**elaborated by Tacu Lilia**

**Clinical case 1**

The 37-year-old patient presented to the gynaecologist with the following complaints: for several months she has been suffering from intermenstrual bleeding, menorrhagia (heavy bleeding), extreme fatigue and weakness. History: 5 years ago she was diagnosed with ankylosing spondylitis (chronic inflammation of the spinal column), for which she receives specific treatment.

Objective: pronounced pallor, brittle nails and hair, labial commissures and taste paresthesias.

**Patient's haemogram:**

|  |  |  |
| --- | --- | --- |
|  | **VALORILE** | **Valori DE REFERINȚĂ** |
| **Hematocrit** | **32** | **Men 39-49%**  **Women 35-45%** |
| **Hemoglobin** | **9,0** | **Men 13,6-17,5 g/dL**  **Women 12,0-15,5 g/dL** |
| **Eritrocite** | **4,2** | **4,7-6,1 mln/mm3** |
| **Number of reticulocytes** | **0,5** | **0,5-1,5%** |
| **MCV** | **74** | **80 -100 fL** |
| **MCH** | **22** | **26 – 34 pg** |
| **MCHC** | **28** | **31 -36 g/dL** |
| **Leucocyte** | **5,7** | **4,800–9,000/mm3** |
| **Neutrophils** | **60** | **60 -62%** |
| **Basophiles** | **0** | **0- 1,0%**  **10 -120/ mm3** |
| **Eosinophil** | **3** | **1-4%**  **4- -500 mm3** |
| **Lymphocyte** | **32** | **25-35%**  **800 -3,500/ mm3** |
| **Monocyte** | **5** | **3-7%**  **200-800/ mm3** |
| **thrombocyte** | **258** | **150,000-450,000/ mm3** |
| **Morphological changes of blood cells** | **Anisocytosis, poikilocytosis, anulocytosis.** |  |

1. **What type of pathological process of the erythrocyte system is present in the patient? Explain the changes in the haemogram.**
2. **Describe the mechanism of iron absorption in the body.**
3. **What is the pathogenetic mechanism of this pathological process of the erythrocyte system, the etiological factor being metrorrhagia?**
4. **What is the pathogenetic mechanism of this pathological process in the erythrocyte system, the aetiological factor being chronic inflammation?**
5. **What is the pathogenetic mechanism of clinical signs such as brittle nails and hair, labial commissures and taste paresthesias?**
6. **In order to establish the diagnosis of this pathological process of the erythrocyte system, further biochemical tests (serum iron, serum ferritin, transferrin, transferrin saturation serum iron binding capacity (TIBC)) are needed. What are they and how do they change?**
7. **What is anulocytosis and what is the mechanism of this morphological change?**

**Clinical case N 2**

The patient, aged 47, was admitted with the following complaints: asthenia, irritability, unstable walking, headache, dizziness, paraesthesia, diarrhea. From the patient's history - one year ago he underwent gastric resection

Objective: teguments are pale, fissured, bright red tongue (Hunter's glossitis).

**Patient's haemogram:**

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| --- | --- | --- |
| **CBC** | **VALORILE** | **ValuesDE REFERINȚĂ** |
| **Hematocrit** | 35 | **Men** 39-49%  **Women** 35-45% |
| **Hemoglobin** | 11,7 | **Men** 13,6-17,5 g/dL  **Women** 12,0-15,5 g/dL |
| **Eritrocite** | 3,6 | 4,7-6,1 milion/mm3 |
| **Number of reticulocytes** | 0,3 | 0,5-1,5% |
| **MCV** | 114 | 80 -100 fL |
| **MCH** | 38 | 26 – 34 pg |
| **MCHC** | 33 | 31 -36 g/dL |
| **Leucocyte** | 4,6 | 4,800–9,000/cumm |
| **Neutrophils** | 70 | 60 -62% |
| Segmented neutrophils | 65 | 40-60% |
| Nonsegmented neutrophils | 5 | 1-6% |
| Metamyelocytes | 0 | 0% |
| Myelocytes | 0 | 0% |
| **Basophiles** | 0 | 0- 1,0%  10 -120/cu mm |
| **Eosinophil** | 2 | 1-4%  4- -500 cu mm |
| **Lymphocyte** | 25 | 25-35%  800 -3,500/cu mm |
| **Monocyte** | 3 | 3-7%  200-800/cu mm |
| **thrombocyte** | 143 | 150,000-450,000/cu mm |
| **Morphological changes of blood cells** | Anisocytosis, poikilocytosis,  Giant neutrophils with  hypersegmented nuclei, erythrocytes with Cabot rings and Jolli bodies |  |

1. **What pathology of the erythrocyte system is present in this patient and what is the aetiological factor? Explain the haemogram changes.**
2. **What is the mechanism of vitamin malabsorption that caused this anaemia?**
3. **What is the pathogenetic mechanism of this erythrocyte system pathology in this patient?**
4. **The haemogram shows the values of the parameters MCV and MCH. What do these parameters indicate in this patient?**
5. **What is the pathogenetic mechanism of Hunter's glossitis (bright red coloured tongue) (reread by pathogenetic chain)?**
6. **What is the pathogenetic mechanism of diarrhoea in this? (Explain by pathogenetic chain)**
7. **What is the pathogenetic mechanism of neurological signs? (Explain by pathogenetic chain)**

**Clinical case 3**

The patient, 32 years old, presented with the following complaints: general weakness, drowsiness, dizziness. From the history the patient had breast cancer and was undergoing a course of cytostatic treatment.

Objective: marked pallor, petechiae, ecchymosis, gingival and nasal bleeding.

Very frequent develop respiratory infections.

**Patient's haemogram:**

|  |  |  |
| --- | --- | --- |
|  | **VALORILE** | **Valori de referință** |
| **Hematocrit** | 29 | **Men**39-49%  **Women**35-45% |
| **Hemoglobin** | 9,0 | **Men39**13,6-17,5 g/dL  **Women35**12,0-15,5 g/dL |
| **Eritrocite** | 3,1 | 4,7-6,1 million/cu mm |
| **Number of reticulocytes** | 0 | 0,5-1,5% |
| **MCV** | 87 | 80 -100 fL |
| **MCH** | 29 | 26 – 34 pg |
| **MCHC** | 33 | 31 -36 g/dL |
| **Leucocyte** | 2,8 | 4,800–9,000/cumm |
| **Neutrophils** | 30 | 60-62% |
| **Basophiles** | 0 | 0- 1,0%  10 -120/cu mm |
| **Eosinophil** | 0 | 1-4%  4- -500 cu mm |
| **Lymphocyte** | 39 | 25-35%  800 -3,500/cu mm |
| **Monocyte** | 3 | 3-7%  200-800/cu mm |
| **thrombocyte** | 108,000 | 150,000-450,000/cu mm |
| **Morphological changes of blood cells** |  |  |

1. **What pathology of the erythrocyte system is present in this patient and what is the aetiological factor?**
2. **What is the pathogenetic mechanism of this pathology?**
3. **What are the signs of agranulocytosis in the patient's haemogram?**
4. **Identify whether pancytopenia is determined in the patient's laboratory analysis, argue.**
5. **What is the pathogenesis of the clinical signs: petechiae, ecchymoses, gingival and nasal bleeding? (Please summarise by pathogenetic chain)**
6. **What is the pathogenesis of common respiratory infections in this patient? (Please summarise by pathogenetic chain)**
7. **How does the number of lymphocytes in the blood count change, of what type and what is the pathogenetic mechanism of these changes?**

**Clinical case 4**

A 46-year-old man was admitted to the hospital with the following complaints: muscle weakness, dizziness, headache, poor appetite, yellowish skin colour, dark urine. According to the patient, 2 weeks ago he was treated with penicillin antibiotics. Physical examination revealed: jaundice and icteric conjunctivae, a soft abdomen on palpation without pain, rhythmic, sonorous heart sounds; auscultatory lungs - without pathological changes; peripheral lymph nodes - without changes. There was no evidence of hepato- and splenomegaly.

**Biochemical analysis**: total bilirubin - 3.2 mg/dL (N=0.1 - 1.2); conjugated bilirubin - 0.5 mg/dL (N=0.1 - 0.5); unconjugated bilirubin - 2.7 mg/dL (N=0.1 - 0.7); haptoglobin - 18 mg/dL (N=30 - 200);

**Urinalysis:** Hemosiderinuria, haemoglobinuria.

**Patient's haemogram**

|  |  |  |
| --- | --- | --- |
| **CBC** | **VALORILE** | **Valori DE REFERINȚĂ** |
| **Hematocrit** | **29** | **Men39**39-49%  **Women35**35-45% |
| **Hemoglobin** | **9,5** | **Men39**13,6-17,5 g/dL  **Women35**12,0-15,5 g/dL |
| **Eritrocite** | **3,0** | **4,7-6,1 mln/mm3** |
| **Number of reticulocytes** | **3,5** | 0,5-1,5% |
| **MCV** | **87** | 80 -100 fL |
| **MCH** | **32** | 26 – 34 pg |
| **MCHC** | **33** | 31 -36 g/dL |
| **Leucocyte** | **5,7** | 4,800–9,000/cu mm |
| **Neutrophils** | **60** | 60 -62% |
| **Basophiles** | **0** | 0- 1,0%  10 -120/cu mm |
| **Eosinophil** | **4** | 1-4%  4- -500 cu mm |
| **Lymphocyte** | **31** | 25-35%  800 -3,500/cu mm |
| **Monocyte** | **5** | 3-7%  200-800/cu mm |
| **thrombocyte** | **278,000** | 150,000-450,000/cu mm |
| **Morphological changes of blood cells** |  |  |

**1. What type of pathological process of the erythrocyte system is present in the patient? Argue by changes in the haemogram.**

**2. What type of haemolytic anaemia is present in this patient? What are the distinguishing features between congenital and acquired haemolytic anaemia?**

**3. What is the pathogenetic mechanism of anaemia in the given patient? (Summarise by pathogenetic chain)**

**4. Which parameter indicates that the given anaemia is hyperregenerative and what is the mechanism?**

**5. What explains the elevated total and indirect bilirubin levels? (Summarise by pathogenetic chain)**

**6. What is the role of haptoglobin and how is its reduced level explained?**

**7. What is the mechanism of haemosiderinuria and haemoglobinuria in this patient?**

**Clinical case 5**

The 47-year-old patient was admitted to the haematology ward with the following complaints: general weakness, insomnia, headache, paraesthesia in the fingers, visual disturbances, loss of work capacity, pyrosis and eructation.

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| --- | --- | --- |
| **CBC** | **Valori** | **Valori de referință** |
| **Hematocrit** | 60 | **Males** 39-49%  **Females** 35-45% |
| **Hemoglobin** | 19,9 | **Males** 13,6-17,5 g/dL  **Females** 12,0-15,5 g/dL |
| **Eritrocite** | 9,4 | 4,7-6,1 million/cu mm |
| **Number of reticulocytes** | 3,7 | 0,5-1,5% |
| **MCV** | 75 | 80 -100 fL |
| **MCH** | 24 | 26 – 34 pg |
| **MCHC** | 30 | 31 -36 g/dL |
| **Leucocyte** | 11,500 | 4,800–9,000/cumm |
| **Neutrophils** | 70 | 60 -62% |
| **Basophiles** | 2 | 0- 1,0%  10 -120/cu mm |
| **Eosinophil** | 6 | 1-4%  4- -500 cu mm |
| **Lymphocyte** | 25 | 25-35%  800 -3,500/cu mm |
| **Monocyte** | 3 | 3-7%  200-800/cu mm |
| **thrombocyte** | 570 | 150,000-450,000/cu mm |
| **Morphological changes of blood cells** | **Anisocytosis, poikilocytosis, anulocytosis** |  |
| **EPO** | 2,5 | 4,3 – 29 UI/L |

Objective: Teguments are red-purple in colour. The face is congested, the sclera injected, and on examination of the fundus of the eye, turgescent veins are seen. Blood pressure 160/85 mm Hg. Moderate hepatomegaly, increased blood viscosity.

**Patient's haemogram**

1. **What type of pathological process of the erythrocyte system is present in the patient, absolute or relative? Explain the changes in the haemogram.**
2. **What type of erythrocyte pathological process is present in the patient, absolute primary or absolute secondary? Explain the changes in the haemogram.**
3. **What is the pathogenesis of this pathological process noted in the patient?**
4. **The haemogram shows the values of the parameters MCV, MCH and MCHC. What do these parameters indicate in this patient and what is the pathogenetic mechanism of these changes?**
5. **What is the pathogenetic mechanism of some neurological signs: insomnia, headache, visual disturbances?**
6. **How does blood pressure change and what is the pathogenetic mechanism (replay by pathogenetic chain)?**
7. **What is the pathogenetic mechanism of moderate hepatomegaly?**