CLINICAL IMPLICATION OF THE ERYTHROCYTIC PICTURE

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In presenting a short paper on the red blood cells, one can not escape the criticism of incompleteness. The criticism would be rightly levelled because the study of the genesis, physiology and pathology of the red blood cells is such that its narration may not be completed for hours. Even simply to outline our present-day knowledge about the erythrocytes without taxing the patience of friends would, indeed, be a miraculous accomplishment on the part of any essayist, Such outline would involve the discussion of the erythropoietic centres and the dificult classification of the Anemias, which at present is, at its best, not quite satisfactory.

At this short discussion we shall take up what is most familiar to us, the study of blood smears in making routine differential white blood counts. We hope to be able to point out common blood findings contributed into the circulation by the red-cell-forming centres under given condition or set of conditions. We shall therefore pick out a few red blood cells encountered in simple smears and discuss their implications which may help in evaluating existing conditions found in various types of disease. Careful study of these cells may throw significant suggestions to guide us to the approach to a plausible conclusion.

As is known, the normal erythrocyte found in the circulation is a round cell, pale-straw in color when stained, and has no nucleus. It measures approximately 7.2 microns in diameter. At birth, however, nucleated red blood cells may be found in the circulation in the proportion of 1 to 5 per every 100 white blood cell population. These nucleated red cells disappear hourly as the child advances in age, until these erythroblasts vanish entirely at the end of the 7th day or 168 hours after birth.

The finding of erythroblasts in the new born should not, therefore, be of concern unless there be a difinite shower of these cells in the circulation. This would strongly suggest erythroblastosis fetalis. After the seventh day reticuli may be found within the cells which are simply the remnants of the disintegrated nuclei. Cells containing such reticuli are spoken of as reticulocytes. They can be easily demonstrated by vital stain such as brilliant cresyl blue. They appear as blue granules or a diffuse network of fibrils. Reticulocytes are a normal finding in the blood to the extent of a little less than one per cent. In infants the percentage is much larger. Increased reticulocyte count is a favorable sign since it reflects excessive demand for new red blood cells on adequately competent erythropoietic centers.

It may, perhaps, be of interest to look into the life span of the red blood cells. It is interesting to note the different opinions of well-known investigators and hematologists as to the length of the life span of the erythrocytes. Dekkers, Ashby, Vischer, Shernin and Rittenberg, and Bale and Finch, to mention a few, have attacked the problem of determining the life span of erythrocytes. They come up with varying results although their respective conclusions were based upon impeccable premises. They all employed ingenious procedures in the pursuit of their search. It makes highly interesting reading to review these investigators' reports. Of course, we can not attempt to discuss in detail the various approaches to the problem employed by these dedicated men. It may suffice to say that their conclusions, though varying in numerical values, have a narrow area of concordance. There seems to be an agreement among these experts that the red cell turn-over in both humans and dogs is 1% per day. The life span of human red cells is between 115 and 120 days. Vischer, furthermore, calculated the functional age of transfused erythrocytes was only 12 to 13 days.

The non-functioning cells undergo fragmentation. These fragments are removed from the circulation by the phagocytes of the reticulo-endothelial system. The hemoglobin is broken up into globin and an iron-containing pigment, hemochromogen

in its reduced form, and hematin when oxidized. This pigment is converted to bilirubin after being freed of iron. This is the substance that gives the plasma its yellow tinge and the basis of Van den Berg's test, the normal of which is around 0.5—0.7%.

In evaluating the red cell count one should be concerned with the physiological changes that take place during the day, whether the individual leads a sedentary or active life. Muscular activity usually induces increased red cell count and high hemoglobin level. This is also true under a high emotional state such as excitement or fear. The mechanism of this phenomenon is at present still nebular. Adult males have generally a higher count of erythrocytes than adult females. We need not mention that drop in barometric pressure has an inverse ratio to the red blood cell count, such as encountered in inhabitants at high altitude where people most likely suffer from anoxemia. This compensatory erythropoietic activity is concomitant with increase in hemoglobin.

Blood counts can not be considered complete unless there be some observations made by the hematologist reflecting his impression based on the findings in a blood examination. There should be noted, whether present or absent, any abnormal relationship between relative components of the blood, any deviation from normal, the size and shape of individual cells as well as peculiarities of their staining properties. Such observations may be of immense value to the clinician who may well correlate his other clinical findings on a given case and thus arrive at a tighter conclusion.

As was previously stated, the average diameter of a red blood cell is about 7.2 microns. This cell is called a normocyte. Variation in size of red blood cells in a given specimen is termed anisocytosis and is a sign of regeneration or activity on the part of the erythropoietic system. Sometimes one observes a preponderance of small red cells ranging from 4 to 6 microns in diameter. This picture is often ephemeral in nature. But should microcytosis persist in implies toxic irritation of the bone marrow. This type of picture is often observed in hemolytic anemia such as found in hemolytic infections like hemolytic endocarditis or hemolytic jaundice. This type of blood

picture may often help in differentiating hemolytic from obstructive jaundice, disease entities which at times are annoyingly baffling. Once in a while we encounter extremely small size red cells with indefinite shape. These are of no significance when not encountered in large quantity in the circulation. These are called schizocytes and they are simply fragments of red blood cells. Obviously when showers of these cells are seen it is suggestive of rapid cell fragmentation or destruction.

On the other side of the morphological balance we may see in blood smears large red blood cells of 12 microns, comparable to the size small lymphocytes. Unusual number of this type of cells is indicative of pathologic regeneration. They are young cells which have been released prematurely into the circulation in answer to certain specific systemic demands. They are always associated with marked anemia and often seen in cases of liver cirrhosis, acute leukemias and a few other disease entities characterrized by macrocytic anemias. When some red cells exceed the size of macroytes, that is, they reach a diameter of 20 to 25 microns and are very rich in hemoglobin, they are called megalocytes. It is important to be able to measure the diameters of the erythrocytes in some instances, since it is very consequential to differentiate between simple macrocytes and megalocytes. The preponderance of megalocytes in the circulating blood is highly indicative of erythropoietic impending or actual exhaustion, while the presence of increased macrocytes is simply a suggestion of abnormal regeneration. Sometimes one may notice in blood studies red cells which present the appearance of a targetboard or bull's eye, that is they show a peripheral hemoglobinrich band and a central hemoglobin-mass island separated by a circular clear zone from the outer hemoglobin ring. Sometimes this island is connected with the peripheral band by a bridge or a well-tained strip whose ends seem to fuse with the body of the island and the outer hemoglobin-band. These cells are generally thinner and much larger than the normocytes, approaching the size of macrocytes. Because of their appearance, these cells are called "target cells." When these cells occur in noticeable number in a given blood smear one should consider the possibility of the presence of obstruc-

tive jaundice, severe hepatitis or erythroblastic anemia (Cooley's). After splenectomy these cells are found in significant numbers.

Of the red cell inclusion bodies, we may mention only two aside from the nucleus of the red cells, which may be of interest to the clinician. These are the basophilic stipplings and malarial stipplings. The basophilic stipplings are basophilic susbstances which have collected in droplets within the body of the red cells. They stain blue. Some appear like coarse granules or fine dust-like particles. When the blood smear is properly stained these granules are easily identified. Red cells containing these granules always take the basic stain. They are referred to as punctate basophiles. Cells harboring these granules when found in undue number, suggest severe anemias or lead poisoning. They have been seen also in various types of malignancy. Basophilic granules have also been seen in malarial infestations. Malaria infested erythrocytes harbor, oftentimes, minute granules similar in size to basophilic stipplings. Under ordinary stain these granules stain bright red in contrast to the deep blue of basophilic stipplings. These fine, minute red granules are referred to as Schuffer's dots. Sometimes these dots are so thick that they often conceal malarial parasites.

A word about blood crisis which is the name given to a condition wherein there appear 5 or more nucleated red blood cells to every 100 white cells counted. This condition suggests strongly an excessive demand upon red blood cell forming centers to greater activation and regeneration to replace the lost destroyed erythrocytes. Blood crises are indications of erythropoietic activity and competency rather than the severity of the disease which called for such erythropoietic activity.

In conclusion, we must be ever conscious that blood smear examination offers extensive fields for fruitful hematological study. To close our eyes to such potentials or ignore its fullest implication is to fall short of our aim to help. Hematologists should project their knowledge and experience in this broad field as they attempt to fully comment on a given blood picture. It is only a clinician of limited experience who would take such

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Homœopaths or lovers of Homœopathy anywhere elected in such bodies or having any influence on the members of such bodies or for the matter of that any authoritative body—e.g. the Government or the Universities should take enthusing lesson from this news and should gird up their loins to raise the status of Homœopathy and to place it on its due footing.

2. In the last session of the out-going Parliament held in March 1962, the Health Minister Shree D. P. Karmarkar stated that the Homœopathic Advisory Committee had recommended to the Union Government to amend the Drugs Control Act, and to enact new rules to bring under control the manufacture and sale of homœopathic drugs. We urge upon the authorities that before they take such a step they should—(1) First give full recognition to homœopathy as a system of medicine, by proper enactments, as control without care is not only illogical, but positively detrimental. (2) They should consult and take into confidence the homœopathic pharmacists of India and benefit by their long experience in the line, which has got its own peculiar problems, technical and others, quite distinct from any other system of pharmacy.

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observation and interpretation to be a pedantic display of superior servation and interpretation to be a pedantic display of superior knowledge rather than an honest cooperative effort.

—*The Pacific Coast Homœo. Bulletin, Dec., '60.*
