

# GROUP SPECIFICITY OF AMNIOTIC FLUID IN THE EARLY PERIODS OF PREGNANCY

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Group specificity of the amniotic fluid during the first 12 weeks of pregnancy corresponds to that of embryonic tissue and is independent of the maternal blood group. Group substances are detectable constantly in the amniotic fluid only after the 11th-12th week of pregnancy, and earlier than this they may be absent, despite definite group differentiation of the embryo.

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The presence of group substances in the amniotic fluid, demonstrated by several workers [1, 4-7, 9, 12], can be used in obstetric practice to solve a number of problems connected with the diagnosis and treatment of hemolytic disease of the newborn [6, 8].

However, many of the principles governing regulation of the metabolism of these substances in the amniotic fluid, important in connection with the development of isosensitization of pregnant women, have so far received little study. This applies, in particular, to the role of mother, fetus, and certain structures of the after-birth in the formation of group activity of the amniotic fluid, a matter on which highly conflicting views are held [3, 4, 6, 8, 10, 11]. One of the main reasons for this state of affairs is the difficulty of obtaining amniotic fluid in the early periods of pregnancy. Data in the literature on detection of group substances mainly refer to amniotic fluid obtained during parturition. However, in many respects this differs from the amniotic fluid in the initial stages of pregnancy.

In the present investigation the group specificity of amniotic fluid obtained by a newly developed method was studied.

## EXPERIMENTAL METHOD

A method was developed for obtaining amniotic fluid in unlimited amounts by puncture of the fertilized ovum at the time of performance of artificial abortion.

Puncture was carried out with full sterile precautions using a long, thick needle. The needle was introduced into the uterine cavity through a hollow metal guide after dilatation of the cervix with Hegar's dilators. If the needle was introduced successfully into the amniotic cavity, absolutely pure amniotic fluid escaped through the needle in a volume of 5-10 ml or more, depending on the period of pregnancy.

Using the method described, 119 samples of amniotic fluid were obtained at the following times of pregnancy: 7-8 weeks—24 samples, 9-10 weeks—56 samples, and 11-12 weeks—39 samples.

Whole native amniotic fluid, kept in a refrigerator for 2-3 h, was used in the experiments without preliminary centrifugation, because during the first 3 months of pregnancy the fluid is absolutely transparent and homogeneous.

The content of group substances A and B in the fluid was determined from the results of the inhibition of agglutination reaction. By means of this test the presence of A and B antigens was determined also in embryonic tissues, which were prepared and investigated by the method described by Volkova [2]. The maternal blood group and the ability of the mother to secrete group antigens (from their presence in the saliva) were determined at the same time.

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TABLE 1. Group Specificity of Amniotic Fluid in Early Periods of Pregnancy with Different Combinations of Maternal and Embryonic Group Differentiation

Group dif-ferentiation (mother/ embryo)	Time of pregnancy (in weeks)								
	7-8			9-10			11-12		
	Number of tests	Substances found		Number of tests	Substances found		Num-ber of tests	Substances found	
		A	B		A	B		A	B
A/A	2	0	0	8	3	0	10	10	0
A/O	7	0	0	4	0	0	—	—	—
O/A	—	—	—	2	2	0	2	2	0
B/B	1	0	1	14	0	13	8	0	8
B/O	5	0	0	3	0	0	1	0	0
O/B	1	0	1	3	0	2	4	0	4
B/A	1	0	0	2	2	0	2	2	0
A/AB	3	2	3	—	—	—	—	—	—
B/AB	—	—	—	2	2	2	2	2	2
AB/A	1	0	0	1	1	0	5	5	0
AB/B	—	—	—	2	0	1	—	—	—
AB/AB	—	—	—	1	1	1	—	—	—
O/O	3	0	0	14	0	0	5	0	0

## EXPERIMENTAL RESULTS

Of the samples of amniotic fluid investigated, 66 corresponded to a homospecific and 53 to a hetero-specific pregnancy.

The presence or absence of group specificity of the amniotic fluid in the early periods of pregnancy was found to be related only to the corresponding level of differentiation of the embryonic tissues (Table 1).

Group substances homologous to the maternal were not observed in the amniotic fluid (regardless of whether or not they were present in the saliva) if they were absent in the embryo. However, this rule is not absolute. In 12 of 77 cases group substances A or B were not found in the amniotic fluid despite their presence in the embryonic tissues. Analysis of the data shows that the incidence of these exceptions depended on the period of pregnancy (Table 1). The absence of group antigens of the embryos in the amniotic fluid was most frequently observed at the earliest times (7-8 weeks) of pregnancy (in 5 of 9 cases), much less frequently at the 9th-10th week (8 of 35 cases), and not at all later still (11th-12th weeks).

Another characteristic feature of these exceptions was that, as a rule, they concerned the A antigen. This antigen could not be found in amniotic fluid taken not later than the 10th week of pregnancy in half the cases in which it was present in the embryonic tissue. Under the same conditions, substance B was not found in only one-ninth of the samples.

A connection was also found between the intensity of group activity of the amniotic fluid and of the embryonic tissues. Comparison of the titers of sera after absorption of hemagglutinins  $\alpha$  and  $\beta$  by the investigated substrates showed that as a rule the group specificity of the embryonic tissues was rather higher than that of the corresponding sample of amniotic fluid. It was also shown that the intensity of group activity of these substrates increases with an increase in the duration of pregnancy. For instance, at the 7th-8th week of pregnancy all samples showed weak group specificity only (titer of serum after absorption between 1:128 and 1:256). At the 11th-12th week of pregnancy, however, the corresponding samples in most cases (60 of 70 cases) had marked group specificity (titer of serum after absorption not above 1:16).

The study of group specificity of the amniotic fluid at the earliest possible stages of pregnancy thus gives a more complete understanding of the process of formation of this specificity.

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