therefore recommends that not more than 0.05 ml of a solution of heparin per milliliter of blood be used.\textsuperscript{1} This caution is based on the original work of Siggaard-Andersen,\textsuperscript{2} who demonstrated that concentrations of heparin of less than 1 mg/ml (approximately 100 units/ml) did not affect the pH, but that for each 1-mg/ml increase thereafter, the pH declined 0.003 units, and the arterial carbon dioxide tension (PaCO\textsubscript{2}) rose 0.1 mm Hg. In a separate experiment, Siggaard-Andersen\textsuperscript{2} demonstrated that a 12 percent dilution of whole arterial blood with physiologic saline solution resulted in a rise in the pH of 0.003 units, with a decline in PaCO\textsubscript{2} of 1 percent of the original value for each 1 percent of dilution; however, there appears to be no clear statement in the clinical literature as to whether adding large amounts of a solution of heparin to blood (which simultaneously increases the concentration of heparin and dilutes the blood) will alter the measured pH, the arterial oxygen pressure (PaO\textsubscript{2}), and the PaCO\textsubscript{2} to a degree that is clinically significant. The following study was conducted to answer this question.

**Materials and Methods**

Twenty-five samples of arterial blood (each 6 to 10 ml) were collected from 25 patients, using just enough of a solution of heparin sodium (1,000 *United States Pharmacopoeia* units per milliliter) to fill the dead space of a 10-ml syringe and 20 gauge needle (approximately 0.2 ml). The samples were kept on ice during the entire analysis. All samples were analyzed on calibrated blood gas analyzers (Radiometer PHM 71 Mk 2 Acid-Base and Radiometer BMS Mk 2 Blood Micro System Analyzers).

After measurement of the initial values for pH, PaCO\textsubscript{2}, and PaO\textsubscript{2}, the samples were serially diluted using 0.5-ml increments of the solution of heparin sodium; and the pH, PaCO\textsubscript{2}, and PaO\textsubscript{2} were remeasured at each increment of dilution. Several other specimens were diluted in one step to 50 percent. The changes in pH, PaCO\textsubscript{2}, and PaO\textsubscript{2} were analyzed statistically using the t-test applied to the mean of the difference between matched pairs at the 95 percent confidence level.

**Results and Discussion**

The concentrations of heparin sodium ranged from 20 to 1,147 units/ml of blood, and the percent dilution ranged from 8.4 percent to 50 percent. One-step dilution and incremental dilution gave the same magnitude of change. The change in pH, PaO\textsubscript{2}, and PaCO\textsubscript{2} with the addition of the solution of heparin sodium is expressed in Table 1 as a percent of the initial value (for simplicity and brevity).

It is not hard to imagine, under the varied circumstances in which arterial blood gas measurements are obtained, that an occasional specimen might suffer dilution by as much as 20 percent or more and might achieve concentrations of heparin sodium of 200 units or more per milliliter of blood (ie, 0.5 ml of the solution of heparin sodium in 2 ml of arterial blood). Our data show that this would not result in either a clinically or statistically significant shift in the pH to the “acidotic” side, and this appears to hold for even more extreme dilutions. Such dilution does result in erroneous values for the PaCO\textsubscript{2}, which declines 1 percent for each 1 percent of dilution, as predicted by Siggaard-Andersen.\textsuperscript{2} The values for PaO\textsubscript{2} rose but were not significantly altered in our samples, even with extreme dilution; however, it should be noted that the initial values for PaO\textsubscript{2} (44 to 86 mm Hg) in all samples were considerably lower than those required for full saturation of hemoglobin. If inadvertent dilution of a sample for arterial blood gas analysis is suspected, the pH and PaO\textsubscript{2} can be relied upon in making therapeutic decisions.

**Table 1—Changes in pH, PaO\textsubscript{2}, and PaCO\textsubscript{2} of Arterial Blood with Addition of a Solution of Heparin Sodium**

<table>
<thead>
<tr>
<th>Percent Dilution with Solution of Heparin Sodium</th>
<th>Percent of Initial Value</th>
<th>Percent of Initial Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pH</td>
<td>PaO\textsubscript{2}</td>
</tr>
<tr>
<td>0 percent</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>10 percent</td>
<td>100</td>
<td>100</td>
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<tr>
<td>20 percent</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>30 percent</td>
<td>100</td>
<td>105</td>
</tr>
<tr>
<td>40 percent</td>
<td>100</td>
<td>105</td>
</tr>
<tr>
<td>50 percent</td>
<td>100</td>
<td>115</td>
</tr>
</tbody>
</table>

*P < 0.05.

Pseudolymphoma of the Lung with Prolonged Follow-Up

To the Editor:

Pseudolymphoma of the Lung with Prolonged Follow-Up

To the Editor:

Pseudolymphoma of the lung is an uncommon disease in which the natural history and the appropriate treatment are poorly defined.\textsuperscript{1,2} Our case demonstrates that this disease can have a benign clinical course for many years, even though progressive localized enlargement is observed radiologically. Also described is the response to therapy with corticosteroids.

**Case Report**

On a routine chest x-ray film in 1971, the patient, an asymptomatic 63-year-old woman, was found to have a well-circumscribed density in the right upper lobe, containing air bronchograms; also present on this x-ray film was a small...
density in the periphery of the left upper lobe. Lymph nodes obtained by a mediastinoscopic procedure were free of specific pathologic abnormalities.

The patient underwent a right upper lobectomy. There was no hilar adenopathy. Within the lobe was a well-circumscribed mass which microscopically showed mature lymphocytes and numerous true germinal centers. Subsequently, chest x-ray films showed a gradual increase in the density in the left upper lobe, which by October 1976 (Fig 1) appeared as a lobulated mass. From this lesion a transbronchial biopsy was obtained, and the histologic findings showed mature lymphocytes. Treatment was begun with methylprednisolone (32 mg daily), and after one month the chest x-ray film showed marked reduction in the size of the lesion.

**DISCUSSION**

In this case, we established the diagnosis as pseudolymphoma of the lung according to previously defined criteria, namely, (1) infiltration with mature lymphoid tissue containing true germinal follicles and (2) the absence of adenopathy. Pseudolymphoma is generally considered a benign tumor, although occasional reports have noted an association with lymphocytic lymphoma; however, our case demonstrates that pseudolymphoma can behave as a benign disease for many years, despite local radiologic progression.

Because of the small number of cases reported and the lack of information about the natural history of pseudolymphoma of the lung, the treatment is not clearly established. Resection has been advocated for localized disease. For the recurrent or more diffuse manifestations of pseudolymphoma, radiotherapy and immunosuppressive chemotherapy have both been used; however, we were unable to find any previous report of treatment of an enlarging pseudolymphomatous infiltrate with corticosteroids alone, but it is clear that the disease is sensitive to this treatment, at least with respect to early diminution in the size of the tumor.

**References**


**Intrapleural Therapy with Tetracycline and Lidocaine for Malignant Pleural Effusions**

To the Editor:

This communication is in regard to my article entitled “Intrapleural Tetracycline for Malignant Pleural Effusions” (Chest 68:510-512, 1975).

Over the past year, I have been using a new technique for intrapleural instillation of tetracycline. I now inject 500 mg of tetracycline drawn up to a volume of 35 ml and then add to this 15 ml of a 1 percent solution of lidocaine (Xylocaine) hydrochloride for injection. With this combination, I no longer administer either morphine sulfate before the procedure or intravenous therapy with alphaprodine hydrochloride (Nisentil) during the procedure. The last four patients who have been treated have had absolutely no pain or disability from the injection by just administering the combination of tetracycline with lidocaine.

The rate of successful treatment still remains around 75 percent (or three of the four last patients in whom this new combination was tried). The solution of lidocaine contains 150 mg of lidocaine hydrochloride, which should not be a cardiotoxic dose, especially with absorption probably slowed by the thickening of the pleura and by the effusion and tumor present in the pleural cavity.

In light of the problems with premedication and pain in the previous methods, the general medical community should be made aware of this new method.

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Miami, Fla