

INVESTIGATION OF ANTIBODIES OF ABO-BLOOD GROUP SYSTEM OF FULL-TERM CHILDREN UP TO ONE YEAR OLD

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It is already known that ABO-system antigens are formed in the erythrocytes and can be detected during the intrauterine development of the foetus. This is possible to be established even in the early stages of the prenatal period. Thus, R. Race, R. Sanger — 1968 (14), P. L. Mollison, F. A. Davis — 1972 (12) prove the presence of A- and B-antigens in 5—6 weeks old foetuses. However, the agglutinins alpha and beta appear quite later, in the period of individual development. No agglutinins could be detected in numerous investigations of blood of foetuses in different stages of embryogenesis (A. Lizunova, V. Shpiganova — 1930; V. B. Feinburg — 1935, etc.) Our studies (3) of foetal blood showed the presence of alpha and beta agglutinins, but later, when the results of the additional investigation of the antibodies' destruction were performed, it was established that they were mother's antibodies transported to the foetus via placental barriers. Alpha and beta agglutinins were quite often found in the serum of newborn, but they were also considered by many authors to be mother's immunoglobulins G, transported in the foetus through placenta (L. Hirszfild — 1928; S. Polajes, M. Lederer, A. Wiener — 1929, etc.) Some investigations (M. Happ — 1920; L. S. Volkova — 1955), however, prove that the newborn can produce own alpha and beta agglutinins. Recently, P. L. Mollison, F. A. Davis — 1972; A. Adinolfi — 1965 suggested such a possibility even during the intrauterine period of the foetus. A. K. Tumano — 1968; P. N. Kossjakov — 1974; P. Prodanov — 1977 reasonably presume their stable detection to be certain at least 3—6 months after birth. Their titer increases in the following periods and reaches its maximum-level in the young mature age.

Our study covers blood-samples of 260 mothers and their children (just after birth). We try to establish the manifestation of alpha and beta antibodies of the blood-group system ABO. Blood-samples of 118 children were investigated during the 4th, 8th, and 12th month after birth, thus it could be possible to follow the complete forming of their phenotype, concerning this system. The results of the study could throw light on the question of the time of production and manifestation of the children's own alpha and beta antibodies, which determines their fitness to forensic-medicine investigation after ABO-system, when the parental origin (parentage) is subjected to suspicion.

The blood was taken of the umbilical cord (new-born) and peripheral vessels (mothers and children).

The investigation was done by using the cross-method of determination of blood-groups after ABO-system with fresh (ex tempore) test-erythrocytes and high-titer test-sera. The method of R. Grubb and B. Swahn (1958),

modification of Van Lobhen et al. (1971) was applied to 17 blood-samples of newborn. It concerns the destruction of the gamma-M-globulins: natural alpha and beta antibodies.

Results

Table 1 shows the distribution of alpha and beta antibodies in blood-samples of mothers and umbilical cord of fullterm new-born. It is obvious

Table 1

Agglutinins	Mother	Umbilical cord	
Alpha	41	21	
Beta	123	24	
Alpha, beta	76	46	
		alpha 7	beta 9
No agglutinins	—	123	
	sustem-ABO 20	30	
Total number	260	260	

that 107 (41.10%) blood-samples of the umbilical cord have alpha or beta antibodies and 46 of them have both. Only 4 (1.94%) samples show different antibodies compared to those of mothers. 2 cases (mothers) have blood-group A (beta), while blood-samples of umbilical cord of children have alpha and beta antibodies with the same (though low) titers (1:4). The rest 2 cases (mothers) are with blood-group B (alpha), while blood-samples of umbilical cord of children also have alpha and beta antibodies with titers 1:4.

The aforementioned method of R. Grubb, and B. Swahn was used to study these 4 cases. No agglutination of erythrocytes with corresponding to children's antibodies antigen was detected. Blood-samples of the same children, 4 months later, maintain the same antibodies with considerably higher titers (1:16). The experimental results suggest that these children, at the time of their birth, have their own alpha and beta antibodies, though not so well manifested. The rest 103 cases show antibodies in their blood-samples of umbilical cord which are the same as those of the mothers. The method of R. Grubb and B. Swahn was applied to 13 of them, but agglutination of the corresponding erythrocytes was detected. This fact confirms that antibodies in serum of new-born are not natural gamma-M-globulins, but most probably gamma-G-globulins of the mother. The latter have a lower sedimentation-constant, therefore, it is possible they could be transpor-

ted through the placental barrier. 3 of the cases are very demonstrative — the mothers with blood-group A (beta) and umbilical samples with beta agglutinins. 4 months later (after the birth) only alpha agglutinin was detected and just after the 8th month their blood-group was finally established to be 0 (alpha, beta).

Table 2 presents the distribution of alpha and beta antibodies in blood-samples of 118 mothers and umbilical cord of their children. The time of

Table 2

Agglutinins	Mother	Children						
		umbilical cord		4th month		8th month		12th month
Alpha	19	9		11		20		20
Beta	54	11		15		42		42
Alpha, beta	33	20		7		42		44
		alpha 2	beta 7	alpha 8	beta 2	alpha 1	beta 1	
No agglutinins	—	57		63		—		—
	AB0 12	12		12		12		12
Total number	118	118		118		118		118

manifestation of children's own antibodies is also registered. It is obvious that 43 (36.44%) of the investigated children have their own alpha and beta antibodies 4 months after birth. Only alpha antibodies are found in 8 of the cases with blood-group 0, only beta antibodies—in 2. About the 8th month after birth all children possess the investigated antibodies, excluding 2 of them, with blood-group 0, where only one of both antibodies was established.

Conclusions

1. Alpha and beta antibodies are most often found (41.10%) in blood of full-term new-born children. It could be accepted that they come through the placenta of mothers.

2. 4 (1.94%) of our cases have their own alpha and beta antibodies.

3. The own alpha and beta antibodies of the full-term new-born children are mature and manifested about 8 months after their birth and only then they could be subjected to a forensic-medicine investigation.

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ИССЛЕДОВАНИЕ АНТИТЕЛ СИСТЕМЫ ГРУППЫ КРОВИ АВО
У ДОНОШЕННЫХ ДЕТЕЙ В ВОЗРАСТЕ ДО ОДНОГО ГОДА*Ив. Лазаров*

РЕЗЮМЕ

Проведено исследование 260 матерей и их доношенных детей — новорожденных как мужского, так и женского пола. Они наблюдались в течение первого года жизни. К моменту рождения у 41,10% всех детей было установлено наличие альфа и бета антител системы группы крови АВО. Лишь у четырех из них (1,94%) с уверенностью можно полагать, что имеются уже созданные, хотя и слабо выявленные собственные альфа и бета антитела. Эти антитела были обнаружены как окончательно оформленные и хорошо выявленные у всех исследованных детей в восьмом месяце после их рождения.