trap expired water vapor. The copper levels found averaged 134 µg per cent.

**Blood Copper Levels**

Further blood samples were drawn on controls and patients on ventilators for four to seven days.

<table>
<thead>
<tr>
<th></th>
<th>Range</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td>93-200 µg</td>
<td>129 µg</td>
</tr>
<tr>
<td>IPPB</td>
<td>84-213 µg</td>
<td>144 µg</td>
</tr>
</tbody>
</table>

**Discussion**

Assuming the maximum copper level 210 µg per cent was administered to the patient, the copper dose administered would be approximately 3.15 mg/day, normal copper intake as quoted by the authors 2-3 mg/day. The authors suggest that a dose of six times this amount (20 mg) is acceptable. If one takes into account that the average expired copper level was 134 µg percent, the actual dose is likely to be in the range of 1.14 mg/day.

It should also be borne in mind that in our experience 50 percent of patients receiving continuous ventilator support do so for 48 hours or less, and that only 10 percent are on ventilators for longer than seven to ten days. Perhaps a comparison between dialysis machines and nebulized water containing small amounts of copper is not a valid one.

In conclusion, the authors' suggested alternative of adding CuCl₂ would be hazardous in terms of: 1) the risk of contaminating the closed system; 2) error in adding the correct dose of CuCl₂; and 3) exposing the patient to six times the copper dose required to maintain sterility of the nebulizer contents.

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**REFERENCES**


P.S. There is a small error in my letter on page 587 (May, 1971 issue). Under section “Practical notes on the Vermont Copper Bactericidal Trip,” it should read: “The vent drain is situated in the distal end cap” etc.

**Anatomic and Histologic Changes of Early Emphysema**

**To the Editor:**

We would like to submit the following data regarding the brownish pigment in smokers' macrophages as an addendum to our paper, "Anatomic and Histologic Changes of Early Emphysema." 

Ultraviolet microscopy revealed the brownish pigment found in macrophages, both along alveolar walls and in sputum, to fluoresce with a bright yellow-brown color. The material also stained positively with lipofuscin. Electron microscopy revealed the cells to be macrophages and to contain inclusions, similar to those described by Harris et al. Tar-like filtrates obtained from tobacco smoke fluoresced with an identical yellow-brown color and stained in an irregular but positive fashion with lipofuscin. In support of these observations, fluorescent histiocytes in sputum related to smoking have been described by Vassar and co-workers. Similar findings in alveolar macrophages have been reported by Roque and Pickren.

In addition, just as Harris et al noted metabolic and lysosomal alterations in smokers' macrophages, Roque and Pickren found striking reductions in the activity of various enzymes in the cells, the intensity of which was proportional to the amount of stored fluorescent material. Thus, it is possible that the brownish pigment is derived from some component of tobacco smoke, and marked functional abnormalities are associated with its presence.

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Burlingame, California

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