Any changes in the size of the slowly equilibrating compartments may be detected by measurements of the 24-hour exchangeable sodium, but they would not necessarily be found in sodium-balance studies or in long-term investigations. Little is known of the nature of these more slowly exchanging compartments, but it is probable that they are related to the large fraction of body sodium (about 40%) contained in bone. Miller *et al.* (1954), using ^{22}Na , found that the counts over the patella remained constant during the initial week when the exchangeable sodium was increasing, even though the specific activity of the plasma was declining. This suggested a continuing exchange of ^{22}Na with bone. There is evidence that the proportion of the exchangeable sodium in bone can be increased or decreased by various factors, including changes in adrenocortical hormones (Nichols and Nichols, 1956). The hormonal changes occurring in depression have not been studied comprehensively, but it is probable that they include considerably increased adrenocortical activity (Persky, Grinker, Hamburg, Sabshin, Korshin, Basowitz, and Chevalier, 1956). However, the discrepancies between the results of the short- and long-term exchangeable sodium experiments can be resolved only by an investigation of changes in the distribution of electrolytes in the body compartments.

Summary

Total exchangeable sodium was measured before and during the period of treatment in 14 patients suffering from a depressive illness, by means of a technique employing the long-life isotope ^{22}Na . Contrary to previous studies, no change in sodium balance was detected in the 12 patients who recovered during the period of investigation.

We thank Mr. J. Vennart, of the Radiological Protection Service, both for his valuable advice and assistance and for lending us some of the equipment used in this investigation. Thanks are also due to Mr. J. Bailey and Mr. D. Arrowsmith for their careful and diligent assistance.

REFERENCES

- Coppen, A. (1960). *J. Neurol. Neurosurg. Psychiat.*, **23**, 156.
 Crammer, J. L. (1957). *Lancet*, **2**, 259.
 Gibbons, J. L. (1960). *Clin. Sci.*, **19**, 133.
 Marinelli, L. D. (1957). *Brit. J. Radiol.*, Suppl. No. 7, p. 38.
 Martin, M. M., Walker, G., and Chapman, M. (1957). *Lancet*, **1**, 653.
 Miller, M., Munro, D. S., Renschler, H. E., and Wilson, G. E. (1954). *Radio-isotope Conference, 1954*, edited by J. E. Johnston, vol. 1. Butterworth, London.
 Nichols, G., and Nichols, N. (1956). *Metabolism*, **5**, 438.
 Persky, H., Grinker, R. R., Hamburg, D. A., Sabshin, M. A., Korshin, S. J., Basowitz, H., and Chevalier, J. A. (1956). *Arch. Neurol. Psychiat. (Chic.)*, **76**, 549.
 Russell, G. F. M. (1960). *Clin. Sci.*, **19**, 327.
 Schottstaedt, W. W., Grace, W. J., and Wolff, H. G. (1956). *J. psychosom. Res.*, **1**, 287.
 Ström-Olsen, R., and Weil-Malherbe, H. (1958). *J. ment. Sci.*, **104**, 696.
 Trolle, C. (1945). *Acta psychiat. (Kbh.)*, **20**, 235.
 Veall, N., Fisher, H. J., McClure Browne, J. C., and Bradley, J. E. S. (1955). *Lancet*, **1**, 419.
 — and Vetter, H. (1958). *Radioisotope Techniques in Clinical Research and Diagnosis*. Butterworth, London.

A pedestrian who uses a zebra crossing in West London is four times safer than a person crossing within fifty yards of it. Compared with tests in 1955 a study made in 1961 shows no decrease in the protection offered to pedestrians. This study also showed that it was safer to cross at a light-controlled junction than at a junction with zebra crossings. (*Road Research 1961*, annual report of Road Research Board, published for Department of Scientific and Industrial Research, H.M.S.O., price 8s. 6d., by post 9s.)

NEEDLE BIOPSY OF THE PARIETAL PLEURA IN PATIENTS WITH PLEURAL EFFUSION

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Since DeFrancis and his associates¹ recorded their first cases of successful biopsy of the parietal pleura with the Vim-Silverman needle in 1955, its diagnostic value has been repeatedly demonstrated.²⁻¹⁷ It has been found to be the single most rewarding diagnostic procedure in our experience at the Philadelphia General Hospital in cases of tuberculous effusion.^{4, 5, 12}

It is the purpose of this paper to review the results of a large series of needle biopsies done in a general hospital, and to study in particular the significance of this procedure in effusions caused by malignancies. Its significance in tuberculosis has been thoroughly evaluated in a previous report.¹²

The present series comprises 185 patients on whom 256 needle biopsies were done by interns and residents of the Philadelphia General Hospital for pleural effusion during a period of 40 months.

Method and Material

The method of biopsy is that which has been described by DeFrancis *et al.*¹ Thoracentesis is done in the usual manner after infiltration of procaine hydrochloride. A 19-gauge needle, attached to a syringe, is inserted while aspirating. When fluid is obtained the progress of the needle is stopped and a haemostat is clamped on the needle at the skin surface. The needle is then withdrawn and the distance between its point and the haemostat is a measure of the depth of the parietal pleura. This distance, minus 5 to 10 mm., is measured from the point of the Vim-Silverman needle and marked with another haemostat. The skin is nicked with a scalpel blade and the biopsy needle inserted to the level of the haemostat. Thus the point of the biopsy needle will lie just outside the parietal pleura. The split needle of the Vim-Silverman needle assembly may then be inserted to its full depth. The other needle is pushed in a centimetre or so while the split needle is held; the entire assembly is then rotated 360 degrees and removed. A small cylinder of tissue is usually found within the split needle.

Several pieces of tissue may be obtained by repeating the procedure through the same skin incision and directing the biopsy needle in slightly different directions. When the biopsy is unsatisfactory it can be repeated.

The patients included in this series were those admitted to the Philadelphia General Hospital from January, 1957, to April, 1960. These patients also often had a thoracentesis with examination of the effusion for tubercle bacilli and for malignant cells by cell block. The latter

procedure consists in sectioning a paraffin block of the centrifuged sediment from the pleural effusion.

In collecting the data for this paper all pleural biopsies done in the 40-month period were taken from the surgical pathology files. The hospital charts of these patients were then individually studied and evaluated.

Results

Table I summarizes the results of biopsy in 185 patients who had a total number of 256 biopsies. A repeat examination was done one or more times in some cases when the first specimen was unsatisfactory. Unfortunately in other instances the biopsy was not

TABLE I.—*Pathological Findings in 256 Needle Biopsies of the Parietal Pleura Among 185 Patients with Pleural Effusion*

Pathological Findings	No. of Patients
Malignant neoplasm	22 (12%)
Tuberculosis	52 (28%)
Non-specific pleuritis or fibrosis	46 (25%)
Normal pleura	28 (15%)
Inadequate tissue	37 (20%)

repeated in spite of poor or non-specific results of the initial procedure. In the tabulation of data, when a repeat biopsy showed malignant cells or caseating tubercles the case was listed under neoplasm or tuberculosis respectively, and any previously unrevealing biopsies were disregarded in such patients.

Of all the patients biopsied, 12% showed neoplasm and 28% presented tubercles; in 40% needle biopsy was of no specific diagnostic value; and 20% had inadequate specimens. The percentage of cases with specific results might have been increased if biopsies had been repeated often enough to obtain a satisfactory piece of tissue in all cases.

The clinical diagnoses of all patients were studied in relation to the biopsy results. Table II summarizes this information. Tuberculosis was the most common diagnosis. The group of "other diseases" included pulmonary infarction, disseminated lupus erythematosus,

TABLE II.—*Results of Needle Biopsies in 185 Patients with Pleural Effusion by Final Clinical Diagnosis*

Final Clinical Diagnosis	No. of Cases	Result of Needle Biopsy							
		Specific Abnormality		Non-specific Abnormality		Normal Pleura		Inadequate Tissue	
		No.	%	No.	%	No.	%	No.	%
Malignant neoplasm ..	37	22	59	5	14	8	22	2	5
Tuberculosis ..	86	52	61	13	15	7	8	14	16
Cardiac failure ..	17	0	0	3	18	2	12	12	70
Pneumonia ..	18	0	0	11	61	5	28	2	11
Other diseases ..	27	0	0	14	52	6	22	7	26
Total ..	185	74	40	46	25	28	15	37	20

trauma, cirrhosis of the liver, nephrosis, etc. Several rather interesting facts are shown in this Table. The results of needle biopsy were almost identical in cases of neoplasm and cases of tuberculosis. The yield of specific abnormality was 59% of 37 cases of neoplasm and 61% of 86 cases of tuberculosis. The distribution of non-specific abnormality, normal pleura, and inadequate specimens was about the same in both of these categories. In contrast, 70% of 17 cases of cardiac failure yielded inadequate specimens and the majority of 18 cases of pneumonia and of 27 cases of other diseases presented non-specific pleuritis in their biopsies.

Table III is a summary of 30 cases of proved neoplasm in which both needle biopsies and cell-block studies were

done. Of the 30 patients, 20 (67%) showed evidence of neoplasm in the needle-biopsy specimen; 16 (53%) had a positive cell block; 33% had evidence of neoplasm in both procedures, whereas 20% had a positive cell block only and 33% had a positive needle biopsy only. The diagnosis of neoplasm was established in 87% of the patients (26 out of 30) when both pleural biopsy and cell

TABLE III.—*Results of Needle Biopsies and Cell-block Studies in 30 Patients with Pleural Effusion Due to Proved Malignant Neoplasm*

	Histological Evidence of Neoplasm	No. of Positive Results
Needle biopsy		20 (67%)
Cell block		16 (53%)
Needle biopsy and cell block		10 (33%)
Cell block only		6 (20%)
Needle biopsy only		10 (33%)
" " and/or cell block		26 (87%)

block were taken into account. Of the four patients undiagnosed by either needle biopsy or cell block, proof of malignancy was obtained by a bronchial biopsy in one and by post-mortem examination in the other three cases. No pre-mortem tissue diagnosis was obtained in the latter three cases.

No instances of death or serious complications as a result of the procedure were recorded. Several patients had a minimal pneumothorax after the needle biopsy.

Discussion

The incidence of tuberculous pleural effusion has increased in older people in recent years. Since effusion caused by malignancies commonly affects the same age-group, it becomes apparent that the differential diagnosis between these two conditions is of prime importance. The needle biopsy has proved to be the most convenient method we have at the present time for making such a differential diagnosis. From the present series it is evident that the procedure is as valuable in instances of neoplasm as it is in cases of tuberculosis. However, the importance of needle biopsy is somewhat greater in tuberculous effusion because positive cultures of fluid for tubercle bacilli are much less common than positive needle biopsies.¹² In contrast, neoplastic cases give as high a yield of positive cell blocks as positive biopsies. However, in tuberculous effusion the culture is seldom positive when the biopsy is negative, while in neoplastic effusion one procedure often makes the diagnosis when the other fails. Therefore, while in tuberculous effusion biopsy is relatively more important than culture of the fluid, in neoplastic effusion histological study of the fluid is as rewarding as biopsy and both should be done.

As has been emphasized in previous reports, if the needle biopsy is unrevealing on one occasion it must not be assumed that either tuberculosis or carcinoma has been excluded. We cannot overemphasize the importance of repeated biopsy if the first specimen is negative or unsatisfactory. Open pleural biopsy may be resorted to if repeated needle biopsies are unrewarding. Biopsy of other tissues may also yield a specific diagnosis if both the needle pleural biopsy and cell block are negative. Examination of the sputum or of the bronchial aspirate have sometimes confirmed the diagnosis in cases of bronchogenic carcinoma.

In this series it was noted that cases of congestive heart failure usually produce inadequate or negative biopsy specimens, while cases of pneumonia show non-specific pleural reactions. These findings are consistent with the known presence or absence of pathological changes to be expected in the pleura in these conditions.

The results obtained in this series of cases are similar to those reported by other investigators. We are aware of only one series larger than this one—that of Mestitz *et al.*⁸ in England. These authors reported on 188 patients with pleural effusion with only 2% having inadequate specimens as compared with 20% in the present series. If the cases with inadequate specimens are removed from each study, then Mestitz *et al.* obtained specific histological results in 55% of their patients compared with 50% of our patients. Trivial complications (subcutaneous haematoma and small pneumothorax) occurred in only two of their patients, and they regarded haemorrhagic disease as the only contraindication to needle biopsy.

Summary

In a series of 185 patients with pleural effusion 256 needle biopsies of the parietal pleura gave a yield of specific findings in 61% of patients with tuberculous effusion and 59% of patients with neoplastic effusion. A majority of patients with cardiac effusion had unsatisfactory specimens, whereas a majority of patients with other diseases had histological evidence of non-specific pleuritis.

In cases of tuberculosis the yield of effusion cultures is much less than the yield of biopsy, but in cases of neoplasm the yield of cell block approximates the yield of biopsy. Since each procedure may yield a diagnosis when others do not, all diagnostic methods should be used in the study of pleural effusion.

REFERENCES

- ¹ DeFrancis, N., Klosk, E., and Albano, E., *New Engl. J. Med.*, 1955, **252**, 948.
- ² Heller, P., Kellow, W. F., and Chomet, B., *ibid.*, 1956, **255**, 684.
- ³ Donohoe, R. F., Katz, S., and Matthews, M. J., *Amer. J. Med.*, 1957, **22**, 883.
- ⁴ Weiss, W., *Amer. J. med. Sci.*, 1957, **234**, 431.
- ⁵ ———, *Amer. Rev. resp. Dis.*, 1958, **78**, 17.
- ⁶ Welsh, J. D., *Arch. intern. Med.*, 1958, **101**, 718.
- ⁷ Donohoe, R. F., Katz, S., and Matthews, M. J., *Ann. intern. Med.*, 1958, **48**, 344.
- ⁸ Mestitz, P., Purves, M. J., and Pollard, A. C., *Lancet*, 1958, **2**, 1349.
- ⁹ Leggat, P. O., *Brit. med. J.*, 1959, **2**, 478.
- ¹⁰ Karlish, A. J., *ibid.*, 1959, **2**, 821.
- ¹¹ Pagel, W., and Goldfarb, S., *J. clin. Path.*, 1960, **13**, 425.
- ¹² Weiss, W., *Dis. Chest*, 1961, **39**, 271.
- ¹³ Lorange, G., Mackay, A., and Gélinas-Mackay, C., *Un. méd. Can.*, 1961, **90**, 238.
- ¹⁴ Carpenter, R. L., and Lowell, J. R., *Dis. Chest.*, 1961, **40**, 182.
- ¹⁵ Reese, J. O., jun., McClean, R. L., and Raen, T. D., *Arch. intern. Med.*, 1961, **108**, 438.
- ¹⁶ Shaw, R. K., and Hallett, W. Y., *Amer. J. med. Sci.*, 1961, **241**, 593.
- ¹⁷ Niden, A. H., Burrows, B., Kasik, J. E., and Barclay, W. R., *Amer. Rev. resp. Dis.*, 1961, **84**, 37.

In the July issue of *The Chiropodist*, the journal of the Society of Chiropodists, members are urged not to keep silent on the subject of their patients' footwear. The editorial says, "Should a chiropodist refuse to give more than a single treatment to corns which are produced by bad footwear? . . . The idea seems to be deeply rooted, particularly in the feminine mind, that to consider comfort when buying a pair of shoes is a sign that she is falling into the ultimate sin, that of growing old! . . . Even when we cannot persuade our patients away from the extravagant fashion entirely, . . . we may be able to suggest that a shoe which is suitable for the dance floor or for a dress occasion is not the best shoe to wear to the office or in which to do the shopping. . . . Even if it is difficult for us to make our voice heard, never let it be said that we failed for want of trying."

PLEURAL BIOPSY IN DIAGNOSIS OF THORACIC DISEASE

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In recent years needle biopsy of the pleura has proved a useful aid to diagnosis in thoracic disease. It is a simple and safe procedure which normally causes no more discomfort to the patient than a simple aspiration. Possible complications are bleeding into the pleural cavity, pneumothorax, lung or liver trauma, infection, and bleeding from an intercostal vessel. In practice they are unusual if the operation is carried out with due care.

Various needles have been used for this operation. Harvey and Harvey (1958), using a Franseen needle, obtained positive histological proof of carcinoma or tuberculosis in 14 (35%) out of 41 pleural biopsies, while Pagel and Goldfarb (1960), using a Harefield needle, obtained positive proof of tuberculosis in 13 (50%) out of 26 cases. Better results were reported by Welsh (1958), who obtained histological proof of carcinoma in 14 (82%) out of 17 cases using a Vim-Silverman needle, while Weiss (1961) obtained positive biopsies in 16 (66%) of his series of 24 cases with the same type of needle.

However, Leggat (1959) used both the Vim-Silverman needle and the Harefield needle (Abrams, 1958) in his series of 22 biopsies, and was of the opinion that it was much more difficult to obtain a satisfactory specimen with the former. Mestitz and Pollard (1958) reported on a series of cases using the Harefield needle, and later gave a more detailed report on their results (Mestitz, Purves, and Pollard, 1958). In their series 228 pleural biopsies were carried out on 200 patients, most of whom had an effusion at the time of the investigation. They established the diagnosis in about 80% of tuberculous and 60% of malignant effusions by this means, and concluded that it is by far the most reliable diagnostic technique when tuberculosis is suspected. They also thought that it should be part of the initial investigation of every patient with a pleural effusion of uncertain aetiology. The latest series in the British literature would appear to be that of Hampson and Karlish (1961), who used the Harefield needle in all their cases. They performed 136 biopsies on 118 cases with pleural effusion, and the results were diagnostic in 24 (75%) out of 32 cases of pulmonary tuberculosis and in 25 (62.5%) out of 40 cases of malignant effusion. These workers suggest that an effusion should not be regarded as of unknown origin unless pleural biopsy has been carried out, preferably at the initial aspiration.

Method

In the present series the Harefield needle was used in all cases. It was felt that this was the best instrument available, in view of the high percentage of positive results, the absence of complications reported (Mestitz

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