**Statistical report : 1935 / Mount Vernon Hospital.**

# THE MOUNT VERNON HOSPITAL

## FOR THE TREATMENT OF CANCER,

# NORTHWOOD,

# MIDDLESEX.

## STATISTICAL REPORT

## FOR

## 1935.

# *The Mount Vernon Hospital.*

# Statistical Report.

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# DEPARTMENT OF EXPERIMENTAL PATHOLOGY.

## REPORT BY J. C. MOTTRAM, M.B., DIRECTOR.

The following investigations have been carried out during the year:—

### (1) Variations in the Sensitivity of the Cell to Radiation, in Relation to Mitosis.

The study of sensitivity has been continued and the findings of Crabtree and Cramer have been further confirmed. Both tumour cells and bean roots show an increased radio-sensitivity under the influence of cold and of hydrocyanic acid; and a decreased sensitivity under nitrogen anaerobiosis.

In the case of the bean root, observations were also made upon the incidence of mitosis under these experimental conditions.

It was found that exposure to hydrocyanic acid and to nitrogen anaerobiosis, under the conditions used for the testing of radio-sensitivity, greatly reduced the number of dividing cells; whereas, exposure to cold left the number of dividing cells unaltered. It is evident, therefore, that the incidence of mitosis plays no part in the radio-sensitivity of the cells under these tests.

Further work upon the radio-sensitivity of cells, and especially of tumour cells, is being continued and a beginning has been made of the treatment of patients, based upon these results.

### (2) On the Origin of Tar Tumours in Mice, whether from Single Cells or Many Cells.

The natural history of tar warts in mice has been further observed and consideration given to the possibility that these warts have origin in single epithelial cells. When calculations are made from the measured growth rate of the warts, which are remarkably constant, of the time required for them to grow from single cells to just visible warts, it is found that periods of time are required very comparable with the latent periods between the application of tar and the appearance of the warts. Further, if they arise from single cells, then this latent period should be shorter for fast-growing warts than for slow-growing; whereas, if they arose from collections of millions of cells, there is no reason why a fast-growing wart should not appear late, or a slow-growing one early.

This was tested by plotting the growth rates of the warts against their time of appearance after the beginning of tarring, and a remarkably close correlation was found.

It has been mentioned that the warts, as a rule, present constant growth rates; but occasionally warts were observed to have a growth rate upwardly concave, that is, showing a progressive increase in growth rate. This suggests that these warts are composed of two or more groups of cells of different growth rates, and that the

upward concavity of the growth rate curve is due to the fastest growing cells coming more and more, to compose the larger part of the wart, and so, to control its growth rate. The multiple autografting of such warts supports this view, since from them arise autografts, some of which are slow and some fast-growing. Furthermore, the histological examination of both the warts and the autografts, shows that the warts vary in the detailed structure of their epithelial cells, and that this variation is reflected in the autografts: for instance, a fast-growing, dedifferentiated, non-keratinising autograft and a slow-growing, keratinising autograft may arise from the same wart, and, on examining sections of the wart itself, groups of these two types of cells be present in its structure.

This question of heterogeneity has been further studied, and a paper dealing with it will shortly appear.

### (3) Meso-blastic Tumours Produced in Fowls by Exposure to Radium.

Since, both in man and in animals, malignant epitheliomas and sarcomas have been produced by exposing the skin to repeated doses of radiation over long periods of time, it seemed likely that the similar treatment of chickens might result in epitheliomas, or, at any rate, sarcomas, similar to those occurring spontaneously in chickens or produced by the inoculation of tar.

Twelve cockerels were used and exposures to radium were made weekly for approximately sixteen months. After two and a half years, seven birds were alive and healthy, one died of tuberculosis, one of an accident and three of malignant tumours rising in the near neighbourhood of the point of radiation. The tumours were a spindle-celled sarcoma, a fibro-sarcoma and a lympo-sarcoma; they were grafted into other birds, all with negative result. It is to be observed that though the skin was radiated, none of the tumours were epitheliomatous, and, since grafting failed, it was not possible to see whether they could be propagated by cell-free filtrates.

References:—

(1) The Brit. J. Radiology. 1935 VIII. No. 94. 643.
(2) J. Path. and Bact. 1935 XL. 407.
(3) Proc. Roy. Soc. Med. 1935 XXIX. 1.

J. C. Mottram.

# DEPARTMENT OF DEEP THERAPY.

## REPORT FROM THE WILLIAM MORRIS RESEARCH FELLOW, AT THE MOUNT VERNON HOSPITAL, NORTHWOOD.

### Brief Summary of the Work carried out in the Radiological Department of the Hospital during the Year 1935—1936.

During the year 201 cases of malignant disease have received treatment in this Department.

These cases come under the following main group headings :—

| | |
|---|---|
| Brain ... ... ... ... ... ... | 1 |
| Skull (bones and soft parts) ... ... ... | 10 |
| Upper air passages ... ... ... ... | 35 |
| Breast (including metastases) ... ... ... | 31 |
| Oesophagus ... ... ... ... ... | 9 |
| Chest ... ... ... ... ... ... | 3 |
| Gynaecological ... ... ... ... ... | 67 |
| Prostate ... ... ... ... ... ... | 7 |
| Rectum ... ... ... ... ... ... | 3 |
| Bone sarcoma ... ... ... ... ... | 6 |
| Various (including lymphadenoma and lympo-sarcoma) ... ... ... ... ... | 23 |
| | 195 |

Some of these cases have been treated by combinations of surgery, radium and X-radiation, and some by X-radiation only.

Of those cases treated by X-radiation alone, the following groups have given the most hopeful results :—

| | |
|---|---|
| Breast. | Skull |
| Prostate. | Bone Sarcoma. |
| Gynaecological. | |

There has been a slight general improvement in results following fresh modifications in technique.

It is hoped to be able to include in the next Report an analytical review of results obtained during the past three years.

### A Summary of Research Work carried out during the Year 1935—1936.

(1) Variations in the methods of dosage and modifications in technique have been further investigated.

(2) Further work in the direction of finding some method, other than by exposure to radiation, which would so affect the malignant cell as to render it more sensitive to the lethal effects of radiation in one or both of the following ways :—

(*a*) By lowering the vitality of the malignant cell, *e.g.*, a direct toxic effect,

(*b*) By increasing the secondary radiation set up in situ.

Amongst other procedures in this direction, such as the exposure of malignant tissue to "Short Wave" radiation (see below), further work with injections of quinine hydrobromide has been done. Results following the use of this substance have been conflicting, but definitely point to the advisability of further investigation.

(3) The loan of "Short Wave" apparatus has made it possible to carry out some preliminary experimental work with a view to ascertaining if—

(*a*) Short Wave radiation has any specific action on malignant tissue, other than that due to thermal changes,

(*b*) Short Wave radiation could be used with advantage as an adjunct to X-radiation in the treatment of malignant tissue.

Unfortunately this work had to be discontinued owing to the return of the apparatus to the owners. This work will be continued when other apparatus becomes available.

(4) The irradiation of deep-seated lesions, through openings made in the tissues in order to increase the total depth dose and at the same time avoid injury to the superficial structures, has been continued.

### Lines of Research proposed to be carried out during the Year 1936—1937, *et seq.*

(1) It is proposed to continue the lines of investigation as indicated above for the year 1935.

(2) As set out in my report for the year 1933, it was suggested that the reactions of malignant tissue to beams of X-rays of very high intensity should be studied, together with my reasons for advocating this line of research.

Owing to the establishment of a new Deep Therapy Department in this Hospital, it will now be possible to carry out this work.

Two Metropolitan Vickers X-ray tubes are being installed and are being provided with a special mechanism whereby it will be possible to use both tubes simultaneously on the same lesion.

When making use of the following physicial factors, 250 kV.—10 mA.—1·5 Cu: filtration—23 Cm: F.S.D. it will be possible to attain a surface intensity in the region of 1,000 "r" per min.

It is hoped in this way to definitely prove whether or no there is any advantage to be gained by the use of high intensity radiation of a degree such as that quoted above.

### Ex-Ray Diagnostic Department.

During the year there have been 536 cases for X-Ray diagnosis.

G. Cranston Fairchild.

# REPORT OF THE PATHOLOGICAL LABORATORY, 1935.

The total number of specimens examined in 1935 was 1072, showing an increase of 167 over the number for the preceding year.

Specimens from the Theatre, Wards and Staff were made up as follows :—

| | |
|---|---|
| Histological Examinations ... ... ... | 282 |
| Blood Counts—Staff ... ... ... ... | 160 |
| ,, ,, Wards ... ... ... ... | 393 |
| Urines, Special Tests ... ... ... ... | 76 |
| Exudates, pus, etc.... ... ... ... ... | 18 |
| Blood—Serological tests ... ... ... | 48 |
| Biochemical Estimations ... ... ... | 60 |
| Throat Swabs, Sputa, etc. ... ... ... | 35 |
| Total | 1072 |

In addition to the above, 30 post-mortem examinations were made and 235 sections from post-mortem material were prepared and examined.

It should be noted that the great majority of the 553 blood-counts were "complete" counts. This branch of the work now takes up so much of the Clinical Pathologist's time, that it is quite impossible for him to undertake any research work; an additional technical assistant is necessary to relieve the situation.

THOS. H. PULLAR.

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# A PRELIMINARY NOTE ON THE 700 MILLIGRAMME RADIUM COLLAR.

*By*

DR. HAROLD GRAY, Physicist to the Hospital.

Some dissatisfaction was felt on the clinical side with the results obtained in the treatment of glands of the neck invaded by malignant growth, and there was reason to believe that this might be due in part to the deeper glands having received an insufficient dose. This dose could not be increased by local application of radium without burning the skin. By placing the radium on a ring all round and at a distance from the neck, however, the deeper glands are irradiated from all directions, and it was found that the dose to these glands could be approximately doubled.

The radium is arranged with the object of delivering an adequate dose to the glands in the vicinity of the carotid artery, from the root of the mastoid to the level

of the upper border of the clavicle, and to the submaxillary and the submental glands. It is obvious that in so far as the total time for which the radium can be applied is limited by the condition of the skin, the maximum dose will be delivered to the glands when the whole area of skin has been uniformly irradiated, for on the one hand if any region is subjected to a greater intensity of irradiation than the remainder, irradiation will have to be discontinued when that area has received the maximum permissible dose, and on the other hand, if over any region the intensity is lower than the average, this region will not have received the maximum permissible dose, and more radium could have been applied locally which would have contributed to the total dose delivered to the glands. The appropriate distribution of radium was found by experiment to be as follows. The radium is everywhere at approximately 5.5 cm. from the skin. The radium round the posterior half of the neck is arranged on two semi-circular rings 10 cm. apart. Round the anterior half of the neck these rings converge and form only a single ring under the chin. The amount of radium per unit length of the ring, of course, varies from point to point. With 700 milligrammes arranged in this way (in the form of 1 milligramme tubes having 0.4 mm. Pt filtration) the mean dose rate at the skin is 48 r per hour.

Between the upper and lower levels of the collar this figure nowhere falls below 45 or exceeds 51 r per hour. The intensity of the radiation throughout the whole volume of the neck has been measured (using a papier mâché model filled with water) by means of small ionisation chambers. With the help of charts showing the position of the glands at a number of cross sections of the neck, which were drawn by Dr. Mac-Donald, the dose delivered to any particular gland region can therefore readily be determined. Midway between the planes of the two rings of radium, the dose at the centre of the neck is over 78 per cent. of the average dose rate at the skin. In the planes of the rings the centre dose rate is approximately 70 per cent. of the average skin dose rate. Above and below the rings the intensity falls off rapidly.

In order to ensure that the skin is always at the correct distance from the radium, the radium is mounted on six brass plates, to each of which is attached a light iron-wire framework carrying a layer of sorbo rubber, shaped to fit the corresponding part of the neck.

These six applicators are contained in a large lead "collar." The lead varies in thickness from 2—4 cm. in different parts of the collar. The purpose of the lead is to protect the patient's head and body from stray radiation and to protect the operators who set up the patient. The collar is constructed in two portions (anterior and posterior halves) which are suspended at the ends of a steel bar in such a way that when not locked the collar hangs open. Thus, should the catch mechanism fail, the halves spring *away* from the patient. The collar hangs freely, the weight being counterbalanced and is capable of rotation about a vertical axis. It is large enough to take a very large neck. The applicators may be moved in till they just touch the patient's neck by means of rods projecting through the collar. The operation of setting up a patient is thus as follows:—The patient is seated in the chair and the collar (open) is lowered over his head with all the applicators drawn back to the fullest extent. When the collar is at the right height (a predetermined position of the counterbalance weights on a scale, the collar is closed by two persons by means of the handles. Stout steel rods sliding in steel tubes, secure that the two halves of the

collar exactly meet without external control. An automatic catch mechanism holds the collar closed. The applicators are then moved into contact with the skin. In general the whole operation takes under half a minute. The patient is provided with a table, book-rest and communication bell, and is left for two hours. By an action similar to the application of a bicycle brake, the catch mechanism can be released and the collar opened and raised for the patient to get up from the chair. The ease with which the collar can be closed and opened is chiefly due to the mechanical ingenuity displayed by Mr. Wyatt, who has constructed the whole collar.

## CLINICAL NOTE.

*By*

JOHN MORTON, Resident Medical Officer.

The collar has now been in use for twelve weeks, working from twelve to sixteen hours daily, except Sundays. A patient receiving full treatment is in the collar for four hours daily. This four hours is divided into two separate treatments of two hours each, with as long an interval as possible between. Different hours are allotted daily to equalize any inconvenience to the patient from broken sleep and interrupted meals.

The collar is in charge of Dr. M. Evans, assisted by a nurse who has no other duties. Necessary reliefs are carried out by other medical officers and ward nurses.

Most of the cases so far treated have had previous irradiation to the same site, and some have also had operative interference. The dose given has been of the order of 4000 r to the skin in these cases, and considering the nature of the previous treatment, this may be regarded as satisfactory. The greatest number of hours' treatment so far given to any patient is 106, lasting over eight weeks, giving 5500 r to skin and 4000 r to growth. We are now treating a series of cases who have had no previous irradiation, but we are not yet in a position to supply figures for the total dose for this series. We have been content so far to secure a very deep erythema accompanied by very marked dry desquamation.

The patients we have so far treated have been as follows:—

| | |
|---|---|
| Carcinoma of pyriform fossa | 4 cases. |
| Intrinsic Carcinoma of larynx. | 1 case. |
| Carcinoma of epiglottis | 1 case. |
| Secondary submaxillary glands | 2 cases. |
| Secondary deep cervical glands | 1 case. |

In each case local improvement has been secured, but it is still too early to gauge the completeness or permanence thereof.

The most constant symptom complained of has been dryness of mouth and throat after a dose of the order of 2000 r has been delivered. After an additional 1000 r some general lassitude has been apparent, accompanied by slight pain on swallowing. This has not been noticeably increased by the end of the treatment.

## EFFECTS ON THE BLOOD.

*By*

DR. THOS. H. PULLAR, Pathologist.

Blood-counts are done as a routine test twice weekly during treatment with the collar, though in a few of the first cases treated the blood was examined every day or every other day.

Considerable variations in the blood-response are seen in different patients, but, as a general rule, the changes may be summarized thus:—

| Skin dose (in "r" units) | Total leucocytes per c.mm. | Total lymphocytes per c.mm. |
|---|---|---|
| 0 | 7000 or more | 1600—2000 |
| 500 | 6000 | 1000 |
| 1500 | 5000 | 500 |
| 2000 | 4500 | 500 |
| 2500 | 4000 | 500 |
| 3000 | 4000 | 500 |
| 3500 | 4000 or less | 300 |

These figures are, of course, only very approximate, but, in nearly every case, the lymphocytes remain at 500 per c.mm. or thereabouts for a long time after an initial fairly rapid fall. (By contrast, in cases treated with 110 mgm. breast plaques 24 hours daily, the fall in lymphocytes is much more rapid and extreme than in these collar patients—probably because more bone-marrow is being irradiated in the breast area.)

In cases complicated by sepsis, the leucocyte-count may remain at a much higher level throughout treatment.

It is, as yet, too early to determine the period of time required for the recovery of the leucocytes to their normal figure after cessation of treatment with the collar.

None of the cases treated has shown any significant alteration in the number of red cells or the haemoglobin content of the blood.

## TABLE I., 1935.

### A TABULAR STATEMENT OF ALL CASES TREATED AND DISCHARGED FOR THE FIRST TIME IN 1935.

| Site. | | Disease. | Methods of Radiation and Other Treatment. Primary Growth. | Lymph Areas. | Total. | Male. | Female. | Alive. | Dead. |
|---|---|---|---|---|---|---|---|---|---|
| LIP ..... | ..... | Sq. Carc.... | I. ..... | ..... | 3 | 3 | | 3 | |
| | Previous Exc.... | ,, ,, ... | I. ..... | ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | ..... | SX. ..... | 1 | 1 | | 1 | |
| | Recurrent ..... | ,, ,, ... | S. I. ..... | ..... | 1 | 1 | | 1 | |
| | | | | | **6** | **6** | | **6** | |
| TONGUE ..... | Anterior ..... | ,, ,, ... | *Nil* ..... | *Nil* ..... | 1 | 1 | | 1 | |
| | Middle..... | ,, ,, ... | I. ..... | ..... | 2 | 2 | | 2 | |
| | | ,, ,, ... | I. ..... | I. ..... | 2 | 1 | 1 | 2 | |
| | | ,, ,, ... | I. ..... | S..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | SX. I. ..... | I. ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | I. ..... | SX. ..... ..... | 1 | 1 | | 1 | |
| | Posterior... .... | ,, ,, ... | I. ..... | ..... ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | I. ..... | I. ..... | 1 | | 1 | 1 | |
| | | | | | **10** | **6** | **4** | **10** | |
| | Recurrent ..... | ,, ,, ... | ..... | ..... | 2 | 1 | 1 | 1 | 1 |
| | Various ... .... | ..... | ..... | ..... | 1 | | 1 | 1 | |
| FLOOR OF MOUTH ..... ... .... ... | | Sq. Carc.... | I. ..... | ..... | 1 | 1 | | | 1 |
| | | ,, ,, ... | SX. ..... | ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | SX. S. ..... | I. ..... | 1 | 1 | | 1 | |
| ALVEOLAR MARGIN ..... ..... | | ,, ,, ... | I. ..... | I. ..... | 1 | 1 | | 1 | |
| | | ,, ,, .. | S. ..... | S. ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | S. ..... | ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | I. SX. ..... | ..... | 2 | 1 | 1 | 1 | 1 |
| | | ,, ,, ... | SX. ..... | ..... | 1 | 1 | | | 1 |
| | | | | | **6** | **4** | **2** | **4** | **2** |
| BUCCAL MUCOUS MEMBRANE ..... | ..... | ,, ,, . | I. ..... | ..... ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | *Nil* ..... | *Nil* ..... | 1 | 1 | | 1 | |
| | | Nature doubtful | I. ..... ..... | ..... | 1 | 1 | | | 1 |
| PALATE ..... | ..... | Sq. Carc. . | I. ..... | ..... | 2 | 2 | | 1 | 1 |
| | | ,, ,, .. | SX. I. ..... | ... . ..... ... | 1 | 1 | | | 1 |
| | | ,, ,, ... | SX. I. ..... | S. ..... | 1 | 1 | | 1 | |
| | | ,, ,, .. | F.S. . ..... | ..... .. ... | 1 | 1 | | 1 | |
| | | ,, ,, ... | F. S. I. ..... | ..... ..... | 1 | 1 | | 1 | |
| | | | | | **6** | **6** | | **4** | **2** |

Figures in heavy type are the summation of the numbers in the immediately preceding category.

*Symbols used to Denote Methods of Treatment.*

| | | | |
|---|---|---|---|
| B | Block Dissection. | IAbd | Interstitial *via* Abdomen. |
| C | Cavitary. | IO | Interstitial through wound. |
| E | Excision of Growth. | LA | Local Amputation. |
| F | Fenestration. | RA | Radical Amputation. |
| H | Heyman Technique. | S | Surface with Radium. |
| I | Interstitial. | SX | Deep Therapy. |

## TABLE I., 1935 *(continued)*.

| Site. | | Disease. | Methods of Radiation. and Other Treatment. Primary Growth. | Lymph Areas. | Total. | Male. | Female. | Alive. | Dead |
|---|---|---|---|---|---|---|---|---|---|
| PALATE *(continued)* | Recurrent ..... | Sq. Carc.... | ..... | ..... | 4 | 4 | | 3 | 1 |
| TONSIL ..... | ..... | ,, ,, ... | I. ..... | I. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | SX. ..... | SX. ..... | 1 | 1 | | | 1 |
| | | Lympho-encoma | SX. ..... | S. ..... | 1 | 1 | | 1 | |
| | | Cyst..... | E. ..... | ..... | 1 | 1 | | 1 | |
| | | Hyperplasia | E. SX..... | ..... | 1 | 1 | | | 1 |
| PHARYNX ..... | ..... | Sq. Carc. .. | *Nil* ..... | *Nil* ..... | 2 | 2 | | 2 | |
| | | Gumma ..... | *Nil* ..... | *Nil* ..... | 1 | 1 | | 1 | |
| PAROTID..... | ..... | Actino-mycosis | S. ..... | ..... | 1 | 1 | | 1 | |
| CERVICAL GLANDS | Secondary ..... | Sq. Carc.... | ..... | I. ..... | 2 | 1 | 1 | 2 | |
| | | ,, ,, .. | ..... | S. ..... | 1 | | 1 | 1 | |
| | | | | SX. ..... | 2 | 1 | 1 | 1 | 1 |
| | Primary ..... | ,, ,, ... | I. SX. ..... | ..... ... | 1 | 1 | | 1 | |
| | | | SX. E. C..... | ..... | 1 | 1 | | | 1 |
| | | | *Nil* ..... | *Nil* ..... | 1 | 1 | | 1 | |
| | Primary, Rec.... | ..... | ..... | SX. ..... | 1 | 1 | | 1 | |
| ŒSOPHAGUS ..... | ..... | Sq. Carc.... | SX. ..... | ..... | 7 | 5 | 2 | 5 | 2 |
| MOUTH ..... | Recurrent ..... | ..... | ..... | ..... | 2 | 2 | | 2 | |
| STOMACH ..... | ..... | Col. Carc. ... | SX. ..... | ..... | 2 | 2 | | 2 | |
| COLON ..... | ..... | ,, ,, ... | S. ..... | ..... | 1 | 1 | | | 1 |
| RECTUM ..... | ..... | ,, ,, ... | I. SX. ..... | ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | SX. I. SX. ..... | ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | C. E..... | ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | E..... | ..... | 2 | 1 | 1 | 1 | 1 |
| | | ,, ,, ... | *Nil* ..... | *Nil* ..... | 1 | | 1 | 1 | |
| | | | | | **6** | **3** | **3** | **5** | **1** |
| | Glands..... | ,, ,, ... | ..... | S. ..... | 2 | 1 | 1 | 2 | |
| | Recurrent ..... | ,, ,, ... | SX. ..... | ..... | 1 | 1 | | 1 | |
| NASAL FOSSA ..... | Recurrent ..... | Sq. Carc. .. | SX. ..... | ..... | 1 | | 1 | 1 | |
| NASO-PHARYNX... | ..... | Nature doubtful | SX. ..... | ..... | 1 | 1 | | 1 | |
| | Recurrent ..... | Sq. Carc. .. | *Nil* ..... ..... | *Nil* ..... | 2 | 2 | | 1 | 1 |
| SUP MAXILLA..... | ..... | ,, ,, .. | SX. F. S. I..... | ..... | 1 | | 1 | 1 | |
| | | ,, ,, .. | SX. I. ..... | ..... | 1 | 1 | | | 1 |
| | | Papilliferous Carc. | SX. F. S. I..... | ..... | 1 | 1 | | 1 | |

Figures in heavy type are the summation of the numbers in the immediately preceding category.

*Symbols used to Denote Methods of Treatment.*

| | | | |
|---|---|---|---|
| B | Block Dissection. | IAbd | Interstitial *via* Abdomen. |
| C | Cavitary. | IO | Interstitial through wound. |
| E | Excision of Growth. | LA | Local Amputation. |
| F | Fenestration. | RA | Radical Amputation. |
| H | Heyman Technique. | S | Surface with Radium. |
| I | Interstitial. | SX | Deep Therapy. |

## TABLE I., 1935 *(continued).*

| Site. | | Disease. | Methods of Radiation and Other Treatment. Primary Growth. | Lymph Areas. | Total. | Male. | Female. | Alive. | Dead. |
|---|---|---|---|---|---|---|---|---|---|
| SUP MAXILLA ... *(continued)* | ..... | Adeno-Carc. | E. ..... | ..... | 1 | 1 | | 1 | |
| | | Nature doubtful | F. SX. ..... | ..... | 1 | 1 | | 1 | |
| LARYNX ..... | Intrinsic ..... | Sq. Carc.... | F. I. ..... | ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | SX. F.I. ..... | ..... | 3 | 3 | | 2 | 1 |
| | | Papilloma ... | E. ..... | ..... | 1 | 1 | | 1 | |
| | Recurrent ..... | Sq. Carc.... | SX. ..... | ..... | 1 | 1 | | | 1 |
| EPIGLOTTIS ... | ..... | ,, ,, ... | I. ..... | ..... | 1 | 1 | | | 1 |
| LARYNX ..... | Extrinsic ..... | ,, ,, ... | SX. F. ..... | ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | SX. F. I. SX. ... | S. ..... | 1 | 1 | | 1 | |
| | | ,, ,, ... | S.X. ..... | ..... | 2 | 1 | 1 | 2 | |
| MEDIASTINUM .. | ..... | Nature doubtful | SX. ..... | ..... | 1 | | 1 | 1 | |
| BRONCLUS ..... | ..... | ,, ,, ... | SX. ..... | ..... | 1 | | 1 | | 1 |
| LUNG ..... | ..... | Carc. ..... | *Nil* ..... | *Nil* ..... | 1 | | 1 | 1 | |
| THYROID..... | ..... | ,, ..... | SX. ..... | ..... | 2 | | 2 | 1 | 1 |
| BREAST ..... | ..... | Sph. Carc. ... | I. ..... | I. ..... | 8 | | 8 | 8 | |
| | | ,, ,, ... | I. S. ..... | I. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | S. I. S. ..... | S. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | S. ..... | S. ..... | 2 | | 2 | 2 | |
| | | ,, ,, ... | S. ..... | ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | SX. ..... | SX. ..... | 3 | | 3 | 3 | |
| | | ,, ,, ... | SX. ..... | ..... | 2 | | 2 | 1 | 1 |
| | | ,, ,, ... | LA. I. S. ..... | I. S. ..... | 2 | | 2 | 2 | |
| | | ,, ,, ... | LA. I. ..... | I. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | LA. ..... | I. ..... | 2 | | 2 | 2 | |
| | | ,, ,, ... | LA. S.X. ..... | SX. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | RA. ..... | I. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | E. I. ..... | I. ..... | 5 | | 5 | 5 | |
| | | ,, ,, ... | RA. ..... | ..... | 1 | | 1 | 1 | |
| | | | | | **31** | | **31** | **30** | **1** |
| | Palliative ..... | ,, ,, ... | I. ..... | I. ..... | 1 | | 1 | 1 | |
| | | ,, ,, ... | S. ..... | S. ..... | 1 | | 1 | 1 | |
| | | | SX. ..... | SX. ..... | 2 | | 2 | 1 | 1 |
| | Too advanced .. | ,, ,, ... | *Nil* ..... | *Nil* ..... | 1 | | 1 | 1 | |
| | | | | | **5** | | **5** | **4** | **1** |
| | Prev. Rad. Amp. | Sp. Carc. . | S. ..... | S. ..... | 7 | | 7 | 7 | |
| | ,, ,, | ,, ,, ... | S. ..... | ..... | 2 | | 2 | 2 | |
| | ,, ,, | ,, ,, ... | SX. ..... | ..... | 2 | | 2 | 2 | |
| | ,, ,, | ,, ,, ... | SX. ..... | SX. ..... | 1 | | 1 | 1 | |

Figures in heavy type are the summation of the numbers in the immediately preceding category.

*Symbols used to Denote Methods of Treatment.*

| | | | |
|---|---|---|---|
| B | Block Dissection. | IAbd | Interstitial *via* Abdomen. |
| C | Cavitary. | IO | Interstitial through wound. |
| E | Excision of Growth. | LA | Local Amputation. |
| F | Fenestration. | RA | Radical Amputation. |
| H | Heyman Technique. | S | Surface with Radium. |
| I | Interstitial. | SX | Deep Therapy. |

## TABLE I., 1935 (*continued*).

| Site. | | Disease. | Methods of Radiation and Other Treatment. Primary Growth. | Lymph Areas. | Total. | Male. | Female. | Alive. | Dead. |
|---|---|---|---|---|---|---|---|---|---|
| BREAST (*continued*) | Prev. Loc. Amp. | Sp. Carc. | S. I. | I. S. | 1 | | 1 | 1 | |
| | Recurrent | ,, ,, | | | 11 | | 11 | 11 | |
| | Sec. Glands | ,, ,, | I. | S. | 1 | | 1 | 1 | |
| | ,, ,, | ,, ,, | | I. S. | 1 | | 1 | 1 | |
| | Metastases | ,, ,, | SX. | | 1 | | 1 | 1 | |
| | | | *Nil* | *Nil* | 1 | | 1 | 1 | |
| | Various | | | | 3 | | 3 | 3 | |
| VULVA | | Sq. Carc. | I. | | 1 | | 1 | 1 | |
| | | ,, ,, | I. SX. | | 1 | | 1 | 1 | |
| | | ,, ,, | E. SX. | | 1 | | 1 | 1 | |
| | | ,, ,, | *Nil* | *Nil* | 1 | | 1 | 1 | |
| | Recurrent | ,, ,, | I. | S. | 1 | | 1 | 1 | |
| | | ,, ,, | S. | | 1 | | 1 | 1 | |
| | | Papilloma | E. | | 1 | | 1 | 1 | |
| | Urethra | Granuloma | I. | | 1 | | 1 | 1 | |
| VAGINA | | Sq. Carc. | C. I. SX. | | 1 | | 1 | 1 | |
| | | ,, ,, | C. SX. | | 1 | | 1 | 1 | |
| | Sec. Glands | ,, ,, | | S. | 2 | | 2 | 2 | |
| | | Vaginitis | *Nil* | *Nil* | 1 | | 1 | 1 | |
| KIDNEY | Recurrent | Carc. | S. | | 1 | | 1 | 1 | |
| CERVIX | | Sq. Carc. | H. | | 27 | | 27 | 26 | 1 |
| | | ,, ,, | H. | SX. | 31 | | 31 | 31 | |
| | | ,, ,, | *Nil* | *Nil* | 1 | | 1 | 1 | |
| | | | | | **59** | | **59** | **58** | **1** |
| | Rec. | ,, ,, | | | 2 | | 2 | 1 | 1 |
| | Prev. Radiation | ,, ,, | | SX. | 1 | | 1 | 1 | |
| | | ,, ,, | C. | | 1 | | 1 | 1 | |
| | Various | Simple | | | 4 | | 4 | 4 | |
| | | Cervical Polyp | C. | | 1 | | 1 | 1 | |
| CORPUS | | Carc. | C. SX. | | 2 | | 2 | 2 | |
| | | ,, | C. | | 1 | | 1 | | 1 |
| | | ,, | C. Hysterectomy | SX. | 4 | | 4 | 4 | |
| | | ,, | Hysterectomy | SX. | 1 | | 1 | 1 | |
| | | | | | **8** | | **8** | **7** | **1** |
| OVARY | | Carc. | SX. | | 2 | | 2 | 2 | |
| | Prev. Hysterectomy | ,, | SX. | | 2 | | 2 | 2 | |
| | Prev. Coeliotomy | ,, | SX. | | 3 | | 3 | 3 | |
| | Previous Ovariotomy | ,, | SX. | | 2 | | 2 | 2 | |

Figures in heavy type are the summation of the numbers in the immediately preceding category.

*Symbols used to Denote Methods of Treatment.*

| | | | |
|---|---|---|---|
| B | Block Dissection. | IAbd | Interstitial *via* Abdomen. |
| C | Cavitary. | IO | Interstitial through wound. |
| E | Excision of Growth. | LA | Local Amputation. |
| F | Fenestration. | RA | Radical Amputation. |
| H | Heyman Technique. | S | Surface with Radium. |
| I | Interstitial. | SX | Deep Therapy. |

## TABLE I., 1935 (*continued*).

| Site. | | Disease. | Methods of Radiation and Other Treatment. Primary Growth. | Lymph Areas. | Total | Male | Female | Alive | Dead |
|---|---|---|---|---|---|---|---|---|---|
| OVARY (*continued*) | Recurrent | Nature? | SX. | | 2 | | 2 | 2 | |
| UTERUS | | Hæmorrhage | C. | | 33 | | 33 | 33 | |
| | Previous Hysterectomy | ,, ,, | C. | | 1 | | 1 | 1 | |
| | Fibroids | ,, ,, | C. | | 3 | | 3 | 3 | |
| | | ,, ,, | C. Hysterectomy | | 1 | | 1 | 1 | |
| PROSTATE | | Carc. | SX. | | 4 | 4 | | 3 | 1 |
| | | Calculi | E. | | 1 | 1 | | 1 | |
| PENIS | | Sq. Carc. | I. | S. | 1 | 1 | | 1 | |
| | | ,, ,, | S. I. E. | I. | 1 | 1 | | 1 | |
| | Sec. Glands | ,, ,, | | *Nil* | 1 | 1 | | | 1 |
| TESTIS | Sec. Glands | Teratoma | | I. SX. | 1 | 1 | | 1 | |
| BLADDER | | Carc. | I. | | 1 | 1 | | 1 | |
| | | ,, | SX. | | 3 | 3 | | 2 | |
| | | | | | | | | | 1 |
| | Rec. | ,, | SX. | | 1 | 1 | | | 1 |
| SKIN | | Rodent Ulcer | I. | | 9 | 7 | 2 | 9 | |
| | Rec. | | | | 3 | 1 | 2 | 3 | |
| | | Sq. Carc. | I. | | 4 | 2 | 2 | 4 | |
| | | ,, ,, | I. E. I. S. | | 1 | 1 | | 1 | |
| | | ,, ,, | I. S. | | 2 | 2 | | 2 | |
| | | ,, ,, | S. | | 1 | 1 | | 1 | |
| | | ,, ,, | E. | | 1 | 1 | | 1 | |
| | | | | | **9** | **7** | **2** | **9** | |
| | Rec. | ,, ,, | | | 5 | 1 | 4 | 5 | |
| | Rec. | Endothelioma | S. | | 1 | 1 | | 1 | |
| | | Fibro-Sarcoma | SX. | | 1 | | 1 | | 1 |
| | | ,, ,, | S. | | 1 | | 1 | 1 | |
| | | Melano-Sarcoma | *Nil* | *Nil* | 1 | 1 | | | 1 |
| | Rec. | ,, ,, | *Nil* | *Nil* | 1 | | 1 | 1 | |
| | Rec. | Papilloma | S. | | 1 | 1 | | 1 | |
| ORBIT | Type? | Sarcoma | I. | | 1 | 1 | | 1 | |
| | Type? | ,, | S. | | 1 | 1 | | 1 | |
| AXILLA | | Fibro-Sarcoma | SX. | | 1 | 1 | | 1 | |
| FEMUR | Type? | Sarcoma | SX. | | 1 | 1 | | 1 | |

Figures in heavy type are the summation of the numbers in the immediately preceding category.

*Symbols used to Denote Methods of Treatment.*

| | | | |
|---|---|---|---|
| B | Block Dissection. | IAbd | Interstitial *via* Abdomen. |
| C | Cavitary. | IO | Interstitial through wound. |
| E | Excision of Growth. | LA | Local Amputation. |
| F | Fenestration. | RA | Radical Amputation. |
| H | Heyman Technique. | S | Surface with Radium. |
| I | Interstitial. | SX | Deep Therapy. |

## TABLE I., 1935 (*continued*).

| Site. | | Disease. | Methods of Radiation and Other Treatment. Primary Growth. | Lymph Areas. | Total | Male | Female | Alive | Dead |
|---|---|---|---|---|---|---|---|---|---|
| TIBIA | | Chondes Sarcoma | S. | | 2 | 2 | | 2 | |
| ABDOMINAL WALL | Malignant | Melanoma | *Nil* | *Nil* | 1 | 1 | | | 1 |
| ILIAC CREST | Type ? | Sarcoma | SX. | | 2 | 1 | 1 | 2 | |
| SPLEEN | | Lympho Sarcoma | SX. | | 1 | 1 | | | 1 |
| ABDOMEN | | „ „ | SX. | | 1 | 1 | | | 1 |
| GROIN | | „ „ | SX. | | 1 | 1 | | | 1 |
| CEREBRAL TUMOUR | Radiation only at Mt. Vernon | Spongeio-blastoma | S. | | 4 | 2 | 2 | 2 | 2 |
| | | Medullo-blastoma | S. | | 1 | | 1 | 1 | |
| LYMPH-ADENOMA | | | SX. S. | | 2 | 1 | 1 | 2 | |
| | | | SX. | | 1 | | 1 | 1 | |
| NECK | | Endothelioma | | | 2 | 2 | | 1 | 1 |
| MISCELLANEOUS | | | | | 13 | 6 | 7 | 9 | 4 |
| | | | | | 392 | 134 | 258 | 347 | 45 |

Figures in heavy type are the summation of the numbers in the immediately preceding category.

*Symbols used to Denote Methods of Treatment.*

| | | | |
|---|---|---|---|
| B | Block Dissection. | IAbd | Interstitial *via* Abdomen. |
| C | Cavitary. | IO | Interstitial through wound. |
| E | Excision of Growth. | LA | Local Amputation. |
| F | Fenestration. | RA | Radical Amputation. |
| H | Heyman Technique. | S | Surface with Radium. |
| I | Interstitial. | SX | Deep Therapy. |

## TABLE XX.

CARCINOMA OF BREAST.

All Cases (untreated when first admitted).

| Year. | Interval since Treatment. | Total. | Alive. | Dead. | Not Traced. |
|---|---|---|---|---|---|
| 1930 | 5 years | 46 | 16 | 29 | 1 |
| 1931 | 4 years | 55 | 20 | 34 | 1 |
| 1932 | 3 years | 51 | 23 | 28 | |
| 1933 | 2 years | 47 | 20 | 27 | |
| 1934 | 1 year | 42 | 21 | 21 | |
| 1935 | | 36 | 34 | 2 | |

## TABLE XX. A.

CARCINOMA OF BREAST.

PALLIATIVE TREATMENT AND NO TREATMENT CASES EXCLUDED.

| Year. | Interval since Treatment. | Total. | Alive. | Dead. | Not Traced. |
|---|---|---|---|---|---|
| 1930 | 5 years | 45 | 16 | 28 | 1 |
| 1931 | 4 years | 47 | 19 | 27 | 1 |
| 1932 | 3 years | 42 | 22 | 20 | |
| 1933 | 2 years | 40 | 19 | 23 | |
| 1934 | 1 year | 32 | 19 | 13 | |
| 1935 | | 31 | 30 | 1 | |

## TABLE XX. B.

CARCINOMA OF BREAST.

INTERSTITIAL RADIATION OF BREAST AND LYMPHATIC AREAS.

| Year. | Interval since Treatment. | Total. | Alive. | Dead. | Not Traced. |
|---|---|---|---|---|---|
| 1930 | 5 years | 23 | 7 | 15 | 1 |
| 1931 | 4 years | 14 | 5 | 9 | |
| 1932 | 3 years | 10 | 3 | 7 | |
| 1933 | 2 years | 11 | 6 | 5 | |
| 1934 | 1 year | 6 | 4 | 2 | |
| 1935 | | 8 | 8 | 0 | |

## TABLE XX. C.

CARCINOMA OF BREAST.

INTERSTITIAL AND SURFACE RADIATION OF BREAST AND LYMPHATIC AREAS.

| Year. | Interval since Treatment. | Total. | Alive. | Dead. | Not Traced. |
|---|---|---|---|---|---|
| 1930 | 5 years | 10 | 3 | 7 | |
| 1931 | 4 years | 20 | 8 | 12 | |
| 1932 | 3 years | 20 | 13 | 7 | |
| 1933 | 2 years | 10 | 5 | 5 | |
| 1934 | 1 year | 0 | 0 | 0 | |
| 1935 | | 1 | 1 | 0 | |

## TABLE XXV.

CARCINOMA OF CERVIX.

All Cases (untreated when first admitted).

| Year. | Interval since Treatment. | Total, | Alive. | Dead. | Not Traced. |
|---|---|---|---|---|---|
| 1930 | 5 years | 43 | 10 | 33 | |
| 1931 | 4 years | 53 | 18 | 34 | 1 |
| 1932 | 3 years | 55 | 20 | 34 | 1 |
| 1933 | 2 years | 39 | 13 | 26 | |
| 1934 | 1 year | 47 | 19 | 25 | 3 |
| 1935 | | 59 | 58 | 1 | |

## TABLE XXV. B.

CARCINOMA OF CERVIX.

ALL CASES TREATED BY RADIATION.

| Year. | Interval since Treatment. | International Degree. 1 | | 2 | | 3 | | 4 | | Total. | | Not Radiated. | | Not Traced. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alive. | Dead. | Alive. | Dead. | Alive. | Dead. | Alive. | Dead. | Alive. | Dead. | Alive. | Dead. | |
| 1930 | 5 years | 4 | 3 | 4 | 6 | 3 | 12 | 0 | 10 | 10 | 32 | | 1 | |
| 1931 | 4 years | 3 | 1 | 6 | 7 | 8 | 16 | 1 | 10 | 18 | 34 | | | 1 |
| 1932 | 3 years | 6 | 3 | 6 | 1 | 6 | 10 | 2 | 19 | 20 | 35 | | 1 | 1 |
| 1933 | 2 years | 1 | 1 | 2 | 3 | 7 | 14 | 3 | 8 | 13 | 26 | | | |
| 1934 | 1 year | 3 | 1 | 6 | 3 | 6 | 9 | 4 | 11 | 19 | 22 | | 1 | 3 |
| 1935 | | 8 | 0 | 16 | 0 | 24 | 1 | 9 | 0 | 57 | 1 | 1 | | |



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