

## Stress Erythrocytosis

**P**OLYCYTHEMIA is ordinarily classified under two main headings: polycythemia vera and secondary polycythemia. Although the term "erythremia" has often been used for the former condition, the older designation of "polycythemia vera" may be preferable since there is actually a polyvalent cellular growth in the bone marrow (panmyelopathy) with a resultant pancytosis, i.e. an increase not only in the red cells of the blood but in the white cells, granulocytes and platelets as well. On the other hand, in "secondary" polycythemia, in which some form of anoxia (high altitude, congenital heart disease, chronic pulmonary disease) is present, erythrocytosis is the only hematologic abnormality. Since there is no increase in white cells, granulocytes, or platelets in this condition, it is perhaps best termed "anoxemic erythrocytosis."

The term "Gaisböck's polycythemia" seems to have been used with some diffidence, perhaps because there has been no real conception as to its significance or indeed of its actual relation to polycythemia vera. Gaisböck<sup>1</sup> singled out cases of relatively mild polycythemia in which splenomegaly was lacking and there was fairly marked hypertension. These cases had the "habitus apoplepticus" of the more ancient writings, and cardiovascular accidents were common. It should be noted, however, that in true polycythemia, hypertension is present in at least half the cases and the spleen may not be palpable.<sup>2</sup> The differences between the two conditions have at times been so ill-defined that some authors, e.g. Wintrobe,<sup>3</sup> have been "doubtful whether Gaisböck's syndrome should be distinguished as a separate entity from polycythemia vera." On the other hand, our own observations have led us to believe that not only is this syndrome not polycythemia at all, but that it is simply a reaction to stress, of which erythrocytosis is only one feature. In line with present day concepts, we have therefore proposed the term "stress erythrocytosis."

In any discussion of erythrocytosis, some knowledge of the normal red cell count is important. One must admit straight off that this is by no means a standard figure but one which varies from individual to individual and more particularly between the sexes. It is rather universally conceded<sup>4</sup> that the red cell count in men is on the average higher than that in women. What is more, one has the impression that the most highly feminine women, i.e. those with the softest skins, the roundest contours, and the most neurasthenic personalities, have the lowest hemoglobin and red cell values, so much so that they almost always seem to be under treatment for "anemia."<sup>5</sup> In contrast, certain men, aggressive, hard-driving, plethoric types, may have rather high values for hemoglobin and red cell count and are often considered to have polycythemia. Not a few are treated for that disease either by venesection or with radio-active phosphorus.

Examination of such individuals usually reveals a "pyknic", "mesomorphic" type, often somewhat obese. A plethoric appearance due largely to increased vascularization of the superficial blood vessels about the cheeks and nose is usually present. The deep purplish color of the mucous membranes and the dis-

tention of the retinal veins seen in true polycythemia are lacking. The spleen is not enlarged to percussion or palpable. The blood pressure is almost always elevated. The hands and feet may show a variable degree of acrocyanosis.

Peptic ulcer, hypertension, and coronary artery disease are often present. The association of these psychosomatic conditions with the erythrocytosis makes one wonder whether long continued stress might not be responsible for all the abnormalities including the elevated erythrocyte count as well.

In stress erythrocytosis, the hemoglobin and red cell counts are elevated without any increase whatever in the leukocytes or platelets, as is found in polycythemia vera. The red cell levels vary from 5.5 to 7 million and there is a parallel increase in the hemoglobin values to concentrations of 16.0 to 18.0 Gm. (105 to 115 per cent). The volume of packed red cells is elevated to levels of 50 to 56

TABLE 1.—*Differential Features of Various Types of Erythrocytosis*

	Polycythemia vera (panmyelopathy)	Anoxemic erythrocytosis	Stress erythrocytosis
R.B.C.....	+++	++	+
Hematocrit.....	+++	++	+
W.B.C.....	++	N	N
Polymorphs.....	+	N	N
Platelets.....	+++	N	N
Reticulocytes.....	+	N	N
Arterial O <sub>2</sub> saturation.....	N*	Low	N
Bone marrow.....	Panmyelopathy	Erythrocytosis	N
Blood volume.....	High total & R.B.C. volume Normal plasma volume	High total & R.B.C. volume Low or normal plasma volume	Normal R.B.C. vol- ume Low plasma volume
Sedimentation rate..	0.1 mm./hr.	Usually above 1 mm./hr. except in extreme cases	Above 1 mm./hr.

\* N = normal

per cent but whether this is due to an actual increase in red cell mass is open to some question. Lawrence and Berlin<sup>6</sup> have recently found that of eighteen individuals with the "polycythemia of stress," the increased red cell, hemoglobin, and hematocrit values were associated with a normal total red cell volume, i.e. the increase was due to a pathologically low plasma volume. This abnormality has previously been recognized only in dehydration and shock. According to these workers the reduced plasma volume may be of psychosomatic origin, representing an effect of long continued psychic stress. Somewhat similar observations were also made by Wilson and Boyle<sup>7</sup> in a recent article carrying the title of "Erroneous Anemia and Polycythemia."

The descriptive and pathogenetic aspects of this syndrome, variously termed Gaisböck's polycythemia, pseudo-polycythemia, polycythemia of stress, stress erythrocytosis, and erroneous polycythemia are treated fully in a rather fascinating book which has come recently to hand: *Le Pletore*, edited by Enrico Greppi<sup>8</sup>

of Florence, Italy. According to Greppi, the plethoric state covers a broad group of conditions characterized in general by four components:

1. Morphologic: Plethoric or athletic (thoracic) habitus; hypertonic obesity.
2. Hemodynamic: Erythrocytosis, increased hematocrit.
3. Vascular: Increased vascularity, vasomotor disturbances, tendency to hypertension.
4. Metabolic: Excess of cholesterol and prothrombin; tendency to athero-thrombosis and thrombophilia.

For the specific designation of the hematologic condition characteristics of plethora, Greppi proposed the term "polyglobulic hypertonic plethora".

Is this condition due to long continued stress, or is the apparent stress simply one expression of the constitutional "drive" and dynamism of these individuals? Or, is it possible that more subtle endocrine factors are operative, as for example, a mild Cushingoid type of reaction, or an excess of male sex hormone? It must be conceded that such speculations have little scientific value and it is certain that much work remains to be done before the exact limitations of this syndrome can be defined. That it exists, and is often misdiagnosed as polycythemia vera and accordingly maltreated cannot be denied. Which brings one to the matter of therapy. As with its opposite number—the so-called anemia of the neurasthenic woman—the best treatment is probably no treatment at all. Of chief importance is that the physician understand the type of individual concerned and that, once the diagnosis has been made (see table), the patient is not treated by venesection, x ray, radioactive phosphorus and the like. Some gentle form of psychotherapy, preferably given by an understanding physician rather than a professional psychoanalyst, may be useful, but ordinarily, some minor adjustments of the individual's life and considerable reassurance are all that are required or, indeed, that can be accomplished.—*William Dameshek*

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