BODY BUILD IN INFANTS

III. Body Build in Disease

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Measurements of the external dimensions of sick infants were made and compared with the values obtained in healthy infants (1).

The technique employed for making the measurements has been described in a previous paper (2).

DESCRIPTION OF MATERIAL

Only sick infants observed at Bellevue Hospital are reported here and hence, comparisons are made only with the healthy infants admitted to Bellevue Hospital.

a. Acute intestinal intoxication. Acute intestinal intoxication is here used to designate a type of reaction in infants characterized by somnolence alternating with periods of hyper-irritability and at times convulsions, cyanosis, hyperpnea, oliguria or anuria, and evidence of dehydration. There is usually fever and an associated infection. Diarrhea and vomiting may or may not be present. There are no characteristic gross anatomical changes except, perhaps, in the liver. Most of the infants here reported were ill during the winter months.

There were 133 infants in this group of whom 64 were males and 69 females. Forty-four (33 per cent) were admitted to the hospital and measured before the onset of illness. Forty infants (30 per cent) were foundlings. There were 78 deaths (59 per cent).

b. Tetany. By tetany in infants is meant a metabolic disorder resulting from deprivation of vitamin D or sunlight, characterized by a tendency to convulsions and spasms of various kinds. The calcium concentration in the serum is regularly diminished and there is a change in the reaction to galvanic stimulation. It may be cured by the administration of vitamin D or ultraviolet radiant energy.

Only infants in whom the serum calcium concentration was below 8.0 mgm. per cent are included in this group. The diagnosis was confirmed in most instances with the electrical reactions. There were 45 infants in this group of whom 28 were males and 17 females.

c. Eczema. Only infants with typical facial eczema are included. There were 59 infants in this group of whom 41 were males and 18 females.

TABLE 1

Comparison of the total body lengths of healthy infants and sick infants at Bellevue Hospital

Age	Healthy		Acute intestinal intoxication		Tetany		Eczema	
	Number of cases	Average total body length	Number of cases	Average total body length	Number of cases	Average total body length	Number of cases	Average total body length
weeks		*mm.*		*mm.*		*mm.*		*mm.*
0–3	31	516	12	507				
4–7	19	532	34	523				
8–11	13	537	15	516	4	531	5	576
12–15	9	594	20	563			4	618
16–19	8	612	10	601	5	592	5	641
20–23			11	619	9	605	8	650
24–27	6	628	8	621	3	622	11	657
28–31	9	640	2	642	7	645	4	667
32–35	3	673	4	630	8	672	4	653
36–39	5	693	5	656	3	650		
40–43	7	688	2	653				
44–47	3	690	4	708	5	693		
48–51	6	702	2	673				

EXPLANATION OF CHARTS

A number of charts, illustrating the differences in the proportions of the external dimensions of infants in health and disease, are shown. In each chart total body length is represented as the abscissa, the dimension in question as the ordinate. The broken lines connect the average points for the healthy Bellevue Hospital infants. Circles indicate infants with acute intestinal intoxication, dots infants with tetany, and crosses infants with eczema.

RESULTS

In table 1, the total body length of healthy and sick infants at Bellevue Hospital are compared in relation to age. Infants with acute

intestinal intoxication are, on the average, shorter than the healthy infants, while infants with eczema are longer. The infants with

TABLE 2

Comparison of infants with acute intestinal intoxication and healthy infants from Bellevue Hospital

Range of total body length	Healthy Bellevue Hospital infants		Infants with intestinal intoxication			Difference healthy infants minus infants with intestinal intoxication and probable error (difference)	Difference divided by probable error (difference)
	Average and probable error	Standard deviation	Number of cases	Average and probable error	Standard deviation		
	a. Diameter of face (bimalar)						
mm.	*mm.*	*mm.*		*mm.*	*mm.*	*mm.*	
450–499	70.8 ±0.29	2.81	16	68.3 ±0.53	3.15	2.5 ±0.60	4.2
500–549	75.3 ±0.44	4.20	53	72.6 ±0.38	4.05	2.7 ±0.56	4.8
550–599	78.3 ±0.58	4.28	27	78.3 ±0.38	2.96	0.0 ±0.69	0.0
600–649	84.8 ±0.42	2.89	27	82.9 ±0.71	5.49	1.9 ±0.83	2.3
650–699	91.4 ±0.64	4.35	10	86.6 ±0.47	2.21	4.8 ±0.79	6.1
	b. Bigonial diameter						
450–499	54.1 ±0.28	2.76	16	53.2 ±0.40	2.37	0.9 ±0.49	1.8
500–549	58.0 ±0.45	4.24	53	56.8 ±0.26	2.98	1.2 ±0.52	2.3
550–599	61.6 ±0.62	4.48	28	60.9 ±0.38	2.98	0.7 ±0.73	1.0
600–649	66.2 ±0.62	4.48	27	64.7 ±0.63	4.84	1.5 ±0.88	1.7
650–699	69.3 ±0.47	3.17	10	67.1 ±0.44	2.05	2.2 ±0.64	3.4
	c. Circumference of thorax at nipples						
450–499	308 ±1.30	12.1	13	295 ±1.90	11.25	13 ±2.30	5.7
500–549	329 ±2.07	19.4	52	320 ±1.61	17.10	9 ±2.62	3.5
550–599	353 ±2.51	18.9	27	344 ±2.64	20.80	9 ±3.64	2.5
600–649	378 ±2.04	14.5	26	369 ±3.00	23.05	9 ±3.63	2.5
650–699	410 ±1.43	9.6	10	398 ±3.68	17.20	12 ±3.95	3.0
	d. Bicristal diameter						
450–499	71.9 ±0.70	6.86	16	74.4 ±0.62	3.68	−2.6 ±0.94	−2.8
500–549	78.3 ±0.74	6.88	53	81.3 ±0.40	4.56	−3.0 ±0.84	−3.6
550–599	88.7 ±0.91	6.68	26	88.1 ±0.75	5.86	0.6 ±1.18	0.5
600–649	96.4 ±0.98	6.78	27	97.6 ±0.89	6.84	−1.2 ±1.32	−0.9
650–699	104.6 ±0.76	5.12	10	103.4 ±0.97	4.54	1.2 ±1.23	1.0

tetany are spread over so wide an age range that the averages have little value.

TABLE 3

Comparison of infants with tetany and healthy infants from Bellevue Hospital

Range of total body length	Healthy Bellevue Hospital infants		Infants with tetany			Difference healthy infants minus infants with tetany and probable error (difference)	Difference divided by probable error (difference)
	Average and probable error	Standard deviation	Number of cases	Average and probable error	Standard deviation		
	a. Diameter of face (bimalar)						
mm.	*mm.*	*mm.*		*mm.*	*mm.*	*mm.*	
600–649	84.8 ±0.42	2.89	13	93.9 ±0.53	2.81	−9.1 ±0.68	−13.4
650–699	91.4 ±0.64	4.35	18	96.1 ±1.02	6.42	−4.7 ±1.20	−3.9
	b. Bigonial diameter						
600–649	66.2 ±0.62	4.48	14	71.9 ±0.88	4.92	−5.7 ±1.08	−5.3
650–699	69.3 ±0.47	3.17	18	73.8 ±0.78	4.91	−4.5 ±0.91	−4.9
	c. Circumference of thorax at nipples						
600–649	378 ±2.04	14.5	15	401 ±4.47	25.60	−23 ±4.91	−4.7
650–699	410 ±1.43	9.6	17	421 ±3.16	19.45	−11 ±3.47	−3.2
	d. Bicristal diameter						
600–649	96.4 ±0.98	6.78	15	101.4 ±0.82	4.68	−5.0 ±1.28	−3.9
650–699	104.6 ±0.76	5.12	18	111.3 ±0.76	4.76	−6.7 ±1.08	−6.2

TABLE 4

Comparison of infants with eczema and healthy infants from Bellevue Hospital

Range of total body length	Healthy Bellevue Hospital infants		Infants with eczema			Difference healthy infants minus infants with eczema and probable error (difference)	Difference divided by probable error (difference)
	Average and probable error	Standard deviation	Number of cases	Average and probable error	Standard deviation		
	a. Diameter of face (bimalar)						
mm.	*mm.*	*mm.*		*mm.*	*mm.*	*mm.*	
600–649	84.8 ±0.42	2.89	19	89.5 ±0.61	3.94	−4.7 ±0.74	−6.4
650–699	91.4 ±0.64	4.35	20	93.8 ±0.59	3.91	−2.4 ±0.87	−2.8
	b. Bigonial diameter						
600–649	66.2 ±0.62	4.48	17	68.5 ±0.55	3.39	−2.3 ±0.83	−2.8
650–699	69.3 ±0.47	3.17	20	73.3 ±0.65	4.28	−4.0 ±0.80	−5.0
	c. Circumference of thorax at nipples						
600–649	378 ±2.04	14.50	19	393 ±2.64	17.05	−15 ±3.34	−4.5
650–699	410 ±1.43	9.60	20	416 ±2.44	16.10	−6 ±2.81	−2.1
	d. Bicristal diameter						
600–649	96.4 ±0.98	6.78	19	102.9 ±0.60	3.87	−6.5 ±1.15	−5.6
650–699	104.6 ±0.76	5.12	19	111.2 ±1.10	7.10	−6.6 ±1.34	−4.9

In tables 2, 3 and 4, various external dimensions of healthy and sick infants are compared in relation to total body length. The distribution of the measurements on individual patients is illustrated in charts 1 to 4.

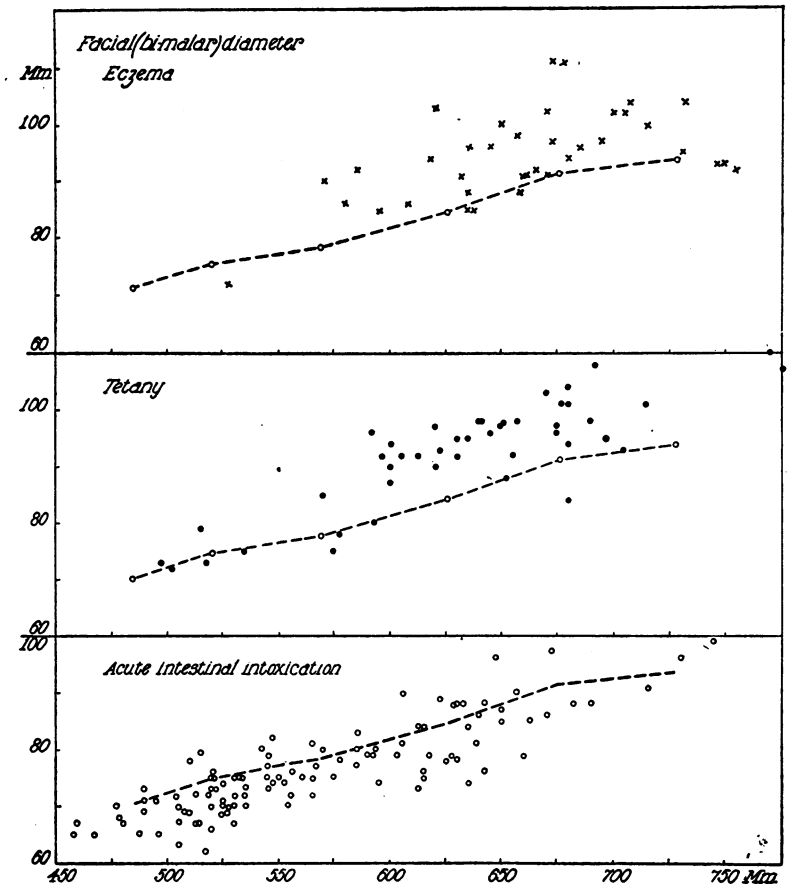

CHART 1. THE RELATIVE WIDTH OF THE FACE (BIMALAR DIAMETER) IN INFANTS WITH VARIOUS DISEASES

Acute intestinal intoxication. It is apparent from the charts that the circles, indicating patients with acute intestinal intoxication, tend to fall below the average lines for healthy infants for the diameter of face, the bigonial diameter and the circumference of the thorax. There is

no difference for the bicristal diameter. These differences, though not always large enough to be significant, are nevertheless regular, the averages for the infants with acute intestinal intoxication being constantly lower than those for the healthy infants with the exception of the bicristal diameter.

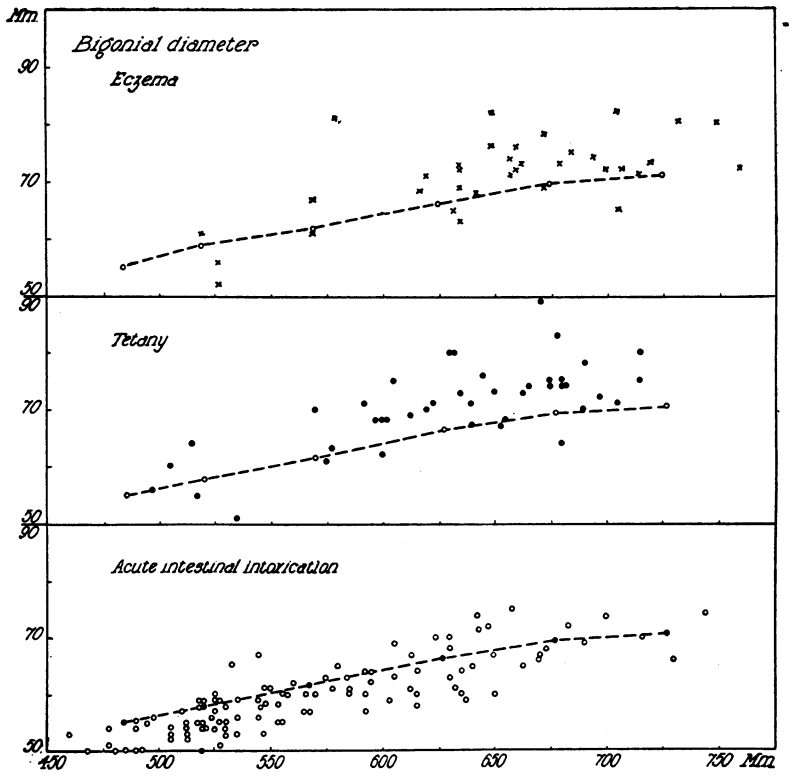

CHART 2. THE RELATIVE DIAMETER AT THE ANGLE OF THE JAWS (BIGONIAL DIAMETER) IN INFANTS WITH VARIOUS DISEASES

Tetany. The dots, indicating measurements on infants with tetany, tend to fall above the average lines for the healthy infants for all four dimensions shown. Differences from the healthy have been calculated for infants ranging from 600 to 649, and 650 to 699 mm. in height only, since these were the only groups in which the number of cases was sufficiently large to make the results significant. Averages for the

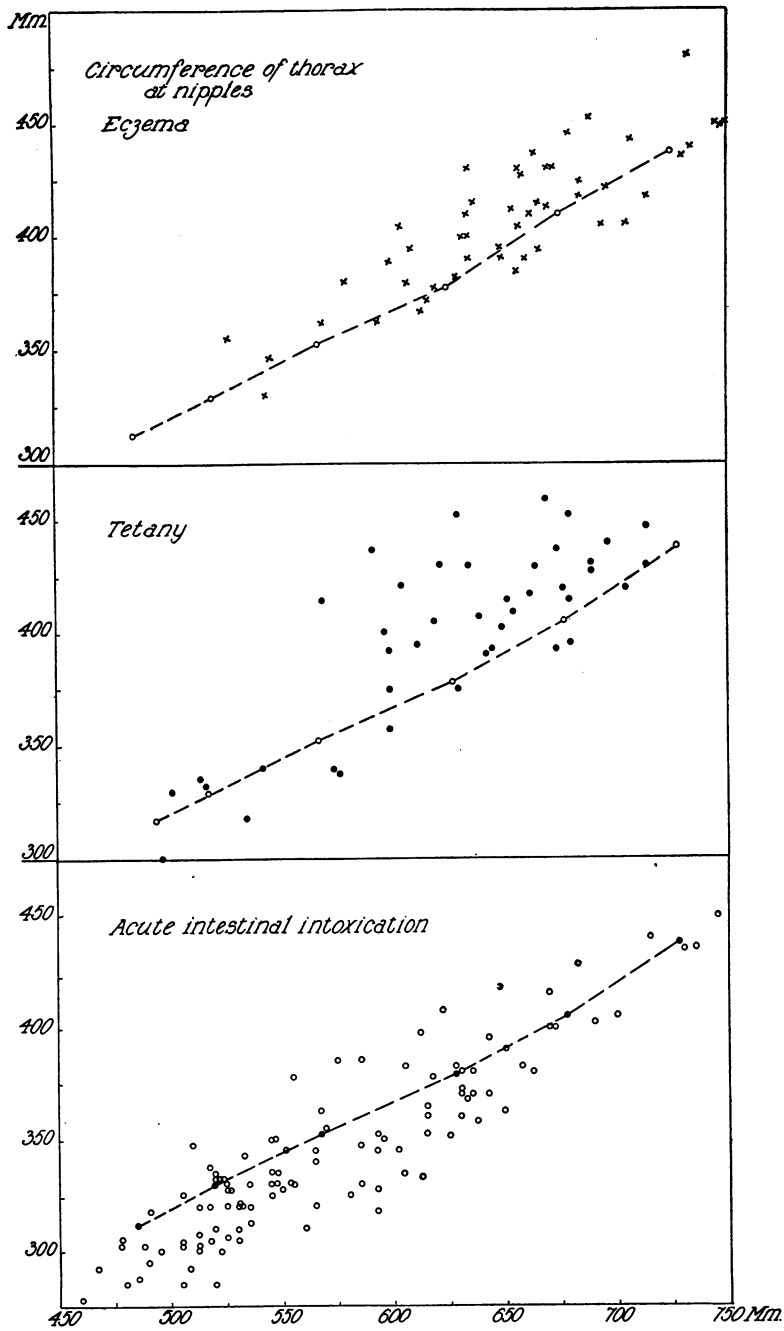

CHART 3. THE RELATIVE CIRCUMFERENCE OF THE THORAX IN INFANTS WITH VARIOUS DISEASES

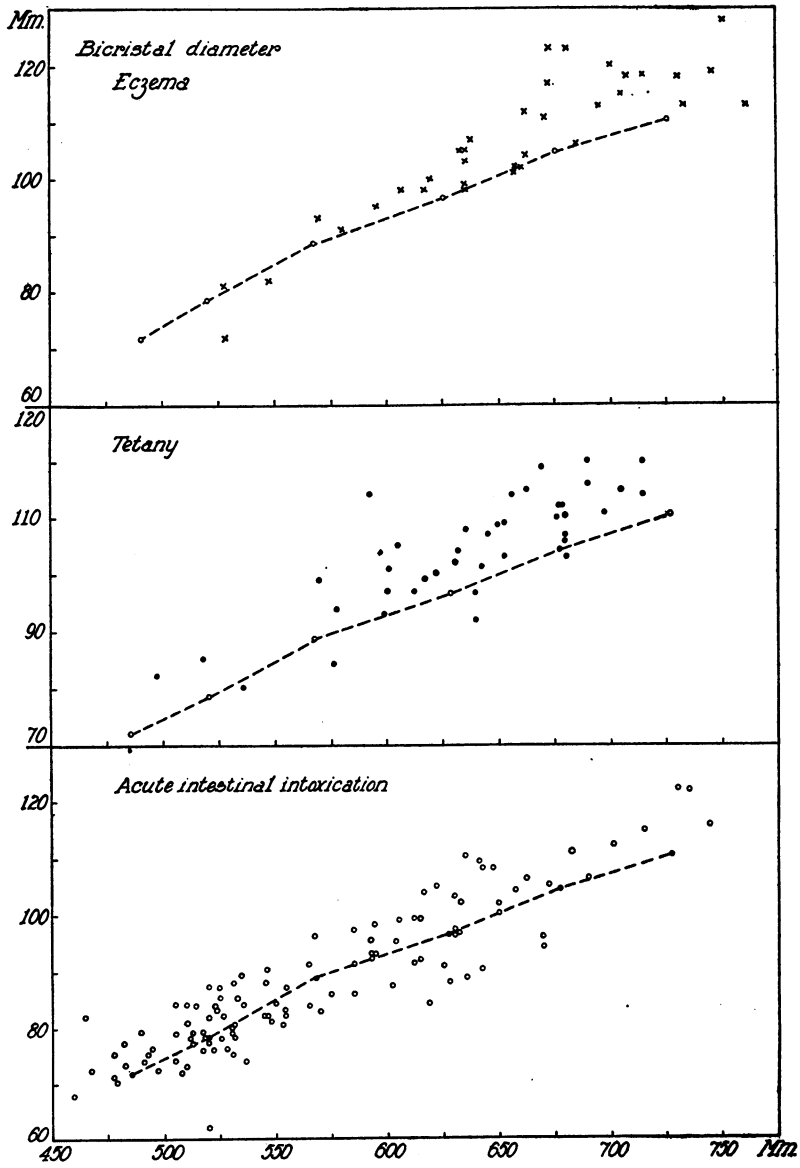

CHART 4. THE RELATIVE WIDTH OF THE HIPS (BICRISTAL DIAMETER) IN INFANTS WITH VARIOUS DISEASES

infants with tetany were regularly higher than for the healthy infants, the difference in all instances being greater than three times the probable error of the difference.

Eczema. The crosses, indicating measurements on infants with eczema, tend to fall above the average lines for the healthy infants for all four dimensions shown. Differences from the healthy have been calculated for infants ranging from 600 to 649 and 650 to 699 mm. in height only, since these were the only groups in which the number of cases was sufficiently large to make the results significant. Averages for the eczema infants were regularly higher than for the healthy infants, the differences in five of the eight groups being more than three times greater than the probable error of the difference.

SUMMARY

1. The proportions of the external dimensions of infants with various diseases were studied.

2. Relative to total body length, infants with acute intestinal intoxication are smaller in their transverse dimensions (diameter of face, bigonial diameter) and in their chest circumference than are healthy infants from the same social environment.

3. Infants with tetany and infants with eczema are relatively larger in their transverse dimensions (diameter of face, bigonial diameter and bicristal diameter) and in their chest circumference than are healthy infants from the same social environment.

We wish to express our sincere thanks to Dr. Franz Boas for many helpful suggestions in the treatment of these data.

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