GENEALOGICAL BLOOD-GROUP ANALYSES OF THE DANZIG QUINTUPLETS

S. RASZEJA, A. KRUEGER

Department of Forensic Medicine, Academy of Medicine, Danzig, Poland

Blood groups of the Danzig quintuplets and their family were determined in order to establish whether they are mono- or polyzygotic in origin. Results of blood grouping showed that they come from a quintovular pregnancy. A pedigree of the quintuplets family is given. The following blood-group systems were tested: ABO, MN, Rh (C^w, C, c, D, E, e), Kell, haptoglobins, Gm^1, and erythrocyte acid phosphatase.

The determination of blood-group traits is of great practical significance for establishing the zygosity of infants from multiple pregnancy (Lukaszewicz and Nowakowski 1958, Raszeja and Krueger 1972). At present this is the simplest method and the analysis of many mutually independent group systems enables to establish the type of zygosity nearly systematically (Race and Sanger 1962). The method of skin transplants, considered to be the ultimate " court of appeal " in the detection of zygosity, has so for not taken roots in practice. The determination of leukocyte antigens (HL-A system) does not yet meet the requirements presented to methods which should in reliable and simple way determine whether one or several ova were involved.

Already when the Danzig quintuples were born, the diversity of sex (two girls and three boys) pointed out that they came from at least a binovular pregnancy. The morphological macro- and microscopic analysis of the afterbirth suggested, however, that the quintuplets are quintovular. In order to confirm this suggestion, it was decided to carry out the analysis of the blood groups of the quintuplets as well as that of the other family members.

MATERIAL AND METHODS

Blood samples were collected from the quintuples at the age of six months. Analysed were also the older brothers of the quintuplets, their parents, the maternal grandfather and the maternal grandmother.

The following blood-group systems were analysed: ABO, MN, Rh (C^w, C, c, D, E, e), Kell, haptoglobins (Hp), Gm^1, and the isoenzymes of erythrocyte acid phosphatase (EAP). The erythrocyte systems and the Gm^1 feature were determined with standard sera supplied by the Biotest Company. The haptoglobin group system and that of acid phosphatase were assayed by means of starch gel electrophoresis. Apart from the above erythrocyte antigens a number of other groups (Kidd, Duffy, Xg^a, and Lutheran) was determined in the quintuplets; because of the arousing doubts of interpretation, probably a result of incomplete antigen maturity, the results of the latter determinations are not included in the report.

Table. *Blood Groups of the Quintuplets and of Their Siblings, Parents, and Grandparents*

	Blood group system						
	ABO	MN	Rh	Kell	Hp	Gm^1	EAP
Grandparents							
Paternal grandfather	O	N	CCDee	K—	2-2	+	BA
Maternal grandmother	B	M	ccddee	K—	2-1	+	CB
Parents							
Father	O	N	C^wCDee	K—	2-2	+	A
Mother	O	MN	CcDee	K—	2-1	+	BA
Quintuplets							
1. Adam	O	N	CCDee	K—	2-2	+	A
2. Piotr	O	N	CCDee	K—	2-2	+	BA
3. Roman	O	N	CcDee	K—	2-1	+	A
4. Agnieszka	O	MN	C^wCDee	K—	2-1	+	A
5. Ewa	O	MN	C^wcDee	K—	2-2	+	BA
Siblings							
Krzysztof	O	MN	C^wCDee	K—	2-2	—	BA
Janusz	O	MN	C^wCDee	K—	2-2	+	A

RESULTS AND DISCUSSION

The comparison of some blood groups of the quintuplets, i.e., of Adam, Piotr, and Roman, as well as Agnieszka and Ewa, enabled to establish undoubtedly their polyembryonal (quintovular) origin.

In the Table the phenotype differences are noted separately for three male and two female infants: Roman differs from the other two brothers by the Rh group (within the range of the Cc) and Hp phenotype, and he differs moreover from Piotr also by the type of acid phosphatase. Piotr differs from Adam only by the phenotype of acid phosphatase. Ewa differs from Agnieszka both by the Rh (C^wc) and Hp, as well as the acid phosphatase phenotype. Also among the older siblings of the quintuplets, group differences were found (group Gm^1, acid phosphatase) and also in comparison with particular infants among the quintuplets; these differences are by no means greater than those found among the quintuplets. The blood-group examination of Janusz, for instance, and of Agnieszka showed a difference exclusively in one system (Hp), as it was also in the case of the comparison of the group traits of Piotr and Adam.

Special attention deserves the fact that a rare trait C^w of the Rh system (frequency 4.7%) was found in two of the quintuplets (Agnieszka and Ewa), who inherited it from their father, who must have had it from his mother (the grandfather of the quintuplets had not this trait).

Prof. S. Raszeja, Department of Forensic Medicine, Academy of Medicine, ul. Debinki 7, 80-211 Gdansk, Poland.