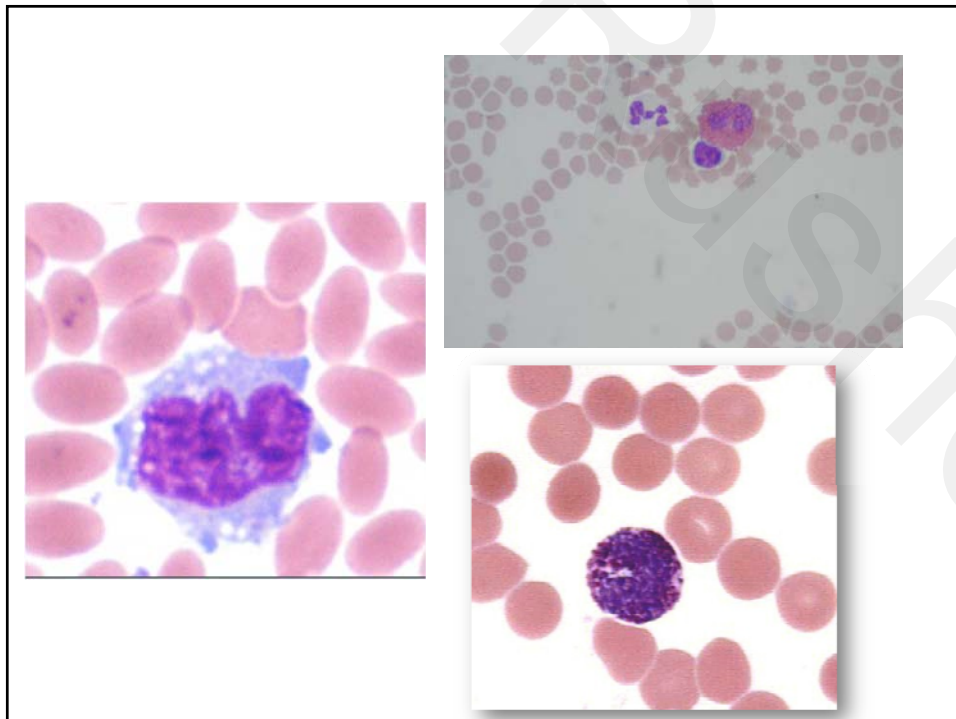


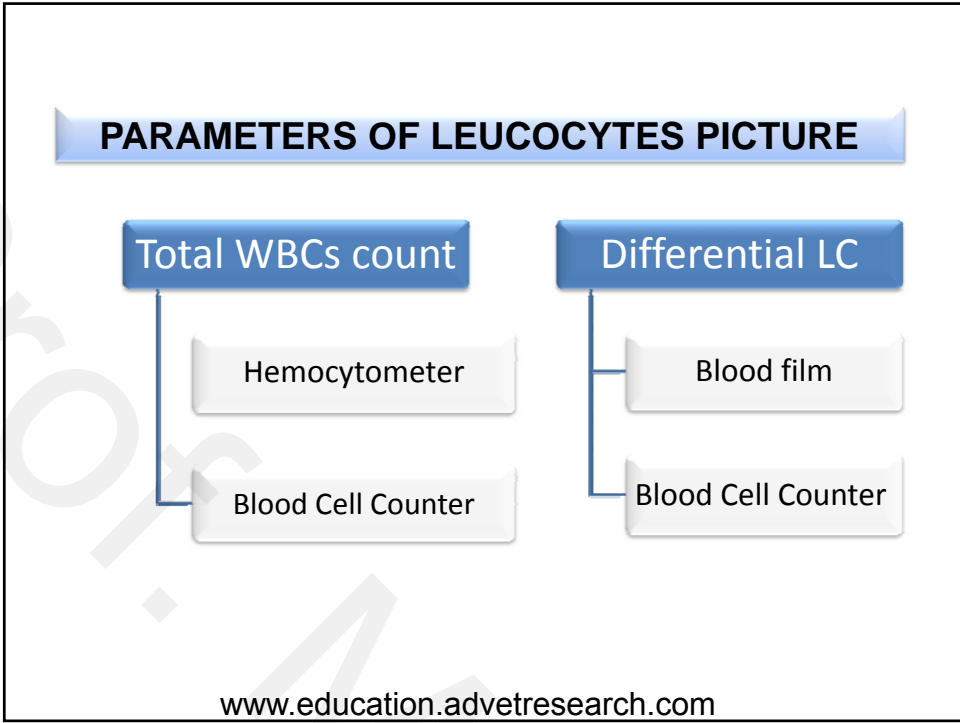
INTERPRETATION of LEUCOCYTES PICTURE

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- ### INTERPRETATION OF LEUCOCYTES PICTURE
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|--------------------------|--------------------------|
| 1. Leucocytosis. | 2. Leucopenia. |
| 3. Neutrophilia. | 4. Neutropenia. |
| 5. Lymphocytosis. | 6. Lymphopenia |
| 7. Eosinophilia | 8. Eosinopenia |
| 9. Basophilia. | 10. Basopenia |
| 11. Monocytosis | 12. Monocytopenia |
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1. Leucocytosis

Means increase the total leucocytic count above the normal upper limit specific for each animal species / unit volume of blood. It is either **physiological or pathological**.

a. Physiological leucocytosis

Causes:

Age of the animal

Breed or species of the animal

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a. Physiological leucocytosis

Muscular exercise and apprehension

Stage of pregnancy

Estrus

Stage of digestion

b. Pathological leucocytosis

Causes:

- Generalized infection such as (Pasteurellosis, leptospirosis and salmonellosis).
- Localized infection caused by bacteria such as *Staphylococcus*, *Streptococcus* and *Corynebacteria Spp.*

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Pathological leucocytosis

- Rapidly growing neoplasm.
- Acute hemorrhage particularly into one of the body cavities.
- Sudden haemolysis of the erythrocytes.
- Leukaemia and trauma.

2. Leucopenia

Decrease the total leucocytic count below the minimum normal limit specific for each animal species.

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2. Leucopenia

Causes:

- A. Degeneration, depression, depletion and destruction of the bone marrow**
- B. Viral infection:** Such as canine distemper, infectious canine hepatitis and swine influenza.
- C. Bacterial endotoxins:** Endotoxins of gram-negative bacteria are located at or in the cell wall and are released on autolysis of the bacteria as *Escherichia coli* endotoxins. Endotoxins resulted in a decrease in lymphocytes and neutrophils

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2. Leucopenia

D. Overwhelming bacterial infection: Bacterial toxæmia and septicaemia.

E. Cachetic and debilitated states.

F. Physical agents such as x rays

G. Chemical agents:

- Antibiotics as chloramphenicol, penicillin and streptomycin.
- Analgesics
- Inorganic chemicals: Lead, benzene, bismuth, mercury.

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NEUTROPHILIA

Neutrophilia means increase the number of neutrophils in the circulation over about 10^9 / l in monogastric animals and about 4×10^9 /l in ruminants.

Causes

As leucocytosis

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NEUTROPENIA

Neutropenia means decrease the number of neutrophils in the circulation under about $4 \times 10^9 / l$ in monogastric animals and about $1 \times 10^9/l$ in ruminants.

Causes

As leucopenia except viral infection

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LYMPHOCYTOSIS

Lymphocytosis means increase the number of lymphocytes in the circulation over about $6 \times 10^9 / l$ in monogastric animals and about $9 \times 10^9/l$ in ruminants.

Causes

1. Recovery from viral infection.
2. Following vaccination.
3. Hypoadrenocorticism.
4. Decrease level of ACTH.
5. Lymphoid leukaemia.

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LYMPHOPENIA

Lymphopenia means decrease the number of lymphocytes in the circulation under about $1 \times 10^9 / l$ in monogastric animals and about $3 \times 10^9/l$ in ruminants.

Causes

- Hyperadrenocorticism in stress, steroid therapy.
- Acute viral infection as canine distemper, canine hepatitis and infectious feline enteritis.
- Ionizing radiation or immunosuppressive drugs.

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EOSINOPHILIA

Eosinophilia means increase the number of eosinophils in the circulation over about $1 \times 10^9 / l$.

Causes

- Allergy.
- Parasitic infection.
- Adrenocortical insufficiency.
- Granulocytic leukaemia.

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EOSINOPENIA

Eosinopenia means decrease the number of eosinophils in the circulation under about $0.1 \times 10^9 / l$.

Causes

- Stress.
- After administration of ACTH or corticoids as a therapeutic measure.
- Hyperactivity of adrenal gland.
- Eosinophilic leukemia

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BASOPHILIA

Basophilia means increase the number of basophils in the circulation over about $0.5 \times 10^9 / l$.

Causes

- Adrenocortical insufficiency.
- Basophilic granulocytic leukemia.
- Hypothyroidism.

BASOPENIA

Basopenia means decrease the number of circulating basophils. Since it is quite normal to find no basophils at all in a blood film, the theoretical possibilities of Basopenia are not worth considering in clinical situation.

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MONOCYTOSIS

Monocytosis refers to an increase the number of circulating monocytes above about $0.5 \times 10^9/l$.

Causes

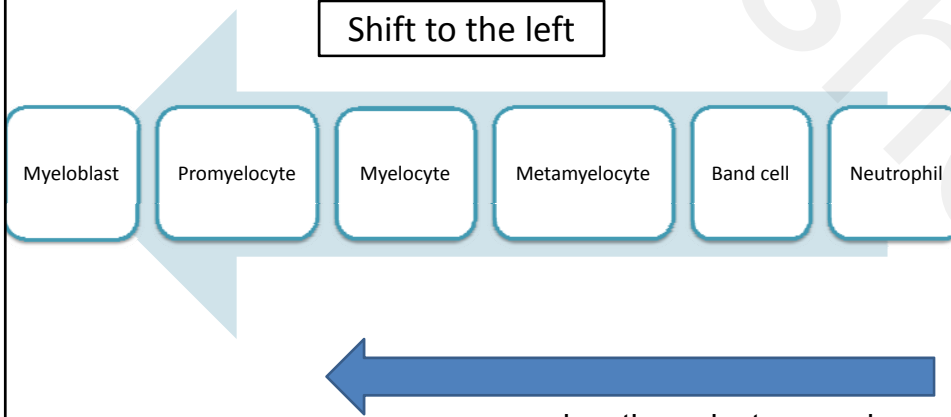
- Chronic diseases.
- Monocytic leukaemia.
- Listeriosis in swines.
- Hyperadrenocorticism.
- ACTH and corticoid treatment in dog, cow and cat.

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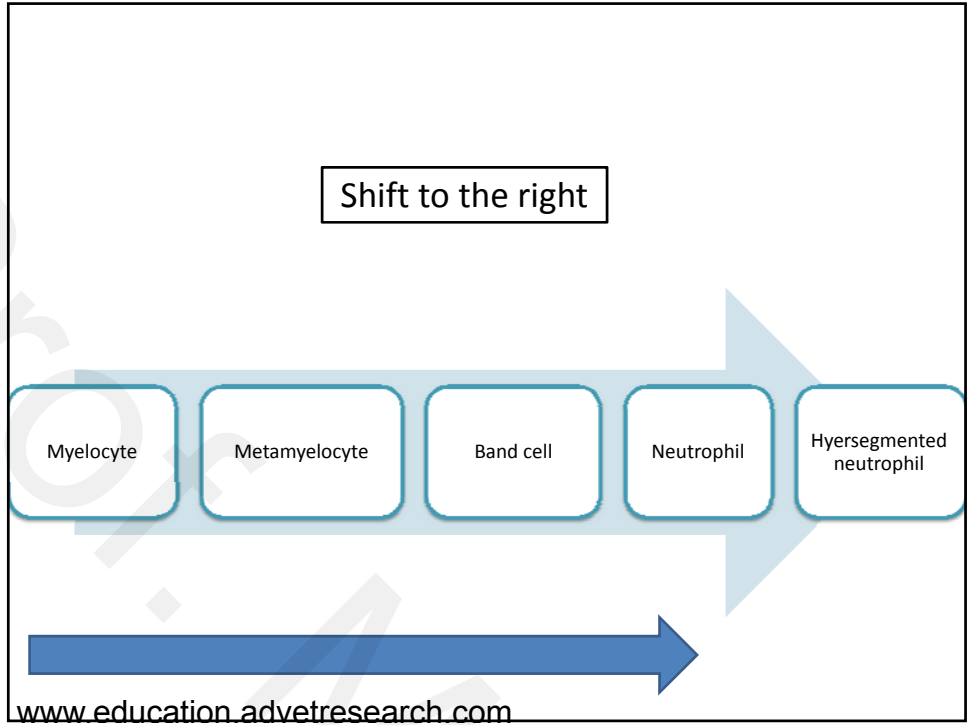
SCHILLING INDEX

It is an index used for classification of neutrophils depending on maturation of neutrophils.

Shift to the left



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Shift to the left

Shift to the left is used to denote an increase in the number of immature neutrophils in the peripheral circulation i.e. more than 7 % band cells.

a. Regenerative shift to the left: This shift is characterized by a leucocytosis, neutrophilia and with the appearance of immature neutrophilic granulocytes in peripheral blood, it is either:

1. A slight shift to the left: It is limited to the occurrence of band neutrophils.
2. A moderate shift to the left: It includes both band and metamyelocyte neutrophils.
3. A marked left shift: Would bring myelocytes and progranulocytes into peripheral blood

Prognosis: Good prognosis.

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b. Degenerative shift to the left

- There is normal, low or falling total leucocytic count accompanied by moderate to marked shift to the left.
- This alteration is a result of inability of bone marrow to mature cells in response to infection and as a result increase the number of immature forms appear in the blood which show toxic changes.
- A degenerative left shift is common in septicemia.
- Toxic neutrophils are considered abnormal cells and are present in the blood as a reflection of toxic condition.

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Toxic neutrophils appear as:

- Signs of toxaemia are seen in neutrophils in diseases accompanied by depression of granulopoiesis.
- Appear in acute inflammatory diseases as peritonitis, pericarditis, mastitis and metritis.
- The appearance of blue black granules.
- The presence of vacuoles located in the cytoplasm along the periphery of the cell.
- Toxic granulation results from precipitation of the basophilic ground substance to form blue black granules.

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LEUKAEMOID REACTION

- A blood picture exhibiting a marked leucocytosis with a considerable number of immature WBCs. It is similar to left shift of the regenerative type in which there is an extreme leucocytosis simulating that observed in leukemic leukaemia.
- Leukaemoid reaction indicates extreme Leucocytosis. With severe left shift to metamyelocyte and myelocytes but no signs of hemopoietic neoplasia and indicate severe inflammation.

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