Table 1. Determinations of Serum Glucose, Protein, and Viscosity (Six Samples)

<table>
<thead>
<tr>
<th>Glucose concn, mg/L</th>
<th>Undiluted serum</th>
<th>Diluted with glucose standards*</th>
<th>Undiluted with saline*</th>
<th>Actual reading</th>
<th>Expected reading</th>
<th>Ektachem+ aceb</th>
<th>Protein, g/L</th>
<th>Relative viscosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>800</td>
<td>880</td>
<td>900*</td>
<td>950*</td>
<td>960</td>
<td>890</td>
<td>154</td>
<td>92</td>
</tr>
<tr>
<td>(1:4)</td>
<td>(1:8)</td>
<td>(1:6)</td>
<td>700</td>
<td>700</td>
<td>1040</td>
<td>1010</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>920</td>
<td>1040</td>
<td>1010*</td>
<td>1060*</td>
<td>1040</td>
<td>1010</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>(1:10)</td>
<td>(1:20)</td>
<td>(1:20)</td>
<td>670</td>
<td>780</td>
<td>850</td>
<td>850</td>
<td>5.9</td>
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</tr>
<tr>
<td>790</td>
<td></td>
<td></td>
<td></td>
<td>810</td>
<td>84</td>
<td>84</td>
<td>32</td>
<td>4.2</td>
</tr>
<tr>
<td>880</td>
<td></td>
<td></td>
<td></td>
<td>900</td>
<td>84</td>
<td>84</td>
<td>52</td>
<td>7.9</td>
</tr>
<tr>
<td>270</td>
<td>820</td>
<td>750</td>
<td></td>
<td>900</td>
<td>82</td>
<td>84</td>
<td>52</td>
<td>7.9</td>
</tr>
<tr>
<td>(1:2)</td>
<td>(1:3)</td>
<td></td>
<td></td>
<td>(1:3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*By glucose oxidase reaction. \(^2\)By hexokinase reaction. \(^3\)Corrected for dilution; dilution factors in parentheses. \(^4\)Equimolar dilution with \(^500\) mg/L glucose standards; results corrected for dilution. \(^5\)1060 mg/L by swc (Technicon Instruments Corp., Tarrytown, NY).

hyperviscosity, we considered that insufficient sample volume secondary to incomplete aspiration or ejection of the sample aliquot is a likely cause of these aberrant results, although consultation with the technical services of the manufacturers of the instruments did not reveal differences in instrumental design that readily explain the different processing of hyperviscous serum. Determination of urea nitrogen in sample 6 also gave depressed readings in the IL, while the results of all other analytes agreed with each other and were normal, as expected. The IL determinations of glucose and urea share the same predilution step; IL results for other analytes (sodium, potassium, chloride, and carbon dioxide), which share a different predilution step, were not noticeably affected. The threshold of hyperviscosity at which insufficient sampling occurs was not determined. However, we did not observe the effect at a relative viscosity of 4.2 (23 °C).

To our knowledge, pseudohypoglobulinaemia secondary to insufficient sampling of hyperviscous serum with IgM macroglobulinemia has not been recorded before. It may not be unique to one type of instrumental design. Because true hypoglobulinaemia has been reported in patients with Waldenström’s macroglobulinemia (5) and other monoclonal hyperglobulinemias (2), this artifact should be kept in mind, to spare the patient discomfort and unnecessary testing. A finding of pseudohypoglobulinaemia can also alert the physician to the presence of the hyperviscosity syndrome which, because of its rarity, is easily overlooked.

References

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Limitations in the Immunoturbidimetry of Urinary Albumin

To the Editor:

We read with interest the Letter of Sathianathan et al. (1) describing the polyethylene glycol (PEG)-assisted immunoturbidimetric determination of urinary albumin with the Cobas-Bio centrifugal analyzer. We have applied an almost identical method to the Technicon RA 1000 "random access" analyzer, using similar reagent conditions: 30-μL sample, 60-fold dilution of rabbit anti-human albumin (Dako Ltd U.K., prod. no. A001) in phosphate buffered saline containing 40 mL PEG 6000 per liter, the final reaction volume being 360 μL. After blanking we make readings at 340 nm after a 5 min incubation at 37 °C.

We wish to make two points.

First, in our hands, preparing standards in phosphate-buffered saline without the addition of a carrier protein to prevent adsorption of albumin onto the surface of polystyrene vessel leads to overestimation of urinary albumin, particularly at concentrations below 20 mg/L. We include 20 ml of bovine serum albumin per liter of standards, both for immunoturbidimetric and radioimmunoassay. This phenomenon may explain the authors’ finding of a lower limit of 3.1 μg/mi for albumin excretion rate in healthy normal volunteers, while a number of workers, including our selves, find lower excretion rates of albumin in many normal subjects, although such values can only be determined by more-sensitive technique such as ELISA or RIA (2, 3).

Secondly, the change in absorbance between 0 and 5 mg of albumin per liter in our assay typically ranges from 0.025 to 0.035 absorbance units, and 1 mg/L represents the limit below which significant amounts of albumin cannot be distinguished from zero with 96% confidence. The fact that, on using the Cobas-Bio, the reliable analytical range for urinary albumin can be extended to 0.31 mg/L despite the use of a longer wavelength of 440 nm intrigue us. We speculate: can this be due only to the differing optics of the Cobas-Bio compared with the RA 1000?

References

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