Saline Infusion, Acidosis, and the Stewart Approach

To the Editor.—The report by Scheingraber et al. highlights the phenomenon of acidemia after infusion of 0.9\% saline in the perioperative period. The accompanying editorial discusses several relevant points; however, we are disappointed that neither the article nor the editorial addresses the central issue of the relative merits of the Stewart approach in describing acid-base physiology and pathophysiology.

Compared with the Henderson-Hasselbalch approach, the Stewart approach has a number of appealing features. (1) The control of acid-base and water homeostasis can be explained in terms of both sodium and chloride regulation. (2) Acid-base status is partly controlled by a number of plasma electrolytes, notably sodium and chloride. These electrolytes can be manipulated in the clinical setting to optimize acid-base status. (3) The factors controlling acid-base status are independent. Criticisms of the Henderson-Hasselbalch approach include a lack of independence between carbon dioxide and bicarbonate. (4) The Henderson-Hasselbalch approach does not allow assessment of nonvolatile buffers, whereas the Stewart approach explicitly includes assessment of weak acids.

Comparison of the Stewart and Henderson-Hasselbalch approaches is complicated by the fact that both approaches adequately describe the acid-base end point, as Scheingraber et al. demonstrate. Further study is required to determine which approach better describes the mechanisms of acid-base physiology.

Previous animal studies have suggested that the alkalinizing effect of lactate-containing solutions in acute resuscitation is time dependent, which underscores the concept of lactate as a strong ion. The removal of lactate from the circulation will increase the strong ion difference and reduce acidosis. This effect may be supplemented by further increases in the strong ion difference associated with lactate metabolism; in contrast, added chloride ions appear to persist longer in the circulation. Subsequently, a smaller strong ion difference is maintained along with greater acidosis, as seen in the report by Scheingraber et al.

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Article Supports Findings of Previous Comparison

To the Editor.—The article by Scheingraber et al. supports the findings of a previous comparison of saline with a balanced salt solution carried out by McFarlane and Lee in 1994. The accompanying editorial by Prough and Bidani described this study as a clinical report of the

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