

Last Month's Slides

Slide 1

See film review on the right.

Slide 2

No clinical context.
Immunophenotyping of circulating lymphocytes requested.

Slide 3

Polymorphic lymphocyte appearance.

Slide 4

Presence of macroplatelets (PDW at 21 fL).
Expert comments: Nothing to report.

Slide 5

Nothing to report.

Slide 6

Nothing to report.



This issue

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 Monthly Digital Case Study [P.1](#)
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Monthly Digital Case Study Presentation July 2022, Slide 1

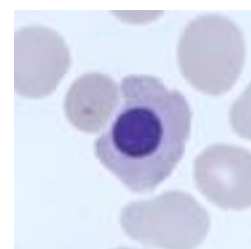
FBC Results

WBC 20.5* ($10^3/\text{mm}^3$)
 RBC 2.6* ($10^6/\text{mm}^3$)
 HGB 7.9* (g/dL)
 HCT 23.7* (%)
 MCV 93 (fL)
 MCH 31.0 (pg)
 MCHC 33.3 (g/dL)
 PLT 27* ($10^3/\text{mm}^3$)
 Neutrophils 84.4 %
 Lymphocytes 0.8 %
 Monocytes 3.4 %
 Eosinophils 0.0 %
 Basophils 0.0 %

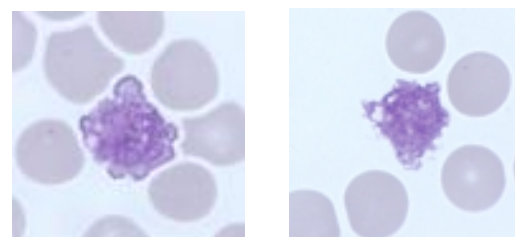
Clinical Haematology unit.
Platelet count monitoring.

Slide Review

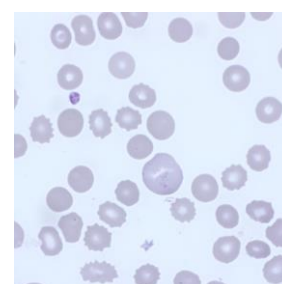
Clinical Haematology unit.
 Platelet count monitoring.
 Anaemia. Anisocytosis (RDWsd at 56 fL).
 Microcytes(+). Macrocytes(+).
 Myelo-erythroblastic.
 Thrombocytopenia.
 Presence of macroplatelets.



Normoblast/Erythroblast



Large Platelets



Anisocytosis

Cell Quiz:



What is the parasite (Field stain)?

- a) P Ovale
- b) Babesia Divergens
- c) P Malariae

Last Month's Cell Quiz



What term best describes the above neutrophil

- a) Hypersegmented
- b) Hypogranular
- c) Pelger Huet form

Answer:

b) Hypogranular. The Neutrophil shows a lack or absence of granules, immature myeloid cells can also be hypogranular or even agranular which can lead to difficulty in correctly identifying the cells correctly. Hypogranular and agranular Neutrophils are associated with Myelodysplasia (MDS).

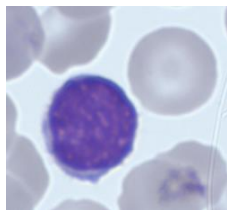
Lymphocytes

The normal range for Lymphocytes is 1.0 to $4.0 \times 10^9/L$ with an estimated 2×10^{12} lymphocytes in the human body which is comparable in cell mass to the liver and brain.

Morphology of normal lymphocytes

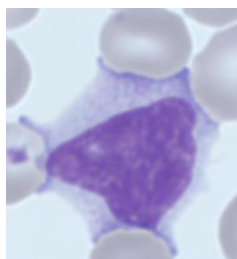
Lymphocytes are mononuclear cells with variable amounts of weakly basophilic cytoplasm.

There are 2 main morphologically different types of Lymphocytes. Small lymphocytes, which are approx. $10-12\mu m$ in diameter have a round or indented nucleus and very scanty cytoplasm. They account for about 90% of the circulating lymphocytes.

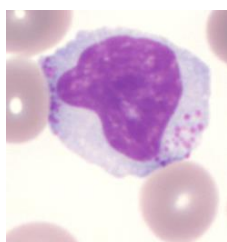


Small Lymphocyte is approximately the same size as a normal red cell and the nucleus has condensed chromatin.

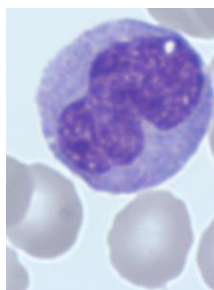
Large Lymphocytes, have a diameter of approx. $12-16\mu m$, have more abundant cytoplasm, and the nuclear chromatin is less condensed and open.



Large lymphocytes may have an irregular outline whereas small lymphocytes tend to have a circular outline.

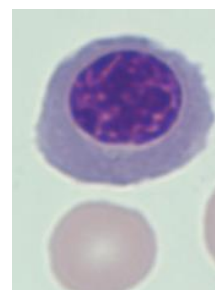


Occasionally a few small azurophilic granules may be seen in the cytoplasm and larger cells may have a dozen, or so, granules. These cells are called **Large Granular Lymphocytes**.



Monocyte

Possible confusion



Nucleated red cell

Monocytes: are significantly larger than lymphocytes with an irregular, often lobulated nucleus. The cytoplasm is greyish blue in appearance.

Nucleated red cells: the nucleus is pyknotic with condensed chromatin, the colour of the cytoplasm is the same as in polychromatic red cells.

Lymphocyte development

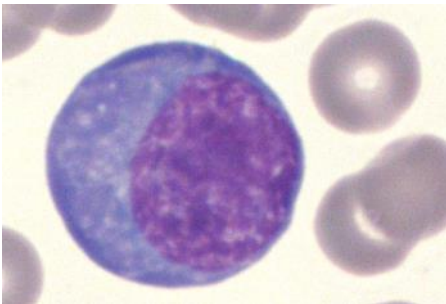
There are 2 main subsets of Lymphocytes: B cells and T cells, depending upon where they develop. B cells develop in the bone marrow, while T cells in the thymus. B and T cells arise from the same pluripotential haemopoietic stem cell. Non-activated B and T cells are morphologically indistinguishable from each other. There is further lymphocyte, known as Natural Killer Cells or NK cell.

Lymphocyte Function

Lymphocytes are essential in the bodies immune system to fight against cancer, foreign viruses, and bacteria. The different types of lymphocytes have their own role to play in the immune system.

B cells

B cells are responsible for the production of antibodies. They have receptors in their surface specific for an individual antigen. When the B cell encounters the specific antigen, it is bound onto the cell surface and activates the cell to either differentiate into a Plasma cell which produces antibodies specific to that antigen or change into memory cells. Plasma cells are larger than normal lymphocytes (14 – 20 um).



Plasma cell

Round or oval with copious amounts of deep blue cytoplasm. The nucleus is often eccentrically placed with coarse chromatin.

T cells

Like B cells, T cells have specific receptors on the membrane of the cell which are antigen specific, but unlike B cells, they do not produce antibodies.

There are 5 different types of T cells, each of which have their own role in the immune system:

- 1) **Cytotoxic T cells:** are responsible for actively searching out and destroying infected cells through the direct action of digestive enzymes.
- 2) **Helper T cells:** are responsible for activation of Cytotoxic T cell, macrophages, and stimulating B Cells to produce antibodies.
- 3) **Regulatory T cells:** suppress the action of B and T cells in order to decrease the immune response when no longer required
- 4) **Natural Killer T Cells:** help in the fight against cancer cells
- 5) **Memory T cells:** are responsible for ensuring that previously encountered antigens are recognised, enabling the immune system to respond more quickly.

NK Cells

NK Cells are the main cells in the innate immune system that are capable of recognising and directly destroying foreign cells e.g. virus or cancer cells.

Bibliography

Alberts B, Johnson A, Lewis J, et al. Molecular Biology of the Cell. 4th edition. New York: Garland Science; 2002. Lymphocytes and the Cellular Basis of Adaptive Immunity. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK26921/>

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