seven on the second. The organisms were then separated and grown in tubes, and were found to consist of:

1. *Staphylococcus pyogenes albus* (largest number of colonies).
 2. *Diplococcus pneumoniae* (Fraenkel).
 3. A bacillus whose specific nature was not determined.
- The amount of pus was increasing daily, and as it seemed to be caused principally by the staphylococcus, I determined to try a vaccine against the staphylococcus alone, and if the other organisms did not disappear, to use vaccines against them later.
- On April 17th, 50 million staphylococcus vaccine (Wright) was injected into the left flank. For three days the pus diminished in amount, but gradually increased until on the sixth day the amount was as great as before injection.
- On April 24th, 100 million staphylococcus vaccine was injected, and every tenth day a similar dose was given until he had had altogether eight injections. After the fourth dose there was no discharge, and the wound healed beautifully.

Before injecting the vaccine I consulted with Dr. James Ritchie, Superintendent of the Royal College of Physicians' Laboratory, Edinburgh, as to whether a mixed vaccine should be given. It was decided to try the staphylococcus vaccine, and you will observe how successful the results have been. There was never any rise of temperature after the injections, and the patient has not felt the slightest inconvenience; he has been regularly at work since January 18th, with the exception of a fortnight after the second operation, and now feels as strong and healthy as ever he did. In September, 1908, his weight was 12 st. 2 lb.; April, 1909, 10 st. 9 lb. His hearing in the right ear is now normal. He is now steadily gaining weight. The points I should like to draw attention to are:

1. The specific causes of the disease—the three different organisms which had probably found their way from the pharynx by the Eustachian tube to the middle ear.
2. When the wounds healed up the first time organisms had remained in the tissues, and a second chill reduced the vitality of the parts, thus allowing the organisms to become more active.
3. That it is not always necessary to estimate the opsonic index when the amount of discharge is seen and the effects of the dose of vaccine easily gauged.
4. When there is more than one organism present, by using a vaccine against the most numerous or virulent type, the others may be killed by phagocytes or die off.
5. In using antiseptics we may be killing only those organisms with which they come in direct contact in the wound, leaving those in the deeper parts to multiply.
6. In using a vaccine the organisms are attacked in every part through the blood.
7. The point of greatest importance is: Had I used the vaccine immediately the pus was seen in September, 1908, would it have had the same effect as it afterwards had? This question I am inclined to answer in the affirmative, and I should advise those who have similar cases to try the stock vaccine of Wright or one made from the organisms of the discharge.

IS RADIUM A CURE FOR CANCER?*

By DR. LOUIS WICKHAM,

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IF I think it useful to write an article on this subject it is because it has become apparent that in different quarters a misunderstanding has arisen as to the conclusions which I have drawn at various times in my lectures.

Some medical men have limited their opinions to the reservations I made in my communications, and have remained incredulous of the value of radium. Others, who were greatly impressed by such good results as I have obtained, have gone too far, overstepping my thoughts and the facts themselves, and have helped to establish a current of exaggeration and enthusiasm which is far from being scientific.

It is therefore necessary to put a stop to these false impressions with regard to the real value of radium.

The following conclusions are drawn from the 600 cases which I have treated during the last five years with Dr. Degrais.

It must first be stated that the word "cancer" is used in its widest sense, signifying a whole series of malignant new

growths histologically different, including epitheliomata, carcinomata, lymphosarcomata, sarcomata, lymphadenomata, mycosis fungoides, etc.

Considered from this point of view I can affirm, from a study of some cases of tumours of each variety, before, during, and after the treatment, that the malignant evolution of these tumours may not only be arrested for months, but that occasionally these tumours have entirely disappeared, giving the impression of real cure, the rays having on cancer cells a somewhat selective action.

This first point is most striking, and it has led, from the point of view of practice, to an exaggerated favourable conclusion. We must not rest satisfied with the observation of the growths alone; we must reason as medical practitioners, and place ourselves in the position of the patient with cancer, and see if in practice the patient derives any definite benefit from these selective effects of radium, and to what degree.

On this new ground, practice, the use of radium is faced by numerous material and other difficulties and drawbacks such as the following:

1. If the cancer is voluminous and increasing rapidly in size, the practitioner has to deal with the following vicious circles:

- (a) The necessity of acting rapidly;
- (b) The fear, when acting too rapidly, and with large doses, of causing toxæmia, and accidents of which he must be particularly on his guard, if he is not sufficiently experienced in the technique, in all cases of large cancers, for example, those of the abdomen.

2. There is no recourse against metastatic growths at a distance:

- (a) Cancerous migrations by lymphatic vessels;
- (b) Cancerous migrations by the blood stream;
- (c) Migrations by the serous surfaces;
- (d) Migrations by the natural passages.

Radium cannot at present have other pretensions than to act on lesions which are localized and sufficiently accessible, or rendered accessible. In cases with generalization, the resources of radium are limited to the reduction in size of the principal tumours, to the arrest of hæmorrhage and secretion, and to the diminution of pain.

3. If the cancer is localized and accessible, but inoperable, radium, with some rare but very remarkable exceptions, can only diminish or stop the hæmorrhages and secretions, and occasionally render the tumour operable; but, in spite of these great advantages, which result in a prolongation of life, the patient, in the end, dies of his cancer.

4. The influence of radium diminishes as the tumour becomes less and less accessible. It is true that the rays of great penetrating power act at a depth without serious injury to the skin surface, but the results will be more uncertain as the tumours are less accessible. The few cases of inoperable cancer which were despaired of, and which I have been able to reduce and maintain, were all easily accessible cases (cancer of the parotid, of the glands in the neck, sarcoma of the shoulder, cancer of the rectum situated at a distance of less than 10 cm. from the anus, etc.).

5. Certain tissues are infinitely less favourably acted on by radium than others, for example, the mucous membranes, especially of the buccal cavity (tongue, tonsils, pharynx, etc.), and in these cases must be added the material difficulty of reaching the region conveniently, and applying the heavy screen-filters and leaving them in position for a sufficient length of time.

6. Lastly, if the cancer is very extensive, a radium-therapist has great difficulty in obtaining the stock of radium necessary to act sufficiently in every direction, for the number of doses needed in a number of cases is very high.

Now it is easy to understand from our previous knowledge that the use of radium is limited by a whole series of material or clinical conditions. The result is that:

(a) To speak in a general way of the cure of cancer by radium, without specifying and explaining circumstances, is to make use of antiscientific and inexact language; and

* I must express my best thanks to Dr. Robinson, of Paris, for his kindness in translating this note.

(b) Too great enthusiasm in radium is apt to lead the doctor who possesses any to use it too much, and thus deprive the patient of the benefits of other treatments which have already proved their utility, especially surgery.

At this point I wish to separate myself from those who extol radium beyond reason. I have been content during the last five years to watch over, observe, and classify the facts, and that is all that must be done at present; any definite conclusion concerning large cases of cancer would be quite premature.

When a doctor who possesses radium is consulted in a case of cancer he should proceed as follows:

(a) In cancers of the skin which are localized, superficial, non-inflammatory, and of rather small dimensions, radium is of great benefit, and he can, without exaggeration, assure the patient of a cure, but only on condition that the patient binds himself to come once each month for a long period to see the doctor, to catch the first trace of any relapse; but the patient must be told also that many other means exist—such as surgery, *x* rays, etc.—which cure just as well.

(b) In all other cancers, whatever their nature, the doctor must first consider if these other means cannot do better. If surgery can do better (as in excision of the breast for an operable cancer, or in excision of a commencing and operable cancer of the tongue, etc.), then radium can be suggested to consolidate the cicatrix after the operation; treatment by radium is then an auxiliary to surgery, and I consider it better than the *x* rays on account of the penetrating power of the radiations.

If surgery is powerless because the cancer is too advanced, extensive, and consequently hopeless, then radium can be employed as a last resource to alleviate pain and prolong life; it can also be applied after the chief part of the growth has been removed by the knife, but in those cases the patient's relatives must be duly warned of the temporary nature of the relief.

If the surgeon cannot intervene on account of the seat or the depth of the lesions, then he can resort to the knife to open the way for the more direct application of radium apparatus (chelotomy, etc.) by means of a catheter.

If the surgeon is unable to intervene on account, not of the gravity of the cancer, but because the condition or age of the patient prevent, or because he refuses an operation, then radium can be applied. It is in these rare conditions in which radium can be applied to less advanced lesions that this method would progress and show what results it can produce, and give statistics which would warrant a bolder intervention in other cases.

Such is the line of treatment I have followed to the present time.

When dealing with a new therapeutic agent which has given such brilliant results from some points of view, one must be armed with all one's *sang froid*, and observe the facts with justice. The question thus presented of the part which radium is actually able to play in the fight against cancer places it, in spite of the reservations enumerated, in a good position, because it is a valuable auxiliary in sufficiently experienced hands and in certain cases which one must know how to distinguish.

The future is still more promising; the results I speak of I have obtained with considerable doses, it is true, as compared with those of the first investigations, but these doses are diminutive in comparison with what will soon be available. In the first instance 1 mg. or 1 or 2 cg. of pure radium was employed, now we use 5 to 50 cg.; soon we shall be able to count on several grams. The progress observed between the first two phases gives some idea of what may perhaps be realized in the future.

At all events, at the present time it would be unjust, in judging the value of radium-therapy, to limit its advantages to its action on malignant tumours; it must be considered as a whole, and especially in its action on angiomas of a prominent and erectile kind; on cutaneous vascular tumours, cheloids, certain rebellious forms of eczema, obstinate tuberculous glands, certain forms of lupus; and then, considering the ground already won, it is difficult, without any exaggeration, not to recognize that radium-therapy, as I have often repeated, has won its place in the therapeutic armamentarium, that the fine French discovery of Curie and of Madame Curie has borne definite and certain fruit in the medical field.

Memoranda: MEDICAL, SURGICAL, OBSTETRICAL.

A SIMPLE METHOD OF COUNTING LEUCOCYTES.

The following method is easy, simple, and capable of rapid completion. The implements cost only a few pence; the results are much more uniform (in my experience) than those of the Thoma-Zeiss apparatus; it is far less tiring than the old methods; and accurate results can be obtained by those who only seldom have occasion to count leucocytes.

The method depends on the obvious fact that when equal-sized drops of diluted blood are placed on a clean slide they should cover equal areas and contain equal numbers of cells. The question of the different degrees of viscosity of different samples of blood may be neglected on account of the high dilution used.

The blood is drawn in the usual way, and diluted ten or twenty times with water, which had better be distilled. Any of the recognized mixing pipettes may be used, but the following method is good and simple:

By means of a capillary tube and test a measured quantity of blood is drawn up, and, in the same way, ten times as much water. The fluids are blown out into a watch-glass, and upon the little pool thus formed a stream of air is blown through a capillary tube. The jet of air, when properly managed, forms a most efficient stirrer. A fair-sized drop of blood must be drawn if uniform results are to be obtained—enough to fill an inch and a half of capillary tubing is a suitable amount. If the blood has been mixed in a pipette it must be blown out into a watch-glass as soon as the mixing is finished.

Drops of the mixture are transferred from the watch-glass on to a slide by dipping the rounded tip of a glass rod into the watch-glass, and then touching the slide with the wet rod-end (an old clinical thermometer forms a convenient glass rod). The slide and rod should be free from grease; I generally pass them through a flame before use. The drops are placed in line on the slide, separated from each other by small intervals. A fresh dip must, of course, be made for each drop transferred. At each descent of the rod on to the slide or watch-glass a faint click should be produced by the contact. If attention is given to this trivial point the drops are more likely to be all of one size. It might be thought that more accuracy would be attained by measuring each drop out by means of a graduated pipette; but, practically, I think the above method is the better.

Ten or a dozen spots should be thus transferred to the slide, which is then dried in the sunshine or before a fire. Too quick drying may cause cracking of the films.

The dried slide is now very gently agitated in a dish of plain water until all the blood pigment is washed off and the slide may be held up to the light and examined. It will be seen that the place of each little spot of blood is marked by a small round film. If the slide is now examined under the microscope, with a small-aperture diaphragm, each spot will be seen to consist of a faint haze of debris evenly besprinkled with dark, conspicuous leucocytes. The clearness of the demonstration may be increased by staining the films with a watery solution of methylene blue. The enumeration may be done by counting the cells in several fields under a $\frac{1}{2}$ objective; but, owing to the comparatively small portion of each film that can be thus covered at one time, it is necessary to count a large number of fields if high uniformity is aimed at. I find the following method more accurate and less fatiguing:

A stiff paper obturator is cut to fit into the eyepiece tube of the microscope. The paper is pierced with ranks of holes made by a large needle. The middle hole should be large to facilitate focussing and finding. Twenty or more perforations should be used, and they should be of such size as to show two or three leucocytes per hole on an average with normal blood. The obturator should be fitted into the middle of the eyepiece tube; a little manipulation will soon show the best position.

A low power should be used in counting, for then a wider field is covered, and the result is more representative of the whole film. If there are ten films on the slide, it is plain that by counting a field from each film one obtains a very good test of how well the blood has been mixed. I have never found any but the smallest variations when