ISSUE
33
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QSP Monthly

HORIBA Medical

NEWSLETTER OF THE QUALITY SLIDE PROGRAM

This issue

February Slides

Slide 1
Nothing to report

Slide 2
Macroplatelets

Slide 3
Haematology Unit, Atypical Lymphocytes. Lymphoma like lymphocytes? NHL

Slide 4
See case study opposite

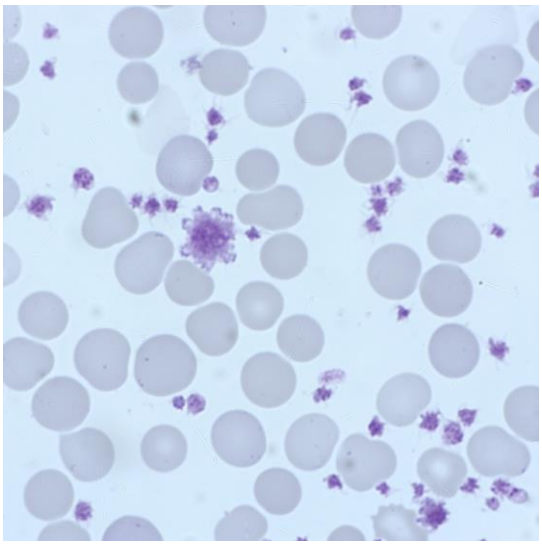
Slide 5
Eosinophilia

Slide 6
Leukocytosis

Monthly Digital Case Study Presentation
February 2023, Slide 4

FBC Results

WBC 25.9 *(10^3/mm3)
RBC 3.28*(10^6/mm3)
HGB 9.4 (g/dL)
HCT 29.9* (%)
MCV 91 (fL)
MCH 28.5 (pg)
MCHC 31.3 (g/dL)
PLT 2721 (10^3/mm3)
Neutrophils 58.8 %
Lymphocytes 29.1 %
Monocytes 7.7 %
Eosinophils 2.6 %
Basophils 0.9 %
Myelocytes 0.9%
Large Platelets 13



Field from RBC section showing numerous platelets, a large platelet and RBC and Platelet anisocytosis

Clinical Details

Female aged 63
Transient ischemic manifestations.

Slide Information

Diagnosis of Essential Thrombocythemia (Cytogenetics: absence of ph chromosome or BCR-ABL rearrangement) Molecular biology: Janus kinase 2 (Jak2) mutation?
Anisocytosis and platelet anisocytosis.

Expert Comment

Appearance of SMP; Either Essential Thrombocythemia (ET) or CML, but the presence of large platelets would suggest ET.

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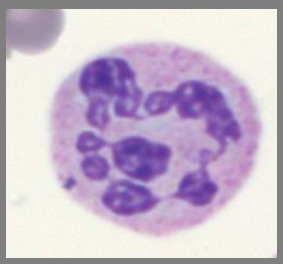
Cell Quiz

What feature is shown in the cell below?

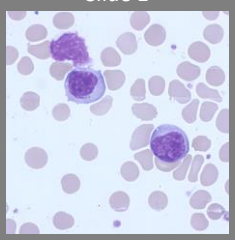


A) Pelger-Huet anomaly
B) Nuetrophil Hypersgementation
C) Neutro Toxic Granulation

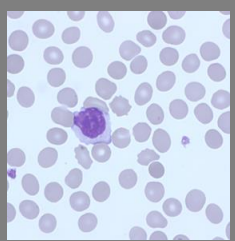
Last Month's Quiz

Look at the haematology results below:
Hb 10.9
WBC 161.1
Platelets 162
Hct 37.1
MCV 110
MCV 110 (fl)
Neutrophil 6.5%
Lymphocyte 93.5%
Which of the slides below would fit with these results?

Slide 1



Slide 2



Right answer: slide 1
Monomorphic hyper lymphocytosis associated with numerous naked nuclei. Expert comment: Aspect of CLL.

Iron Deficiency

Iron is a trace element that is essential for numerous cellular metabolic functions. As iron is toxic, the body must have tight regulation of iron absorption to avoid iron deficiency or iron overload.

In a normal 70kg person, the body iron content is 3.5-4g in females and 4-5g in males. Most of the iron is distributed as follows: 65% in the form of haemoglobin (2300mg), 15% in myoglobin and enzymes, 20% in iron stores and only 1-2% bound to Transferrin. Iron is stored as Ferritin complexes contained in every cell but most commonly in the bone marrow, liver and spleen.

A normal western diet contains approx. 7mg of iron / 1000kCal, only 1-2 mg is normally absorbed each day. Dietary iron is in 2 forms: haem iron (10%) and non haem (90%). Haem iron is found in foods from animals (red meat, chicken, fish). 15%-20% of haem iron is absorbed. Non haem or inorganic iron is found in foods of plant origin, cereals and some foods of animal origin e.g. milk and eggs. Less than 5% of non haem iron is absorbed. Haem is taken up directly by interstitial cells by a process called endocytosis and is the most easily absorbed form of iron. Once in the circulation, iron is bound to Transferrin and transported to the bone marrow for haemoglobin synthesis and incorporation into red cells. The body is able to increase the intestinal iron absorption dependant on the bodies iron requirement.

About 120 days after the red cells enter the circulation, senescent red cells are phagocytised by macrophages in the spleen, liver or bone marrow, and the iron is released to be re used. Recycling of haem iron from senescent red cells is the primary source of iron for erythropoiesis and accounts for delivery of 40-60 mg/day. Some of the recycled iron is stored as ferritin and haemosiderin while the majority of it is released via ferroprotein into the plasma bound to transferrin. Approximately 1-2 mg of iron is lost each day as a result of sloughing of cells. In women, approx. 0.006mg iron/day/kg is lost during normal menstruation. Note that the normal amount lost equals the amount taken in by dietary forms of iron, therefore any imbalance will lead to iron depletion.

Iron deficiency can be caused by either failure to absorb sufficient iron (low dietary intake, malabsorption) or chronic blood loss (from genitourinary, gynaecological, gastrointestinal tract). Iron deficiency is a worldwide problem, particularly in underdeveloped countries with an estimated frequency of 30% of the global population. Iron deficiency anaemia is the most common anaemia.

Iron deficiency develops slowly and can be defined in 3 stages (depletion of stores, iron deficient erythropoiesis, iron deficient anaemia) which progress unless the iron status is returned to normal, either by increase of iron uptake or cessation of chronic blood loss. The classical microcytic hypochromic RBC picture is only seen in the iron deficiency anaemia stage, therefore tests for iron status are crucial in detecting iron deficiency prior to the onset of anaemia.

Laboratory tests for iron status include: serum Ferritin iron stores, total iron binding capacity, transferrin saturation, serum iron, and zinc protoporphyrin.

Clinical picture:

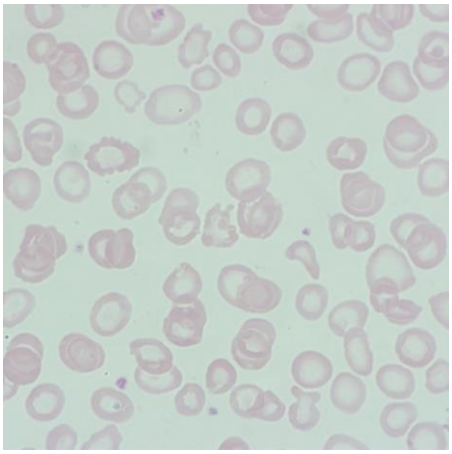
Iron deficiency symptoms are secondary to anaemia and include weakness, headaches, irritability, tinnitus and varying degree of fatigue and exercise intolerance, commissural cheilitis (fissures in the corners of the mouth and koilonychia (spoon nails). Some patients may display signs of pica (craving or eating of non food items e.g. clay, soil, or paper). Ice pica is said to be very specific for iron deficiency states. Restless Leg Syndrome may also be seen.

Haematological Abnormalities:

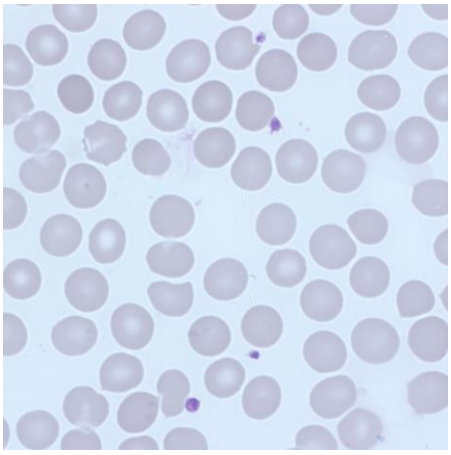
As the iron deficiency progresses, the RDW may increase, indicating the increase in anisocytosis caused by the introduction of smaller red cells (microcytic) into the circulation. Microcytic red cells are produced in the bone marrow due to an extra cellular division before the critical haemoglobin concentration required to stop mitosis is achieved due to the decrease in iron concentration.

Iron Deficiency anaemia must be considered if the Hb, Hct, and MCV is lower than the normal range for that patient. Morphological changes are not usually marked until the Hb falls below 10-11 g/dL when the characteristic features appear (microcytosis, hypochromasia, anisocytosis, and poikilocytosis). The hypochromic cells often have a large area of central pallor. Target cells may be seen, but if seen in numerous numbers, Haemoglobin C or S trait may be considered. Poikilocytoses include elliptocytes, which may be very thin. These are often referred to as pencil cells.

RBC from Iron Deficiency Patient



Normal RBC



The table below shows the laboratory tests in the investigation of iron deficiency:

	Normal	Iron store Depletion	Iron deficient erythropoeisis	Iron deficient anaemia
Bone marrow iron stores	1-3 +	0-1+	0	0
Serum Ferritin mcg/dL	50 - 200	< 20	<15	<15
TIBC mcg/dL	300 - 360	>360	>380	> 400
Serum Iron g/dL	50 - 150		< 50	<30
Seturatiom %	30 - 50		< 20	<10
Protophoryn mcg/dL	30 - 50		> 100	>200
RBC Morphology	Normal	Normal	Normal	Microcytic Hypochromic

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Bibliography

Iron deficiency anaemia; G. Barragan-Ibanex et al; Rev Med Hosp Gen Méx. 2016;79(2):88---97

Diagnosis and management of iron deficiency anaemia in the 21st century; Teeri D Johnson-Wimb;ey et al; Ther Adv Gastroenterol (2011) 4(3) 177184

Editorial Team

Kelly Duffy
Andrew Fisher

About us

HORIBA UK Limited
Kyoto Close
Moulton Park
Northampton, UK
NN3 6FL

HORIBA Medical
Parc Euromédecine, 390
Rue du Caducée, 34790,
France

www.horiba.com/medical

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