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BLOOD GROUPS, ABNORMAL HEMOGLOBINS AND HEMOLYSIS

ON THE RELATIONSHIP OF THE BLOOD GROUP ANTIGENS Mi\textsuperscript{a} AND Vw TO THE MNSs SYSTEM.

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The rare erythrocyte antigens, Mi\textsuperscript{a} (Miltenberger) and Vw (Verwyst), are shown to belong to the MNSs blood group system and to bear a close relationship to each other. In 3835 apparently unrelated individuals of London and Glasgow, nine Mi\textsuperscript{a} specimens were encountered, three of which were also Vw+. Mi\textsuperscript{a} Vw+ blood has never been found. Thirteen pedigrees of varying size show that Mi\textsuperscript{a} Vw— and Mi\textsuperscript{a} Vw+ are characteristics inherited as Mendelian dominants, and that the genes expressing Mi\textsuperscript{a} and Vw+ fail to segregate from each other or from the particular MNSs chromosome with which they are associated. Mi\textsuperscript{a} Vw+ is usually expressed by Ns and Mi\textsuperscript{a} Vw— by MS chromosomes. There is no information as yet concerning the relationship of these antigens to the other rare MNSs properties, Hu (Hunter), He (Henshaw) and Vr (Verd.); the antigen M\textsuperscript{a} (Gilfeather) is expressed by a gene allelic to M and N.—R. R.


An inexpensive method of preparing a lectin specific for the agglutination of N and MN human erythrocytes is described, along with new data concerning the mechanism of lectin agglutination. The proteins of the crude saline seed extract were fractionally separated with cold ethanol to obtain an active lectin representing only about 0.59 per cent of the original seed proteins. Upon dialysis, this preparation became nonspecific, agglutinating all human erythrocytes, and the dialysate, containing amino-polysaccharide material, was found to inhibit the nonspecificity and thus restore specific N agglutination. A series of sugars were tested for the property of substituting for the dialysate, and melibiose and
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Raffinose were found to be the most potent. N agglutination and panagglutination after dialysis were found to be inseparable properties of the lectin, and the authors agree with an earlier suggestion that lectin agglutination may be dependent upon the metabolic selective carbohydrate-binding power of some plant proteins. One of the authors was allergic to the seed powder; precautions are advised.—R. R.


An Rh antigen produced by the Rh alleles R' and r' has been termed rh, the “i” substituting for both “one” and “prime.” This specificity had been encountered by others in 1954 and attributed to “position effect on C, but the anti-rh now reported contains no anti-rh' (C). The use of anti-rh does not increase the number of Rh genotypes (barring exceptional reactions) but does increase the number of phenotypes that can be recognized. The new antigen is related to the Rh antigen “f,” and both, by substituting for hr' (C e), contrast with each other and with rh” (E). Because of this relationship, and because of insufficient evidence to justify a separate locus, f, the antigen “F” has been reconsidered as hr (C e). An antibody cross reacting with both hr' (C e) and rh” (E) is termed hri (C e) because it yields reactions antithetical to those of anti-rh (C e). This report uses both Rh-Hr and CDE notations, and it is apparent that no notations for the Rh system will ever be simple.—R. R.


A report of three cases of anti E antibody: In the first patient the antibody was associated with hemolytic anemia due to lymphoma. Two antibody components were present: (a) incomplete autoantibody which was depressed by steroids, and (b) saline active, probably naturally occurring, anti E antibody, not affected by steroids. In the second patient the presence of the antibody was due to sensitization of pregnancy and in the third case due to multiple blood transfusions. Serum electrophoresis revealed an increase of gamma globulin fractions in all three cases, but there was no decrease of gamma globulin after specific absorption of anti E antibody.—W. J. M.


The literature on the S factor is reviewed briefly and the characteristics of the second Australian example of anti-S are described. The antibody gave weak agglutination with S-positive cells suspended in glucose-citrate and strong agglutination with cells suspended in albumin or albumin-fortified plasma. The indirect Coombs test and the Polyvidone (P. V. P.) test gave negative results when S-positive cells were tested against the serum containing the antibody. It is not possible to state whether the antibody was of the naturally occurring or of the immune variety. The results of a survey with this serum on samples from 510 Australian blood donors are given. In this series 53.6 per cent were S positive, with gene frequencies of S = 0.32 and s = 0.68. The value of the S factor in medicine, genetics and anthropology is discussed briefly. Stress is laid on the importance of using methods of cross typing prior to transfusion that will reveal the less common, as well as the more common, antibodies. It is pointed out, once again, that the MNSs system is one of the most discriminating of all the blood group systems for distinguishing between two samples of blood.—G. C. de G.

A 69 year old woman with carcinoma of the cecum developed two transfusion reactions due, most likely, to naturally occurring anti-M antibody. This antibody was most active at 5 C., less active at 21 C. and inactive at 37 C.—W. J. M.


The authors review and discuss the problem of the significance of minor cross match. They conclude that it is not essential in routine work, but stress the importance of reliable methods for ABO grouping, routine use of a sensitive test for the major cross match and the necessity for an effective screening of donor’s sera.—W. J. M.


When hemoglobin electrophoresis was performed on starch, best results were obtained when the pigment was converted to cyannhemoglobin.—H. M.


The effects of temperature on the titratable —SH groups in several animal hemoglobins determined by the argentometric and mercurinietric methods are discussed. As with a variety of human hemoglobins, changes in peptide configuration permits more —SH groups to be titrated with increasing temperature in horse, sheep and dog hemoglobins, whereas cow hemoglobin has a negative temperature coefficient for binding of heavy metals.—A. I. C.


Total half-cystine content of human hemoglobin and globin has been determined by several methods including oxidation with perfnonic acid and alkylation with iodoacetic acid. These data were then compared with the results of amperometric titration with Ag ions. Four to 6 half-cystine or sulfhydryl groups are indicated by the former technics whereas 8 Ag ions are bound by the same substances, suggesting that Ag binds to sites other than sulfhydryl groups or cysteino residues.—A. I. C.


Three patients with homozygous Hgb S disease were studied in relationship to pulmonary function and oxygen dissociation curves. In each, severe arterial oxygen unsaturation was unaccompanied by alterations in pulmonary function. The oxygen dissociation curves were shifted to the right, as determined by in vivo oxygen breathing experiments. In one patient, re-study after the hemoglobin had been raised from 6.8 Gm./100 ml. to 11.9 Gm./100 ml. corrected the displacement of the curve only in part, thus leading the authors to conclude that the defect was related to the Hgb S-containing red cells per se, although the mechanism for the shift remains obscure.—A. I. C.

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An inverse correlation between the percentages of red cells capable of sickling and the quantity of Hgb F was demonstrated by studying a series of sickle cell trait infants from birth to approximately four months of age. No correlation between the percentage of Hgb S and the degree of sickling was found. Possible distribution of erythrocytes in terms of the types of hemoglobin they contain is discussed.—A. I. C.


A hematologic study of four cases of hemoglobin-H disease from two Greek Cypriot families living in London: Studies with radioactive iron and chromium on two of the cases showed a slight increase of total red cell output and a slight to moderate reduction in the red cell life span, with no evidence of excessive splenic destruction.—R. M. H.


A study of the Heinz bodies was performed in patients with favism during the hemolytic crisis. The presence of these bodies in the erythrocytes is constant from the onset of the crisis. The bodies decrease within 24 to 36 hours from the beginning of the crisis, while the reticulocytes are progressively increasing. The disappearance of the Heinz bodies takes place a few hours before the rupture of the erythrocytes.—P. d. N.


Incubation of erythrocytes with acetylphenylhydrazine produces Heinz bodies in patients with favism, but not in normal subjects. Patients with favism gave similar results whether or not there had been a recent hemolytic episode.—P. de N.


During the hemoglobinuric crisis, a marked fall of reduced glutathione was observed in patients with favism, whereas no modifications of the oxidized glutathione were observed. Following crisis, the reduced glutathione rapidly reached values definitely higher than those before the crisis, and are often superimposable on those of normal subjects. One year after crisis, reduced glutathione was found to be decreased as compared to normal values, some times markedly.—P. d. N.


Patients with severe and intermediate types of thalassemia were studied when in hematologic equilibrium. The longevity of the patients' erythrocytes in their own circulations was determined with Cr51 together with measurement of red cell volume. It was then possible to calculate daily rates of production and destruction of erythrocytes and hemoglobin. Mean red cell life in severe thalassemia ranged from 10.3 to 28.6 days (rate of destruction from 4.2 to 11.5 × normal). In thalassemia intermedia mean cell life
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ranged from 23.5 to 39 days (rate of destruction 3.1–5.2 × normal). In two splenectomized patients mean cell life was 10.9 and 23.5 days. The rate of production of erythrocytes varied from 2.2 to 6.1 × normal rate and of hemoglobin from 1.5 to 5.4 × normal rate. The degree of anemia in an individual patient could not be correlated with the rates of destruction or production alone but was determined by the balance achieved between the two mechanisms. Rates of effective red cell production were increased above normal but not to the degree found in patients with other hemolytic diseases. Rates of effective hemoglobin synthesis were below those for red cells. Levels of fetal hemoglobin or rates of fetal hemoglobin production could not be correlated with rates of red cell destruction or production or with degree of anemia. It is stressed that the individuals studied must represent the relatively less severe cases in the spectrum of homozygous thalassemia since many children require transfusions so frequently as to preclude such investigations.—I. S.


Included is a short review of the cases of thalassemia which have been observed in Germany, all of which, with one exception, were of the minor type. In two families living in the environs of Cologne, the authors have observed 8 cases of thalassemia minor. The main finding in the blood smear was not target cells but a marked anisocytosis with microcytes, ovalocytes and poikilocytosis. There was augmented osmotic and mechanical resistance of the erythrocytes. Electrophoretic investigation of the hemoglobin showed an elevated amount of Hb-A₂ (5.5 to 6.1 per cent) and Hb-F of 3.4 to 5.3 per cent.—H. M.


Five cases of hereditary spherocytosis were studied during a major crisis. Three occurred in one family and two in another. There was evidence that acute infection may have been a precipitating factor in at least two of these cases. Hematologically, all showed pancytopenia, with low reticulocyte counts and erythroid hypoplasia of the bone marrow. These findings were compatible with the concept of the so-called "aplastic crisis" induced by environmental factors, one of which is infection.—T. H. B.

ERYTHROPOIESIS


A heat-stable acidic glycoprotein, isolated from plasma from anemic rabbits and shown to be erythropoietically active (Proc.Soc.Exper.Biol.& Med. 98:602, 1958) was hydrolyzed with acid. It was demonstrated that the material lost its activity, possibly due to the hydrolytic removal of neuraminic acid. It was stated that neuraminic acid does not in itself stimulate erythropoiesis, but that it may be an important part of the erythropoietin molecule.—A. J. E.