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Acidosis in Cholera. II. Changes in Serum Electrolytes.

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Of the series of cases of cholera reported in the preceding paper,[1] more detailed studies were made on 13 in order to gain a more complete picture of the changes in serum electrolytes. Besides pH and bicarbonate content, we also determined serum total base, chloride, phosphate, proteins and lactate. These determinations were made during the acute stage, usually before treatment, and repeated at intervals during the course in the hospital. Altogether 48 determinations were made on the 13 cases.

TABLE I.

Showing average concentrations in serum electrolytes during acute stage and during convalescence. Values except pH are expressed in milli-equivalents per liter.

	Acute Stage (1)	Convalescence* (2)	Difference (1)-(2)
pH	7.27	7.45	0.18
Total base	138.4	152.5	—14.1
HCO_3	14.8	30.7	—15.9
Cl	92.2	99.2	— 7.0
HPO_4	4.0	1.8	2.2
Proteins	15.8	13.5	2.3
Lactate	6.8	2.3	4.5
Undetermined	4.8	5.0	— 0.2
Sum of anions	138.4	152.5	—14.1

* Figures in this column represent averages of 12 cases, as one patient died during the acute stage.

The average values obtained during acute stage on admission and those on recovery are presented in Table I. It is noted that in the acute stage besides the decrease in pH and bicarbonate content, there is a distinct reduction in serum total base and chloride concentrations and an elevation of phosphate, lactate, and, to a lesser extent, proteins. These changes tend to disappear with recovery from acute symptoms, although the rate of return to normal of individual constituents may vary considerably. When the values obtained on admission are compared with those on discharge, it may be observed that during the acute stage sufficient base is lost from the body to lower the serum base concentration to the extent of 14.1

[1] Liu, S. H., Wang, S. H., and Fan, C., PROC. SOC. EXP. BIOL. AND MED., 1933, **30**, 417.

milli-equivalents per liter. Added to this alkali deficit from loss of base is the increased demand for base from the increase of 2.2 milli-equivalents in phosphate, 2.3 milli-equivalents in protein and 4.5 milli-equivalents in lactate, totalling 9.0 milli-equivalents. The combined alkali deficit from loss of base and from increased demand for it amounts to 23.1 milli-equivalents. This alkali deficit is shared by bicarbonate and chloride. Chloride, being a fixed acid, is decreased only 7.0 milli-equivalents, leaving the greater part of the burden to bicarbonate, which is decreased 15.9 milli-equivalents, giving as a result marked acidosis.

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Nature and Result of Animal Tissue Reactions to Cellulose.

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(Introduced by C. M. Van Allen.)

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Experimental evidence of the biological decomposition of cellulose was first presented 80 years ago,[1] and many articles have since been written concerning this phenomenon. The amassed knowledge has been well summarized.[2, 3] We will therefore stress a few salient points.

The bacteria and fungi that live on cellulose exist for the greater part in soil, dung, or ensilage. Several saprophytic bacteria, as *B. cereus* and *B. mesentericus* have been reported as acting on cellulose,[4] but this has not been substantiated.[5] At first it was thought that symbiosis was necessary for the dissolution of cellulose, but further work demonstrated the ability of pure strains to perform this task. The action in any case is the result of a cellulase, and this has been repeatedly isolated.[6, 2, 3] It has been claimed that cellulase has only a slight effect on untreated cellulose but reacts

[1] Mitcherlich, (Quoted in Bradley & Rettger and in Kellerman and McBeth, references Nos. 2 and 3).

[2] Bradley, L. A., and Rettger, L. F., *J. Bact.*, 1927, **13**, 321.

[3] Kellerman, K. F., and McBeth, I. G., *Centralbl. f. Bakt.*, 1912, **34**, 485.

[4] Thaysen, A. C., and Bunker, H. J., *Biochem. J.*, 1926, **20**, 692.

[5] Spies, J. W., Mandeville, F. D., and Awdziewicz, F. J., unpublished studies.

[6] Belehrádek, Jan, *Arch. Int. Physiol.*, 1922, **17**, 260.