RHESUS ANTIBODY ANTI-c IN CHINESE PERSONS A REPORT OF THREE CASES

By M. G. T. Mendoza-Barker, M.D. (MANILA)
and
C. S. Ying (Laboratory Technician)
(From The Blood Transfusion Service, General Hospital, Singapore.)

Rhesus antibodies are rare. Rhesus D, by far the most potent antigen, produces anti-D in only a small proportion of Rh-negative persons. This category includes some Rh-negative women who had one or more pregnancies with Rh-positive foetuses, and some Rh-negative persons, male or female, who have received previous injections of Rh-positive blood.

The calculated percentage frequency of the chromosome cde (r) in the English race is 38.86, and the calculated percentage frequency of the genotype cde/cde (rr) is 15.1020. Comparatively, the frequency of the cde chromosome in the Southern Chinese is 3 per cent, which implies the presence of 1 cde/cde person per 1000. In several Chinese communities the frequency of Rh-negative persons is known to approximate this figure. In a survey of 5,000 Chinese in Singapore, Maycock and Gibson-Hill found 7 i.e. 0.14 per cent to be Rh-negative. One, therefore, expects to find rarer instances of rhesus antibody among the Chinese. The same authors encountered two cases of Rh-negative Chinese women who developed Anti-D after several pregnancies.

Occasionally, Rh-D positive persons may form anti-bodies against the related antigens C or E and their allelomorphs c or e, although these are less potent immunizing agents compared to antigen D. The order of genotype frequency in the Chinese being CDe/CDe (RIRI), CDe/cDE (RIR2), and CDe/cDE (RIRo), the most likely antigens to cause immunization in RIRI person are E and c. Gibson-Hill and Sneath, (1952) reported a case of rhesus antibody anti-E in an RIRI Chinese woman after a single transfusion. In 1954, Maycock and Gibson-Hill mentioned a case of rhesus antibodies anti-C + anti-e in a Chinese woman with the uncommon genotype cDE/cDE (R2R2).

The following cases of rhesus antibody anti-c in Chinese persons are believed to be the first examples recorded in Singapore or Malaysia.

CASE 1.

Clinical History

The blood of a 40 years old Chinese woman with a bad obstetrical history and no living child was received for precautionary grouping and cross-matching. Fourteen out of 15 blood matched with her serum were incompatible. It was her fifth pregnancy. One pregnancy had terminated in miscarriage, another in premature birth, and two others had ended in neonatal death. She gave no history of a previous transfusion.

Fortunately, the course of her delivery was uneventful and she required no transfusion. Her infant daughter was equally healthy and needed no exchange transfusion.

Grouping

The patient's blood group was B, CDe/CDe (RIRI).

Antibody Tests

1. *Two-stage papain test:* The patient's serum was tested against a panel of known genotyped cells by this method. Table 1.

2. *Indirect Coombs Test:* The patient's serum was tested against a panel of known genotyped cells suspended both in saline and 20 per cent bovine albumin. After incubation at 37° C, the saline mixture was washed and tested with anti-human globulin serum (A.H.G.). Table 1.

Absence of Rhesus Antibody Anti-E

The antibody anti-c present in the patient's serum was absorbed by cde/cde (rr) cells. After complete absorbtion the serum was retested with cde/cde cells as control and cDE/cde (R2r) cells to detect the presence of rhesus antibody anti-E. Both the 2-stage papain and the indirect Coombs tests were

negative which indicated the absence of rhesus antibody anti-E. (See Table 2.)

Titration of the Antibody

The titre of the antibody was determined by the Indirect Coombs method. The results are shown on Table 3.

Confirmation

The presence of anti-c was confirmed by the Red Cross Blood Transfusion Service, Queensland Division, Brisbane Australia. The serum was tested against a panel of 23 R1R1 cells and the tests eliminated anti-MNSs, P, Le^a, Le^b, Kk, Fy^a, Fy^b, Lu^a, Lu^b, Jk^a, Jk^b antibodies. In addition, the serum was tested with a panel of six cells containing the c antigen. These gave positive results +++++. The presence of anti-E was eliminated by the absorption technique. Titration with R2R2 and rr cells in 30 per cent albumin showed a titre of 1: 128. No saline antibodies were demonstrated.

TABLE 1

BLOOD GROUP OF RED CELLS	Agglutination			
	2-Stage Papain Test	Indirect Coombs Test		
		Saline	Bovine Albumin	Anti-human Globulin Serum
O CDe/CDe MNs Le^a Fy^a	—	—	—	—
B CDe/CDe Ms P Le^b Fy^a	—	—	—	—
O CDe/CDe Ns Fy^a	—	—	—	—
B CDe/cDE MNS Le^b Fy^a	+	—	+	+
O cDE/cde Ms Le^a Fy^a	+++	—	++	++
O CDe/cde MNs Le^b Fy^a	+	—	+	+
B CDe/cDE MNs Fy^a	+	—	+	+
B cde/cde	+++	—	++	++
O cde/cde	+++	—	++	++
O cde/cde (random x 12)	+++			
O CDe/CDe (random x 3)	—			

TABLE 2

BLOOD GROUP OF CELLS USED	2-Stage Papain Test	Indirect Coombs Test		
		Saline	Bovine Albumin	Anti-human Globulin Serum
O cde/cde	—	—	—	—
O cDE/cde	—	—	—	—

TABLE 3

Blood Group of Cells used O cde/cde	Dilutions									
	1	2	4	8	16	32	64	128	256	512
Saline	—	—		—	—					
Bovine Albumin	+++	+++	+++	+++	++	++	+	+		
Anti-human Globulin Serum	+++	+++	+++	+++	++	++	+	(±)		

BABY OF THE PATIENT

Grouping

The baby was group O CDe/cDE (R1R2).

Antibody Tests

1. The direct Coombs test performed on the baby's cells was negative.

2. The mother's serum was tested against the baby's cells, and although the more sensitive 2-stage papain test was positive +++, the indirect Coombs test was completely negative. This indicated a low concentration of antibody in the baby's circulation.

CASE 2.

Clinical History

A blood specimen was received from a 49 years old woman with a carcinoma of the cervix, severe bleeding and a haemoglobin of 29 per cent. On admission, she was given a pint of group O rhesus D positive emergency blood followed by a second pint of compatible blood. The next day, she received two more pints of compatible blood.

Twenty days later, another specimen from the patient was received for further cross-matching. Three out of 4 bottles of blood matched by the Coombs technique were incompatible. The patient received the compatible blood with no untoward effects. Further inquiry into the patient's past history revealed a compatible blood transfusion 14 months previously. She had nine pregnancies, 2 of which terminated in abortions and 9 as normal deliveries. The patient eventually died.

Grouping

The patient was group O CDe/CDe (R1R1).

Antibody Tests

1. The direct Coombs test was negative.

2. Autoagglutination test with the patient's own cells suspended both in saline and bovine albumin and incubated at 37° C were negative. The cells in saline suspension were tested with anti-human globulin serum after thorough washing, and the test also gave a negative result.

3. The patient's serum, tested against a panel of known genotyped cells, by the 2-stage papain test, agglutinated only those cells which carried the c and E antigens. Table 4.

Titration of Antibody

The serum was titrated against cde/cde (rr) cells using the 2-stage papain method. The titre was 1:4.

No indirect Coombs test was performed in conjunction with the 2-stage papain test because of the inadequate amount of serum available for investigation. For the same reason, the presence of anti-E was not ruled out by the absorption method. Anti-E, therefore, may or may not be present in combination with anti-c. It was not possible to send the specimen overseas for confirmation.

CASE 3.

Clinical History

A 56 years old Chinese male patient with Tuberculous Meningitis and Thalassemia Major received a pint of blood to correct his anemia. Seven months later, a second specimen received from the patient showed the presence of antibodies. Compatible blood was found, using the Coombs method, and the patient received further blood transfusions without ill effects.

TABLE 4

Blood Group of Cells Used	2-Stage Papain Test
O CDe/CDe MN Le^a Fy^a	—
O CDe/CDe N Fy^a	—
O CDe/CDe M P Le^b Fy^a	—
O cDE/cde M Le^a Fy^a	++
O cde/cde	++
O Cde/cde	+
O cdE/cde	++

Grouping

The patient was group B CDe/CDe (R1R1).

Antibody Tests

1. The patient's direct Coombs test was weakly positive.

2. Autoagglutination test with his own cells suspended both in saline and 20 per cent bovine albumin gave positive results ++ at 37° C. This indirect Coombs test with anti-human globulin serum was also positive.

3. The serum, tested against a panel of known genotyped cells, by the 2-stage papain and the indirect Coombs tests, gave negative results except with the cells that carried the c and the E antigens.

Titration of the Antibody

The titration performed with cDE/cde (R2r) cells suspended in saline showed a titre of 1: 1. After thorough washing the cells were tested with anti-human globulin serum. These showed a titre of 1: 4.

Donor

The initial transfusion of the patient came from a Malay donor whose blood group was B CDe/cDE (R1R2). In the absence of any other history of previous blood transfusion or injections, this transfusion, no doubt, introduced the immunizing agents, antigens E and c. Subsequent compatible transfusions for the patient were supplied by donors of various races, Malays, Indians, and Chinese, who had the blood group B CDe/CDe (R1R1) in common.

Confirmation

The Red Cross Blood Transfusion Service, Queensland Division, Brisbane, Australia confirmed the presence of a weak anti-c plus a potent anti-E and a weaker non-specific auto-antibody component.

DISCUSSION

Rhesus D positive persons may form rhesus antibodies against one or more of the rhesus antigens C and c or E and e. This may occur after one or more pregnancies or blood transfusions. The occurrence of an antibody after a single transfusion is uncommon, but such instances have been known to happen before. The case reported by Gibson-Hill and Sneath is an example. In the formation of an antibody, the amount of transfused blood is not important. However, there is evidence that the interval of transfusion determines the antibody response.

In pregnant women, the rhesus antibody may cause haemolytic disease in the infant.

SUMMARY

1. Three cases of rhesus antibody anti-c in Chinese persons are described.

2. In the first case the antibody existed as pure anti-c, and arose as a result of pregnancy.

3. In the second case, the co-existence of anti-E was not ruled out. The antibody may have arisen either as a result of pregnancy or of blood transfusion.

4. In the third case a weak anti-c was in combination with a potent anti-E and a weaker non-specific auto-antibody component. The antibodies were formed after a single blood transfusion.

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