Sir,

Evidence has been provided in the recent literature that vitamin C may interfere with glucose measurements in urine [1] when using the specific enzymatic system for glucose determination, glucose oxidase. A similar interference has been noted in ascorbic acid enriched plasma pools containing glucose [2]. This enzyme assay is widely employed at present in clinical laboratories for exact blood glucose determinations.

We were interested to see whether in uremic patients vitamin C supplementation could also modify blood glucose levels determined by glucose oxidase. In patients undergoing intermittent hemodialysis, vitamin C supplementation is generally recommended because of possible ascorbic acid tissue depletion [3,5]. In such patients (as well as in patients with normal renal function) receiving oral vitamin C supplementation, high plasma levels of this vitamin may be obtained [3] sufficient to expect an interference with the enzymatic blood glucose determination. 17 uremic patients on a long-term hemodialysis programme received a daily oral dose of 2 × 0.5 g vitamin C during 3 days, between two dialysis sessions. Their blood glucose levels were determined 8-12 h after the last vitamin C intake using three ‘specific’ enzymatic assays: glucose dehydrogenase [5], hexokinase [6] and glucose oxidase [7]. In normal subjects, blood glucose determinations using hexokinase and glucose oxidase, respectively, yield identical results when interfering substances are excluded [2,8,9]. The oxidizable substance, vitamin C, interferes with the latter enzymatic reaction during the second step of the determination process [1]. No such interference is noted with the glucose dehydrogenase and the hexokinase assay systems, which are direct measurement methods.

Table I.

<table>
<thead>
<tr>
<th>Glucose oxidase</th>
<th>Hexokinase glucose dehydrogenase</th>
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<tr>
<td>Blood glucose concentration, mg/lOOml</td>
<td>84 ± 4</td>
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<td>p &lt; 0.001*</td>
<td>p &lt; 0.001*</td>
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The results of the present study are shown in table I. The values indicated are means ± SEM of blood glucose determinations in 17 patients using the three enzymatic methods. They clearly demonstrate that in hemodialysis patients on daily oral supplementation of 1 g vitamin C, blood glucose levels are falsely decreased with the glucose oxidase method when compared to the two other enzymatic assays. Therefore, we suggest that the glucose oxidase method should not be used in uremic patients receiving ascorbic acid when exact blood glucose determinations are required.

References


* Student’s paired t test comparing the glucose oxidase values with those obtained with hexokinase and glucose dehydrogenase, respectively.

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