THE ACIDOTIC STATE OF NORMAL NEW-BORNS
WITH SPECIAL REFERENCE TO THE ALVEOLAR CO₂ TENSION, ALKALI
TOLERANCE AND ACETONURIA

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The work of Ylippo, in 1914, was a stimulus to the study of this subject in new-borns. He claims to have found (1) that the human organism at birth is in a state of "physiologic acidosis"; (2) that the blood shows an "acidotic constitution" (he having found the P_H of the blood to be as low as 6.58); (3) that the CO₂ dissociation curve of the blood of new-borns shows an acidosis (20 per cent. less than in adults), and (4) that the hydrogen concentration is uniformly higher than in adults. Of the many methods for determining acidosis, the two most accurate are, first, the chemical study of the blood, and second, the study of the CO₂ alveolar tension. The method for determining the CO₂ alveolar tension is simple and in most conditions an accurate one for determining acidosis. So far as we know this has never been determined in new-borns.

Alveolar air is the air which is in or comes from the alveolae of the lungs. As the exchange of CO₂ between the lungs and the blood takes place in the alveolae, the tension of the different gases in the alveolae (according to the law of diffusion of gases) will be practically the same as in the blood. The percentage of CO₂ in the alveolar air is not quite the same in different individuals, but the average is about 5.6 for adults. This in terms of pressure is about 40 mm.

Technic.—One hundred and fifty-one determinations were made on fifty babies. The youngest was one hour old, the oldest was 32 weeks of age. The majority were from one day to one week old, and there were two premature babies, one of seven and one eight months. The effects of food and exercise (crying and struggling) on the CO₂ tension were studied. Of the various methods of obtaining alveolar air, it was necessary to choose the method most easily adapted to the new-born.

Haldane's method is, of course, impractical because with this the cooperation of the patient is necessary; the same objection applies to Lindhard's method. Higgins' modification of Plesch's method is by far the most advantageous in working with new-borns. Instead of using the Hygeia nipple with rubber tubing over the mouth, as is suggested by Howland¹ for infants, the pulmotor mask for new-borns

1. Howland, J. H., and Marriott, W. McK.: Acidosis Occurring with Diarrhea, *Am. J. Dis. Child.* **11**:309, 1916.

which could be applied very snugly to the face, preventing any escape of air, was used. The principle of this method of collecting air is quite different from the Haldane. Instead of trying to obtain samples of air from the alveolae, by means of deep respirations, this method necessitates the rebreathing of a certain amount of air until it is in equilibrium with the air in the alveolae. The initial amount of air in the bag, the length of time for breathing, and the character of the breathing, must be considered, in order to determine the results accurately. The greatest difficulty met with in securing uniform readings was that the character and rate of breathing could not be controlled.

The pulmotor mask has two brass tubes; the upper one is used to allow the baby to breathe through before beginning the experiment, after the mask has been put in place; the lower tube has a three-way valve and is connected to the football bag by another rubber tube. It is preferable to begin the experiment at the end of an expiration and to end it at the beginning of an inspiration, but this, of course, with new-borns is usually impossible. It was necessary to examine the air in the bag immediately because diffusion takes place very readily, and the readings are lower in the fourth and fifth specimens than in the first ones.

TABLE 1.—DETERMINATIONS OF CO₂ ALVEOLAR TENSION OF
NORMAL NEW-BORNS

(Time of Reading, 30 Seconds. Initial Air in Bag 150 to 250 c.c.;
Average, 200 c.c.)

No.	Date	Time of Day	Age	Air in Bag, C.c.	Time, Sec.	Haldane Method	Marriott Method	Remarks
1	12/13	9:30 a.m.	3 days	150	30	24.6	22.0	Cried twice before reading
2	12/14	1:00 p.m.	2 days	150	30	22.38	18.0	Quiet
3	12/14	1:10 p.m.	11 days	200	30	.....	18.0	Cried and struggled during reading
4	12/14	1:20 p.m.	5 days	200	30	.....	22.0	Cried ten times before but quiet during reading
5	12/14	1:45 p.m.	5 days	150	30	.....	18.0	Cried ten times but quiet during reading
6	12/14	2:15 p.m.	3 days	150	30	.....	20.0	Cried five times before reading
7	12/14	4:00 p.m.	3 days	150	30	.....	18.0	Cried during reading
8	12/17	4:00 p.m.	6 days	150	30	.....	20.0	Quiet
9	12/20	1:40 p.m.	7 days	150	30	.....	23.0	Quiet
10	12/20	1:50 p.m.	10 days	150	30	32.08	25.0	Quiet
11	12/20	1:55 p.m.	4 days	150	30	34.32	27.0	Quiet
12	12/21	10:30 a.m.	8 days	150	30	25.36	25.0	Quiet
13	12/21	11:45 a.m.	5 days	150	30	24.62	22.0	Quiet
14	12/21	1:30 p.m.	8 days	150	30	28.35	22.0	Quiet
15	12/21	1:45 p.m.	5 hrs.	150	30	28.94	25.0	
						35.06	33.0	
						35.8	35.0	
						35.8	20.0	
						27.6	33.0	
						24.6	26.0	
						26.11	30.0	
						22.30	20.0	

TABLE 1.—DETERMINATIONS OF CO₂ ALVEOLAR TENSION OF
NORMAL NEW-BORNS—(Continued)(Time of Reading, 30 Seconds. Initial Air in Bag 150 to 250 c.c.;
Average, 200 c.c.)

No.	Date	Time of Day	Age	Air in Bag, C.c.	Time, Sec.	Hal-dane Method	Mar-lott Method	Remarks
16	12/21	2:00 p.m.	3 hrs.	150	30	23.87 27.6 28.3	20.0 29.0 30.0	
17	1/29	3:40 p.m.	4 days	150	30	32.08 35.8	22.0 25.0	
18	1/29	4:00 p.m.	7 days	150	30	29.84 26.8	27.0 30.0	
19	2/ 2	10:30 a.m.	2 mos.	150	30	35.8 35.8	35.0 40.0	
20	2/ 2	11:15 a.m.	4 hrs.	150	30	25.8 26.11	28.0 30.0	
21	2/ 7	9:45 a.m.	2 mos.	150	30	28.35 21.63	35.0 32.0	
22	2/ 7	10:05 a.m.	1 day	150	30	27.6 29.8	28.0 30.0	
23	2/ 9	12:10 p.m.	2 mos.	150	30	37.13 34.8	25.0 30.0	
24	2/10	1:00 p.m.	1 day	150	30	32.8 31.3	25.0 22.0	
25	2/13	2:50 p.m.	2 days	150	30	22.3 20.8	20.0 25.0	
26	2/13	3:45 p.m.	7 days	150	30	29.8 34.3	20.0 25.0	Very quiet Orying, struggling
27	2/13	10:40 a.m.	1 day	150	30	22.38 25.36	20.0	Bleeder
28	2/14	10:50 a.m.	5 days	150	30	41.7 42.5	25.0 30.0	
29	2/14	11:35 a.m.	8 days	150	30	39.5 37.3	25.0 28.0	
30	2/14	Noon	1 day	150	30	27.0 22.0	20.0 20.0	
31	2/15	11:40 a.m.	8 days	150	30	35.06 37.3	25.0 28.0	
32	2/15	11:40 a.m.	1 day	150	30	22.3 22.3	30.0 28.0	
33	2/15	Noon	18 hrs.	150	30	27.6 28.3	.....	
34	2/17	Noon	3 days	150	30	31.3 29.8	25.0 27.0	
35	2/17	1:00 p.m.	3 days	150	30	27.6 26.8	25.0	
36	2/17	1:30 p.m.	8 days	150	30	35.06 35.06	35.0	
37	2/17	1:30 p.m.	1 day	150	30	24.6 22.8	.....	
38	2/18	11:10 a.m.	2 days	150	30	39.5 42.5	20.0	
39	2/18	11:30 a.m.	4 days	150	30	29.8 29.8	25.0	Collapse
40	2/18	12:15 p.m.	2 days	150	30	23.1 23.8	.....	
41	2/19	1:10 p.m.	.....	...	..	23.8	.....	
41	2/19	12:45 p.m.	4 days	150	30	23.8 22.3	30.0 32.0	
42	2/19	1:20 p.m.	4 days	150	30	20.14 22.3	25.0 30.0	
43	2/20	1:20 p.m.	9 days	150	30	23.13 23.13	25.0	
44	2/23	1:45 p.m.	1 day	150	30	24.6 24.6	20.0	Collapse
45	2/25	3:00 p.m.	2 hrs.	150	30	28.3 18.0—	.....	Too quiet breathing
46	2:25	3:30 p.m.	3 days	150	30	37.3 37.3	30.0	
47	2/25	4:00 p.m.	1 hr.	150	30	26.11 25.36	20.0	
48	2/25	4:30 p.m.	6 days	150	30	35.06 36.5	.....	
49	2/25	5:00 p.m.	1 day	150	30	12.6 20.0	15.0	Very quiet
50	2/25	5:15 p.m.	1 day	150	30	16.41 18.65	20.0	

In Table 1, fifty readings were made on twenty normal new-borns. The time of reading was the standard 30 seconds, which is the time of circulatory cycle. The initial amount of air in the bag was 150 to 250 c.c., the average being 200 c.c. This was taken according to Howland's technic with infants.

The babies were from one hour to two months old. It can be seen that the readings with Marriott's method are lower than with Haldane's. This may be because Marriott's was done after Haldane's, the CO_2 tension becoming lower on account of escape of air, from bag.

The results by Haldane's ranged from about 20 to 42 mm. The average reading was 30 mm. Readings were made at about the same time each day on the same babies and under the same conditions. From these fifty readings no conclusions could be drawn, the results varying too much.

TABLE 2.—DETERMINATIONS OF CO_2 ALVEOLAR TENSION IN TWENTY NORMAL NEW-BORNS

(Time of Reading, 30 Seconds. Air in Bag, 50 c.c.)

No.	Date	Time of Day	Age	Air in Bag, C.c.	Time, Breath, Sec.	Haldane Method	Remarks
1	3/9	7:00 p.m.	5 days	50	30	35.0	
2	3/9	5:20 p.m.	9 days	50	30	33.57	
3	3/9	5:20 p.m.	5 days	50	30	40.28	
4	3/8	5:15 p.m.	4 days	50	30	40.28	
5	3/8	5:00 p.m.	8 days	50	30	34.32	
6	3/8	4:10 p.m.	4 days	50	30	36.33	After; very quiet
7	3/8	1:00 p.m.	5 days	50	30	24.6	
8	3/8	12 Noon	5 days	50	30	28.3	
9	3/7	2:30 p.m.	4 days	50	30	31.33—?	After
10	3/7	4:50 p.m.	7 days	50	30	40.28	
11	3/7	4:40 p.m.	6 hrs.	50	30	42.52	After
12	3/7	4:30 p.m.	3 days	50	30	41.78	
13	3/7	2:00 p.m.	4 days	50	30	37.3	Before cried
14	3/7	1:50 p.m.	7 days	50	30	39.5	
15	3/7	1:10 p.m.	7 days	50	30	43.2	After struggled
16	3/7	12:30 p.m.	3 days	50	30	42.5	
17	3/7	12:10 p.m.	7 days	50	30	26.11	After cried
18	3/6	2:10 p.m.	.....	50	30	28.35	
19	3/6	1:10 p.m.	3 days	50	30	44.01	After quiet
20	3/5	12 Noon	5 days	50	30	44.76	
21	3/5	11:15 a.m.	1 day	50	30	39.54	After cried
						40.28	
						37.3	After cried
						41.03	
						43.2	Before vomited, struggled
						44.01	
						41.03	
						31.3	Before cried
						37.3	
						36.5	After
						39.5	
						42.5	After
						40.28	
						41.78	Before quiet
						43.27	
						35.0	Before quiet
						37.3	
						38.79	After quiet
						41.03	
						35.06	After cried
						37.3	

TABLE 2.—DETERMINATIONS OF CO₂ ALVEOLAR TENSION IN TWENTY NORMAL NEW-BORNS—(Continued)

(Time of Reading, 30 Seconds. Air in Bag, 50 c.c.)

No.	Date	Time of Day	Age	Air in Bag, C.c.	Time, Breath, Sec.	Hal-dane Method	Remarks
22	3/5	10:00 a.m.	3 days	50	30	35.8 37.3	Before quiet
23	3/3	11:00 a.m.	1 day	50	30	44.76 44.76	Struggled after
24	3/4	5:00 p.m.	4 days	50	30	46.25 47.00	Before quiet
25	3/4	4:45 p.m.	1 day	50	30	42.5 43.2	Quiet before
26	3/4	4:00 p.m.	4 days	50	30	45.5 44.7	
27	3/4	3:30 p.m.	11 hrs.	50	30	28.35 26.11	Barely breathed
28	3/3	5:15 p.m.	1 day	50	30	41.78 42.52	Before quiet
29	3/3	5:15 p.m.	3 days	50	30	40.28 37.3	After quiet
30	3/3	4:50 p.m.	3 days	50	30	32.08 30.59	After cried
31	3/3	4:45 p.m.	10 hrs.	50	30	45.51 44.01	After quiet
32	3/3	9:50 a.m.	4 hrs.	50	30	42.52 43.27	Before struggled very much
33	3/3	10:20 a.m.	.....	50	30	38.09 37.3	Before cried very much
34	3/3	10:00 a.m.	.....	50	30	36.5 35.8	Before quiet, shallow breathing
35	3/3	9:00 a.m.	.....	50	30	45.5 45.5	Before quiet
36	3/3	9:50 a.m.	.....	50	30	45.51 45.51	Before quiet
37	3/3	9:40 a.m.	3 days	50	30	43.27 42.52	Before quiet
38	3/2	3:00 p.m.	5 hrs.	50	30	40.28 36.55	Before quiet
39	3/2	3:00 p.m.	.....	50	50	35.06 29.89	Before quiet; can't explain after
40	3/2	10:00 a.m.	.....	50	30	41.28 44.01	Before cried
41	3/2	10:00 a.m.	1 hour	50	30	38.7 35.9	
42	3/2	10:00 a.m.	.....	50	30	22.3	Barely breathed
43	3/1	6:30 p.m.	1 day	50	30	38.7 40.2	After
44	3/1	6:00 p.m.	4 days	50	30	42.5 40.2	Before struggled
45	3/1	6:00 p.m.	1 day	50	30	44.61 40.28	Before struggled
46	3/1	5:40 p.m.	1 day	50	30	43.27 40.28	Before cried very much
47	3/1	11:20 a.m.	1 day	50	30	42.52 39.54	Quiet
48	3/1	11:30 a.m.	1 day	50	30	32.08 32.08	Right after cried

Table 2 shows the results of forty-eight determinations on twenty normal new-borns were made. The respiration time was 30 seconds, and the initial amount of air in the bag 50 c.c. After the first fifty readings (Table 1) it was decided that the amount of air in the bag used for infants (Howland) was too large for new-borns, because very often associated with low readings there was practically no change in the contour of the bag during respiration, which meant insufficient, or no diffusion, of air in the bag, with air expired. Therefore, the lowest possible amount of air in bag was used. This was one bulb

TABLE 3.—EFFECT OF FOOD ON CO₂ ALVEOLAR TENSION
(Twenty-Five Readings, 30 Seconds; 50 c.c. in Bag.)

No.	Date	Time of Day	Age	Air in Bag, C.c.	Time, Sec.	Before	After	Remarks
1	12/11	10:30 a.m.	8 days	150	30	30' 24.6	30' 35.8	
2	2/7	9:45 a.m.	2 mos.	150	30	26.8 35.06 30'	35.8 30'	
3	2/9	12:10 p.m.	2 mos.	150	30	36.55 70' 37.2	35.8 20' 35.06	
4	2/27	2:20 p.m.	5 days	150	30	15' 37.25 40.28	15' 32.8 33.5	
5	2/28	5:45 p.m.	12 hrs.	150	30	10' 20.81 22.38	50' 26.8 24.6	No food obtained
6	2/28	9:45 a.m.	11 hrs.	150	30	15' 25.36 25.36	15' 20.14 18.65	No gain in weight, very quiet
7	2/28	10:15 a.m.	3 days	150	30	10' 18.65 15.66	15' 18.65 20.14	Very quiet, 7th mo. premature
8	2/28	10:30 a.m.	3 days	150	30	10' 26.11 26.11	30' 23.13 25.36	Very quiet, 8th mo. premature
9	3/1	10:45 a.m.	12 hrs.	50	30	20' 32.08 37.3	30' 25.3 30.5	No gain in weight, nursed
10	3/1	10:30 a.m.	7 days	50	30	15' 35.06 35.06	15' 30.59 32.08	Cried very much
11	3/2	5:45 p.m.	2 days	150	30	10' 22.38 21.68	10' 29.84 25.36	
12	3/2	9:50 a.m.	24 hrs.	150	30	5' 38.7 35.9	30' 22.38 25.36	
13	3/3	3:00 p.m.	3 days	150	30	10' 30.59 30.59	120' 26.11 32.82	
14	3/3	9:40 a.m.	3 days	50	30	10' 42.52 43.27	120' 40.28 37.30	
15	3/4	5:15 p.m.	5 hrs.	50	30	10' 38.7 37.3	70' 27.6 25.6	
16	3/5	3:40 p.m.	1 day	50	30	10' 38.71 40.28		
17	3/5	9:50 a.m.	1 day	50	30	.....	30' 44.76	Struggled
18	3/5	11:00 a.m.	1 day	50	30		44.76	
19	3/5	11:15 a.m.	1 day	50	30	30' 26.11 28.35	45' 37.3 35.06	
20	3/6	5:30 p.m.	2 days	50	30	50' 37.3 35.0	10' 43.27 41.78	
21	3/6	2:10 p.m.	2 days	150	30	50' 27.6 27.6	10' 38.09 32.82	
22	3/7	1:10 p.m.	4 days	50	30	1' 43.27 44.01	10' 28.35 26.11	Vomited, strug- gled
23	3/7	2:00 p.m.	4 days	150	30	1' 35.07 35.07	10' 30.59 29.84	Quiet
24	3/8	2:20 p.m.	4 days	50	30	10' 39.54 37.3	120' 42.52 43.27	Cried very much
25	3/8	Noon	5 days	50	30	10' 36.55 39.54	20' 24.6 28.3	Very quiet
26	3/8	1:50 p.m.	4 days	50	30	10' 41.03 41.03	10' 40.28 40.28	
27	3/8	2:30 p.m.	8 days	50	30	45' 37.3 41.03	20' 41.78 42.52	
28	3/8	5:15 p.m.	4 days	50	30	.....	120' 39.54 40.28	
29	3/8	6:20 p.m.	1 day	50	30			
30	3/8	2:00 p.m.	1 day	50	30			
31	3/8	4:40 p.m.	1 day	50	30			

TABLE 4.—DETERMINATION OF CO₂ ALVEOLAR TENSION OF EIGHT NEW-BORNS
FROM 1 HOUR TO 8 DAYS OLD WITH THE EFFECT OF EXERCISE
ON DETERMINATION
(50 c.c. in Bag; 30 Seconds.)

No.	1 Hour to 1 Day	1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days	From 8 to 14 Days	Remarks
1	41.78	40.28	29.8	45.51	32.08	45.51	41.03	37.3		
2	41.78	44.01	.....	42.52	40.28	.....	.....	40.28	.....	12 hrs. 32.08
3	.....	38.7	41.78	38.79	37.3	41.03	40.28	40.28		
4	4 hrs. 43.27	42.52	37.3	43.27	44.01	28.35	43.27	39.54	53.59	10 hrs. 45.51
5	5 hrs. 38.7	40.28	39.54	28.35	34.32					
6	6 hrs. 40.28	.....	27.6							
7	.....	37.3	.....	37.3	41.78					
8	.....	.....	.....	.....	46.25					

full, which is the equivalent of about 50 c.c. The difference between the CO₂ tension, using 50 c.c. of air in the bag, is uniformly and strikingly different from that where 150 c.c. is used. The results also are much more uniform with the former. They range from 26 mm. to 45 mm. The few readings lower than this can be eliminated

TABLE 5.—COMPARISON OF READINGS WITH DIFFERENT AMOUNTS OF AIR IN BAG AND THE DETERMINATION OF A STANDARD

No.	50 C.c.	150 C.c.	250 C.c.	Age	Time	Remarks
1	43.27 41.28	38.09 32.82	.....	3 days	2:10 p.m.	
2	37.3 35.06	27.6	.....	3 days	1:10 p.m.	
3	41.03 48.79	35.06 29.8	.....	5 days	12 Noon	
4	37.3 35.06	32.08 32.08	.....	1 day	11:15 a.m.	Cried
5	37.81 35.81	23.87	.....	3 days	10:00 a.m.	Before
6	44.76 44.76	35.8 35.8	.....	1 day	11:00 a.m.	Struggled
7	28.35 26.11	29.09 28.35	34.32 31.33	11 hours	3:20 p.m.	
8	..... .....	38.79 35.81	35.06 27.60	3 days	3:00 p.m.	Very quiet
9	27.6 25.36	28.35 27.6	22.38 22.38	3 hours	3:40 p.m.	Very shallow, barely breathed
10	38.7 38.7	30.59 32.4	30.59 32.4	1 day	6:30 p.m.	
11	44.01 42.4	40.28 35.5	30.59 30.59	1 day	6:00 p.m.	Struggled
12	43.27 41.28	40.28 40.28	30.59 26.11	1 day	5:40 p.m.	Struggled
13	42.52 40.28	33.57 30.59	30.59	1 day	11:30 a.m.	Very quiet
14	32.08 30.59	32.08 32.08	22.38	1 day	11:30 a.m.	Cried
15	..... .....	38.7 35.9	22.30 20.14	24 hours	9:55 a.m.	Cried
16	44.01 41.28	32.08 29.84	.....	10 days	10:00 a.m.	Quiet
17	35.06 29.84	30.59 29.84	.....	10 days	3:00 p.m.	Quiet
18	40.28 36.55	25.38 22.38	.....	36 hours	3:00 p.m.	Cried
19	42.52 43.27	30.59 30.59	.....	3 days	5:15 p.m.	Quiet
20	45.51 45.51	25.36 22.38	.....	3 days	9:50 a.m.	Quiet
21	36.81 35.81	22.38 14.92	.....	.....	9:56 a.m.	Barely breathed
22	38.09 37.39	38.09 36.55	.....	6 days	9:50 a.m.	Cried very much
23	43.27 42.52	35.81 31.33	.....	4 hours	9:50 a.m.	Struggled
24	45.51 44.61	22.38 20.89	.....	10 hours	4:45 p.m.	Got nothing
25	32.08 30.59	32.82 30.59	.....	3 days	4:50 p.m.	Cried
26	40.28 37.30	32.82 26.11	.....	3 days	5:15 p.m.	Quiet
27	42.52 41.28	30.59 27.62	.....	2 days	5:30 p.m.	Quiet

because in these, breathing was too shallow. The majority of the readings were from 35 to 42 mm., and varied only from 3 to 5 mm. Three readings were made each time, and the two within 2 mm. of one another were recorded.

We should advise 50 c.c. of air in the bag, with 30 seconds for breathing period, as a standard for new-borns.

Ylippo² claims that starvation usually lowers the alveolar CO_2 tension, and that ingestion of food usually increases it. We found on the other hand that food has no effect on the CO_2 tension. Readings were made immediately, and one, two or three hours after feeding. The first few days, when the baby received practically no food at all, there was no definite decrease in CO_2 tension, which is indicative of acidosis, such as Ylippo claims to have found.

Ten new-borns were studied from one hour to eight days of age, 50 c.c., in the bag, 30 seconds breathing time. Although in some instances struggling and crying during the period of experiment raised the CO_2 tension, yet in the majority of readings there was no change, therefore it could not be said, from our experiments, that muscular action has any definite effect on the CO_2 tension.

With 250 c.c., the readings were uniformly lower than with 150 c.c., and those of 150 c.c., uniformly lower than 50 c.c. As to the length of time, readings taken after ten seconds of breathing showed a much lower CO_2 tension than those of 20 seconds, and those of 20 seconds much lower than those of 30 seconds. Readings were taken with breathing time as high as one and one-half minutes; at which time the babies became blue.

Alkali Tolerance of Normal New-Borns.—The alkali tolerance test is a practical and quick method of determining the amount of sodium bicarbonate necessary to change the urine from acid to alkali. Since Ylippo claimed that the P_H of the urine of normal new-borns showed high acidity we attempted to confirm his findings by this test. We administered orally with the stomach tube 0.16 gm. and 0.33 gm. of sodium bicarbonate. Sodium bicarbonate, 0.33 gm., administered every two hours, invariably caused vomiting after the first or second dose, therefore, 0.16 gm. was given every two hours which was retained by all babies. Of thirty babies, nine vomited; of the twenty-one remaining, the results as shown in the chart were obtained.

The lowest amount necessary to change the urine to alkaline was 0.1 gm., the highest, 4 gm.; the average was 1.7 gm. The results would probably have been lower if one intravenous injection had been made, but this was impractical. Even though in proportion to the weight, a much smaller amount of sodium bicarbonate is necessary to change the urine of a normal new-born to alkaline than in an adult, nevertheless, it is difficult to see how one can conclude from these results that the urine of a normal new-born shows high acidity.

2. Ylippo, A.: Ueber die CO_2 dissoziations-kurve und die respiratorische funktion des blutes bei säuglingen mit schweren ernährungsstörungen, Berl. klin. Wchnschr. 52:252, 1915.

A quantitated determination of the acetone in the urine of ten normal new-borns was made (Huppert-Messenger method).

Twenty-four-hour specimens were collected. In only one was acetone found; 0.3 mg. was the twenty-four hour amount. These findings do not bear out the assumption that the new-born is acidotic at birth.

CONCLUSIONS

1. Alveolar CO_2 tension is a practical index of acidosis.
2. Fifty c.c., of air in the bag, over a period of 30 seconds for breathing gives the most constant results.
3. The modification of Plesch-Higgins' method of collecting air with the use of the pulmotor mask is the most practical way of collecting air from new-borns.
4. We have not been able to establish a lower CO_2 tension which is indicative of the so-called "acidotic state."
5. The ingestion of food, or starvation and muscular exercise under these conditions, have no constant demonstrable effect on the alveolar CO_2 tension.
6. The urine of the normal new-born is nearly always acid.
7. It takes on an average 1.7 gm. of sodium bicarbonate to turn the urine from acid to alkaline, giving 0.16 gm. every two hours by mouth.
8. Our results with the alkali tolerance test for normal new-borns do not indicate an acidosis.
9. Practically no acetone is found in the urine of normal new-borns.

This work has been discontinued during the period of the war, but it is hoped that it can be resumed with a view of investigating the alkali reserve and the P_H of the blood of normal new-borns.

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