

# DETECTION OF STAGE-SPECIFIC ANTIBODIES IN THE BLOOD OF PREGNANT WOMEN

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It was determined in investigations conducted in the Laboratory of Immunology of Embryogenesis at the Institute of Experimental Biology of the Academy of Medical Sciences of USSR that, in addition to species (group) and organospecific antigens in tissues of embryos of different species of animals, there are also present the so-called stage-specific antigens which are characteristic of definite periods of embryogenesis [1-5, 7, 10-13].

These experimental data were confirmed in clinical practice. Examination of blood sera of pregnant women between 7 and 15 weeks of pregnancy has established the presence of antibodies of the precipitin type, which reacted specifically with extracts of human fetuses of the same periods of development [6]. In 2 of the 19 women examined these antibodies were not found; these two women were examined during the 15th week of pregnancy. The authors had expressed a supposition that precipitins found in the blood of pregnant women are apparently produced as a result of their immunization by the stage-specific antigens of the fetal tissues. The maternal stage-specific antibodies may act as regulators of protein synthesis in the developing fetal tissues, and the interference with the process of formation of antibodies against stage-specific fetal antigens may lead to abnormalities of development of the fetus [5].

The organ or tissue specificity of these antibodies was not studied in the above investigation; consequently it was difficult to conclude on the possible effect of these antibodies on the development of the fetal tissues or organs. Moreover, the material studied was not extensive enough to permit a formulation of a definitive statement on the existence of stage-specific antibodies.

The present work deals with the study of organ- and stage-specific antigenic interrelationships between the mother and the fetus at different stages of embryogenesis in normal pregnancies.

## EXPERIMENTAL METHODS

Blood sera of pregnant and of healthy nonpregnant women were studied by means of the precipitation reaction in agar gel [13] and in capillary tubes with agarized medium [8]. The method of preparation of the antigen has been described earlier [9].

A total of 162 sera were studied. These included 45 from women between the 6th and 9th weeks of pregnancy, 47 between the 15th and the 19th weeks of pregnancy, 58 between the 35th and 40th weeks of pregnancy, and 12 from healthy nonpregnant women 18 to 32 years of age.

The sera were tested against antigens of fetal tissues at the same stage of development, and in control experiments against adult human tissues. Extracts from tissues of kidneys and hearts of embryos were used as antigens. It has been determined in our previous experiments [9] that in these tissues the stage-specific antigens were present.

Precipitation Reaction between Blood Sera of Pregnant and Nonpregnant Women and Extracts of Tissues of Kidneys and Hearts of Human Fetuses

	No. of women studied	Results of reactions with tissues of fetuses at differ. stages of devel. (in weeks)								Adult human tissues	
		6-9 weeks				15-19 weeks				35-40 weeks	
		kidneys		heart		kidneys		heart		kidneys	
		+	-	+	-	+	-	+	-	+	-
Period of pregnancy (in weeks)											
6-9 . . . . .	45	3	42	3	42	0	45	0	45	0	45
15-19 . . . . .	47	1	46	2	45	46	1	45	0	0	0
35-40 . . . . .	58	0	68	0	58	53	5	52	3	6	3
Nonpregnant healthy (controls) . . . . .	12	0	12	0	12	0	12	0	12	0	12

Legend: +) positive immunodiffusion reaction; -) negative reaction.

Each serum was tested several times and in all cases similar results were obtained.

## RESULTS

The results obtained are shown in the table.

It will be seen from the table that blood sera of women during the 6th to 9th weeks of pregnancy gave very weak precipitation reaction with fetal tissue extracts of the same periods of development. In sera of women between the 15th and the 19th weeks of pregnancy there were distinct antibodies which reacted specifically with extracts of the kidney and heart of fetuses at the same stages of development as well as with extracts of kidneys of fetuses between the 35th and the 40th weeks of development (see the figure, Ia).

In sera of women between the 35th and the 40th weeks of pregnancy there were precipitins against extracts of kidneys and hearts of fetuses between 15 and 19 and 35 and 40 weeks of development as well as against adult human kidney extracts (see the figure, II). There were no precipitins against either fetal tissue or adult tissue antigens in the sera of healthy nonpregnant women.

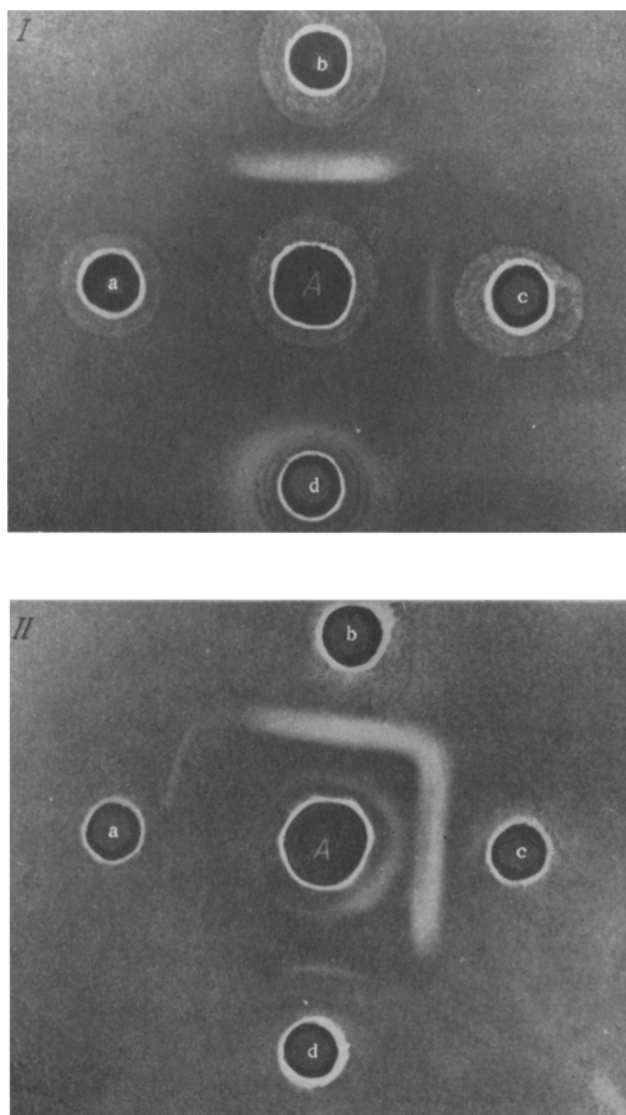
Apparently the kidney and the heart tissues of fetuses between 6 and 9 weeks of development do not have well-defined immunogenic properties, since it was seen that precipitins formed in the maternal blood serum during this period of embryogenesis gave very weak reactions. Beginning at the 15th to the 19th week of development the stage-specific antigens in fetal kidney and heart tissues become more immunogenic so that in the blood sera of pregnant women there were found in all cases precipitins, which were also found at later stages of pregnancy, but did not react with antigens from adult human tissues.

Thus, it is possible to conclude that the precipitins found in the sera of pregnant women are most probably a result of immunization of these women against stage-specific antigens present in the tissues of their fetuses.

We are inclined to share the opinion [5] that stage-specific antibodies may play an important part in the normal progression of early embryogenesis. It was determined [1] that stage-specific antigens, present in tissues of animal embryos, reflect the histological past of a given species. Their appearance is related to the fact that at different stages of development there arise in the embryo organism certain types of tissue biosynthesis and structure, which are characteristic of lower animals (antigenic recapitulation). It is not to be excluded that certain abnormalities in the development of human fetuses and the birth of children with, for example, cervical fistulae, failure of closure of the ductus arteriosus Botalli, of the interatrial septum, etc., may be due to the fact that the maternal organism is not able to produce antibodies against recapitulatory antigens produced in the fetal tissues. This is only a hypothesis which may be either rejected or confirmed in future investigations.

## SUMMARY

The ring precipitation and agar gel tests with sera from women in the 15th-19th weeks of pregnancy revealed antibodies to extracts



Immunodiffusion in agar between sera of pregnant women obtained from the 15th to 19th (I) and 35th to 40th (II) weeks of pregnancy, and extracts of kidney and heart tissues of embryos at different stages of development. A) serum; a-d) extracts of tissues of embryos at 6-9, 15-19, and 35-40 weeks of development and extract of adult tissue, respectively. Explanation in the text.

of the kidney and heart tissues of embryos of the same terms of development as well as of kidney tissue of fetuses at a later period. The blood serum from women in the 35th-40th weeks of pregnancy was found to have antibodies to kidney and heart tissues of fetuses in the 15th-19th, 35th-40th weeks of development and to kidney tissue of adult humans. In control nonpregnant women no antibodies to the antigens of both embryonic and adult tissues were found.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of the first issue of this year.

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