

History and Scope

Presence of blood in human body has been known from those days when men used to inhabit forests and caves. However, the fact that blood circulates in our body was discovered by William Harvey a couple of centuries back. Many systems of medicine, Greek, Roman and Unani, etc. ascribe bodily diseases to impurities or abnormalities in the blood. It is a known fact today that most diseases—traumatic, inflammatory, infective, organic (not functional) and neoplastic (both benign and malignant) are accompanied by alterations in the blood. These alterations may be in the plasma, serum, blood cells, etc. Blood is being used extensively for diagnostic as well as therapeutic purposes. Maximum research has perhaps been carried out on this liquid connective tissue of our body. Always dynamic and moving; its stoppage leads to death of the tissue getting devoid of its blood supply.

Blood has been related to life and if one goes through the holy books—blood-bath or bloodshed or bloody war has been associated with death. The diagnosticians of yester years did not possess a microscope to see the simple changes that occurred in blood, all the same, they could see it grossly. They knew that if allowed to clot and settle in a transparent container, blood formed four distinct layers. At the bottom was found a dark red (almost-black, jelly-like) layer, above this was seen a red layer, still above was visualised a pale green or whitish layer. Atop all these were recognized a transparent, yellow serum. These layers were possibly related to the four humors, viz. black bile, sanguis, phlegm and yellow bile respectively. Health or disease was thought to be arising from a proper or improper mixture of these four humors. Even about 3 centuries back, physicians still believed the theory of humors. As we understand today, they did have a point—a Wintrobe's tube when centrifuged shows three layers—a bottom layer of packed red cells, a whitish creamy layer called the buffy coat and the topmost layer of plasma. One can obtain sufficient information just by carefully examining these layers. The fact is discussed in detail in the relevant chapters.

From seventeenth century AD till 1920, many individuals provided their hypotheses, theories and findings but the modern hematological concepts were provided first (in 1920) by Whipple, Minot and Castle. The last 50 years have seen tremendous advancement in the field of hematology, which now covers and embraces closely such diverse medical principles as biochemistry, cell biology, immunology, physical chemistry, molecular biology, genetics and nuclear medicine. Despite the complexities; Hb, TLC, DLC and ESR are perhaps the first investigations that are requisitioned by a physician or a surgeon. These are remarkably simple techniques and provide treasures of informations.

A perfectly normal person displays diurnal variations in Hb, TLC, DLC, etc. Changes occur in a pregnant woman. A cursory glance at the stained blood film may reveal the underlying cause of the complaints that the patient presents with. Burring of red cells

implies uremia, macro-ovalocytosis may point towards malabsorption or undernutrition, punctate basophilia or RBCs leads towards lead poisoning. Microcytic-hypochromic anemia with eosinophilia should make you think about a possible hookworm infestation. You name the disease or syndrome and blood shall show some sort of deviation from normal. How would you diagnose a hypochondriac? Before you refer the patient to a psychiatrist just do his ESR. A normal ESR should make you refer the case to a psychiatrist. Let me illustrate with an example—how can you differentiate true myocardial infarction from cardiac neuroses—the former shall show leucocytosis with neutrophilia with markedly raised erythrocyte sedimentation rate and the latter would show none of these findings. Indeed, these simple hematological investigations change the course of your thinking, diagnosis and hence the treatment. How does one assess the prognosis of organic disorders?—here again a simple investigation like ESR provides the much wanted invaluable information. If the ESR is gradually decreasing, the patient is on his way to recovery; on the contrary, if it is increasing, perhaps something else needs to be done for the patient is going on a downhill track. This is the diagnostic aspect, there is yet another facet, the therapeutic use of blood. You can choose whole blood or its fractions for various hematological disturbances. Are you going to do a prostatectomy or a thyroidectomy? Well, you will need blood to replenish the lost blood. The most frequently donated tissue is the red liquid connective tissue (blood), blood transfusion is a life-saving treatment in many instances. We are now doing bone marrow transplantation to help the victims of aplastic anemia and similar disorders where the bone marrow dries up. Simply said, *blood is life*.

A sound knowledge of clinical medicine is absolutely essential for any hematologist worth the name. The polluted environment of this disorganised modern era is leading to anemias, leukemias and other non-hematologic problems. A detailed history is a must with special reference to exposure to chemicals or drugs. Diet, menstrual history, history of gastrointestinal blood loss and any history of fever should also be inquired into. Family history with affliction related to a particular sex is also important. Take a close look at the skin, sclerae, tongue and nails, etc. Palpate the liver and spleen. Record any findings if obtained. Perform the investigations required at the earliest (i.e. soon after withdrawing the blood sample), delay can lead to erroneous results and consequent improper treatment. Although artificial intelligence of computers and machines is being utilised these days but nothing can replace the participation of human eye attached to a knowledgeable brain (the eyes cannot see what the brain does not know). A well-examined peripheral smear is a storehouse of information that can change the entire course of diagnosis and therefore treatment. No degree of automation can be compared to even a not so perfect hematologist. For instance, it is advisable to recheck the adequacy of platelets in a peripheral smear as blood cell counters can count dust particles as platelets. Similarly, cell counters count large stress lymphocytes and blasts in the same category, namely large lymphocytes and mistakingly they count late normoblasts as small lymphocytes. To say the least, do not overestimate the capability of cell counters while underestimating your own knowledge and judgement.

Nobody can deny the fact that *better diagnosis means better treatment and therefore quicker recovery and relief*. While reporting try and be descriptive—tell the physician what a schistocyte means and conveys. Just as a good hematologist may not know how to interpret an EEG, likewise, the ablest of physicians may have forgotten that stomatocytes can be seen in chronic liver disorders or burring or RBCs can be seen in uremia. Make suggestions to the physician for the ultimate benefit of the patient. For instance on performing ESR if

you see icteric plasma column—convey it to the physician, he may not have considered this at all.

The only malignancy where we can claim a cure rate is that of blood, a type of leukemia, the acute lymphoblastic leukemia. I cannot in any language or phrase express the full importance of blood in our body's system. One can go on endlessly, it is the horizon. One may think one has reached the end but just one look forward will convince you that you have just covered an anthill and not a mountain. This century shall make further revelation; revelations that we may have not dreamt about as yet. Can we teach our army, navy and airforce (the fighting system of our body, namely blood) to recognize tumors as foreign elements, if we can. Well, blood will show its loyalty and wage a war against the devilish tumor. The day is not very far when we will be able to do that and that shall be the most difficult battle won. It shall be a breathtaking event, a spectacle, a feat; man landing on moon will then be just a minor achievement.