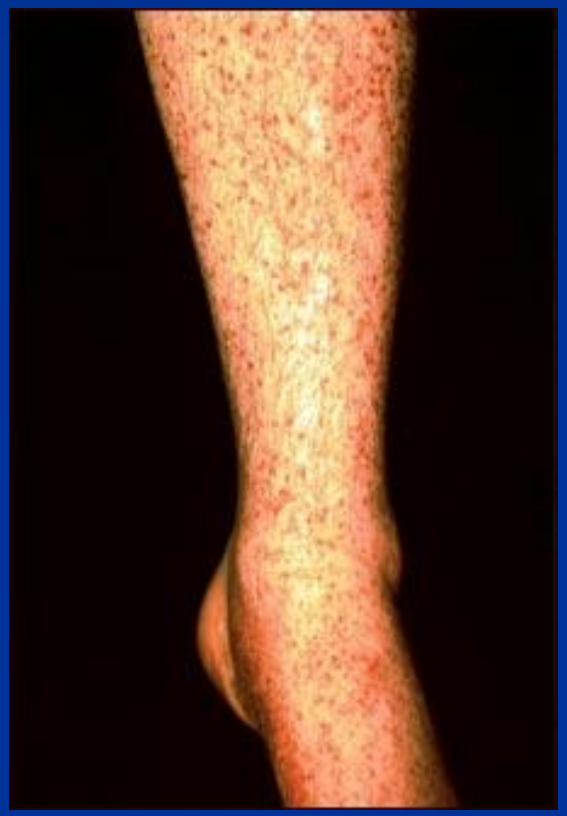
- At the general inspection:

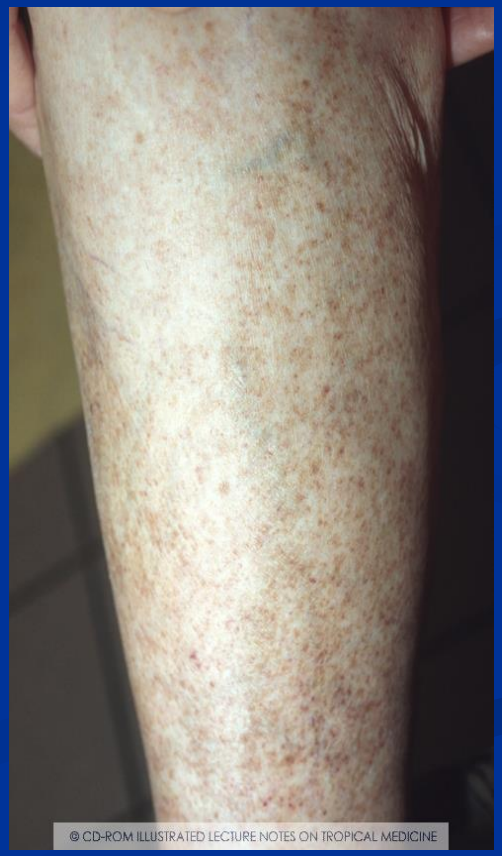
· on a skin are found out hemorrhagic spots of purpupal, cherry-dark blue, brown and yellow color, mainly on a forward surface of a trunk, in places of pressure upon a skin of a belt, braces, garters.

· it is possible to see hemorrhages on the face, conjunctivas, lips, in places of injections.

· petechial rash usually arise on a forward surface of shins.






© CD-ROM ILLUSTRATED LECTURE NOTES ON TROPICAL MEDICINE

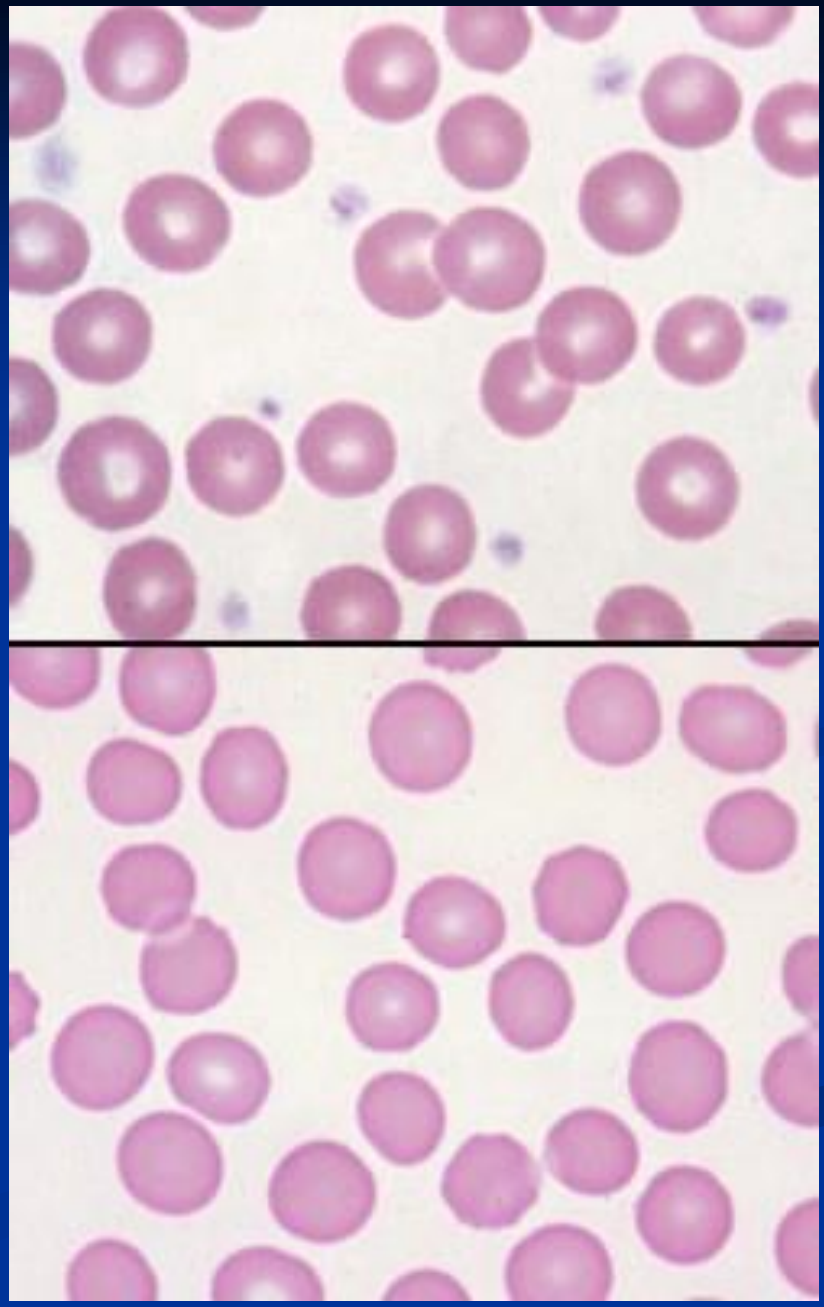
Additional researches

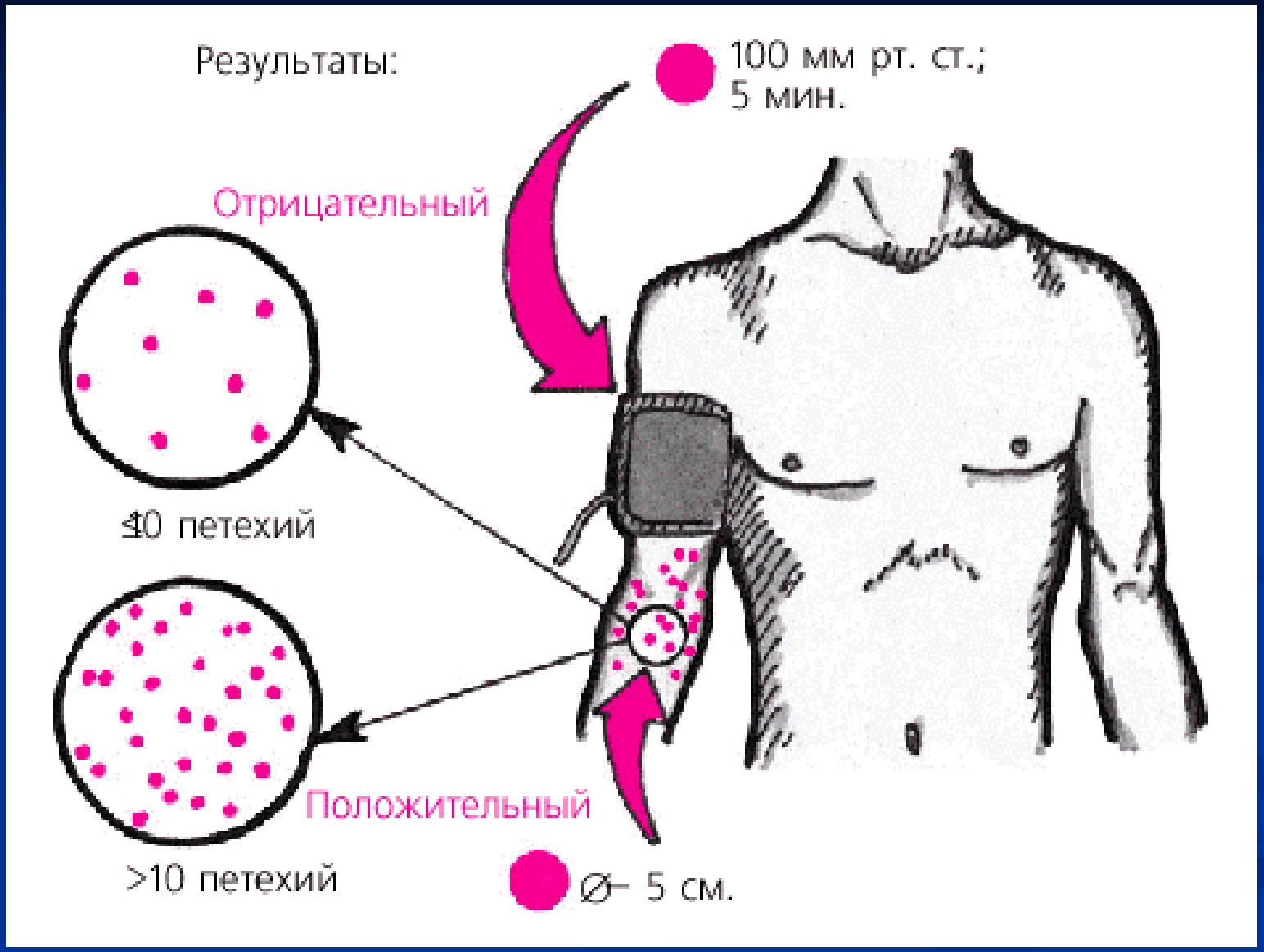
- The main diagnostic sign is the thrombocytopenia
- Infringements of thrombocytes functional activity in the form of reduction of their adhesion and aggregation are observed
- Less often – post hemorrhagic anemia
- Bleeding time after Duke happens is extended
- Positive test with a tourniquet

Amount of thrombocytes in blood smear:

NORM →

Thrombocytopenia →




Результаты:
100 мм рт. ст.;
5 мин.
Отрицательный
≤10 петехий
>10 петехий
Положительный
∅– 5 см.

Coagulopathy

Happen hereditary and acquired

- The hereditary:

  Hemophilia A (83 - 90 %)

  Hemophilia B

  Hemophilia *C*

  Lack of the factor of Hageman

  Illness of Willebrand

- The acquired:

  Infectious diseases

  Mechanical jaundices

  Diseases of liver

  Illnesses of kidneys

  Mieloproliferative diseases

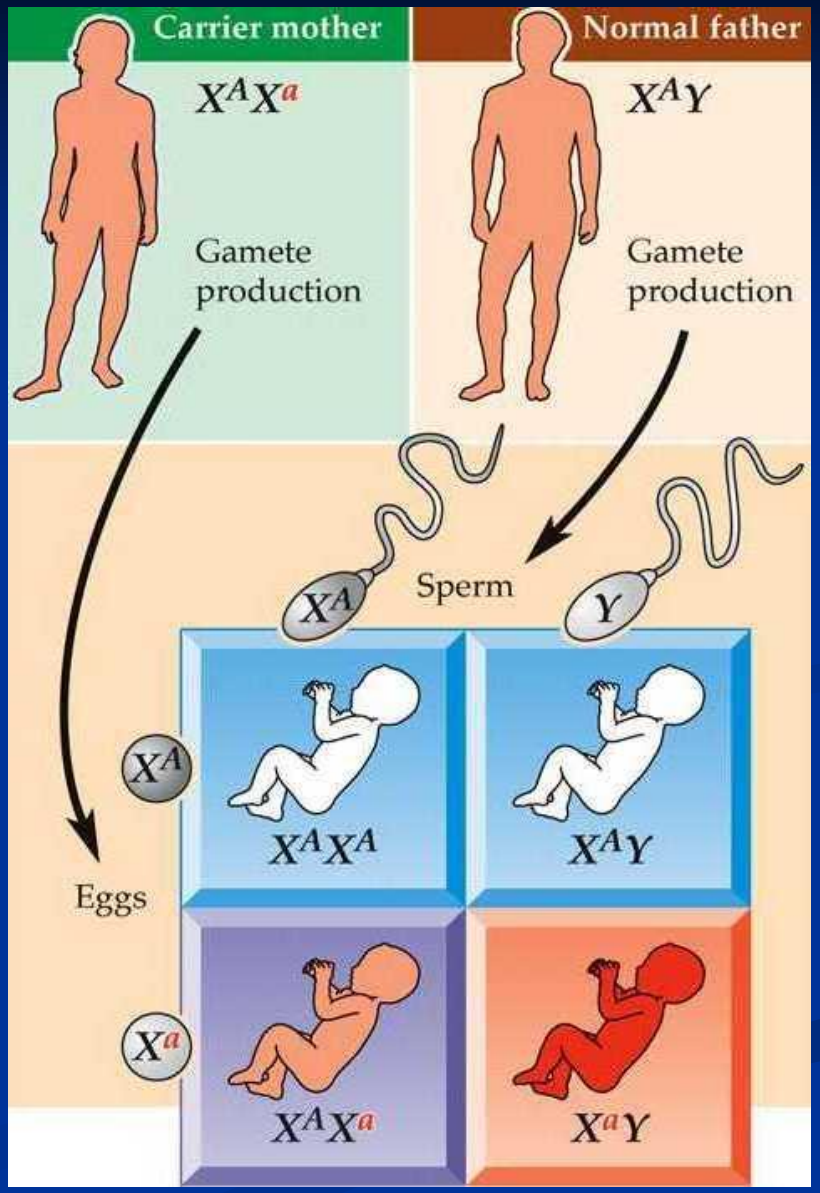
  DIC-syndrome

  Medicamentous

Hemophilia

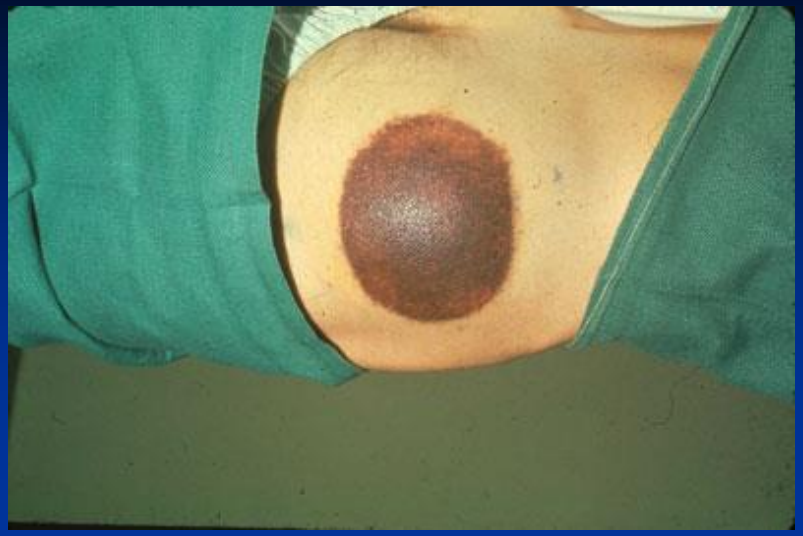
- It is sharply reduced amount of antihemophylic globulin (VII) - a hemophilia A, or IX factor – hemophilia B. Inherit linked to a sex with the X-chromosome, hemophilia C – XI factor
- **Frequency of a hemophilia A makes 12—16 on 100000, hemophilia B — 1,0—1,5 on 100000 man's population.**

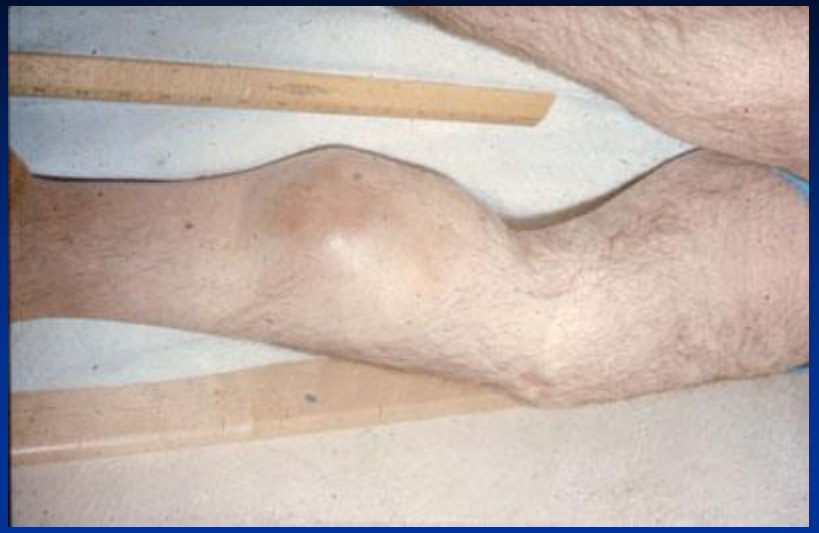
- Hemophilia A and B are inherited on the type linked to a sex, i.e. transfer diseases of the woman, and the males who have received from mothers pathologically changed X-chromosome are ill of hemophilia. On a female line disease can be transferred in the latent form throughout many generations

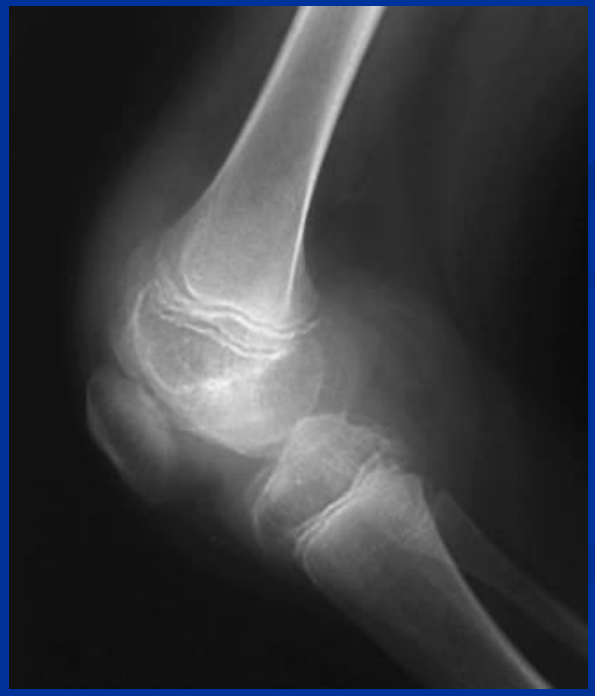


Clinic

- **Hematomas type of hemorrhage -** deep, intense and painful hemorrhages in soft tissues (subcutaneous cellular tissue, muscles, under fascias), in large basic joints. Because of repeating hemorrhages heavy destructive arthroses, an osteoporosis develop in joints and polycystosis, osteoporosis of bones (it is frequent with intra- and extraarthicular fractures), contractures, fibrous ancylosis, atrophies of muscles of extremities, which lead to invalids of patient.







Diagnostics

- **Lee-White time enlargement**
- **Lengthening of activated partial thromboplastine time (APTT)**
- Quantity of thrombocytes – in norm
- Duration of a bleeding after Duke – in norm
- Tourniquet test - negative

- The hemophilia diagnosis is based on the data of the genetic anamnesis (the inheritance linked to a male)
- Clinical picture
- Laboratory researches (indicators of coagulogram)

Treatment

- At a bleeding intravenously enter the concentrated preparations of factors of a coagulation:
- At a hemophilia A — cryoprecipitate, concentrate of VIII factor of coagulation, at their absence — i.v. quickly fresh or fresh-frozen plasma;
- At a hemophilia B — complex of concentrate II, VII, IX, X coagulation factors and also plasma
- At gastroenteric and other bleedings use aminocapron acid (till 8-12 g per day)

Anemias.

Anaemia

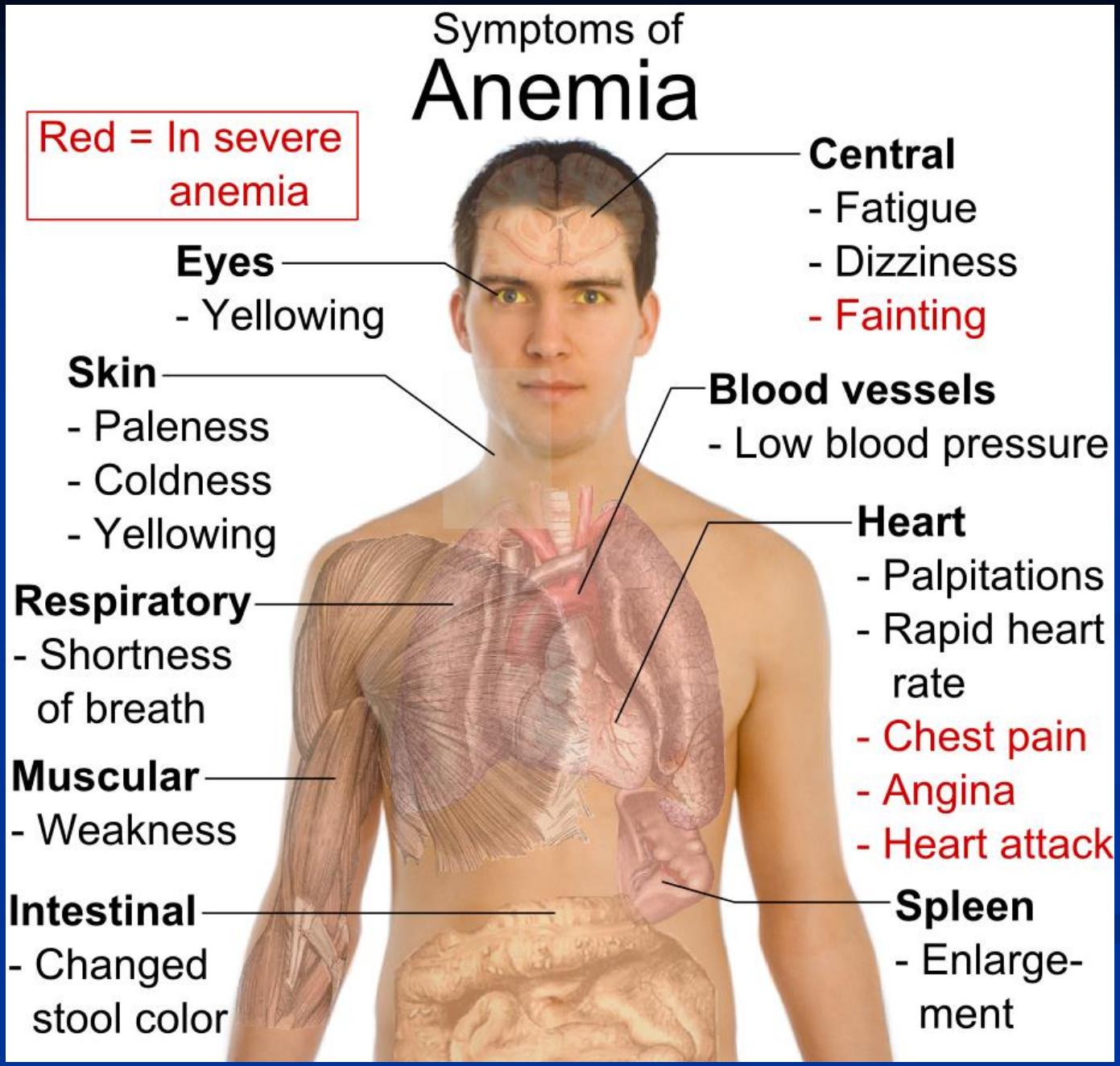
•- is a blood disease of erythrocytes quantity or their hemoglobin saturation

•- in the peripheral blood can appear erythrocytes of different size (poikilocytosis, poikilocythemia), different shape (anisocytosis),

•- different level of colouring (hyperchromatism and hypochromatism),

•- erythrocytes with inclusions (Jolli's corpuscles, Kabo's rings),

•-nuclear erythrocytes (erythroblasts, normoblasts, megaloblasts).


Symptoms of
Anemia
Red = In severe anemia
Central
- Fatigue
- Dizziness
- Fainting
Eyes
- Yellowing
Skin
- Paleness
- Coldness
- Yellowing
Blood vessels
- Low blood pressure
Heart
- Palpitations
- Rapid heart rate
- Chest pain
- Angina
- Heart attack
Respiratory
- Shortness of breath
Muscular
- Weakness
Intestinal
- Changed stool color
Spleen
- Enlarge-ment

Syndrome of anemia

Chief complains:

- Weakness
- Fatigue
- Vertigo
- Exertion dyspnoe
- Palpitation
- Loss of work capacity
- Poor appetite
- Fever (sub febrile)
- Perverted taste – eats chalk, earth, coal etc.
- Olfaction changes – like strong smells (petrol etc.)

General appearance of p-t of Fe^{++} deficiency anemia

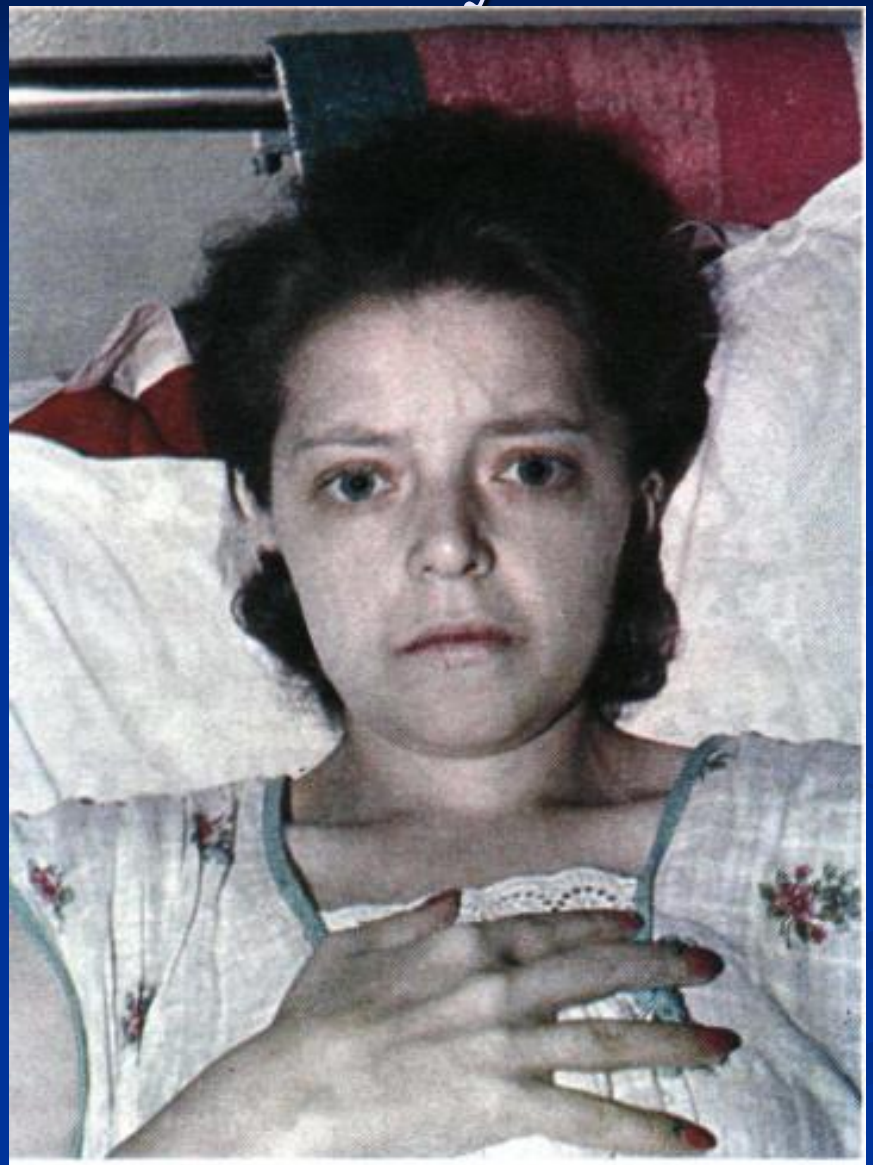
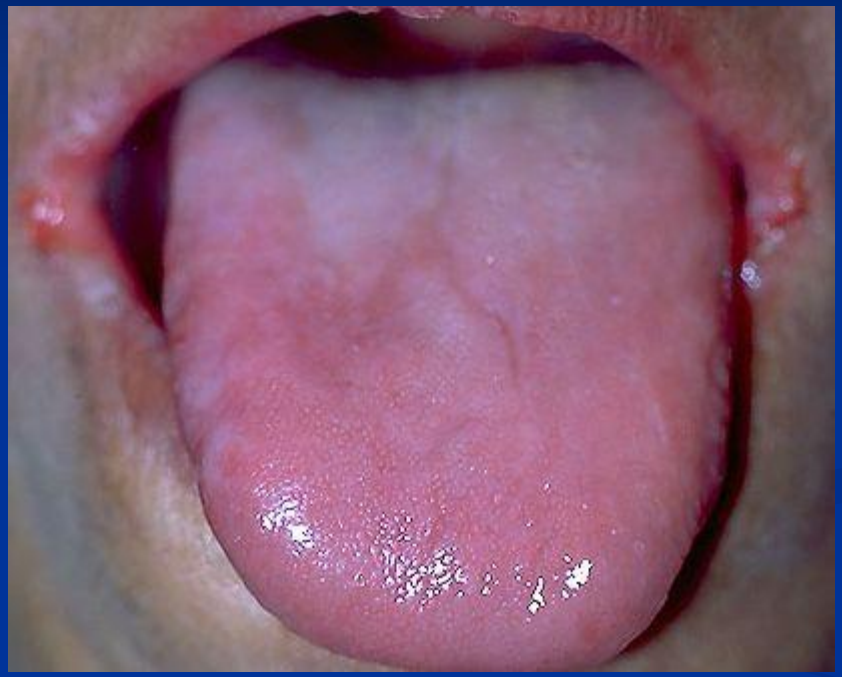
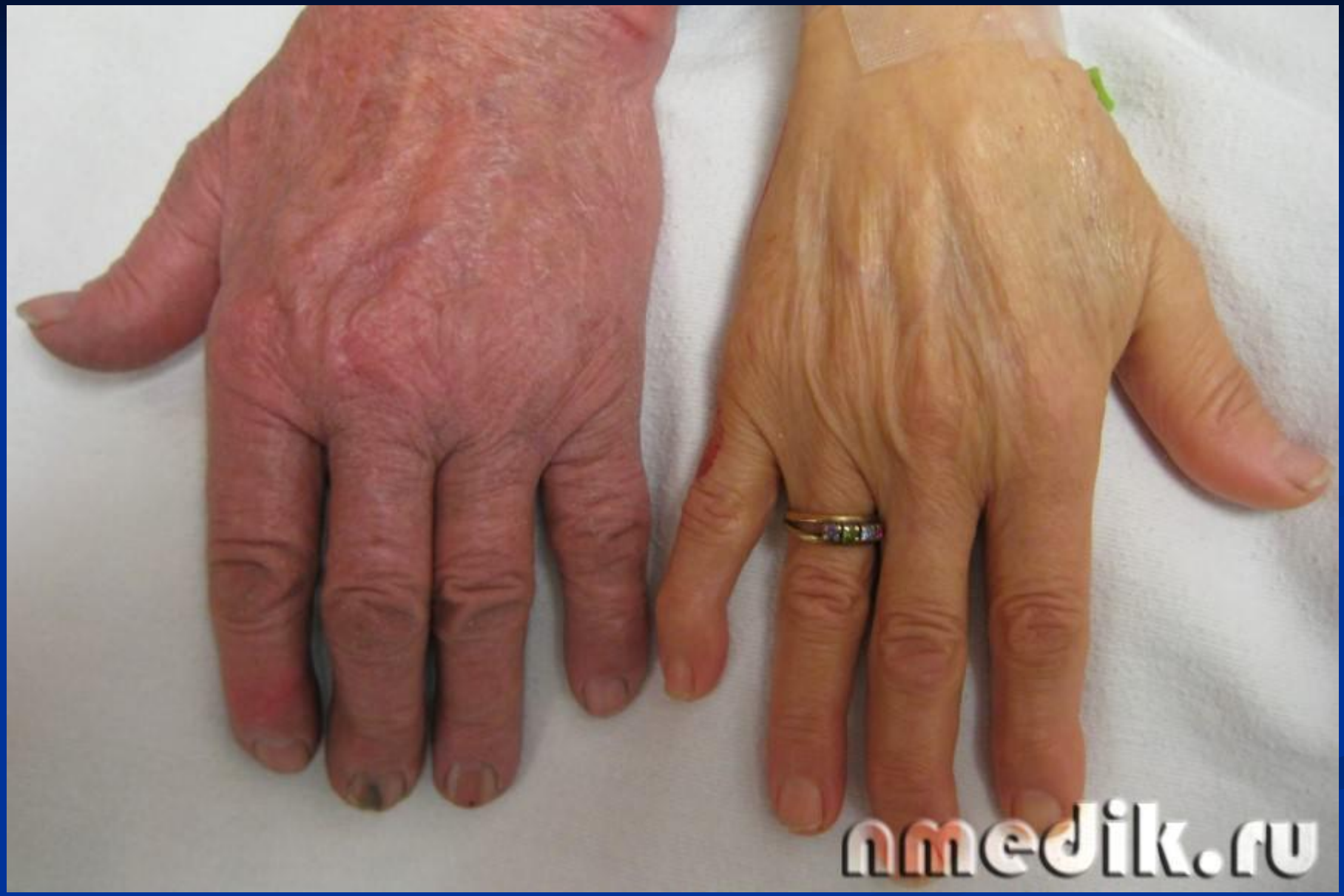
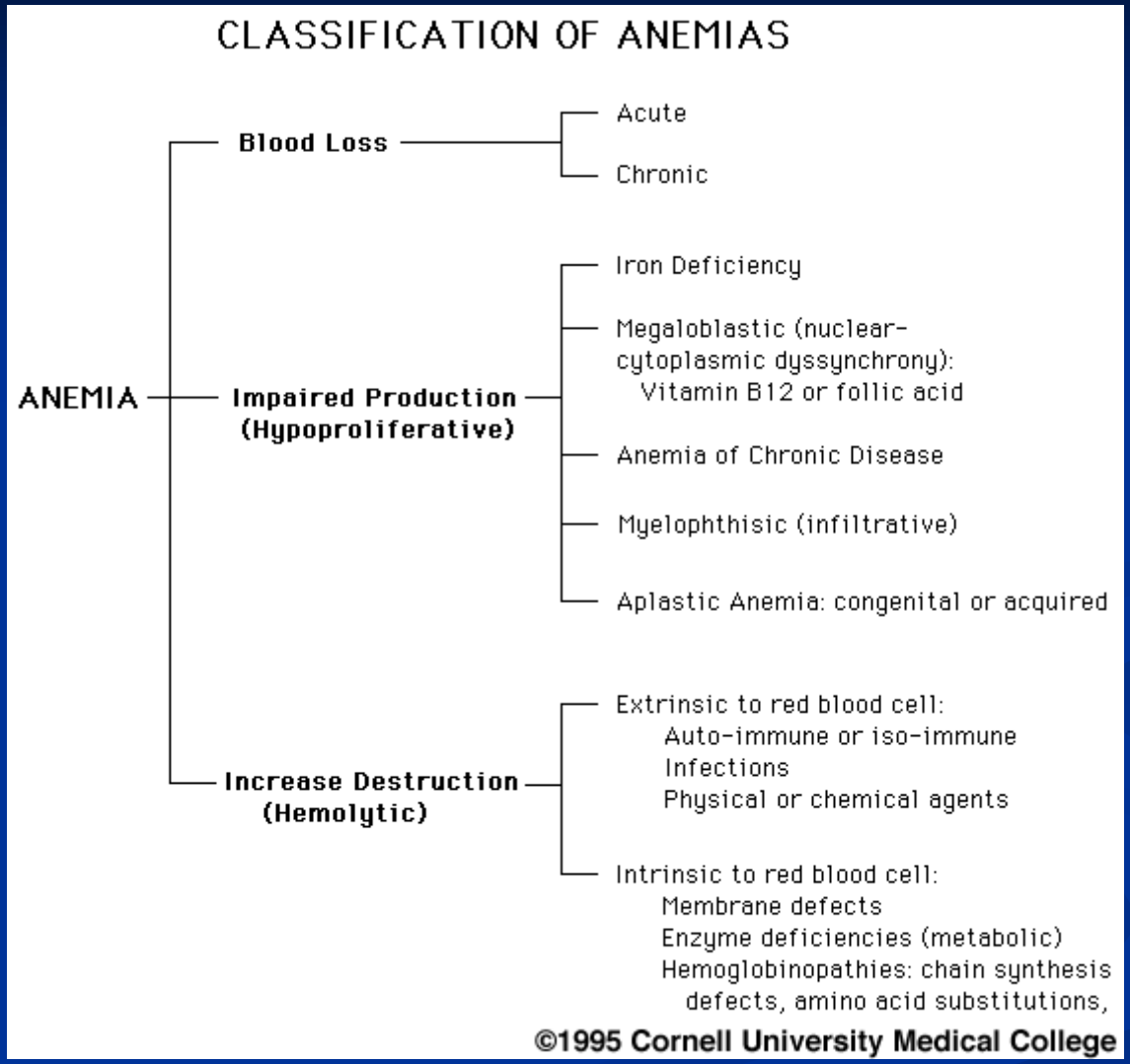


Рис. 6.7. Внешний вид больной с железодефицитной анемией.




nmedik.ru


MedUniver.com
все по медицине...


CLASSIFICATION OF ANEMIAS
ANEMIA
Blood Loss
Acute
Chronic
Impaired Production
(Hypoproliferative)
Iron Deficiency
Megaloblastic (nuclear-
cytoplasmic dyssynchrony):
Vitamin B12 or follic acid
Anemia of Chronic Disease
Myelophthisic (infiltrative)
Aplastic Anemia: congenital or acquired
Increase Destruction
(Hemolytic)
Extrinsic to red blood cell:
Auto-immune or iso-immune
Infections
Physical or chemical agents
Intrinsic to red blood cell:
Membrane defects
Enzyme deficiencies (metabolic)
Hemoglobinopathies: chain synthesis
defects, amino acid substitutions,
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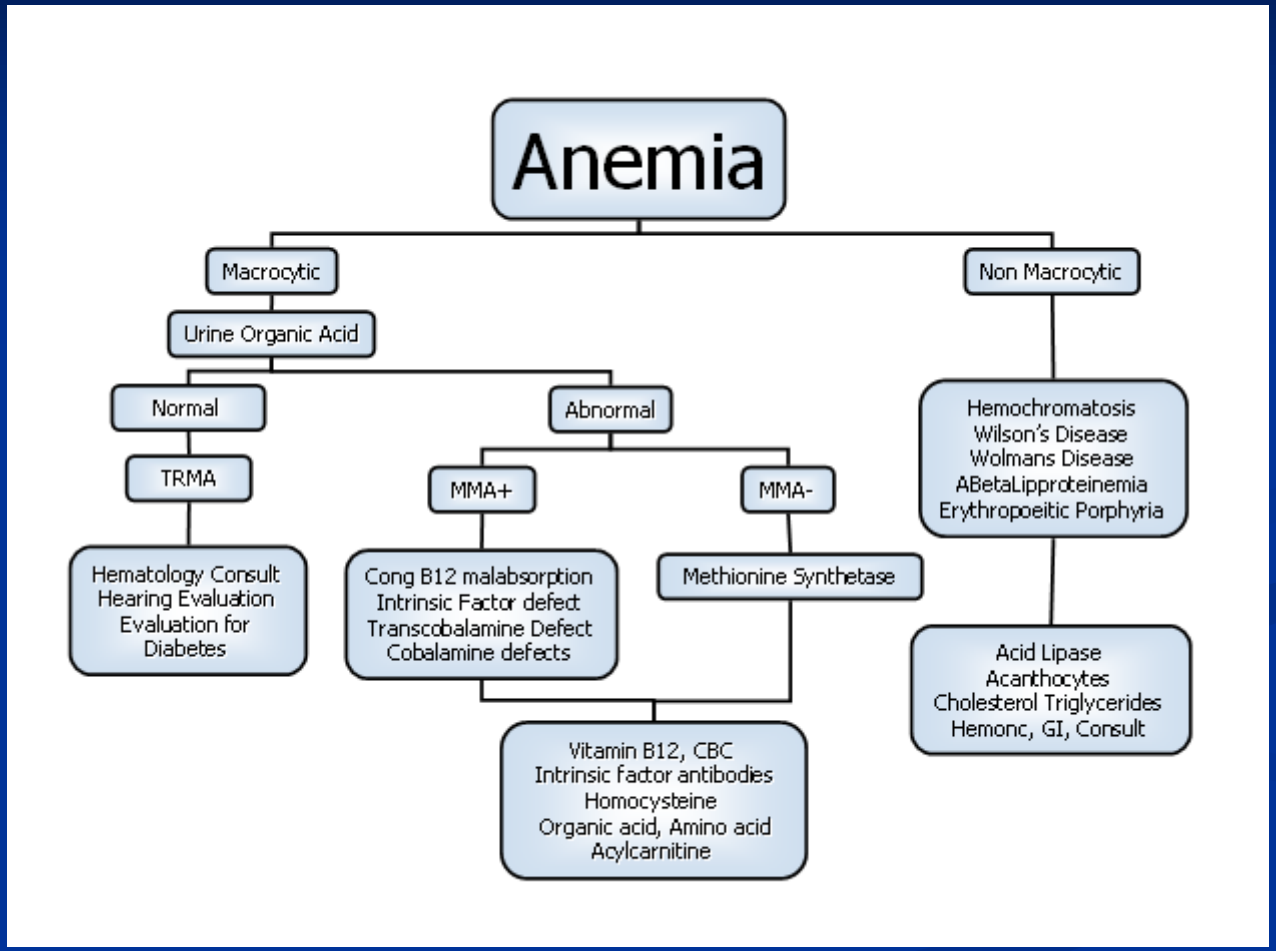

Anemia
Macrocytic
Non Macrocytic
Urine Organic Acid
Normal
Abnormal
TRMA
MMA+
MMA-
Hemochromatosis
Wilson's Disease
Wolmans Disease
ABetaLipproteinemia
Erythropoeitic Porphyria
Hematology Consult
Hearing Evaluation
Evaluation for
Diabetes
Cong B12 malabsorption
Intrinsic Factor defect
Transcobalamine Defect
Cobalamine defects
Methionine Synthetase
Acid Lipase
Acanthocytes
Cholesterol Triglycerides
Hemonc, GI, Consult
Vitamin B12, CBC
Intrinsic factor antibodies
Homocysteine
Organic acid, Amino acid
Acylcarnitine

Classification of Anemia According to Underlying Mechanism

- ***Blood Loss***
- ***Increased Rate of Destruction (Hemolytic Anemias)***
- ***Impaired Red Cell Production***

•***Blood Loss***

- Acute: trauma
- Chronic: lesions of gastrointestinal tract, gynecologic disturbances

•***Increased Rate of Destruction (Hemolytic Anemias)***

•Intrinsic (intracorpuscular) abnormalities of red cells

•••*Hereditary*

•••Red cell membrane disorders

•••••Disorders of membrane cytoskeleton: spherocytosis, elliptocytosis

•••••Disorders of lipid synthesis: selective increase in membrane lecithin

•••Red cell enzyme deficiencies

•••••Glycolytic enzymes: pyruvate kinase deficiency, hexokinase deficiency

•***Increased Rate of Destruction (Hemolytic Anemias) 2***

••••Enzymes of hexose monophosphate shunt: G6PD, glutathione synthetase

•••Disorders of hemoglobin synthesis

•••••Deficient globin synthesis: thalassemia syndromes

•••••Structurally abnormal globin synthesis (hemoglobinopathies): sickle cell anemia, unstable hemoglobins

•••*Acquired*

•••Membrane defect: paroxysmal nocturnal hemoglobinuria

Increased Rate of Destruction (Hemolytic Anemias) 3

•••Antibody mediated

•Extrinsic (extracorpuscular) abnormalities

•••••Isohemagglutinins: transfusion reactions, erythroblastosis fetalis

•••••Autoantibodies: idiopathic (primary), drug-associated, systemic lupus erythematosus, malignant neoplasms, mycoplasmal infection

•••Mechanical trauma to red cells

•***Impaired Red Cell Production***

•A Disturbance of proliferation and differentiation of stem cells: aplastic anemia, pure red cell aplasia, anemia of renal failure, anemia of endocrine disorders

•B Disturbance of proliferation and maturation of erythroblasts

•1 Defective DNA synthesis: deficiency or impaired use of vitamin B12 and folic acid (megaloblastic anemias)

•2 Defective hemoglobin synthesis

•••••Deficient heme synthesis: iron deficiency

•••••Deficient globin synthesis: thalassemias

•3 Unknown or multiple mechanisms:

• sideroblastic anemia,

•anemia of chronic infections,

•myelophthisic anemias due to marrow infiltrations

•(normocytic, microcytic, or macrocytic);

• degree of hemoglobinization, reflected in the color of red cells (normochromic or hypochromic); and other special features, such as shape.

•These red cell indices are often judged qualitatively by physicians, but precise quantitation is done in clinical laboratories using special instrumentation.

Microangiopathic hemolytic anemias: thrombotic thrombocytopenic purpura, disseminated intravascular coagulation

•••••Cardiac traumatic hemolytic anemia

•••Infections: malaria, hookworm

•••Chemical injury: lead poisoning

•••Sequestration in mononuclear phagocyte system: hypersplenism

•The most useful red cell indices are as
•follows:
•• *Mean cell volume:* the average volume of a red blood cell, expressed in femtoliters (cubic micrometers)
•• *Mean cell hemoglobin:* the average content (mass) of hemoglobin per red blood cell, expressed in picograms

•• *Mean cell hemoglobin concentration:* the average concentration of hemoglobin in a given volume of packed red blood cells, expressed in grams per deciliter
Howell-Jolly bodies
•There is also a nucleated RBC just beneath this RBC. Abnormal and aged RBC's are typically removed by the spleen. The appearance of increased poikilocytosis, anisocytosis,

•The size of many of these RBC's is quite small, with lack of the central zone of pallor. These RBC's are spherocytes. In hereditary spherocytosis, there is a lack of spectrin, a key RBC cytoskeletal membrane protein. This produces membrane instability that forces the cell to the smallest volume--a sphere. In the laboratory, this is shown by increased osmotic fragility. The spherocytes do not survive as long as normal RBC's.

Posthemorrhagic anaemia

•develops as a result of hemorrhage

•-of the stomach or bowels vessels under the ulcer or tumouric affection,
•-of uterine tube rupture under the extrauterine pregnancy,
•-of aortic rupture,
•-of lung vessels fret under tuberculosis, and others.

Anaemia as a result of hematosis disturbance

•develops under

•- the deficiency of iron,

•- the deficiency of B-12 vitamin, folic acid.

•To this type hypo- and aplastic anaemias are numbered.

Asiderotic (iron-deficiency) anaemia

•is always hypochromic and
•develops under the poor arrival of iron into the organism with food.
•Such anaemias are common among children,
•and also under intense need of iron while pregnancy, female juvenile or climacteric chlorosis.
•This anaemia can appear under the stomach, bowels diseases, especially after their resection.

- **The most common cause for a hypochromic microcytic anemia is iron deficiency. The most common nutritional deficiency is lack of dietary iron. Thus, iron deficiency anemia is common. Persons most at risk are children and women in reproductive years (from menstrual blood loss and from pregnancy).**

•Synonyms of B-12 and folicdeficient anaemias:

•megaloblastic anemia
•hyperchromatism anemia,

•pernicious (Biermer's, Biermer-Ehrlich) anemia
Megaloblastic anemia
• A peripheral blood smear shows a hypersegmented neutrophil with a six-lobed nucleus

Causes of Megaloblastic Anemia 1

- ***Vitamin B12 Deficiency***
- Decreased intake
  - Inadequate diet, vegetarianism
- Impaired absorption
  - Intrinsic factor deficiency
    - Pernicious anemia
    - Gastrectomy
  - Malabsorption states
  - Diffuse intestinal disease, e.g., lymphoma, systemic sclerosis
  - Ileal resection, ileitis

  - Competitive parasitic uptake
    - Fish tapeworm infestation
  - Bacterial overgrowth in blind loops and diverticula of bowel
- Increased requirement
  - Pregnancy, hyperthyroidism, disseminated cancer

Causes of Megaloblastic Anemia 2

•Folic Acid Deficiency

•Decreased intake
•••Inadequate diet—alcoholism, infancy
•Impaired absorption
•••Malabsorption states
•••Intrinsic intestinal disease
•••Anticonvulsants, oral contraceptives
•Increased loss
•••Hemodialysis
•Increased requirement
•••Pregnancy, infancy, disseminated cancer, markedly increased hematopoiesis
•Impaired use
•••Folic acid antagonists

Causes of Megaloblastic Anemia 3

•Unresponsive to Vitamin B12 or Folic Acid Therapy

•Metabolic inhibitors of DNA synthesis and/or folate metabolism, e.g., methotrexate
Megaloblastic anemia
•(bone marrow aspirate). Megaloblasts in various stages of differentiation. Note that the orthochromatic megaloblast is hemoglobinized (as •revealed by cytoplasmic color), but in contrast to normal orthochromatic normoblasts, the nucleus is not pyknotic. The granulocytic precursors are also large and have abnormally
•"immature" chromatin.

B-12 and folicdeficient anaemias

•Pathogenesis of B-12 and folicdeficient anaemias

• are characterized by erythrogenesis destruction and

• appear under food B-12 vitamin disturbance in the stomach, which is observed under its diseases, when gastromucoprotein secretion prolapse is met.

•Such changes can be of hereditary origin or autoimmune genesis.

B-12 and folicdeficient anaemias

•Aetiology

•Under the lymphogranulomatosis,
•polyposis,
• syphilis,
•corrosive (necrotic, (toxico) chemical) gastritis,
• malignant growths of stomach,
• after the stomach, bowels resections there can appear perniciouslike anaemias. The cause of such anaemia can be exogenous deficiency of B-12 vitamin or folic acid of children fed on goat's milk.

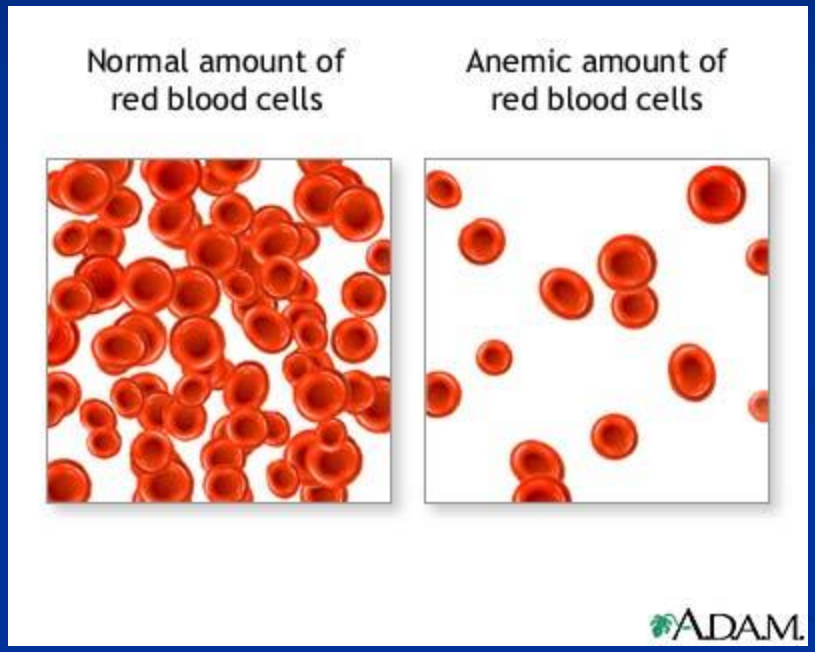
B-12 and folicdeficient anaemias

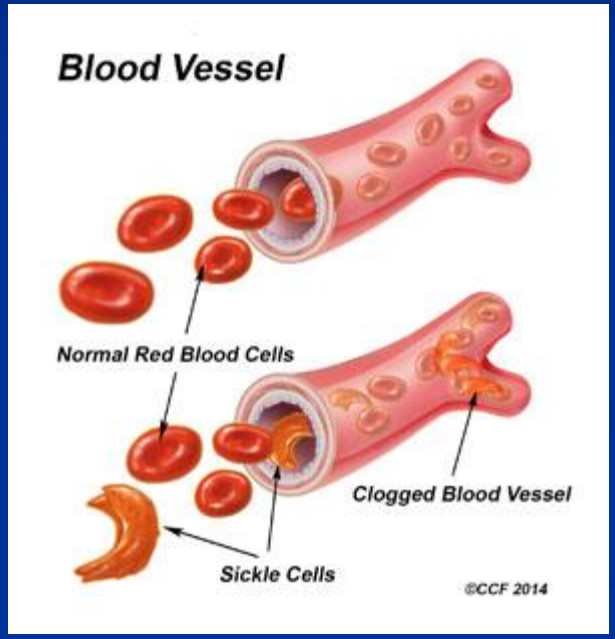
•Morphology

•The pathomorphologic manifestations of this anaemia are as next: liver, spleen, kidney *hemosiderosis*,
• *fatty degeneration* of parenchymatous organs,
•general obesity,
• bleach lemon-tinged skin,
•small *hemorrhages* in mucous, serous tunics and skin.
•In gastrointestinal tract there are *atrophic and sclerotic* changes,
• the marrow turns to raspberry-red with the predominance of erythroblasts, normoblasts, and megacaryoblasts.
•In lateral and posterior (dorsal) columns of spinal cord there is *funicular myelosis*, in the brain there are the centres of encephalomalacia and ischemia.

•*Extravascular (intracellular) anaemia* is mostly of inherited origin and divides into
•--erythrocytopathy,
•--erythrocytoenzymopathy and
•--hemoglobinopathy


СТРУКТУРА КРОВИ ЧЕЛОВЕКА С ЖЕЛЕЗОДЕФИЦИТНОЙ АНЕМИЕЙ
Красные кровяные тельца, эритроциты, с помощью содержащегося в них гемоглобина обеспечивают органы и ткани тела кислородом, необходимым для их функционирования.
Поскольку гемоглобин ответственен за красный цвет крови, при анемии красные кровяные тельца, а, следовательно, и кровь приобретают более светлый оттенок.
Кровь, бедная эритроцитами и гемоглобином, транспортирует недостаточное количество кислорода.
Гемоглобин, за счет содержащихся в нем атомов железа, притягивает молекулы кислорода.
Кислород


Normal amount of red blood cells
Anemic amount of red blood cells
A.D.A.M.


Blood Vessel
Normal Red Blood Cells
Clogged Blood Vessel
Sickle Cells
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