

CASE D—EVALUATION OF HYPONATREMIA

The evening supervisor notes that a patient's serum sodium has failed delta check alerts compared to the results from the previous week. She had run the initial specimen on the Beckman CX-7, and repeated the test on the Ektachem. All results were similar except for the sodium. The specimen was retested on both instruments and the results were essentially the same as the first determination on each instrument. Several other patients were run, and there were no differences in results between the CX-7 and the Ektachem. Serum osmolality was measured as 302. What is the osmotic gap using results from each of the two instruments? What is the cause for the discrepancy of results from the two specimens? Does this patient have an abnormality of sodium?

| INSTRUMENT | Na | K | Cl | CO ₂ | BUN | Creatinine | Glucose |
|------------|-----|-----|-----|-----------------|-----|------------|---------|
| CX-7 | 129 | 5.0 | 107 | 19 | 33 | 2.0 | 152 |
| Ektachem | 142 | 5.1 | 107 | 20 | 33 | 2.1 | 155 |

Discussion

As with case B, this patient had results which differed significantly from a previous specimen on the same patient. In this case, however, there is a discrepancy between two different instruments measuring the same analyte. On the CX-7, sodium is measured by ion selective electrodes (ISE's) using diluted samples; on the Ektachem, non-diluted ISE's are employed. There is an osmotic gap of 24 using the results from the CX-7, while there is a gap of -2 using the Ektachem results. Since the Ektachem showed the higher sodium value, the most likely explanation is that the patient's serum had increased solids. Since it was not lipemic, an increase in protein was the most likely etiology; the patient turned out to have multiple myeloma with a total protein of 13.8 g/dL.

Because lipemia is the most common cause of this phenomenon, many laboratories routinely clear specimens of gross lipemia before performing analyses for electrolytes if using diluted ISE's or flame photometry. This patient's "serum" sodium is actually low, since each mL of serum actually contains only about 86% water. However, the concentration of sodium in plasma water was actually normal, as reflected by the normal serum osmolality. Since the body regulates the concentration of sodium in water, this patient has no abnormality of sodium metabolism.