December 1991 to June 1994, carcinoembryonic antigen levels in pleural fluid (CEApf) from 461 consecutive patients were measured prospectively with a radioimmunoassay (RIA-guest CEA; Behring, Germany) in our department. The cause of the effusion was neoplastic in 113 patients, paramalignant in 43, benign in 273, and unknown (possibly malignant) in 32 patients. The 273 benign effusions were associated with the following causes: tuberculosis (91), transudate (41), parapneumonic effusion (41), pulmonary embolism (6), empyema (5), pleuropneumonitis (5), non-malignant chylothorax (5), rheumatoid arthritis (4), uremic effusion (3), postsurgical effusion (3), hemothorax (3), systemic lupus erythematosus (2), postcardiac injury syndrome (2), pancreatitis (2), 7 other benign etiologies, and 53 of nonneoplastic unknown etiology (NUE). NUEs are effusions of no known cause in patients with either of the following criteria: (1) nonspecific pleuritis studied by thoracoscopy, thoracotomy, or autopsy; or (2) no symptoms or recurrence of effusion with a clinical and radiologic 6-month follow-up.2

Our results differ from those of García-Pachón et al.1 We found a significant correlation (Pearson’s correlation test) between CEApf level and pH or lactate dehydrogenase in the whole benign-effusions group and in the subgroup with CEApf level >10 ng/mL (Table 1).

The best accuracy for CEApf in our series achieved with a 10 ng/mL cutoff point: sensitivity, 0.59; specificity, 0.94; accuracy, 0.84 (paramalignant and unknown cause effusions were excluded). With this cutoff level, there were 15 false-positive samples. Six of these were parapneumonic, 5 were empyema, 2 were rheumatoid arthritis, and 2 were NUE, with no diagnostic thoracoscopy and thoracotomy, respectively. Carcinoembryonic antigen serum level was measured in 12 samples, and it was not elevated in any case.

In conclusion, our data support the notion that the CEApf level in benign effusions is related to lactate dehydrogenase and pH level in pleural fluid. In addition, rheumatoid arthritis should be added to the list of false-positive causes of CEApf.

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Tumor Markers in Sputum of Patients With Bronchioloalveolar Carcinoma

To the Editor:

We read with interest the case study by Hidaka and Nagao (July 1996)3 about a bronchioloalveolar carcinoma (BAC) case with severe bronchorrhea. The authors studied the carcinoembryonic antigen (CEA) and gastrointestinal cancer-associated antigen (CA 19-9) levels in the sputum and serum of their patient and found that the sputum contained significantly higher levels of these tumor markers than the serum. We also had a similar case with BAC and bronchorrhea in whom we found high levels of CEA, CA 19-9, CA 125, and CA 15-3 in sputum. Similar to the case of Hidaka and Nagao, the levels of tumor markers in sputum were significantly higher than the levels measured in serum (Table 1).

Table 1—The Tumor Marker Levels of the Patient in the Sputum and Serum

<table>
<thead>
<tr>
<th>Marker</th>
<th>Sputum</th>
<th>Serum</th>
<th>Normal Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEA, ng/mL</td>
<td>&gt;550</td>
<td>175</td>
<td>0.0-3.4</td>
</tr>
<tr>
<td>CA 125, U/mL</td>
<td>&gt;500</td>
<td>&lt;1</td>
<td>1.7-32</td>
</tr>
<tr>
<td>CA 15-3, U/mL</td>
<td>152</td>
<td>122</td>
<td>7.5-53</td>
</tr>
<tr>
<td>CA 19-9, U/mL</td>
<td>&gt;1000</td>
<td>987</td>
<td>0.0-33</td>
</tr>
</tbody>
</table>

A literature review showed us that studies about measurement of tumor markers in sputum or bronchial lavage fluid are exceptionally rare.1 Mostly, CEA level was measured in bronchial and bronchoalveolar lavage fluids of patients with lung cancer.2,3 However, the authors’ and our case led us to believe that these tumor markers may be produced and secreted in the lung locally rather than being secreted in serum. We therefore believe that further investigations about the measurement of these tumor markers in sputum or bronchial lavage fluid are necessary. We are aware of the technical difficulty in determining the normal ranges of the tumor markers in these materials (due to problems of standardization). However, a study by us involving measurement of tumor markers in bronchial lavage fluids of lung cancer patients is still continuing.

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