Erythrocyte Lithium Analysis

To the Editor:
Elizur et al. (1) and Nelson and Cohen (2) found that erythrocyte lithium concentration and erythrocyte/plasma lithium ratio may be of greater diagnostic significance than is serum lithium concentration. Lytkens et al. (3) found that certain schizophrenic patients retain more lithium intracellularly than do normal persons, which may explain why symptoms of lithium toxicity may appear in the presence of “normal” serum lithium concentrations. Our own clinical results are in harmony with this interpretation.

Hisayasa et al. (4) proposed that atomic absorption spectrophotometry without internal standards be used for such analyses. Unfortunately, their use of a relatively hot (2600 K) air/acetylene flame and the lack of an ionization buffer and internal standards decrease the general usefulness of their procedure.

In performing our routine erythrocyte lithium analyses we find that atomic absorption spectrophotometry is not necessary. Instead, we use the flame atomic emission photometer, with potassium internal standard and air/propane flame, which we also use for serum or plasma lithium assays (Instrumentation Laboratory, Inc.; Model 343-03). Whole blood is collected with sodium heparin or sodium ethylenediaminetraacetic acid, and cells and plasma are separated immediately. Potassium-containing anticoagulants must be avoided. The hemolysate is made by adding 0.5 ml of cells, 0.5 ml of water, and 0.1 ml of chloroform, followed by vortex-mixing and centrifugation. Plasma and hemolysate are then assayed in the same manner as are serum samples. Potassium concentration in the hemolysate is about 35–45 mmol/liter and has negligible effect on the lithium assay procedure recommended by the manufacturer. Precision is essentially equivalent to that for serum assays (CV, 5%), and it is not necessary to wash the cells before hemolysis.

Therapeutic ranges are still fairly broad and may depend on the affective disorder being treated. However, the optimum erythrocyte/plasma lithium ratio is at least 0.22, and the erythrocyte lithium concentration range is 0.2–0.8 mmol/liter. More than 0.8 mmol/liter erythrocyte lithium may be toxic.

Determination of the erythrocyte/plasma lithium ratio has also been valuable to our clinicians because the ratio decreases the effects of collecting the specimen at the incorrect time. Further, a common patient subfuge intended to hide noncompliance is that of the taking of a large dose of lithium carbonate on the evening before a visit to the outpatient clinic. This can be detected by the very small erythrocyte/plasma ratio and high plasma lithium concentration in a patient who is known to have an adequate ratio when under inpatient care.

References

Richard Eisenberg
Regional Clinical Laboratories
Erie, Pa. 16501

Table 1. Concentrations of Haloperidol in Blood

<table>
<thead>
<tr>
<th>Hours after Ingestion</th>
<th>Case A</th>
<th>Case B</th>
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<tbody>
<tr>
<td>2</td>
<td>68</td>
<td>42</td>
</tr>
<tr>
<td>24</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>48</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>72</td>
<td>neg.</td>
<td>neg.</td>
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Haloperidol Concentrations in Blood in Cases of Acute Intoxication

To the Editor:
Although haloperidol is a widely used tranquilizer, fatal intoxication with this drug is little unknown. Thus we have little information on the concentrations of this compound in blood in cases of acute intoxication.

We wish to report analytical data on blood in two cases of acute intoxication with haloperidol. Because neither case was fatal, we were also able to measure the subsequent excretion rate of the drug.

Two children, 5 years (case A) and 4 years old (case B) (body weights 17.8 and 16 kg, respectively) were admitted to the Children’s Hospital in coma. According to information given by their parents, the children had taken some tablets of “Aloperidin” (haloperidol, 2 mg/tablet) about an hour before their admission to the intensive care unit. Their mother, who first noticed the event, told us that the oldest boy took 8 to 10 tablets, the second 5 or 6.

Blood analyses were performed immediately in both cases, spectrophotometrically (1).

Results of our measurements are indicated in Table 1. The concentration of the drug in blood measured about 2 h after the event was used as a base of our observations in the excretion rate. By the second day the concentration was less than half that of the first day. The third day it was less than 15%, and by 72 h the test was negative.

Braun et al. (2), using radioactive haloperidol, observed that after oral administration of this drug the highest concentration was found in the liver 3 h later, and by 24 h a third of the dose taken was excreted in the urine, according to Soudijn et al. (3), in the form of the glycine conjugate or in the form of p-fluoroophenylactic acid. This is the only relevant information we could find in the literature.

References

Antonios Coutselinis
Denis Boukis
Pan Kentarchou

Dept. of Forensic Medicine
University of Athens
School of Medicine
Goudi, Athens 609
Greece