A survey of the mortality rate for the city of Birmingham indicates an incidence rate three times as great in the overcrowded, badly housed population in the inner ring of the city (where economic factors play an important part) as that in the outer ring, where housing, ventilation, and social factors do not devitalize the inhabitants. Sunless courts and alleys are still too frequently the causes of an overcrowded hospital, for had cases of pneumonia under 10 years of age been included in this survey approximately one thousand primary infections would have been seen, and those in two years!

Emphasis has been laid on the tremendous extent of infection of those dying, and when this is considered in conjunction with the figures showing the day of disease on which patients were admitted to hospital it will be apparent that in the present circumstances, whatever mode of therapy is used, one must expect an irreducible mortality of at least 15 per cent. or over. I feel that where home conditions are good and adequate help is available the movement of patients is quite correctly deprecated: where these conditions do not obtain I feel that every inducement should be employed to persuade patients and relatives to permit removal at the earliest possible juncture. Too often I see an almost hopeless sufferer admitted on the fifth day, accompanied by one or more relatives whose whole vitality has been sapped in a vain endeavour to see the illness through in most unfavourable circumstances. The nursing of pneumonia is one of the most exacting tasks any unaided household can undertake, and it may be that if this fact were

forcibly placed before those concerned consent for hospitalization in suitable cases would be obtained more readily. It is impossible to visualize any serum so potent that it would prove capable of re-establishing a circulation which is failing from peripheral paralysis, as is the case with many of our patients on admission. Again, where more than half the lung area is consolidated, is it likely that sterilization of the blood in the later days is going to be of sufficient service to allow recovery to take place? A large percentage of elderly patients will always succumb to the disease, but it is in the third, fourth, and fifth decades that we need every possible assistance in preventing the death of the mainstay of large families.

SUMMARY AND CONCLUSIONS

1. 497 cases of primary pneumonia with an incidence of ten years and upwards are reviewed.

2. A criterion of diagnosis in early stages of the disease is needed.

3. No specific therapy was given, and the gross mortality rate was 25.6 per cent. Excluding those moribund on admission the mortality rate was 20.6 per cent.

4. Prognosis was more dependent on age than on any other factor. Mortality for cases under 40 years was 12.5 per cent., for those over 40 years 41.7 per cent.

5. Pulmonary abscess is a fairly common post-mortem finding.

6. A plea is made for cases of pneumonia to be sent to hospital as early as possible in the disease.

I am grateful to several of my colleagues for the use of their notes in preparing this article.

ON THE TREATMENT OF NEW GROWTHS BY FLUORESCEIN AND X RAYS*

BY

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The cases which form the subject of the present note were treated by the combined *x*-ray and fluorescein method. It had been represented to me that the treatment was harmless and that good clinical results had followed its use. It had also been suggested that such benefit as was recorded might be due to some secondary radiation produced by the action of *x* rays upon fluorescein. At the outset it may be said that such an action of penetrating radiations of the *x*- and *γ*-ray type was regarded as in the highest degree improbable when the chemical composition of the drug employed—sodium fluorescein—was taken into consideration. In all cases sodium fluorescein was administered by the mouth, and in some cases a 5 per cent. solution was employed locally, but only at the time of *x*-ray treatment. For oral administration about 1 gram was given, divided into two cachets, four hours before *x*-ray treatment. The skin and conjunctivae were well coloured by the dye, which was manifest also in the sweat, urine, and exudates from ulcerated surfaces, when these were present. The local application of a 5 per cent. solution of sodium fluorescein was confined to those cases in which ulceration was present.

The obvious difficulty in estimating the value of such a method of treatment is that of obtaining suitable controls. Growths respond differently to radiations, and one and the same growth may show a tendency either to rapid increase or to temporarily diminished activity spontaneously. Nevertheless, as will be seen, an attempt at a very rough control was made.

Forty-five cases were treated. In the great majority of them it was impossible to state that the administration of fluorescein had influenced the action of the radiation in the slightest degree. Some cases of ulcerated mammary carcinoma did, however, appear to respond better to *x*-ray treatment when fluorescein was used at the same time. Six cases of carcinoma of the rectum in which there was a mass of growth protruding from the anus did not derive the least benefit. The total number of recurrent breast cases treated was thirty: of these, fifteen showed local ulceration; the remaining fifteen showed enlarged supraclavicular and axillary glands with or without subcutaneous carcinomatous nodules. Of the fifteen cases of ulcerated mammary cancer five had been receiving ordinary routine *x*-ray therapy before fluorescein treatment was started, and it was these five cases which served as a very rough control. In three of them it certainly appeared as though the local condition improved more under the fluorescein treatment; in the remaining two it was apparently without effect—either good or bad. Of the remaining ten cases of ulcerated breast cancer in the treatment of which fluorescein was used from the first, perhaps six seemed to make what seemed to be unusually good progress; the remaining four showed no special features.

To this matter we shall return shortly. As already said, no special effect was noted with the six rectal cases and with the fifteen non-ulcerated breast cases; while the same was true of two cases of neoplasm of the lung, three of non-ulcerated bone sarcoma, and four of lymphadenoma. The sum-total of the therapeutic experiment was, then, that nine cases of ulcerated recurrent breast carcinoma seemed to have been benefited to some extent by the use of fluorescein.

We may now turn to the consideration of certain laboratory experiments which were carried out by Dr. Creed and myself upon mice, tadpoles, and toad ova. In the case of the mice, these animals were fed upon the ordinary laboratory food to which had been added a 5 per cent. solution of sodium fluorescein. They took

*The expenses of this work were defrayed by a grant from the Medical Research Council.

it well, and evidence of the absorption of the drug was given by the coloration of the skin and the urine. When such animals were killed the peritoneum was found to be stained, and the dye could be dissolved out from the liver and other organs. In all cases the mice were kept in semi-darkness so as to avoid any possible complication from normal solar radiation. Some of the animals were irradiated through a 4-mm. aluminium filter, receiving a dose of $1\frac{1}{2}$ Sabouraud B doses. Examples were killed at different periods after the radiation and sections of the organs examined. No differences could be detected between control and fluorescein-fed irradiated animals. Another batch of mice fed with sodium fluorescein were given an ordinary B dose of unscreened radiation. This is the ordinary dose given for producing epilation in the treatment of tinea of the scalp. No differences were observable in the response of mice fed with fluorescein and the controls.

Irradiation of tadpoles and amphibian ova led to a similar lack of difference between examples kept and irradiated in a solution of sodium fluorescein and those kept in ordinary water. One experiment with toad ova, however, led to experiments which it is thought may supply the key to some of the apparently beneficial clinical results. A batch of toad ova had been brought by a kind and enthusiastic friend from a particularly unsavoury pool. When the lid was removed from the container the condition of the contents was at once evident, and further investigation showed that in most cases the "gelatinous" envelope which normally holds the ova in elongated "strings" had decomposed to a diffuent mass. A few intact strings were, however, rescued. These were thoroughly washed in several changes of water and then divided into two batches, one of which was placed in 5 per cent. sodium fluorescein while the other was placed in ordinary water. Both were put into a cool, dark cupboard, and were left for about a week. At the expiration of that time the specimens left in water had suffered disintegration of the "gelatinous" material and become offensive; the specimens kept in sodium fluorescein, on the contrary, still preserved their moniliform arrangement, and had no smell. The "gelatinous" material had absorbed the dye to such an extent that the individual ova could only with difficulty be distinguished. The obvious suggestion from this was that the sodium fluorescein had exercised an antibacterial action.

A series of experiments with different organisms was then carried out with Dr. J. N. Cumings. These need not be here described in detail, but the general conclusion was that sodium fluorescein solutions exert a mild antibacterial action, and a 5 per cent. solution was found to take at least seven and a half hours to kill ordinary organisms, including *Staphylococcus aureus* and *Bacillus coli*. It was, however, found to act as an inhibitor to the growth of these organisms, even in a concentration of 0.5 per cent. A similar antibacterial action was obtained with specimens of normal urine and of urine from a patient suffering from cystitis, the development or increase in ammoniacal odour being somewhat less in the presence of sodium fluorescein.

Now it is well known that septic changes militate strongly against the success of any form of radiation therapy, and it seems possible that the thorough permeation of the ulcerated tissue with the dye, in cases treated with fluorescein, and its presence in the serous discharge, may have had a beneficial effect from the mild antibacterial action. It may be noted that all of the cases of ulcerated breast carcinoma which appeared to have derived any benefit from fluorescein plus radiation as distinct from those merely irradiated were patients of scrupulous personal cleanliness, in whom the ulcerated

areas were carefully dressed and where, in short, everything possible was done to ensure a clean condition of the parts. In cases of breast cancer which were ulcerated, but where the same scrupulous cleanliness was not observed, the apparent benefit from fluorescein was not seen, while in the cases of carcinoma of the rectum a similar effect was noted. It seemed therefore possible that the mild antibacterial action of the dye was sometimes able to turn the scale a trifle in the patient's favour.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

AN UNUSUAL CASE OF FRACTURE OF THE ATLAS

The report by Dr. A. Ingham in the *British Medical Journal* of December 31st, 1932, of two cases of injury to the cervical spine resulting from a minor degree of trauma in a motor accident aroused my interest, as I recently had a similar case under my care.

On September 28th, 1932, I was called in consultation on a lady, aged 50, who three weeks previously had been travelling on the back seat of a car, when it was involved in a head-on collision. The patient was dazed, and did not remember what happened, but another passenger stated that she was thrown forward against the back of the front seat. She was taken to a nearby hospital in the South of England, and kept in bed there for three weeks. When I saw her she complained of inability to control the movements of her head, and some pain down the left side of the neck. She was, in fact, quite unable to support her head, which rolled about in any direction. Besides this there was only slight tenderness just beneath the base of the skull posteriorly. X-ray examination showed a fracture at the base of the posterior arch of the atlas on either side, the arch being displaced slightly backwards. The patient was given a plaster splint which effectually supported the head on the shoulders. Massage and supported movements were started at once, and in a month's time good control had been gained, and an uneventful recovery followed. A radiograph four months after the accident showed no attempt at callus formation.

In this case I would suggest that the fracture was due to muscular violence, resulting from sudden flexion of the neck over the top of the back of the front seat, when the patient was thrown forwards.

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RECTO-VAGINAL FISTULA AND PERSISTENT LEFT SACRO-POSTERIOR POSITION

It may, I feel, be of interest to publish an account of the following case in view of its unusual nature.

Late one night I was asked by a midwife to see a 7-para who was in labour and had just begun to pass faeces per vaginam. I found a fat patient of low mentality, with marked oedema of legs, vulva, and abdominal wall. She was passing faeces per anum and per vaginam. Anus and perineum appeared normal. Abdominal examination revealed a large baby with its head in the fundus and its back to the left, but no foetal heart was heard. There was marked right obliquity of the uterus and the bladder was much distended. Two ounces of olive oil were passed gently into the rectum, and in one minute oil appeared in the vagina. In spite of this, it was felt necessary to pass a catheter. After a thorough cleansing of the region this was done (under anaesthesia owing to the extreme tenderness and oedema) and much dark-coloured urine obtained, which, on boiling, became nearly solid. The foetal vulva was seen appearing, but no further examination was then thought advisable. Much liquor was still present. The patient only had niggling pains, and after