inadequacies as the price of the latency of his infection. These minute local infiltrations of plasma cells and lymphocytes represent the processes of a local tissue immunity. With time this immunity mechanism in itself becomes dangerous to the individual through the functional inadequacies which it may eventually produce. Whether a consistent five-year period of treatment would finally rid the body entirely of spirochaetes I cannot say, for in my material there have been no cases that have been under continuous treatment for that period of time. The fact remains, however, that in syphilitics accorded what has been regarded by the clinician as thoroughly satisfactory treatment, with complete clinical cure, latent lesions of syphilis still present themselves on microscopical examination of the necropsy material derived from such cases.

BILATERAL SPONTANEOUS PNEUMOTHORAX.

REPORT OF A CASE WITH RECOVERY.

BY

D. EVAN BEDFORD, M.D., M.R.C.P.,
ASSISTANT PHYSICIAN TO THE MIDDLESEX HOSPITAL;

AND

H. JOULES, M.D., M.R.C.P.,
MEDICAL REGISTRAR TO THE MIDDLESEX HOSPITAL.

(With Special Plate.)

It is well known that bilateral artificial pneumothorax can safely be employed as a therapeutic measure in suitable cases of bilateral lung disease. Provided that collapse is induced gradually and is carefully controlled, dyspnoea and cyanosis do not occur. Spontaneous pneumothorax, even when unilateral, often provokes severe symptoms owing to the suddenness of the collapse and to the high positive pressure which may develop in the pleural cavity. McLaughlin and Fildes,¹ writing in 1927, state "it is well known that double spontaneous pneumothorax is incompatible with life." We have recently observed the following case of bilateral spontaneous pneumothorax in which, in spite of symptoms of the utmost severity, recovery eventually took place.

A.S., a male aged 19, came to the Middlesex Hospital on March 7th, 1928. He had always enjoyed good health, and had been perfectly well up to the morning of his visit to hospital. On rising at 7 o'clock, he noticed a pain starting beneath the left scapula and working round to the front of the left chest. The pain was described as shooting in character, and gradually increased in severity; it was intensified by any exertion, by deep breathing, or by moving the left arm. Breathlessness started five hours after the onset of pain and gradually became worse. He was seen at hospital at 4 p.m., complaining of severe pain in the chest and of breathlessness.

Examination.

The patient was well developed physically. He appeared to be in the greatest distress; the expression was anxious and the face was pale and somewhat cyanosed. Respiration was laboured, and at each expiration he made a peculiar whistling or whining sound. On attempting to lie flat the face and hands became severely cyanosed. There were exaggerated respiratory movements of the extraordinary muscles of respiration of the neck and upper part of the chest, but the lower part of the chest hardly moved at all, and the intercostal spaces were sucked in during inspiration. The abdominal respiratory movements were excessive. The left side of the chest moved a little better than the right. On percussion there was hyper-resonance over the whole of the chest with absence of cardiac and hepatic dullness; the note over the right base was more drum-like than on the left side. On auscultation hollow blowing breath sounds were just audible at the apices, but at the bases no breath sounds were heard. The coin sound was not elicited. The pulse was regular, rate 90, and of good volume. The blood pressure was 150 mm. systolic. The apex beat was felt in the left nipple line, and the heart sounds were normal.

A tentative diagnosis of right pneumothorax was made, but the absence of displacement of the heart and the unusual chest signs could not be explained, so that it was decided to make an immediate x-ray examination. On screening, the heart was normally situated and of normal size, though the vascular pedicle was slightly displaced to the left, and the cardiac pulsation appeared excessive. There was a large pneumothorax on each

side of the chest, and both lungs were almost completely collapsed, except for a small area at each apex which remained expanded. There was about half an inch of lung visible surrounding the left border of the heart, and an inch surrounding the right border. With each inspiration there was slight movement of the collapsed lungs. The diaphragm moved well. A radiogram was taken, and is reproduced in the special plate; owing to the urgency of the symptoms a good record was not obtained.

Course.

On arriving in the ward the distress became more severe; the face and arms were almost black, and the pulse became small and rapid. Oxygen was administered by nasal catheter, and the needle of a pneumothorax apparatus was inserted into the fourth right intercostal space, in the anterior axillary line. The intrapleural pressure was so high that fluid was expelled from the manometer, but a pressure of well over 30 cm. of water was certainly present; 550 c.cm. of air were withdrawn slowly, and the intrapleural pressure fell to +12–12 cm. of water. This procedure was attended with most dramatic relief of the distress. Morphine 1/4 grain and strychnine 1/30 grain were then given, and the patient was left receiving continuous intranasal oxygen. The left pneumothorax was not interfered with. During the night he again became severely distressed, and air was allowed to escape by inserting an ordinary serum needle into the right pleural cavity. From this time onwards he remained perfectly comfortable. Slight cyanosis of the lips and cheeks was present for a few days, but there was no distress. Respiration was 24, the pulse 65 to 80, and the temperature remained normal.

During the next fourteen days the physical signs suggested gradual expansion of both lungs, occurring first on the right side. The cardiac and liver dullness remained absent. Signs of fluid were never found, nor was the coin sound ever elicited. The heart was neither palpable nor audible at this period. After two weeks he was allowed up without ill effect. Cough was negligible and sputum scanty in amount, and contained no tubercle bacilli. Physical examination prior to discharge from hospital, on March 28th, 1928, showed the heart to be normally situated; the chest signs suggested that there was still some air in both sides of the chest. An x-ray examination on March 23rd, 1928, showed the right lung to be fully expanded and a fairly large pneumothorax still present on the left.

The patient has been kept under observation as an out-patient since his discharge from hospital up to the present time (May, 1929), and no signs or symptoms of any lung lesion have ever been detected. X-ray examination on December 12th, 1928, showed both lungs fully expanded and no signs of lung disease.

COMMENT.

Bilateral spontaneous pneumothorax has been previously reported by Benedict,² Briggs,³ Emerson,⁴ Hawes,⁵ Hazen,⁶ Marshank,⁷ Meyer,⁸ Le Wald,⁹ and others; altogether we have been able to find reports of ten cases in the literature. The most frequent underlying cause of spontaneous double pneumothorax is pulmonary tuberculosis, though it may occur in apparently healthy subjects, as in our case. Recovery is uncommon, ensuing in but three of the above, and those that do recover may get a recurrence of pneumothorax.

Le Wald's patient was a healthy male, aged 20, who first had a right pneumothorax, and a week later a large double pneumothorax. Meyer reported a case of bilateral pneumothorax which recurred four times, always during coitus; at necropsy no active tuberculous lesion was found. In Hawes's case, that of a male aged 27, there were recurrent attacks over a period of ten years, involving the right and left sides alternately, recovery eventually taking place.

In our case it is difficult to account for the onset of pneumothorax, which apparently took place during the night and apart from physical exertion. No signs of disease have ever been found, though the patient has now been under close observation for a year, and we may assume that the chest is healthy. The occurrence of bilateral pneumothorax in such a case may have been due to a unilateral pneumothorax with high positive pressure rupturing into the opposite pleural cavity through the mediastinum, as in Le Wald's case, and the fact that severe symptoms were not present until some hours after the onset rather favours this explanation. Another possibility was the existence of a natural communication between the two pleural sacs; this seems unlikely in our case, as the left pneumothorax, which was not aspirated, persisted longer than the right.

With regard to diagnosis, the absence of any displacement of the heart in a case with signs of pneumothorax

and in which there is great distress should suggest a bilateral one. The advisability of aspirating both pleural cavities was considered. Aspiration of the right side, however, gave sufficient relief on both occasions, and it was decided to leave well alone and to avoid all unnecessary interference which might increase the risk of infection. There is no doubt that aspiration saved the patient's life. It seems remarkable that both lungs finally expanded without any complication such as effusion or infection.

We are indebted to Dr. G. E. S. Ward for permission to continue our observation of this case while under his care, and to record it.

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NEW ANALYSES OF CARBOHYDRATE FOODS AND THEIR APPLICATION TO DIABETIC DIETS.

BY

R. D. LAWRENCE, M.D., M.R.C.P.,*

AND

R. A. McCANCE, Ph.D., M.D.*

(From the Biochemical Department, King's College Hospital.)

ANYONE who has taken the trouble to compare the carbohydrate content of foodstuffs given in different food tables must have been struck by their divergencies and contradictions, often amounting to several hundred per cent. It therefore seemed essential to investigate the subject further if any degree of accuracy in dietetics, and especially diabetic diets, was ever to be obtained. Fresh analyses have therefore been carried out and the results published.¹

In the past compilers of food tables have largely failed to differentiate between (a) starch and the soluble sugars which are completely available as such for metabolism, and (b) other carbohydrates such as cellulose, pentosans, inulin, which are certainly not available as carbohydrate and whose exact value in nutrition is doubtful. By our methods of analysis we have separated these two groups, and our final tables show the carbohydrate physiologically available for metabolism. Some of the new figures differ greatly from older ones, as the following comparison shows. The older figures are taken from food tables² prepared by Harrison and Lawrence in 1923 from the sources then available. The figures give the percentage of carbohydrate in foods as eaten.

	Percentage Carbohydrate.	
	Old.	New.
Cabbage	2-3	1.0
Celery	3.5	1.0
Lettuce	2.5	0.7
Olives	9.0	0
Rhubarb	2.5	0.6
Strawberries	9.0	4.4
Tomato	4.0	2.4
Beetroot	7.0	8.0
Potato	20.0	19.2
Bread	50-55	50-55

It will be noticed that great changes appear in most vegetables and fruits, in which much of the total carbohydrate has been found to be "unavailable." On the other hand, the new and old figures agree in foodstuffs rich in the available carbohydrates (sugar and starch), such as beetroot, bread, and potatoes.

Application to Diabetic Diets.

These new analyses explain the specific effect that has been attributed to green vegetables in the treatment of diabetes. Thus when a patient confined himself for a day

or two to green vegetables instead of their supposed equivalent of bread or rich carbohydrate food, the glycosuria disappeared. This was because the available carbohydrate was much lower than was supposed.

In practice, therefore, diabetics may always be allowed large amounts of green vegetables, enough to satisfy the most voracious appetite. Moreover, it is quite unnecessary to boil vegetables three times, as was often done in the past, because they contain so little carbohydrate after ordinary domestic methods of cooking. It will be possible in future to make the carbohydrate content of diabetic diets more uniformly accurate, and consequently treatment, and especially experimental therapeutic investigations, may be made more accurate also.

Changes in the Line Ration Diet.

These new food values for carbohydrates have already been incorporated in the line ration diet cards introduced by one of us in 1924,³ and in the last edition of *The Diabetic Life*.⁴ Indeed, some confusion for patients and doctors using the scheme has been unavoidable, as new figures have from time to time been substituted for old as analyses became completed. However, the basis of the scheme is unchanged, and each line still contains 5 grams of carbohydrate, $7\frac{1}{2}$ grams of protein, and 15 grams of fat. The protein and fat food values remain the same, and many of the richer carbohydrate foods, such as bread and potatoes. But practically all the amounts prescribed of green vegetables and many fruits have been increased. The values for such articles as cabbage, spinach, cucumber, and tomatoes have been doubled because the carbohydrate content is about half what we supposed in 1924. A few others, such as lettuce, asparagus, and rhubarb, have been found to contain so little carbohydrate that they have been allowed as "extras," because average helpings contain a negligible amount of carbohydrate.

Naturally the patients are getting more carbohydrate than before, and some have required a few more units of insulin. Depending on the foods chosen by the patient, the increase in carbohydrate now allowed is from 30 to 60 per cent., calculated on old food values. Thus the amount of carbohydrate now allowed in a diet of ten lines (50 grams of carbohydrate) may equal 65 to 80 grams when worked out with previous food values. This increase is probably better for the patient and conforms with the general tendency to increase the carbohydrate in diabetic diets. It has had the effect of reducing the amount of acetone bodies in the urine of patients using the line ration scheme. The ratio of carbohydrate to fat in this scheme was originally intended to be 1 to 3, just high enough to allow complete combustion of fats to proceed. In practice, however, complete combustion was seldom obtained, as Rothera's test was frequently positive in the urine. This was because less carbohydrate was being given than was supposed in theory. The introduction of the new values has corrected this, and the patients' urines are now more consistently free from traces of acetone bodies.

It may be of interest to see how our new figures apply to other schemes of diabetic diets. MacLean's⁵ "fifth day" diet contains 42 grams of carbohydrate, but on our new reckoning only about 26 grams. Similarly, some of the sample meals given by Joslin⁶ as containing 10 grams of carbohydrate contain only about 5 grams. And working out a ten-line diet (50 grams of carbohydrate) containing much vegetable by the food values given by Joslin (the standard figures used in America) gives a carbohydrate content of 94 grams—admittedly an extreme example. It is interesting to note that Joslin now aims at giving even his severe diabetics 80 to 100 grams of carbohydrate a day—amounts the same as the line ration scheme when the different food values used are considered.

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* Working for the Medical Research Council.

FIG. 1. October 1st, 1928.

FIG. 2. October 22nd, 1928.

FIG. 3. November 5th, 1928.

FIG. 4. December 31st, 1928.

FIG. 1.—Radiogram taken on admission, showing bilateral pneumothorax. The limits of lung tissue have been outlined.

FIG. 2.—Radiogram taken on December 12th, 1928, showing complete re-expansion of both lungs and absence of any gross lesion therein.