**Elaborated by Titica Elena**

**Clinical case 1**

A 65-year-old man, on public transport, loses consciousness after a coughing fit. He is transported by AMU to the Hospital, where he is admitted to the Therapy Department with the fallowing complaints: progressive dyspnea, dry cough, fever, petechiae in the thoracic region and ecchymoses on the abdomen and legs.

**Anamnesis:** chronic bronchitis, recurrent urogenital fungal infections, gingivorrhea after oral hygiene.

**Objective data:** auscultatory harsh breathing, the abdomen is difficult to palpation due to ascites. USG: splenomegaly and hepatomegaly/Radiography: bilateral pneumonia.

Blood smear: Blast cells ↑↑↑; containing azurophilic granules, MPOX test +; Lipid test +; Glycogen test -;

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| **Terminology** | **Results**  **of Patient 1** | **Measurement units** | **Reference values** |
| **Hemoglobin (HGB)** | 88 | g/l | **Man Woman**  **136-172 120-150** |
| **Erythrocytes (RBC)** | 2,5 | x 106/mm3 | **Man Woman**  **4,3-5,9 3,5-5,0** |
| **Hematocrit** | 30 | % | **Man Woman**  **39-49 33-43** |
| **MCV** | 112 | fL | **82 - 96** |
| **MCH** | 39 | pg | **27 - 33** |
| **MCHC** | 34 | g/dl | **33-37** |
| **RDW** | 16 |  | **11.5 – 14.5** |
| **Reticulocytes** | 2 | % promiles | **5 - 10** |
| **Trombocytes** | 120 | x 103/μL | **150-450** |
| **Trombotocrit** | 0,8 | mL/L | **1.08-2.82** |
| **Leucocytes** | 200000 | leucocyte/mm3 | **6000-8000 leucocyte/mm3** |
| *Leukocyte formula* |  |  |  |
| **Neutrophyls:**  Myeloblasts | 64 | % | **0** |
| Promyelocytes  Myelocytes | 0  0 | %  % | **0**  **0** |
| Metamyelocytes | 0 | % | **0** |
| Nonsegmented | 3 | % | **1-6** |
| Segmented | 16 | % | **47-72** |
| **Eosinophyls** | 2 | % | **0.5-5** |
| **Basophyls** | 1 | % | **0-1** |
| **Lymphocytes** | 10 | % | **25-35** |
| **Monocytes** | 4 | % | **3-11** |

Questions

1. What type of the leukocyte pathology system is attested in the patient and what is the etiological factor of it?

2. What are the differentiating criteria between acute and chronic myeloid leukemia?

3. Progressive dyspnea, attested in the patient, can be a criterion attributed to pulmonary leukostasis. Explain what does leukostasis represents, as a general clinical manifestation in leukemia.

4. List the general clinical manifestations of leukemia, tick which of them are present in the patient.

5. List 3 types of morphological changes that are related to the process of abnormal neutrophil differentiation in the patient as a manifestation of structural atypia in leukemia. Tick the change present in the patient.

6. Explain the pathogenetic mechanism of anemia in the patient.

7. Explain the pathogenetic mechanism of haemorrhagic syndrome in the patient.

A 9-year-old boy, together with his father, adesseses to the family doctor with complaints of: persistent headache, decreased visual acuity, permanent bone pain, enlargement of both testicles not accompanied by fever at the moment. Palpation: generalized symmetrical lymphadenopathy, hepato/splenomegaly.

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| **Terminology** | **Results**  **of Patient 1** | **Measurement units** | **Reference values** |
| **Hemoglobin (HGB)** | 80 | g/l | **Man Woman**  **136-172 120-150** |
| **Erythrocytes (RBC)** | 2,1 | x 106/mm3 | **Man Woman**  **4,3-5,9 3,5-5,0** |
| **Hematocrit** | 30 | % | **Man Woman**  **39-49 33-43** |
| **MCV** | 98 | fL | **82 - 96** |
| **MCH** | 32 | pg | **27 - 33** |
| **MCHC** | 38 | g/dl | **33-37** |
| **RDW** | 15 |  | **11.5 – 14.5** |
| **Reticulocytes** | 2 | % promiles | **5 - 10** |
| **Trombocytes** | 135 | x 103/μL | **150-450** |
| **Trombotocrit** | 0,9 | mL/L | **1.08-2.82** |
| **Leucocytes** | 150000 | leucocyte/mm3 | **6000-8000 leucocyte/mm3** |
| *Leukocyte formula* |  |  |  |
| **Neutrophyls:**  Myeloblasts | 0 | % | **0** |
| Promyelocytes  Myelocytes | 0  0 | %  % | **0**  **0** |
| Metamyelocytes | 0 | % | **0** |
| Nonsegmented | 2 | % | **1-6** |
| Segmented | 28 | % | **47-72** |
| **Eosinophyls** | 2 | % | **0.5-5** |
| **Basophyls** | 0 | % | **0-1** |
| **Lymphoblasts**  **Prolymphocytes**  **Lymphocytes** | 48  0  17 | %  %  % | **0**  **0**  **25-35** |
| **Monocytes** | 3 | % | **3-11** |

Blood smear: morphologically small blast cells, without granules, with little cytoplasm,

PAS reaction + and acid phosphatase reaction +.

Questions:

1. Identify what type of pathological process of the leukocyte system is present in the patient.

2. List the clinical and paraclinical criteria for identifying the pathological process:

3. There are 3 indispensable processes for any type of leukemia present in the given patient: anaplasia, hyperplasia, metaplasia. Give their definition.

4. Explain from a pathogenetic mechanism of the bone pain in a child.

5. What is the pathogenetic mechanism of thrombocytopenia in the patient?

6. Describe the general pathogenesis of acute leukemia.

7. Specify the classification of leukemias depending on the number of leukocytes and blast cells detected in the peripheral blood. To what type is attributed the patient?

A 68-year-old man, goes to his family doctor at the insistence of his wife who noticed that her husband had become jaundiced for about a month. The patient's complaints: permanent feeling of fatigue, lack of appetite and "catches colds" quickly and frequently (recurrent bronchitis and urethritis).

**Objective:** symmetrically enlarged submandibular, cervical, supra/subclavicular, inguinal lymph nodes, soft, painless on palpation. Splenomegaly. Hepatomegaly.

**Immunophenotyping:** Absence of IgM in serum and absence of IgA in urethral secretions; IgG in serum=0.4g/l (<2g/l is already suggestive of immunodeficiency.

**Blood smear:** Gumprecht shadows.

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| **Terminology** | **Results**  **of Patient 1** | **Measurement units** | **Reference values** |
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| **Erythrocytes (RBC)** | 2,1 | x 106/mm3 | **Man Woman**  **4,3-5,9 3,5-5,0** |
| **Hematocrit** | 30 | % | **Man Woman**  **39-49 33-43** |
| **MCV** | 98 | fL | **82 - 96** |
| **MCH** | 32 | pg | **27 - 33** |
| **MCHC** | 38 | g/dl | **33-37** |
| **RDW** | 15 |  | **11.5 – 14.5** |
| **Reticulocytes** | 2 | % promiles | **5 - 10** |
| **Trombocytes** | 135 | x 103/μL | **150-450** |
| **Trombotocrit** | 0,9 | mL/L | **1.08-2.82** |
| **Leucocytes** | 180000 | leucocyte/mm3 | **6000-8000 leucocyte/mm3** |
| *Leukocyte formula* |  |  |  |
| **Neutrophyls:**  Myeloblasts | 0 | % | **0** |
| Promyelocytes  Myelocytes | 0  0 | %  % | **0**  **0** |
| Metamyelocytes | 0 | % | **0** |
| Nonsegmented | 1 | % | **1-6** |
| Segmented | 8 | % | **47-72** |
| **Eosinophyls** | 0 | % | **0.5-5** |
| **Basophyls** | 0 | % | **0-1** |
| **Lymphoblasts**  **Prolymphocytes**  **Lymphocytes** | 3  5  80 | %  %  % | **0**  **0**  **25-35** |
| **Monocytes** | 3 | % | **3-11** |

Questions:

1. Identify what type of pathological process of the leukocyte system is attested in the patient.

2. What is the etiology of this pathological process of the leukocyte series attested in the patient?

3. What are the pathogenetic factors that promotes lymphoblast malignancy?

4. What is the pathogenetic mechanism of recurrent bacterial infections in the patient?

5. Explain what does Gumprecht fingerprints represent?

6. It is known that chronic lymphocytic leukemia can transform into the acute form. The basis of this process is "Tumor Progression". What is this process?

7. What is the pathogenetic mechanism of jaundice in the patient?

**Clinical case 5**

A 45-year-old patient presents to the family doctor with the following complaints: cough with muco-purulent sputum, dyspnoea, fever 38.5○C, chest pain, muscle weakness. The symptoms started several days ago and gradually worsened. On auscultatory examination, the doctor found rales and crackles in the right lung and an increased respiratory rate (24 breaths per minute).

Chest X-ray: lobar pneumonia on the right side, middle lobe.

**Patient's haemogram**

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| **CBC** | **Valori** | **Valori de referință** |
| **Hematocrit** | 45 | **Males** 39-49%  **Females** 35-45% |
| **Hemoglobin** | 15,1 | **Males** 13,6-17,5 g/dL  **Females** 12,0-15,5 g/dL |
| **Eritrocite** | 5,6 | 4,7-6,1 million/cu mm |
| **Number of reticulocytes** | 1,3 | 0,5-1,5% |
| **MCV** | 97 | 80 -100 fL |
| **MCH** | 27 | 26 – 34 pg |
| **MCHC** | 34 | 31 -36 g/dL |
| **Leucocyte** | 15,7 | 4,800–9,000/cumm |
| **Neutrophils** | 72 | 60 -62% |
| Segmented neutrophils | 58 | 40-60% |
| Nonsegmented neutrophils | 10 | 1-6% |
| Metamyelocytes | 4 | 0% |
| Myelocytes | 0 | 0% |
| **Basophiles** | 0 | 0- 1,0%  10 -120/cu mm |
| **Eosinophil** | 3 | 1-4%  4- -500 cu mm |
| **Lymphocyte** | 26 | 25-35%  800 -3,500/cu mm |
| **Monocyte** | 7 | 3-7%  200-800/cu mm |
| **thrombocyte** | 357 | 150,000-450,000/cu mm |
| **Morphological changes of blood cells** |  |  |

1. **What type of pathological process of the leukocyte system is present in the patient? Argue the changes in the haemogram.**
2. **What is the pathogenetic mechanism of this pathological process of the leukocyte system?**
3. **What type of neutrophilia is seen in the patient, with left- or right-sided nuclear deviation? Please justify your answer. What are the types of left-shift neutrophilia?**
4. **What is the main function of migrating neutrophils in the inflammatory focus?**
5. **In severe pneumonia, a leukemoid reaction of the myeloid series may be present in the hemoleucogram. Is this change present in the patient? How is it characterised?**
6. **What is the pathogenetic mechanism of fever in this patient?**
7. **What type of inflammation predominates in the patient (acute or chronic)? Please justify your answer.**