

Rh ISOSENSITIZATION IN THE AMERICAN NEGRO

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THE INCIDENCE of Rh isosensitization in the Caucasoid population has been studied by numerous investigators. However, to our knowledge, no similar comprehensive studies on the occurrence of Rh isosensitization in the Negro have been published. As a result of the paucity of such studies, there has been a more or less general impression that Rh isosensitization and erythroblastosis fetalis in the American Negro is a rarity.¹ The purpose of this paper is to disprove this concept on the basis of a statistically significant series of Negro patients studied in this laboratory.

The material for this study was taken from the files of the Baltimore Rh Laboratory for the period beginning August 1, 1945 and ending November 1, 1948. During this period a total of 55,561 individuals have been studied. The sera of all Rh-negative individuals are routinely examined for antibodies by testing against pooled, O MN Rh-positive erythrocytes suspended in 30 per cent bovine albumin solution. The specificity of any antibody found is likewise determined. The plan of prenatal study as carried out in this laboratory has been previously published.²

RESULTS OF STUDY

In the group of 55,561 patients there were 43,615 Caucasoid individuals of whom 8,889 (17.48 per cent) were Rh₀ negative. The remainder, 11,496, were American Negroes of whom 1,302 (8.37 per cent) are Rh₀ negative. The incidence of Rh-negative individuals, particularly in the Caucasoid group, is somewhat higher than previously established figures since many such patients, when found to be Rh negative elsewhere, have been referred to us for study. Excluding this factor, the patients constituting this study represent a completely unselected and random group. In the group of 8,889 Rh₀-negative Caucasoid individuals 503 instances of Rh isosensitization were encountered. Among these cases were 34 patients who have been studied through two pregnancies and 9 instances of sensitization by transfusion in males. Correction for these factors leaves a total of 460 isosensitized Caucasoid females. The incidence of isosensitization is, therefore, 5.2 per cent.

Among the 1,302 Rh₀-negative Negro patients 77 instances of Rh isosensitization were encountered. Thirteen of these patients have also been observed through two pregnancies. Thus, the corrected figure of 64 sensitized individuals represents an incidence of isosensitization in the Negro group of 4.9 per cent. The difference in the incidence of isosensitization between the Caucasoid and Negro group was found to be insignificant on statistical analysis.*

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* The formula for the standard error (σ) of the difference between 2 percentages is:

CLINICAL ASPECTS

Examination of the clinical records of this group of patients demonstrated a significant fact which may be one of the reasons for the existing general impression concerning the rarity of erythroblastosis fetalis among the American Negroes. In contrast to the Caucasoid group, approximately one half of the infants were inadequately studied during the neo-natal period. These patients were hospitalized in many different institutions throughout the city. Thus many relatively mild cases of erythroblastosis fetalis were undoubtedly over-looked. In spite of this fact, 14 cases of clinically obvious hemolytic disease of the newborn were encountered in the series. Of the latter group 4 were severe enough to lead to death. As will be observed in table 1 the degree of isosensitization observed in 64 cases is entirely comparable to that seen in Caucasoid individuals. Yet, the immediate mortality rate of 6.2 per cent is distinctly lower than the overall mortality from congenital hemolytic disease. Whether this is actually representative of the true situation, or whether this is simply another evidence of inadequate clinical follow-up, cannot be accurately stated at this time.

Two illustrative examples of erythroblastosis fetalis in the American Negro will be cited:

Case 1. H. S., a 43 year old, Negro, para 7, with 6 living children, was first seen in the last trimester of her pregnancy. The past history was negative for previous blood transfusions and erythroblastosis fetalis. She was found to belong to type O MN, Rh negative. Serologic studies revealed a univalent antibody in titer of 3 units with serum-suspended cells, and 6 units with albumin-suspended cells. The blocking test was negative. Antibody specificity was Rh₀. Serologic studies were carried out every two weeks, and a significant rise in titer was observed. On her last visit, two weeks before delivery, the antibody titer with serum-suspended cells was found to be 48 units while the titer with albumin-suspended cells was 384 units. The blocking test was now strongly positive. She delivered an infant weighing

$$\sigma_D = \sqrt{\frac{p^1q^1}{n_1} + \frac{p^2q^2}{n_2}}$$

where

p = per cent of nonsensitized cases
q = per cent of sensitized cases

and

n = total number of cases.

$$\sigma_D = \sqrt{\frac{0.94825 \times 0.5175}{8,889} + \frac{0.95084 \times 0.04916}{1,302}}$$

$$\sigma_D = 0.65\%$$

$$\text{Difference (D)} = 5.175\% - 4.916\% = 0.26\%$$

$$\frac{\sigma}{\sigma_D} = \frac{0.26}{0.65} = 0.4$$

so that difference is not statistically significant.

3,335 grams whose blood type was O MN, Rh₂. The initial hemoglobin level was 15 grams and there were 22 per cent nucleated red blood cells in the peripheral blood. Jaundice appeared two hours after birth and lasted three days. Hepatomegaly and splenomegaly were also present. The infant received no transfusions and was discharged from the hospital, apparently clinically normal on the fifth postpartum day. On the twentieth postpartum day examination in the Pediatric Clinic revealed the liver and spleen to be barely palpable. There was no jaundice, but blood study revealed a hemoglobin of 4.0 grams. Multiple transfusions of fresh type O MN, Rh-negative blood were given with subsequent uneventful recovery.

Case 2. S. A., 20 year old, Negro, para 2, with 2 living children, was first seen in the thirty-second week of her pregnancy. The past history revealed no instance of previous blood transfusions nor of any previous erythroblastotic infants. The patient's blood type was found to be O MN rh'; that of her husband O MN, Rh₁ Rh₁ (probable genotype R^I R^I). Both previous children were O MN, Rh₁ rh' (genotype R^I r'). Initial serologic studies revealed univalent antibodies in a titer of 96 units with albumin-suspended cells. The blocking test was negative. Antibody specificity was Rh₀. Blood studies at biweekly intervals demonstrated practically no rise in the antibody titer. On the day prior to delivery serologic study revealed a titer of 196 units with albumin-suspended cells and only 2 units with serum-suspended cells. There were no agglutinins active in saline solution and the blocking test was negative. The patient was delivered of an infant weighing 3,285 grams whose blood type was O, MN, Rh₁. The initial hemoglobin

TABLE 1.—Antibody Titers in Various Cell Suspension Media in 64 Isosensitized Negro Women

Units of antibody	Suspension media			Blocking test
	Physiologic saline solution	Pooled human serum	30% bovine albumin solution*	
0	42 cases	10	0	Positive 30 cases
1-10	18 cases	37	9	
10-100	4 cases	17	24	Negative 34 cases
100-1000	0 cases	0	15	
1,000-10,000	0 cases	0	6	

* Ten cases not studied with this medium.

was 15 grams and blood smears showed 4 per cent nucleated red cells. Because of a falling hemoglobin, a 90 cc. transfusion of fresh O MN, Rh-negative blood was given to the infant on the second day of life. Severe jaundice was observed on the second day associated with hepato-splenomegaly. Despite transfusions every other day the hemoglobin continued to drop. During the next forty-six days numerous small transfusions were necessary to maintain a satisfactory hemoglobin level. In all, a total of 620 cc. of blood was given over the forty-six day period.

These cases, which are presented to illustrate the severity of erythroblastosis fetalis in Negro infants, by no means illustrate ideal methods of management. It is rather interesting to observe that Case 1 illustrates a variety of erythroblastosis fetalis not infrequently encountered, in which the development of marked anemia occurred three to four weeks after delivery in an infant apparently clinically normal, during the early neo-natal period. In view of the current procedure of early discharge of postpartum patients, this variety of erythroblastosis fetalis is undoubtedly overlooked unless special attention is paid to blood studies during the first four to six weeks of life.

Since the incidence of the Rh-negative type in the American Negro (8.4 per cent) is only somewhat more than one half of that in Caucasians (13 to 15 per cent), the actual number of cases of erythroblastosis fetalis in Negroes will be correspondingly lower. Nevertheless, survey of a large series has revealed that there is no significant

difference in the incidence of isosensitization of Rh₀-negative individuals in either group. Rh isosensitization and erythroblastosis fetalis may be expected to occur in the American Negro in direct proportion to the incidence of the Rh-negative type in that race. Similar observations have been made in other races.³

SUMMARY

1. Studies of the Rh factor in 11,486 pregnant female American Negroes revealed 1,302 who were Rh₀ negative (8.4 per cent). Sixty-four cases of isosensitization were encountered which gave an incidence of 4.9 per cent in the Rh-negative patients. In comparison, among 8,889 Rh₀-negative Caucasians, 460 cases of isosensitization (5.2 per cent) were encountered. The difference was found to be statistically insignificant.

2. Two typical examples of erythroblastosis fetalis in American Negro infants are presented.

REFERENCES

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