plate labeling. We find this procedure to be as effective as the single-plate development system; sensitivity and separation are maintained while reducing the cost per test.

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References

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Source of Error in Cerebrospinal Fluid Protein Determination with the Du Pont Automatic Clinical Analyzer

To the Editor:

The most widely used method for measurement of cerebrospinal fluid (CSF) total protein is turbidimetry. We use the Du Pont Automatic Clinical Analyzer (aca; Du Pont Instruments, Wilmington, Del. 19898) for this measurement. In this method, CSF proteins are precipitated by trichloroacetic acid and the resulting turbidity is measured spectrophotometrically (1).

Values are falsely low when Lab-trol Chemistry Control (Dade, Division of American Hospital Supply Corp., Miami, Fla. 33152) is used to standardize the aca. Lab-trol is a protein-based material containing a total protein concentration of 70 g/liter and an albumin concentration of 49 g/liter.

We compared the protein concentrations in a series of CSF specimens, and in a CSF control material (Ortho Spinal Fluid Control, Ortho Diagnostics, Inc., Raritan, N.J. 08869), standardizing with Lab-trol and with a normal human serum. Results are tabulated below:

<table>
<thead>
<tr>
<th>aca standardized with</th>
<th>Lab- Human trol serum</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF protein, mg/liter</td>
<td></td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>460           540</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>220           290</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>230           270</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>110           170</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>50            150</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>90            140</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>40            120</td>
</tr>
<tr>
<td>Unknown CSF</td>
<td>110           150</td>
</tr>
<tr>
<td>Ortho control</td>
<td>780           950</td>
</tr>
<tr>
<td>Ortho control</td>
<td>50            100</td>
</tr>
</tbody>
</table>

We have not determined the cause of the falsely low CSF protein values when Lab-trol is used to standardize the aca, but we recommend use of a normal human serum or a CSF control material for standardizing the instrument for CSF protein determination.

Reference

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Values for Uric Acid in Patients' Sera as Measured with SMAC (Phosphotungstate) and AutoAnalyzer (Uricase)

To the Editor:

The phosphotungstate/hydroxylamine method (1) used in the Technicon SMAC System to measure uric acid is known to exhibit positive interference from a variety of substances (2), among which acetaminophen, ascorbic acid, L-dopa, α-methyl dopa, and 6-mercaptopurine are particularly important (3). To assess the extent of interference produced by nonurate chromogens in patient specimens, we did paired uric acid analyses on 1185 unselected specimens received by the NIH Clinical Chemistry Service. Each specimen was analyzed the same day by the phosphotungstate method with the SMAC and by the automated uricase method of Gochman and Schmitz (4). The difference between the means of values obtained by each of the two methods was 4.6 mg/liter (P < .001). The mode of the differences was 2 mg/liter. Ninety-eight percent of the differences fell in the range −5 to +15 mg/liter (see Figure 1). The equation of the regression line was

\[ y = 6.2 + 0.967x \]

where y is the SMAC result and x the uricase result. The standard error of the estimate was 4.9 mg/liter.

Musser and Ortizgoa (1) reported a mean of 3 mg/liter for nonurate chromogens in pooled sera studied by the phosphotungstate method. Singh et al. (3) reported that a 176 mg/liter aqueous solution of ascorbic acid (several-fold the usual serum concentration) had an apparent uric acid concentration of 14 mg/liter by the phosphotungstate method. In contrast, Gochman and Schmitz (4) reported that ascorbic acid added to pooled sera in a concentration of 20 mg/liter depressed the value for apparent uric acid by 10 mg/liter in the automated uricase method, presumably by interfering with oxidation of the chromogen during the peroxidase reaction used to measure the hydrogen peroxide released during the uricase reaction. For both methods, reducing substances seem to be the most important source of interference, producing falsely high values in the phosphotungstate procedure and falsely low ones in the automated uricase procedure. Falsely high values might lead to an unnecessary evaluation for hyperuricemia; falsely low values might mask dangerously high concentrations of uric acid in patients receiving antitumor therapy and could delay the diagnosis of gout.

Fig. 1. Comparison of the uric acid concentrations (mg/dl) measured by the SMAC phosphotungstate method and an automated uricase method for 1185 patient specimens