

the bicarbonate content rose slightly in spite of the increased chlorine-ion concentration. This rise in bicarbonate was rendered possible by an increase in the total base content and a fall in the protein concentration.

Our study reveals that when diuresis was successfully established and maintained there is no evidence to support the view that injections of sodium chloride solutions in dehydrated infants further deplete the lowered alkaline reserve.

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Treatment of Dehydration of Diarrhea with Parenteral Fluids.
II. Effect on Excretion of Fixed Acid and Base.

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(Introduced by Oscar M. Schloss.)

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Hartmann¹ believes that diarrhea increases the relative loss of fixed base* from the body, first because there is a less complete resorption of alkaline intestinal secretions, and second, because with the accompanying oliguria there is a decreased excretion of fixed acids.* He states that the parenteral injection of NaCl solution may augment the accumulation of fixed acids in the blood by the retention of chlorine-ions leading to a reduction of the plasma bicarbonate content. He cites that portion of the data published by Holt, Courtney and Fales² which shows that loose stools contained much larger quantities of fixed base, especially sodium and potassium, than did normal stools. He failed, however, to point out the fact that the excretion of the fixed acids increased in a proportionate manner. Furthermore, the data are unsuited to an adequate consideration of the total loss of acid and base from the body because of the lack of published analyses of the urines.

In an attempt to add to the available data we determined the quantities of fixed acids and base in both the urine and stools of 6

¹ Hartmann, A. F., *Am. J. Dis. Child.*, 1928, xxxv, 557.

* The term "fixed base" refers to sodium, potassium, magnesium and calcium. The fixed acids are chloride, phosphate and sulfate. In this report comparison is made between the 2 calculated as cc. of 0.1 N acid and alkali solutions.

² Holt, L. E., Courtney, A. M., and Fales, H. L., *Am. J. Dis. Child.*, 1915, ix, 213.

infants with diarrhea in 8 periods of active treatment with parenteral fluids. These fluids consisted of hypodermoclyses of isotonic NaCl solution followed usually by the intravenous injection of 10% glucose solution. Collections of the excreta were begun at varying intervals following the first treatment and were continued for as long as 48 hours whenever circumstances permitted.

As a basis of comparison, a similar study was conducted on 3 normal untreated infants in 4 collection periods. A normal preponderance of fixed base over fixed acid was apparent in the total excreta of all 3 infants. This relation is most simply expressed as an acid:base ratio. The average of the 4 periods is 1 part of fixed acid to 1.48 parts of fixed base. This figure is derived from the following individual values: 1.45, 1.44 and 1.46 for the periods during which whole lactic acid milk was fed, and 1.55 during the period of protein milk intake. These ratios are surprisingly similar to that existing in normal plasma—105 cc. of 0.1 N fixed acid to 150 cc. of 0.1 N fixed base per 100 cc., a ratio of 1:1.43.

The analyses of the excreta from the patients with diarrhea showed great variations in the acid:base ratio. The average of the 8 periods was 1:1.35. The outstanding fact is that these patients with dehydration, undergoing treatment with parenteral fluids consisting largely of NaCl solutions, excreted relatively more fixed acid than the normal infants. The most striking example of this high acid excretion was furnished by an infant showing rapid clinical improvement. His acid:base ratio was 1:1.01. The maximum preponderance of base (ratio 1:1.54) was seen in a patient rapidly approaching death. Even in this instance the ratio did not exceed that found in a normal infant receiving the same diet.

These results do not correspond to Hartmann's prediction concerning the effect of NaCl solutions on the fixed acid and base excretion of dehydrated infants. We believe this discrepancy to be due to the fact that his explanation presupposed the existence of continuing oliguria and our results were secured during periods of well-sustained diuresis. The successful restoration of urine flow is well indicated by the fact that the daily urine volumes varied from 200 cc. to 520 cc. in these 6 infants whose weights varied from 6 to 11 pounds.

It may be concluded from these data obtained from 6 infants with diarrhea that active treatment with isotonic NaCl solution in combination with hypertonic glucose solution, administered to the point of complete restoration of urine flow, did not disproportionately increase the excretion of fixed base.