SUMMARY AND CONCLUSSION

In the circulating blood of man there are in health three types of cell-the leucocytes, the erythrocytes and the platelets. The leucocytes are distinguished in unstained preparations by the presence of nuclei, by their size and by the absence of colour. When stained by one of the standard Romanowsky methods three main classes of leucocyte can be readily differentiated and these are the granulocytes, the moncoytes and the lymphocytes. In supravital preparations these three types of cell are seen to have marked differences in motility. These morphological differences are matched by very important differences in kinetics and in function.

The granulocytes have varialby-lobed coarse nuclei. Their cytoplasm contains numerous distinct granules and the staining reaction of these enable three types of cell to be distinguished. In the most numerous they are neutrophilic, in the second subgroup they are eosinophilic and in the third and least numerous they are basophilic.

The monocytes are alos granulated cells but have much more finely structiured nuclei and very fine granules.

The lymphocytes usually have rounded dense nuclei and their clear blue cytoplasm is free of all but the occasional azurophilic granule.

All classes of leucocyte are involved in defence against various insults. The neutrophil granulocytes are mainly phagocytic and bacteriolytic. The monocytes are also phagocytic and on entering the tissues they transform into various types of macrophage. The lymphocytes are involved in immune responses and when stimulated artificially or by an appropriate antigen are capable of remarkable transfomation from the resting state into an active "blast like cell. There is now good evidence that some of them are capable of transformaing into multipotent stem cells or conlony-forming units.

The percentages and absolute numbers of the leucocytes normally present in the peripheral blood are :-

Table : The normal percentages and absolute numbers of peripheral blood leucocytes.

Cell type	Percentage	Absolute numbers ul
Granulocytes		
Neutrophils.	40-75	2500-7500
Eosinophils.	1-6	40-440
Basophils.	1	15-100
Monocytes.	2-10	200-800
Lymphocytes.	20-45	1500-3500

Although subject to some rhythmic variations these numbers remain remarkably constant during health. All types of cell remain in the circulation for hours at most so that they are replaced several times each day. Granulocytes and monocytes do not reenter the circulation once they have left it and they are replaced by newly matured cells from the bone marrow. The lymphocytes are replaced partly by new cells but largely by long-lived cells which repeatedly recirculate by way of the lymph nodes and the thoracic duct.

As they are living cells all classes of leucocytes contain the usual enzyme systems and apparatus required to maintain their metaboism but they also contain more specialized structures which are essential for their specific functions such as the lysosomal granules of the neutrophil granulocytes.

Quantitative disorders of leucocytes:-

Neutropenia:-

Means that neutrophil's number is less than 1,500/mm^3

It can be classified into :-

1) Reduced granulocytopoiesis with myeloid hypoplasia: This is due to the trauma of bone marrow which may be malignant deposits, physical, or chemical injuries.
2) Increased ineffective granulocytopoiesis: due to vitamine B_{12} deficiency.
3) Reduced grnulocyte survival: due to leucocytes antibodies, hypersplenism, bacterial toxins, or some drugs.
4) Combined type.

Neutrophilia

The upper limit of normal for the absolute number of neutrophils is about 8,000/mm^3

Mechanism of neutrophilia: Shifting of neutrophils from storge compartment in the bone marrow into the blood, and from marginal pool into circulating pool in the blood, increase of granulopoiesis, or increase survival of neutrophils, Usually combind mechanism is found.

Causes of neutrophilia: Physical stimulations e.g. : cold, burns....etc., Physiological stimulations e.g.: exercise, emotion .... etc, infection, especially pyogenic type, inflammatory stimuli e.g. rhumatic fever..... ..... etc., Tumours: many neoplastio condition associated with neutrophilia, some drugs e.g. heparin, digitals.... etc., and idopathic type of neutropenia.

Eosinophilia

When eosinophilic number is above 450/mm^3, accompanies a variety of disorders: parasitic infestation, allergic disorders, hypereosinophilic syndromes, some tumours e.g. lymphoma, and idiopathic eosinophilia.

Basophilia

Above 50 /mm^3. This may be of diagnostic importance in allergic patients. Usually patients with basophilia have high risk of anaphylaxis.

Lymphocytosis

It is an increase in lymphocytes more than 9,00/mm^3. in adults. Causes of absolute lymphocytosis includes: infective mononucleosis, infective lymphocytosis, whooping cough, toxoplasmosis, cytomegalovirus infection, and endocrine disorders e.g. thyrotoxicosis and Addison's disease.

Monocytosis and phagocytic hyperplasia

In Monocytosis the absolute number of monocytes is above 500/mm^3 in adults:-

Causes:-

1) Infeotions: These include: tuberculosis, subacute bacterial endocarditis, brucellosis, typhoid fever, malaria, rickettesia, schistosomiasis, and syphilis.

2) Haematological disorders:- Preleukaemic state, leukaemia, neutropenieas and haemolytic anaemias.

3) Collagen vascular disease:- rhomatoid, systemic lupus eryethematosis..... etc.

4) Fever of unknown origin.

5) Malegnancy.

6) Foreign bodies.

7) Storge diseases; hyperlipoprotienaemia, hypercholesterolaemia, Gaucher's disease, and Niemann-Pick's disease.

Qualitative abnormalities of granulocytes

1- Abnormalities of the humoral signal defects: Immunoglobulin or complement defficiency may result in impaired neutrophil function.

2- Abnormalities of the sensory process of the neutrophil: The excellent example is the Chediak-Higashi syndrome which is autossomal recessive genetic disease characterised by: neutropenia, thrombocytopenia, and recurrent infections due to poorly response of neutrophil to chemotaxis.

3- Abnormalities in motil responses of neutrophil: this includes: neutrophil action dysfunction, lazy leucocyte syndrome, neutrophil paralysis, and diabetes mallitus.

4- Defects in microbicidal activity: as in chronic granulomatous disease, and myeloperoxidase difficiency.

Leukaemia

It can be defined as "An abnormal, neoplastic, generalised, self prepetuating proliferation of one of the leucocytic tissues, often associated with abnormal white blood cell count and an abnormal increase in leucocytic mass and leading to anaemia, thrompcytopenia"

Classification: The most recent is: FAB type in which :

1- Lymphoblastic leukaemia: classified into L_1 & L_2 & L_3 according to morphological characters.

II- Myloid leukaemia: classified into: Myeloblastic L: without maturation (M_1), M.L. with maturation (M_2), hypergranular promyelocytic L. (M_3) Myelomonocytic L. (M_4), Monocytic L. (M_5), and erythro cytic L.(M_6)

III- Dysmyelopietic syndromes: 1- Refractory anaemia with excess of blasts. 2- Chronic myelomonocytic leukaemia.

Other types of classifications depend on the type of cells, and the onset, and course of the disease whether acute or chronic.