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Hyperglycemia and Hyponatremia

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To the Editor:

I would like to make a few comments on the insightful theoretical study of the hyponatremic effect of a 100 mg% rise in serum glucose ($\Delta\text{Na}/\Delta\text{Glu}$) recently reported by Dr. Wolf.¹ Although the introduction states that this topic was examined experimentally only once, by Hillier et al,¹ there are at least two other such studies, one by Seldin and Tarail³ (in which $\Delta\text{Na}/\Delta\text{Glu}$ was estimated⁴ to be 1.74 mM/100 mg%), and another by Shalwitz et al.⁵ Shalwitz et al also found that serum [K] rose concomitantly with glucose. To explain that observation, they suggested a transport mechanism for potassium affected by glucose and insulin, an idea somewhat like the modification Dr. Wolf made to his model—i.e., as glucose rises, a progressive depression occurs in the Na/K pump—in order to account for the surprising post hoc finding of Hillier et al that $\Delta\text{Na}/\Delta\text{Glu}$ steepened as glucose rose. Does the author's model predict the behavior of [K] as glucose rises? The unmodified model predicted the opposite, i.e., a shallowing of $\Delta\text{Na}/\Delta\text{Glu}$ as glucose rises, as did two prior theoretical studies.^{6,7} The explanation for this should be that the amount of water moving out of the cells progressively decreases with each successive 100 mg% rise in glucose, but this appears to be misstated in the results section as an “*increase* in water moving out of the cells.”

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