The education of the medical man and the worker in the recognition of these tumours and the dangers attending their neglect has already resulted in the patients being referred for treatment at an earlier and more favourable stage than formerly. There remains much, however, to be done in teaching the early recognition of this form of cancer, which on account of its situation on the surface should be easily recognized before secondary deposits have formed.

In shale workers the application to the skin of a protective mixture of lanolin and olive oil, as advocated by Twort, is a useful means of prevention, but its success

depends on the willing co-operation of the worker, and so its use is liable to be neglected.

It gives me much pleasure to record my grateful thanks to the medical boards of the following hospitals: the Manchester Skin Hospital, the Manchester Royal Infirmary, the Salford Royal Hospital, and the Holt Radium Institute—by whose permission I have had access to much clinical material and statistical information. I also wish to acknowledge my debt to Dr. E. M. Brockbank, who has very willingly placed at my disposal his experience of working conditions in industry. (A portion of the statistics was collected with the financial assistance of the Manchester Committee on Cancer.)

CANCER OF THE LUNG ITS MODES OF BEHAVIOUR

BY

F. G. CHANDLER, M.A., M.D., F.R.C.P.

PHYSICIAN, WITH CHARGE OF OUT-PATIENTS, ST. BARTHOLOMEW'S HOSPITAL; PHYSICIAN, CITY OF LONDON HOSPITAL FOR DISEASES OF THE HEART AND LUNGS, VICTORIA PARK, E.

The frequency of primary malignant tumour of the lung is fully recognized to-day. It sometimes escapes recognition because the doctor is reluctant to contemplate such a diagnosis, or because the tumour is obscured by secondary changes affecting symptoms, signs, and radiographical appearances, and chiefly, perhaps, because of the number of varied guises in which it appears.

This article is an attempt to represent diagrammatically its various modes of behaviour. In addition to primary carcinoma of the bronchus or bronchioles, I shall arbitrarily include the so-called giant sarcoma of the pleura, because this grows inwards from the visceral pleura, and looks like a lung tumour, but the rarer primary mediastinal tumours and the very uncommon malignant pleural endothelioma are not included.

Fig. 1 illustrates a small carcinomatous nodule in the bronchus. The only symptom may be a haemorrhage, small or profuse; the signs none, or diminished air entry. As the growth increases in size it may be so situated that the air can enter the lung but cannot return, and for

a time an area of emphysema will exist. Soon, however, the growth will completely occlude the bronchus, and the air will become absorbed, or a valve action may occur, allowing air to come out of the lung but not to enter it, and so an area of atelectasis will be produced. At first this atelectasis may take the form of a band in the x -ray picture (Fig. 2). Soon a wider area is involved and the whole of the lobe will become airless, and will draw the trachea towards it (Fig. 3). Finally the main bronchus is involved, and the whole lung becomes atelectatic, drawing the mediastinum and its structures towards the side affected (Fig. 4). This is a common

mode of behaviour of a bronchial carcinoma. The area of opacity in these cases bears no relation to the size of the tumour. The whole side may be opaque, but the tumour quite small. This will account for those cases where, after irradiation treatment, the whole lung has become translucent again, because of shrinkage of the tumour, the lung once more becoming aerated.

Fig. 5 is intended to represent another common mode of onset of symptoms of a carcinoma of the bronchus — namely, pneumonia or bronchopneumonia. This occurs distal to the tumour. There may be no reason to suspect carcinoma until the progress begins to take an unexpected or abnormal course — for example, the patient may continue to spit up blood after the apparent subsidence of the pneumonia, or the physical signs may persist. An x -ray examination at this time may show a tumour quite definitely. It is important

- FIG. 1.—Small intrabronchial carcinoma. Nothing abnormal seen.
FIG. 2.—Commencing atelectasis.
FIG. 3.—Extending atelectasis, displacement of trachea to affected side.
FIG. 4.—Atelectasis of whole lung, displacement of all mediastinal structures to affected side.
FIG. 5.—Pneumonia distal to tumour.
FIG. 6.—Growth breaking down to form abscess shown in two common sites.
FIG. 7.—Bronchiectasis distal to tumour.
FIG. 8.—Infiltrative type.
FIG. 9.—Massive type.
FIG. 10.—Tumour in hilum region.
FIG. 11.—Early involvement of mediastinal glands.
FIG. 12.—Shadow of malignant tumour obscured by heart shadow.
FIG. 13.—This becomes an obvious tumour-like mass in the true lateral view.
FIG. 14.—Commencing pleural effusion, secondary to tumour.
FIG. 15.—Large effusion obscuring tumour shadow and displacing mediastinum to opposite side.
FIG. 16.—A large tumour displacing mediastinum to opposite side; a rare form, probably a giant sarcoma of the pleura, or a very slowly evolving carcinoma of the lung.

not to defer this examination too long, lest, later, secondary changes obscure the shadow of the tumour, making the diagnosis uncertain.

Another not uncommon mode of behaviour is abscess formation. This takes place in or around or distal to the tumour, and may occur in any part of the lung. Fig. 6 illustrates two common sites where this occurs. Another suppurative complication is bronchiectasis distal to the tumour (Fig. 7). Fig. 8 illustrates the infiltrative type of growth, which may closely resemble tuberculosis and other inflammatory conditions. The symptoms and signs may be identical, and the diagnosis only be arrived at by negative sputum examinations, and possibly bronchoscopy.

Fig. 9 illustrates another common type where there is an obvious tumour-like mass.

Fig. 10 represents a tumour near the hilum. This may be extremely difficult to interpret, and a differential diagnosis will rest between inflammatory glands, lymphadenoma, leukaemia, and malignant growth. In this diagram the right diaphragm is represented paralysed and raised. This is almost pathognomonic of malignancy, as is involvement of the recurrent laryngeal type.

Fig. 11 represents another type with early invasion of the mediastinal glands, when the symptoms may be almost entirely pressure symptoms, simulating a mediastinal tumour. Sometimes with growths in the lower lobe the x-ray appearance in the anterior view is obscure and extremely difficult to interpret, especially on the left side, because of the heart shadow (Fig. 12). In such cases the true lateral view may show quite clearly the tumour-like mass (Fig. 13).

Fig. 14 represents a similar central growth with a commencing pleural effusion, which may soon obscure all signs of growth. This effusion may become large, as in Fig. 15, displacing the heart and mediastinum to the opposite side, and the fluid may be clear and sterile, or it may be blood-stained, or it may become an empyema.

Fig. 16 illustrates a rarer type of growth, where the mass itself is so large as to displace the mediastinum to the opposite side. This is probably the giant sarcoma of the pleura or a very slowly evolving carcinoma of the lung.

E. Lenstrup (*Ugeskrift for Læger*, February 28th, 1935, p. 268) paints a rather gloomy picture of the outlook for the subjects of congenital syphilis. His conclusions are drawn from the 401 children admitted to the fifty-bed Welander Home in Denmark, and from the 135 children, born of syphilitic mothers, kept under supervision in the observation department of the same home. His analysis of the first 250 patients admitted to the home between infancy and the age of 12 shows that approximately half of those who survived were imbeciles. Yet the specific treatment they received was so effective that in no case did the disease break out again, clinically or serologically, after the first courses of treatment with mercury and other specifics had been given. Of the comparative merits of these specifics—mercury, salvarsan, bismuth, etc.—the author expresses no dogmatic opinion; alone, or in various combinations, they seemed to be effective enough, except in the matter of mental health. He traces this refractoriness of imbecility to specific treatment to the ancestry of these children, recruited from the lowest levels of society. In this connexion he notes that while acquired syphilis was reduced in 1932 in Denmark to less than a third of its incidence in 1926, the decline in the number of cases of congenital syphilis in the same period has been nothing like so dramatic. This is probably because there is a residuum of mentally inferior women who neglect to accept free specific treatment, and who continue to be a recurring source of supply for the Welander Home.

HAEMOLYTIC STREPTOCOCCAL LEUCOCIDIN

PRELIMINARY REPORT *

BY

C. G. PAINE, M.D.LOND.

BACTERIOLOGIST TO THE JESSOP HOSPITAL FOR WOMEN, FIRTH
AUXILIARY, NORTON, SHEFFIELD, AND LECTURER IN
BACTERIOLOGY TO THE UNIVERSITY OF
SHEFFIELD

There seems to be little doubt that the capacity for developing high virulence in strains of haemolytic streptococci is due to the elaboration by those organisms of a substance that kills or paralyzes the phagocytic cells of the body. Considerable difference of opinion exists as to the mechanism of production of such a toxin, and to its relationship to other better-known streptococcal products. Levaditi (1908) was of the opinion that leucotoxic effects were constant with all strains of haemolytic streptococci, but were not strictly related to haemolytic activities. Nayakama (1920), using the delicate but essentially artificial technique of methylene-blue reduction by normal leucocytes, considered that haemolytic streptococci secreted a filterable leucocidin, which corresponded closely in time of production in the course of culture with the filterable haemolysin. On the other hand, Todd (1927) showed that the virulence of haemolytic streptococcal strains depended upon the ability of those organisms to multiply in normal defibrinated blood, and that virulence was definitely associated with a particular type of colony formation, the matt colonial forms being virulent or capable of attaining virulence under suitable conditions, whereas the smooth or glossy forms were immutably avirulent. He also showed (1932) that antigenic haemolysin production is independent of colony formation. In other words, it is possible to obtain a strain of haemolytic streptococci which shows at the same time good haemolytic powers and a relative absence of virulence. Such a strain is in our possession: it is a Dochez strain, obtained from the National Collection of Type Cultures and subsequently artificially subcultured for more than a hundred times. There is thus some confusion of ideas upon the exact nature and relations of the streptococcal leucocidin.

In this preliminary report upon the nature of streptococcal leucocidin it is shown that the type-specific acid-soluble M protein, first isolated by Lancefield in 1928, is identical with, or very closely related to, the substance that is responsible for the death or paralysis of normal leucocytes.

Technical Details

The apparatus used in this work consisted of a small glass chamber 20 mm. in diameter and 8 mm. deep. The top edge was carefully ground. This chamber was inset to a depth of 7 mm. into a hollow rectangular copper warm stage 3 in. long, 1½ in. wide, and 1½ in. deep, provided with a glass window at the bottom and two tubular water outlets. This copper warm stage, fitting easily into the moving stage of a microscope, was connected by a siphon to a water bath, the water, after circulating through the warm stage and heating the glass chamber, running to waste. The temperature, the water-level of the bath, and the rate of flow through the siphon were very carefully controlled.

Preparations of normal leucocytes were made in the following way. A few drops of the author's blood were allowed to clot on a circular cover-slip, No. 3, 3/4 in. diameter, and were then incubated in a moist Petri dish at 37° C. for thirty minutes. The clot was then flicked off, leaving the leucocytes adhering to the cover-slip, which was then gently washed in Tyrode's solution to remove

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