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THE PRECIPITIN REACTION IN INFANT STOOLS *

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While much has been written concerning the digestion of protein by the gastro-intestinal tract of the infant and many investigations of a chemical nature have been made for the determination of the presence of protein in the infant stool, still no extensive effort has been made, so far as we can find, to apply the biologic test.

In 1905 Hamburger¹ tested a limited number of cases and found that the precipitin reaction was never positive with cow lactoserum, but always with antihuman serum. Since then, the only examinations carried on in this manner have been for the determination of the nature of the material found in the curds so frequently present in the stools of infants. Talbot² first, and later Uffenheimer and Takens³ and Maccone⁴ report positive results with antiserum to cow milk casein. In the examination of the stools of three normal bottle fed infants Talbot got no precipitin reaction.

Hektoen, Fantus and Portis⁵ have recently examined the stools of normal and diseased adults with antihuman serum and they obtained positive reactions in a large percentage of cases. The technic in the work now reported is the same as that they used, except that in our series tests were made with both antihuman and antibeef serum.

Liquid feces were filtered directly through fine filter paper; semi-solid or solid feces were mixed with 0.9 per cent. salt solution so as to obtain as concentrated an extract as possible and then filtered through a Buchner filter. If the extract was acid to litmus paper it was neutralized with dilute sodium hydrate solution; if alkaline, it was neutralized by means of hydrochloric acid. Chloroform was added to

* From the John McCormick Institute for Infectious Diseases and the Presbyterian Hospital.

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1. Hamburger: *Jahrb. f. Kinderh.* **62**:479, 1905.

2. Talbot: *Arch. Pediat.* **27**:440, 1910.

3. Uffenheimer and Takens: *Ztschr. f. Kinderh.* **2**:32, 1911.

4. Maccone: *La Pediatria* **26**:270, 1918.

5. Hektoen, Fantus and Portis: *J. Infect. Dis.* **24**:482 (May) 1919.

restrain bacterial growth. Clarification of the extract was secured by rapid centrifugation.

The precipitin tests were made in small, clear glass tubes about 0.5 cm. in diameter; a small quantity of extract was placed in the tube and about 0.1 cm. of antihuman or antibeef rabbit serum was introduced at the bottom by means of a capillary pipet in such manner as to get a precise line of contact between the two fluids. The tubes were kept at room temperature and the results read after one hour. In most of the positive reactions there formed rather promptly a well defined precipitate in the form of a grayish layer at the junction of the extract and the serum. As a rule, the precipitin serum, antihuman and antibeef, was 12,000 in titer, that is, it would give a precipitate within 20 minutes at room temperature with dilution of human or beef blood, 1:12,000, in salt solution.

The stools all came from infants in the maternity and children's wards of the Presbyterian Hospital.

In all, 133 stools of thirty-four new-born infants were examined. Of these, thirty-two stools from nineteen infants gave positive reactions to antihuman serum; two were positive to antibeef serum and one was questionably so. All stools were examined with both antibeef and antihuman serum, and it is interesting to note that of the few who were given supplementary feedings of cow's milk none gave a positive reaction to antibeef serum, and that the two instances in which a reaction to antibeef serum occurred, and also in the doubtful case, there was no record of cow's milk having been given. It would have been interesting in these cases to have tested the mother's milk by the same method. While one must always consider the possibility that these infants might have obtained some supplementary feeding by mistake, this seems not at all likely, since when such mistakes occur they are invariably reported to the pediatrician in charge. Perhaps the reactions in these two cases were of a nonspecific nature; normal rabbit serum, however, gave no reaction.

The examination in the older infants was carried out on 407 stools from forty-eight different infants varying in age from five days to twenty-two months. Here the reaction to antihuman serum was positive in 115 stools, and to antibeef serum in sixty-three stools. It is rather interesting that in only fourteen stools were both reactions positive. The results in all of the forty-eight cases in which five or more stools were examined are given in the table. Control tests with normal rabbit serum gave negative results uniformly.

The tests were made in cases without selection. The infants were fed on albumin milk and mixtures of cow's milk in which the percentage of protein was rather high. There was, however, no difference

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in this respect from our custom before or since the examinations began. Large curds were in no instance present in any of the stools. The so-called "casein" curds we see very rarely in the Presbyterian Hospital wards since in nearly all cases we use albumin milk or boiled milk.

PRECIPITIN TESTS OF INFANT STOOLS WITH ANTIHUMAN AND ANTIBEEF SERUM

No.	Age	Diagnosis	Number of Stools	Reaction with Antihuman Serum	Reaction with Antibeef Serum
1	6 wks.	Normal infant.....	9	5	1 (?)
2	8 mos.	Weight disturbance.....	5	2	0
3	5 mos.	Dyspepsia.....	7	0	0
4	18 mos.	Dyspepsia.....	8	1	1
5	2 mos.	Dyspepsia and decomposition.....	7	2	3
6	4½ mos.	Decomposition.....	6	1	1
7	4 mos.	Decomposition.....	5	0	0
8	? wks.	Decomposition; congenital syphilis..	27	12	13
9	5 mos.	Decomposition; habitual vomiting..	28	10	8
10	5 mos.	Intoxication (convalescent).....	9	3	0
11	5 mos.	Intoxication (convalescent); spas- mophilia.....	28	9	1
12	17 mos.	Enterocolitis; suppurative otitis media; hypothyroidism.....	8	3	0
13	6 mos.	Habitual vomiting.....	17	8	2
14	14 days	Spina bifida.....	9	2	1
15	5 wks.	Harelip.....	8	0	0
16	8 mos.	Harelip and cleft palate.....	10	2	1
17	5 wks.	Harelip and cleft palate.....	9	2	1
18	5 mos.	Harelip and cleft palate.....	28	10	3
19	17 mos.	Hydrocele.....	6	1	1
20	1 year	Bronchitis.....	8	2	0
21	7 mos.	Bronchitis.....	5	2	1
22	5 days	Capillary bronchitis; enlarged thymus (?).....	5	5	0
23	8 mos.	Spasmophilia; bronchitis.....	12	2	1 (?)
24	8 mos.	Spasmophilia; congenital syphilis...	18	7	3
25	7 wks.	Congenital syphilis; osteomyelitis...	9	2	0
26	17 mos.	Multiple bone tuberculosis.....	10	0	0
27	3 wks.	Prematurity.....	22	7	11
28	5 mos.	Prematurity.....	20	1	2
29	2 wks.	Normal infant.....	9	4	1 (?)

A glance at the table will show that there was no special tendency to positive reactions in any particular class. In a careful survey of the charts we were unable to determine any connection between the type or frequency of stool or the character of the food and the reaction in the stool. The work is being continued with particular reference to tests for casein and also other substances.