

### The Very Rare Rh Genotype *R<sub>yr</sub>* (*CdE/cde*) in a Case of Erythroblastosis foetalis

IN a case of erythroblastosis foetalis, the mother was found to belong to the rare *Rh* phenotype which includes the genotype *R'R''*. *Rh*-typing of her family makes it clear that the genotype is, in fact, *CdE/cde* or *R<sub>yr</sub>* (or, in the latest nomenclature of Dr. Wiener, *rrr*). The combination *CdE* has never previously been clearly demonstrated<sup>1-5</sup>. The claim of Stancu, Clark and Snyder<sup>6</sup> to have discovered *CdE* seems insufficiently documented for so important a claim.

Fisher<sup>7</sup> first stated that the combination *CdE* should be capable of existence. He and Race afterwards suggested<sup>8</sup> that its frequency in the English population would probably be less than 0.005 per cent, and that of the genotype *CdE/cde*, about 37 per million.

The case described is that of Mrs. K., whose seventh pregnancy ended at 7½ months in the birth of a baby which became severely jaundiced and died on the fourth day of kernicterus.

Mrs. K.'s blood group is *O MN P*; her red cells are, moreover, agglutinated by anti-*C* and anti-*E* but not by anti-*D*. Her serum contains both complete and incomplete anti-*D*. The blood of the husband is not available as he is abroad; he is known to be *D* positive. Mrs. K.'s mother and her third child are of the same rare *Rh* type (*CdE*) as herself. The *Rh* types of all members of the family who have been tested are given in Fig. 1, in terms of their reactions with anti-*C*, anti-*D* and anti-*E* sera.

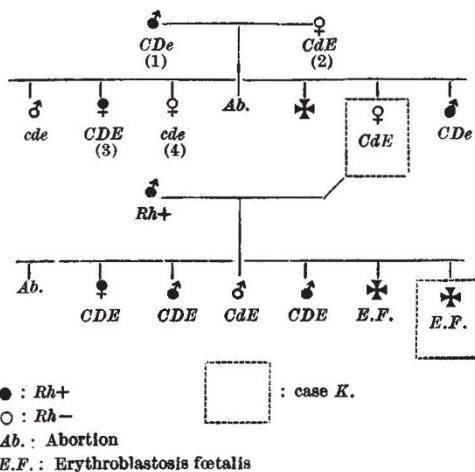


Fig. 1. The *Rh* types of Mrs. K. and her relatives (tested with anti-*C*, anti-*D* and anti-*E* sera)

Two sibs of Mrs. K. are *Rh* negative (*cde/cde*). Their parents must, therefore, both be heterozygous, with the combination *cde* on one chromosome. It is thus possible to fix the genotypes of all the surviving members of two generations of the family as shown in Fig. 2, and to identify *CdE* as an inherited combination on one chromosome. Race's table of antigen-antibody reactions can thus be completed (Fig. 3).

Only anti-*C*, anti-*D* and anti-*E* sera were available for most of the tests; Mrs. K.'s parents were, in addition, tested with anti-*c* kindly supplied by Dr. J. J. Van Loghem, jun., of the Centraal Laboratorium Bloedtransfusiedienst van het Nederlandsche Roode

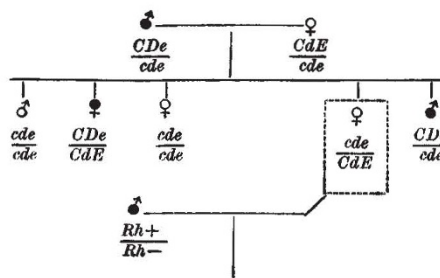


Fig. 2. The *Rh* genotypes of Mrs. K. and her relatives

	<i>cDe</i>	<i>cde</i>	<i>cDE</i>	<i>cdE</i>	<i>CDe</i>	<i>CdE</i>	<i>CDE</i>	<i>CdE</i>	<i>Rh<sub>v</sub></i>
Anti- <i>C</i>	+	-	-	-	+	+	+	+	+
Anti- <i>D</i>	+	-	-	-	+	+	+	+	-
Anti- <i>E</i>	-	-	+	+	-	-	-	-	+
Anti- <i>c</i>	+	+	+	+	-	-	-	-	-
Anti- <i>d</i>	-	+	-	+	-	+	-	-	+
Anti- <i>e</i>	+	+	-	-	+	+	-	-	-

Fig. 3. Fisher's synthesis of the *Rh* system

Gene combinations and their reactions with different antisera. The data within the inner line had been established by Race and Taylor by the end of 1943 and were the basis of the complete scheme proposed by Fisher. Murray, Race and Taylor announced in 1945 the reactions of *R<sub>v</sub>* with anti-*D* and anti-*E*. Mourant later in 1945 described anti-*e*. Diamond<sup>10</sup> in 1946 announced his discovery of anti-*d*, and this antibody was fully described by Hill and Haberman<sup>11</sup> in 1948. The discovery of *R<sub>v</sub>* and its reactions are described in the present paper.

Kruis, Amsterdam. Mrs. K. and her children are now abroad and are not available for further tests.

Dr. J. J. Van Loghem, jun., checked the *CdE* type of Mrs. K. and the presence of antibodies in her serum. Miss E. W. Ikin and Mrs. J. Woodward in the laboratory of Dr. A. E. Mourant in London carried out full *Rh* tests on the blood of Mrs. K. and her sibs (3) and (4) with the following results:

	Anti- <i>C</i>	Anti- <i>D</i>	Anti- <i>E</i>	Anti- <i>c</i>	Anti- <i>e</i>
Mrs. K.	+	-	+	+	+
(3)	+	-	+	+	+
(4)	-	-	-	+	+

Our data prove the existence of the combination *CdE* on one chromosome. Thus the eighth allelic combination *CdE* of Fisher's theory is recognized, and this ingenious synthesis may be considered as completely confirmed.

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