HYPOCHROMIC MATURE ERYTHROCYTES : A SPECIFIC MARKER OF IRON DEFICIENCY.

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Background : Since the era of erythropoietin (rHuEPO), iron supply has been a major limiting factor for therapeutic response. The percentage hypochromic red cells (%HYPO) and reticulocyte hemoglobin content (CHr) have proved to be reliable parameters for functional iron deficiency. However, CHr shows acute changes following rHuEPO or iron administration and %HYPO presents a lack of specificity. We have previously shown that %HYPO depended on erythropoietic stimulation. Some new cell counters measure volume and Hb concentration of individual reticulocytes and mature RBC. In this study, routine measurements, reticulocyte and mature RBC cell parameters of a normal population were compared to those of patients with hemolytic (HA) or iron deficient anemia (IDA) to identify a specific marker of iron deficiency.

Methods. Red cell parameters were measured by the Advia 120 (Bayer Diagnostics, Tarrytown, NY, USA). We determined reference values in a population of 66 members of the nursing team of the CHU Liège as the 95th percentile. These data were compared with 7 patients with HA and 8 with IDA.

Results : As expected, IDA was microcytic (MCV: 73.9±8.0 fL) and hypochromic (CHCM: 28.5±1.6 g/dL). CHr was low (23.2±3.0 pg) and %HYPO was high (46.6±18.3 %). On the other hand, HA was macrocytic (MCV: 104.3±5.4 fL) and had a normal CHCM (34.0±2.1 g/dL). CHr was high (37.2±2.3 pg). %HYPO was also high (12.7±3.2 %) despite the absence of any sign of ID (ferritin, serum iron, transferrin saturation and red cell parameters were normal in all patients). Comparing mature erythrocyte parameters, we observed that hypochromic mature erythrocytes (HME) were normal/high in HA (4.9±1.9 %; normal range 0.2-3.4 %) whereas it was much increased in IDA (50.1±18.7 %). The reticulocyte count was 64.2±28.9 and 309.8±92.9 x109/L in IDA and in HA, respectively.

Conclusion : « Stress erythropoiesis » leads to bias in red cell parameter determination (increased cell volume and decreased cell hemoglobin concentration). This study demonstrates that the percentage of hypochomic mature erythrocytes (HME) is a specific marker for iron deficiency, independent of the erythropoietic activity as its determination is not biased by the presence of high numbers of reticulocytes.