ABSTRACTS

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ABSTRACTERS

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ERYTHROCYTES


Glucose is a promoter of phosphate exchange in the red cell. Because of recent work (Gabnio and Finch) which demonstrated a beneficial effect of adenosine on restitution of organic phosphate compound of stored cells and on prolongation of the storage period of red cells, the authors studied the effect of adenosine on P32 disappearance from plasma and P32 distribution in phosphate compounds of the red cell. It was found that adenosine could substitute for glucose in mediating phosphate exchange in erythrocytes.—A.G.M.


Venous blood from healthy donors was drawn into cold ACD solution and distributed as aliquots into a number of sterile tubes. These were sealed and stored in two groups, one at 4 C. and the other at 37 C. At intervals the tubes were removed from storage and the incorporation of acetate-2-14C into the total stromal fraction of the stored cells was determined. Upon storage at either temperature there was a progressive loss in the ability of the erythrocyte stroma to incorporate acetate-2-14C. The diminution of the ability to incorporate acetate is dependent upon the temperature of storage and may reflect alterations in the dynamic state of the stroma lipids under these storage conditions. This technic demonstrates an abnormality of erythrocyte stroma metabolism that occurs during storage at 4 C. at a much earlier time than the appearance of significant changes in post transfusion viability of the red cells.—R.H.G.


In a patient with postural hypotension syncopal attacks were provoked by making the patient stand in the upright position. Following such attacks a considerable increase in the more immature reticulocytes was demonstrated in the peripheral blood, probably caused by the attending cerebral hypoxia. The observations reported support the theory, that the oxygen tension in the basal part of the brain is an essential factor in regulating the liberation of reticulocytes into the peripheral blood.—M.S.

THE RESISTANCE OF RED CELLS IN VITRO. A STUDY OF THE OSMOTIC PROPERTIES, THE MECHANICAL RESISTANCE AND THE STORAGE BEHAVIOUR OF RED CELLS OF FETUSES, CHIL-
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This article gives important information concerning certain physical properties of red cells of fetuses, infants and children. The red cell fragility in hypotonic NaCl solutions has been studied by a modification of Ponder's method. The mean osmotic resistance was found to be low in young fetuses (14-21 weeks), on an average 0.584 cent NaCl compared with 0.504 in adults, and the span of hemolysis was great. In cord blood at birth the mean osmotic resistance was approximately as in adults, but the span of hemolysis was still somewhat increased. In newborn infants 12-48 hours after birth, and later throughout infancy and childhood, the mean osmotic resistance of the erythrocytes increased in comparison with adults. The mechanical resistance of the red cells was reduced in cord blood and during the first two or three months of life. Red cells of newborn infants at birth seem to be more vulnerable to storage at +4 C. and at +37 C. than adult red cells.

On the whole, this is a good report, which adds to our knowledge about the physical properties of red cells of fetuses and infants. Most conclusions seem to be well founded, although the author's interpretation of the data presented cannot always be accepted by the reader. For example, his reasons for assuming that the newly formed red cells are more fragile in hypotonic NaCl solutions than the average red cell, and that the oldest cells are most resistant, are not convincing.—M.S.


The osmotic fragility of the red cells of white albino rats was measured before and after a sizable phlebotomy. It was determined that there was a significant decrease in the osmotic fragility of cells after phlebotomy which occurred coincident with the appearance of a new red cell population. It is unfortunate that reference No. 13 was misinterpreted by the authors.—W.N.J.

BLOOD GROUPS


In 300 patients with histologically confirmed uterine or other gynecological cancer treated in Helsinki between 1948 and 1953, blood groups were determined. In 310 controls, 31.6 per cent were of Group O, 44.8 per cent of Group A, 15.5 per cent of Group B and 8.1 per cent of Group AB. For the malignancy cases, the figures were, respectively 37.7, 36.7, 19 and 6.7 per cent. The incidence of Group O was therefore higher in those with gynecological cancer, and this was particularly so with cancer of the uterus.—R.H.G.


During the years 1944-53, 777 cases of histologically proved lung cancer were blood grouped. The grouping was compared with that in 1000 blood donors in the same area. There was no significant difference in the ABO blood groups of the two series. There was an excess of group A at the expense of group O in oat cell tumors, but not in the other histological types. In 555 cases tested with anti-D serum, 12.4 per cent were rhesus negative as compared with 17.9 per cent of controls. This difference is statistically significant.—R.H.G.


The survey was carried out in 12 hospitals in England and covers the years 1948-53. Rigid diagnostic criteria were employed. From 13,000 case records, 7,702 cases were con-
sidered satisfactory. The selection of suitable controls against which to match the blood-group frequencies observed in the different diseases was a difficult matter. Patients with peptic ulcer, who numbered 3,011, showed an increased incidence of Group 0. If this series is typical, persons of Group 0 are 35 per cent more likely to develop peptic ulceration than are persons of the other groups. The ABO frequencies in cancer of the colon and rectum, the breast and the bronchus did not differ significantly from the controls. There was no difference in ABO groups between gastric and duodenal ulcer patients. No significant difference was found in sex proportion or in age between patients of the four blood groups. There was no significant increase in Rhesus negative subjects in association with any of the four diseases.—R.H.G.


An investigation of the blood groups was carried out on 3,813 consecutive admissions, and the records were acceptable in 3,651 of these. They included 541 cases of toxemia of pregnancy. As compared with the nontoxemic patients, the toxemic ones showed a significant excess of women of group O. In many cases of toxemia of pregnancy the mechanism must be something other than heterospecificity of the fetus, but the authors plan to investigate whether this is ever a factor in the production of toxemia.—R.H.G.

A STUDY OF THE BLOOD GROUPS IN HABITUAL ABORTION. C. McNeil, L. C. Warenaki, C. D. Fullner and E. F. Treuelman. From the Holy Cross Hospital Laboratories and Department of Obstetrics and Gynecology, Holy Cross Hospital, and Department of Pathology, University of Utah College of Medicine, Salt Lake City, Utah. Am. J. Clin. Path. 24: 767-773, 1954.

An analysis of the ABO blood groups of 404 random matings, of which 85 were classified as habitual aborters, showed a highly significant statistical value when abortion was compared to incompatible ABO matings. Immune ABO antibodies (partial neutralization technic of Witebsky) were found more frequently in aborters.—J.H.A.


A comparison has been made of the C and E antigens in the red cells of donors whose genotypes contain the same Rh genes, D, C, E, etc. but in different alignments. Two comparisons were made: that between red cell samples 1 and 2 in the following table, and that between 3 and 4. All four samples gave reactions of about equal strength with some anti-C and some anti-E sera, but with other sera wide differences occurred.

<table>
<thead>
<tr>
<th>Genotype of donor</th>
<th>Antisera</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>anti-C</td>
</tr>
<tr>
<td></td>
<td>(u)</td>
</tr>
<tr>
<td>1. dCE/deE</td>
<td>0</td>
</tr>
<tr>
<td>2. dCe/deE</td>
<td>39</td>
</tr>
<tr>
<td>3. DCE/Dec</td>
<td>0</td>
</tr>
<tr>
<td>4. DCe/DcE</td>
<td>34</td>
</tr>
</tbody>
</table>

Scores represent the strength of reaction of four samples of blood against titrations of six selected antisera.

The influences of Rh genes on each other are complicated, but when the arrangement of C and E is as in rows 1 and 3, C is inhibited, and when the arrangement is as in rows 2 and 4, E is inhibited.

This is a complex though short paper and is unsuitable for abstracting.—R.H.G.

A married woman aged 64, with three children had persistent anemia and splenic enlargement. The Coombs test was negative. Over a period of three months, 60 pints of blood were given by transfusion, but splenectomy was required, and the patient thereafter remained fit and well. A diagnosis of hypersplenism was made. After operation the serum was found to contain anti-Lutheran antibody. The blood groups of relatives were established and no Lutheran antigen found in the husband, children or sisters of the patient. The patient may have been immunised by blood transfusion, but the character of the anti-Lutheran titers was suggestive of a naturally occurring antibody.—R.H.G.


A 27 year old patient who had had six pregnancies all ending in abortions at two to five months appeared to have a new isoagglutinin in her serum. The serum of this group A, Rh positive patient agglutinated the blood of each one of a hundred random bloods of Groups O and A, independent of their Rh status, but failed to react with its own red cells and the red cells of three out of four siblings. This appeared to be a single antibody differing from anti-K and anti-e.

The sera of the propositus and her three compatible siblings failed to react with the group O red cells of the patient in whose serum anti-Tja was first described. Moreover the red cells of the three siblings failed to react with their own four sera and with three stock samples of anti-Tja. There are thus now thirteen examples of anti-Tja in seven families scattered over five continents.

It seems that anti-Tja is a naturally occurring antibody that is regularly present if the red cells lack the very frequent blood factor Tja. The individual is of the rare genotype Tjb Tjb.

There have been eighteen miscarriages with no full-time pregnancies in five patients with anti-Tja in the child-bearing age. Two other such patients have had successful pregnancies.—R.H.G.

HEMOLYTIC DISEASE OF THE NEWBORN


Hemolytic disease of the newborn commonly occurs in Rh-negative women delivered of Rh-positive children, but may be seen in Rh-positive mothers: in the majority of such cases the maternal serum contains Rh antibodies, anti-E or anti-e. Antibodies to other blood group antigens, such as anti-Kell, may also be present in the maternal serum giving rise to the condition, and even rarer blood group antigens such as Cw may be the cause. Family antigens may also be responsible: they appear to be of two kinds—those observed because they have given rise to hemolytic disease of the newborn, and those found within a family but not associated with the occurrence of the disease.

In a third pregnancy, a patient gave birth to a child with hemolytic disease. The direct Coombs test on the child's cells was positive. The mother was A1R1R2(CDe/cDE). Detailed serological studies indicated that a rare Rh agglutinogen at the C-e locus, Cw, was responsible. The maternal serum was tested with a total of 3,931 blood samples from healthy donors, Group O and A samples being tested with unabsorbed serum and Group B and AB with serum from which the anti-B agglutinins had been absorbed. With the cells of the father and the affected child and in only four other instances did the cells give positive results with
the maternal serum; the albumin and Coombs technics and papainized-cell method were used. Tests with various anti-C sera indicated that these cells appeared to have a modified C antigen which gave characteristic reactions. Cells which gave positive results with the maternal serum all gave this characteristic pattern of reaction except where this was masked by the presence of a normal C antigen. Family studies suggested that the C antigen was inherited as a mendelian dominant characteristic.—R.H.G.


Isoantibodies against A and B antigens were studied in 224 pregnancies, mostly group O mothers. In homospecific pregnancy and in most cases of heterospecific pregnancy no change was observed in the antibody pattern before and after delivery. An occasional case of heterospecific pregnancy demonstrated an immune response. This response consisted in moderate elevation in agglutinin titer with parallel changes in gum acacia titers, antibody demonstrable in serum media, and by the indirect Coombs after partial neutralization with blood group specific substance, and by the appearance of hemolysins. The immune response was found not to persist or affect unfavorably the outcome of future pregnancies.

Data are presented that suggest that the antigenic stimulus occurs during labor and is supplied by soluble blood group specific substance and not whole erythrocytes. Comparison of the isoantibodies of cord sera and the corresponding maternal sera showed that agglutinins do pass the placental barrier, but less readily and independently of the immune antibodies. The protective mechanism in heterospecific pregnancy appears to be blood group specific substance in the tissues of the fetus. Evaluation and comparison of infants born of heterospecific and homospecific pregnancy with respect to development of early jaundice, serum bilirubin, hemoglobin, spherocytosis, sponomegaly, hepatomegaly, and general clinical behavior did not show any appreciable differences between the two groups. In seemingly normal heterospecific infants, selective increased destruction of transfused cells was shown, suggesting that maternal isoantibodies may produce effects on fetal red cells without clinically or immunohematologically recognizable disturbances in the newborn. ABO incompatibility does produce certain pathologic effects in newborns, but only when the maternal antibody shows immune characteristics are these effects severe enough to produce harmful effects on the infant. Kernicterus was observed in 15 per cent of a group of 38 infants showing early jaundice. There was an apparent relationship to bilirubinemia and a factor of individual sensitivity.—J.H.A


Hemolytic disease of the newborn can be predicted with certainty before delivery, and the diagnosis established within minutes of birth. With exchange transfusion the mortality need only be of the order of 2 per cent of live born infants with this disease. However in 1952 the recorded mortality in England and Wales was 14 per cent. This represents 435 deaths in the year and the authors believe that 367 of these lives might have been saved.

In the north of England at least 5 out of 1,000 babies will suffer from hemolytic disease of the newborn, of 100 such babies 10-15 will be stillborn, and of 100 such live born babies 60 will require transfusion sooner or later. Early exchange transfusion is the treatment of choice.

The management of 451 cases of hemolytic disease is described. The best results were obtained where cases were delivered in hospitals offering special facilities. Various recom-
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Recommendations are made for the setting up of centers to treat the condition and predict its occurrence.—R.H.G.


It has already been reported both from Britain and from the U. S. A. that exchange transfusion has greatly reduced the incidence of kernicterus in hemolytic disease of the newborn. During two years in Dundee, however, there have been 30 infants with hemolytic disease of the newborn: 10 were considered to need no treatment, 16 had exchange transfusions, 1 died during exchange transfusion, and 3 had simple transfusions. Kernicterus developed in 5 infants, of whom 4 had had exchange transfusions, 3 of these 4 being premature babies. In these 4, the onset of abnormal cerebral signs was preceded by steadily increasing jaundice, but only in one were repeated estimations made of the serum bilirubin level and in this case, at the time of symptoms, the level was 25 mg. per 100 ml. Factors that may be related to the development of kernicterus include the hemoglobin level of cord blood, the possibility of potassium intoxication from stored blood, the giving of too much blood, the high serum bilirubin level in the infant, and hypoglycemia. Till the matter is better understood, the best hope of reducing the incidence of kernicterus would appear to be by repeated exchange transfusion to keep the serum bilirubin level low.—R.H.G.


Bilirubin was obtained in crystalline form from the pigmented brain areas of 5 newborn infants with severe kernicterus.—R.S.

Anaemia from Bleeding of the Fetus into the Mother's Circulation. B. Chown. From the University of Manitoba, Winnipeg, Canada. Lancet 1: 1213–1215, 1954.

Wiener has suggested that a fetus may bleed into the mother's circulation, giving rise to non-hemolytic anemia in the infant.

A 25 year old mother who had never had a blood transfusion, but who had had a previous spontaneous abortion, was group B, Rh negative (cde/cde). She became pregnant and no Rh antibodies were found in her blood at 3 months and 7 months. She gave birth after an uneventful pregnancy to a girl with Hb. 7.8 G. per 100 ml., red cells 2,300,000 per cu. mm., who belonged to group B, and was Rh positive and Coombs negative.

The mother's blood was examined by differential agglutination, antibody absorption and biochemical analysis. The baby differed from the mother in having the antigens C' and D. When the mother's blood was tested with saline anti-C' and with saline anti-D, some agglutination occurred. When an indirect Coombs test was done on the mother's cells with blocking anti-D serum, there was gross partial clumping. Further investigations suggested that 5–10 per cent of the red cells in the mother's circulation were derived from the baby. On the day of delivery there was no anti-D in the mother's blood. On the twentieth day saline anti-D was present, and there was a weak indirect Coombs reaction. Anti-C' did not become demonstrable. It is suggested that feto-maternal transfusion may cause non-hemolytic anemia of the newborn, fetal death, atypical toxemia and, rarely, jaundice of pregnancy.—R.H.G.