EFFECT OF FETAL SEX ON THE SIGN OF THE ELECTRIC CHARGE ON SPERMATOZOA

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UDC 618.293-07:612.616.2.014.423

If the urine of a pregnant woman with a male fetus is injected into a frog, some of the spermatozoa produced by the frog carry a positive electric charge, and others a negative charge. In the case of a female fetus, the spermatozoa produced by the frog all have an electric charge of the same size.

Injection of a pregnant woman's urine into male frogs and microscopic examination of the contents of the cloaca for the presence of spermatozoa is a well-known method used for the diagnosis of early pregnancy [2]. However, the writers have shown for the first time that the microscopic picture of the arrangement and movement of the spermatozoa in this material bears a definite character depending on the sex of the fetus. For example, if the fetus is of the male sex, large numbers of intensively moving spermatozoa are visible, and against this background in the field of vision 2 or 3 (and sometimes more) large, halo-like colonies of spermatozoa can be seen. If the fetus is of the female sex, a few, sluggishly moving and chaoatically arranged single spermatozoa are observed under the microscope.

On the basis of these observations the writers postulated that if the urine of a pregnant woman carrying a male fetus is injected into frogs, spermatozoa are produced which carry different electric charges, while if the urine of a pregnant woman carrying a female fetus is injected, spermatozoa carrying the same charge are liberated.

According to the literature [1], under natural conditions frog spermatozoa carry a negative electric charge only.

The object of this investigation was to determine the principles governing the formation of the sign of the electric charge on frog spermatozoa liberated in response to injection of the urine of a pregnant woman.

EXPERIMENTAL METHOD

Observations were made on 674 pregnant women in the early stage of pregnancy: 144 between the 8th and 12th weeks, 160 between the 24th and 28th weeks, and 370 between the 39th and 40th weeks (after parturition). The test for pregnancy was carried out on frogs by the Galli-Mainina method [2]. To determine the electric charge of the spermatozoa, and on this basis to make a preliminary diagnosis of the sex of the fetus, a drop of the cloacal contents of the frog was placed on a slide between two flat, metal electrodes, fixed to the slide and located 5-6 mm apart. The electrodes were connected to the output of an electrical device producing a nonlinearly increasing voltage. The maximum of the output voltage was from 40 to 60 V. The drop of fluid placed on the slide was examined under the microscope before and after switching on the electric field (magnification 70×). If spermatozoa with both positive and negative charges were detected in the cloacal contents, the preliminary conclusion was drawn that the fetus was of the male sex, while if the spermatozoa carried only a positive or only a negative charge, it is considered that the child was of the female sex. The results were verified after parturition, the preliminary conclusion being compared with the actual sex of the infants.

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Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 69, No. 5, pp. 96-99, May, 1970. Original article submitted June 13, 1969.

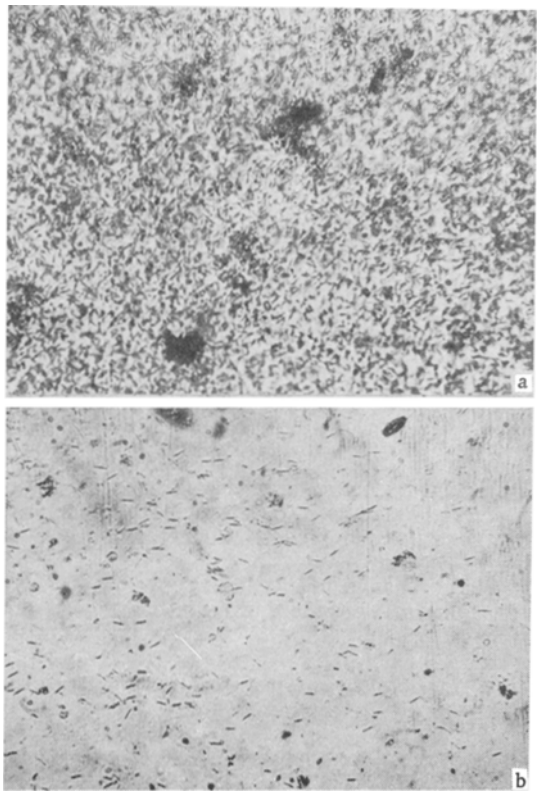

Fig. 1. Microscopic picture of arrangement and movement of spermatozoa before action of electric field (70×). a) Male fetus present; b) female fetus present.

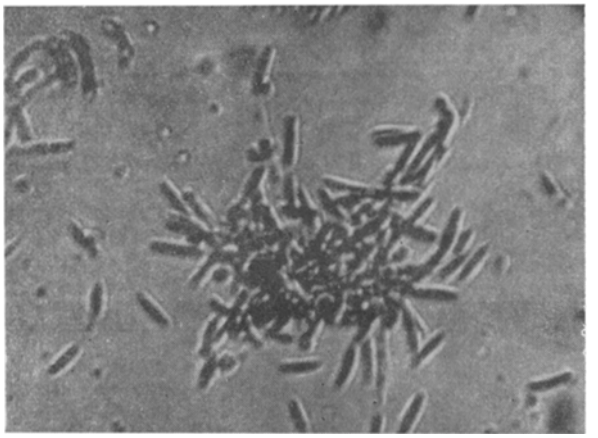

Fig. 2. Colony of spermatozoa (before action of electric field), magnified (280×).

EXPERIMENTAL RESULTS

Before the electric field was switched on the microscopic picture was as follows in the presence of a male fetus. Large numbers of intensively moving spermatozoa were observed, and against this background a few distinct halo-like colonies were present (Figs. 1a, 2). After switching on the electric field, the spermatozoa began to move toward both electrodes, and as a result the following alternatives could develop: slow movements of the separate colonies of spermatozoa, with some spermatozoa becoming detached from the colonies and moving in different directions, movement of two streams of spermatozoa in opposite directions (the commonest), a whirling movement of spermatozoa both at the beginning and at the end of their separation from the colonies. Movement of a smaller number of spermatozoa to one electrode and a larger number to the other could also take place. In some cases the colony remained in the field of vision and a group of spermatozoa became detached from it and moved toward one electrode, while the spermatozoa scattered over the field of vision moved in both directions.

In the presence of a female fetus, chaotically scattered and sluggishly moving spermatozoa were observed under the microscope in comparatively small numbers (Fig. 1b). During the action of the electric field the spermatozoa moved in one direction toward one pole.

Between the 39th and 40th weeks of pregnancy, spermatozoa characteristic of the presence of a male fetus, with both positive and negative electric charges, were discovered in 192 of the 370 cases.

Agreement between the actual sex of the newly born infant and the preliminary diagnosis was obtained in 180 cases. Characteristic spermatozoa of a female pregnancy, with an identical electric charge, were discovered in 178 cases. The actual sex of the newly born infant coincided with the preliminary prediction in 167 cases.

Between the 24th and 28th weeks of pregnancy, divergence of the spermatozoa in the electric field toward opposite poles was observed in 88 of 160 cases, and the actual sex of the infant agreed with that predicted in 84 cases. Spermatozoa with the same charge were found in 72 cases; the actual sex of the infant agreed with that predicted in 69 cases.

Between the 8th and 12th weeks of pregnancy, spermatozoa with different electric charges were found in 76 of 144 cases, and the predicted sex of the child agreed with its actual sex in 74 cases. Spermatozoa with an identical electric charge were discovered in 68 cases. The predicted and actual sexes of the child agreed in 66 cases. Altogether, in 356 of 674 cases, spermatozoa with different electric charges characteristic of a male pregnancy were found in the material tested, and after birth the predicted sex of the child

TABLE 1. Results of Preliminary Determination of Fetal Sex

Duration of pregnancy (in weeks)	Total number of cases	Boys				Girls			
		preliminary determination	agreement	P	σ	preliminary determination	agreement	P	σ
8-12	144	76	74	0.973	0.0263	68	66	0.975	0.0293
24-28	160	88	84	0.954	0.0218	72	69	0.958	0.0236
39-40 After parturition	370	192	180	0.937	0.017	178	167	0.937	0.017
Total	674	356	338	0.948	0.011	318	302	0.949	0.012

Note. Probability of correct diagnosis of fetal sex (P) and standard deviation $\sigma = \sqrt{\frac{Pq}{n}}$; $q = 1 - P$ calculated in accordance with the binomial distribution.

agreed with its actual sex in 338 cases and did not agree in 18 cases (5%). Spermatozoa with the same electric charge, characteristic of a female pregnancy, were found in 318 cases, and the actual sex of the infant agreed with that predicted in 302 cases and did not agree in 16 (5%).

On the basis of these results (Table 1) it can be concluded that the electric charge on frog spermatozoa liberated in response to injection of the urine of a pregnant woman depends on the sex of the fetus.

LITERATURE CITED

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2. N. S. Nikolov et al., Laboratory, Functional, and X-Ray Diagnosis in Obstetrics and Gynecology [in Russian], Sofia (1964).