

IMMUNOCHEMICAL INVESTIGATION OF GROUP  
DIFFERENCES IN HUMAN FETAL SERA

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Investigation of the blood sera of human embryos and infants born at full term showed that group differences in the sera in relation to embryo-specific globulins appear in the early stages of embryogenesis (6-8 weeks) and persist throughout the period of intrauterine development. Data are given for the incidence of distribution of each group of embryo-specific globulins.

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It was shown previously [2] that the sera of human fetuses at the age of 10-30 weeks differ in their complement of embryo-specific globulins. These results provided a basis for the classification [2] of human fetal blood sera into 8 groups depending on the presence or absence of three embryo-specific globulins in each serum. A full account and details of identification of these antigenic components can be found in earlier papers [1, 3].

The object of the present investigation was to determine at which stages of embryogenesis it becomes possible to detect group differences between fetal sera as regards embryo-specific globulins, and whether these differences persist until birth.

## EXPERIMENTAL METHOD

Antisera against embryo-specific globulins were obtained by a cycle of 3-6 reimmunizations of rabbits with mixed human fetal serum. The antisera thus obtained were exhausted with an excess of mixed donors' serum. In this investigation we used one batch of antiserum (No. 132) which reacted specifically after exhaustion with the three known embryo-specific globulins. Titration of the sera of the embryos and newborn infants was carried out under strictly standardized conditions by Ouchterlony's method [5] as modified by N. I. Khramkova and G. I. Abelev [4].

Altogether a hundred individual samples of blood serum from embryos aged 6-12 weeks (artificial abortion) and a hundred samples of blood serum from full-term newborn infants were studied.

## EXPERIMENTAL RESULTS

The results given in Table 1 show that blood serum of group 1 was most commonly found in the embryos and fetuses (in 48% of cases on the average), containing all the known embryo-specific globulins (conventionally described as 1-2-3). Group 2 (1-2-0), characterized by absence of embryo-specific  $\beta_2$ -globulin from the serum, was found half as frequently. Sera of the embryos and infants belonging to group 3 (1-0-0) were observed on the average in 16.5% of cases. Sera of group 4 (1-0-3) were about half as frequent as those of group 3.

As Table 1 shows, embryo-specific  $\alpha_1$ -globulin was a constant component of the fetal serum belonging to four groups. These groups are the most widespread, accounting altogether for about 96% of sera. It is interesting to note that in frequency of distribution the first four groups are arranged in descending order, and the incidence of each group is about half that of its predecessor.

The sera of embryos and newborn infants not containing embryo-specific  $\alpha_1$ -globulin were found comparatively rarely. Groups of fetal sera not containing the first antigenic components (0-2-3, 0-2-0, 0-0-3, 0-0-0) had a lower incidence. Among the 200 sera studied, for example, only one serum was found

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TABLE 1. Group Characteristics of Blood Sera of Embryos and Full-Term Newborn Infants in Accordance with Previous Classification [2]

Group	Designation of group based on embryo-specific globulins*	No. of blood sera (in %)		Criterion of significance of differences between frequency of discovery of each group
		embryos (6-12 wks)	newborn infants (40 wks)	
1st	1-2-3	50	46	0.57
2nd	1-2-0	23	24	0.16
3rd	1-0-0	15	18	0.50
4th	1-0-3	9	6	0.90
5th	0-2-3	1	3	1.01
6th	0-2-0	1	2	0.59
7th	0-0-3	1	0	1.00
8th	0-0-0	0	1	1.00

\* 1)  $\alpha_1$ -globulin, 2)  $\alpha_2$ -globulin, 3)  $\alpha_3$ -globulin.

† V. S. Genes, Table of Significance of Differences between Groups of Observations Based on Qualitative Indices [in Russian], Izd-vo "Meditsina" (1964), p. 12.

in which all three embryo-specific globulins were absent (group 8) and only one serum belonging to group 7. In 40 samples of fetal sera investigated previously [2], no serum of groups 7 and 8 was found. It is concluded that the last two groups are observed in less than 0.5% of cases.

Since the criterion of significance (Table 1) of the differences discovered in distribution of each group among embryos and full-term newborn infants was less than 2, it can be concluded that each group of fetal sera is found with equal frequency at all stages of intrauterine development. This conclusion is in agreement with earlier results [2] for the frequency of each group among human fetuses aged 10-30 weeks.

Group differences between fetal sera thus begin to appear in the early stages of embryogenesis (6-8 weeks) and persist throughout the period of intrauterine development. It would be interesting to determine the times after birth at which the production of embryo-specific globulins ceases and whether antibody production against individual embryo-specific globulins by the mother can take place in cases when fetus and mother belong to different groups during pregnancy.

#### LITERATURE CITED

1. Yu. S. Tatarinov, Vopr. Med. Khimii, No. 6, 584 (1964).
2. Yu. S. Tatarinov, Vopr. Med. Khimii, No. 3, 98 (1965).
3. Yu. S. Tatarinov, Vopr. Med. Khimii, No. 1, 37 (1967).
4. N. I. Khramkova and G. I. Abelev, Byull. Éksperim. Biol. i Med., No. 12, 107 (1961).
5. O. Ouchterlony, Lancet, 256, 346 (1949).