That I have seen repeatedly. And we do not want to confuse leakage of cerebrospinal fluid from the spinal canal with the little droplets that will appear in the upper central part of the ulcerated area, which come from the open central canal of the cord. Where there is an ulcerated area, if you look carefully in the median line toward the top you will almost invariably see a minute hole, and if you watch it long enough you will find a little droplet oozing from that as sweat comes from a sweat gland. If you figure the thing out you will see how the hole comes there embryologically.

There is a definite danger of death from meningitis after operation, and also the danger of death from sudden leakage. If the utmost care is not taken through posture and in every way to prevent excessive leakage at the time of operation, the results are, within twelve hours, an excessive rise of temperature. For instance, it may happen in a case operated in the morning, that in the evening the temperature may go to 106° or 110°. Then there is the danger of leakage around stitch holes, which not necessarily always, but sometimes, adds tremendously to the danger of death from meningitis. The third danger is the danger of hydrocephalus. When we take away the spina bifida in many of these cases we take away the safety valve. The operations which have been devised for the cure of hydrocephalus are operations which try to bring the cerebrospinal fluid into communication with a large area of fat, whether subcutaneous fat or retroperitoneal fat. Where we have a spina bifida we have that condition existing. We have the meninges coming out, spreading out, and lying in contact with this large area of subcutaneous fat, so that there is that safety valve. There is a chance for the cerebrospinal fluid to pass out from this big tumor into the subcutaneous tissues, and there is a balance struck between the secretion and the absorption back again into the subcutaneous tissues from the spina bifida; and when we cut off the spina bifida we take away the safety valve, and the head fills up.

I agree absolutely with Dr. Thomas that we must use the utmost care in saving any nerves that we can. And in answer to Dr. Harmer's question, I would say that I personally have not any one method of choice, but I believe in simply saving them in the best way possible, and I think usually the best way is to open where there are no nerves, and then work from the inside, rather than trying to work from the outside, because we can see better on the inside than on the outside.

I think Dr. Thomas emphasized one point which is very important, and that is, always look at the perineum. Whenever there is any paralysis it is bound to show there. It may show elsewhere, but always in the perineum.

REPORT OF RESULTS OF RADIUM TREATMENT AT
THE COLLIS P. HUNTINGTON MEMORIAL HOS-
PITAL BY THE CANCER COMMISSION OF
HARVARD UNIVERSITY.

BY WILLIAM DUANE, PH.D., BOSTON,
AND

ROBERT B. GREENOUGH, M.D., BOSTON.

THE treatment of cancer and allied conditions
by radium has now (June, 1917) been in oper-

ation at the Collis P. Huntington Memorial Hos-
pital for a sufficient length of time to permit
conclusions with regard to its value to be formu-
lated. Radium was first employed here in Sep-
tember, 1913, and from that time to the present
day has been the main interest and activity of
the clinical work carried on by the Cancer Com-
mission.

The chief responsibility for this work must be
accorded to Dr. J. Collins Warren, Chairman of
the Cancer Commission of Harvard University.
Dr. Warren early saw the necessity for an in-
dependent and unbiased investigation of the
value of the many therapeutic agents advocated
from time to time as "cures" for cancer, and it
is due entirely to his wise foresight, his unlim-
ited enthusiasm, and his untiring effort that the
hospital was established, and the clinical work of
the Commission begun on a broad basis of scien-
tific accuracy, and with resources sufficient to
maintain these standards. During this period
a number of different individuals have taken a
part in the work, but owing to the very complete
system of records and clinical notes established
by the first Physician-in-Charge of the Hospital,
Dr. Thomas Ordway, the data obtained are now
available for study, and the results can be ac-
cumulated and stated with a considerable degree
of accuracy. The hospital was opened during
the period when Dr. E. E. Tyzzer was Director
of the Cancer Commission, and he took a large
part in the organization of the work, as well as
the more definite responsibility for the patho-
logical work, the reports of autopsies and the
examination of clinical pathological material.
The work with radium began in September,
1913, with the appointment to the Commission
of William Duane, Ph.D., Research Fellow in
Physics. Dr. Duane has had charge of the pre-
paration and measurement of the radium, and
of the details of its practical application to treat-
ment of the cases adjudged suitable for radium
therapy. In addition to Dr. Tyzzer, Dr. Ord-
way and Dr. Duane, a number of others have
had a share in the collection of the data on
which this report is based: Dr. Ellis Kellert
and Dr. George Benet, resident physicians; Dr.
Henry A. Christian and Dr. Francis Peabody,
consulting physicians; Dr. J. Lucien Morris, Dr.
F. S. Hammett, Dr. Henry Lyman, chemists;
Dr. W. J. Kerr, Dr. Carl T. Harris, Dr. Clar-
ence T. Hyman, house officers; Dr. Edward H.
Risley and Dr. Channing C. Simmons, assistant
surgeons; Dr. George A. Leland, Jr., Out-
Patient surgeon; Dr. A. A. Ghoreyeb, Research
Fellow in Pathology; Miss Irene W. Mason and
Miss Anna Gibson, matron-superintendents of
the hospital; and many consultants in special
lines of clinical work, including Drs. Harvey
Cushing, C. A. Porter, D. Crosby Greene, Harris
P. Mosher, E. A. Crockett, W. P. Graves, George
Derby, C. J. White, as well as Dr. Robert B.
Greenough, Surgeon-in-Charge of the Hunting-
ton Hospital. All of above-mentioned persons
have in some degree contributed to the accumu-

lation of the material upon which this report is based.

The present organization of the hospital work is as follows: A patient is referred to the hospital by his own physician, or by another institution. Application cards are furnished with blanks for the principal data which it is desired to obtain. The patient is then examined with a view to the diagnosis and the question of whether or no radical operative treatment is a possibility. When the opinion of a consultant is needed the services of the members of the different departments of the Harvard Medical School are freely called upon, and have been most generously given. With the exception of certain minor superficial lesions of the non-metastasizing type, it has always been the policy of the hospital in operable cases, to advise operation, and to withhold radium or other non-operative treatment. If operation is considered advisable the patient is referred to one of the larger hospitals, or returned to his own physician with this opinion. A few cases have been received at the Huntington Hospital for radical operation, but they are taken only for special reasons, and are the exceptions to the general rule.

Pathological reports in confirmation of the diagnosis of cancer are sought in every case. In the cases of post-operative recurrence of cancer, the pathological report upon the tissue removed at operation can usually be obtained. In advanced inoperable and ulcerated cases, a fragment of tissue to confirm the diagnosis can usually be secured with the curette, without undue danger of spread of the disease. Where the tissues are unbroken, however, it has been the policy of the hospital to refrain from employing the exploratory excision of fragments of tissue, on the ground that the danger to the patient of artificial spread of the disease outweighed the advantages of a certain diagnosis. This rule has been broken, advisedly, from time to time, but only on rare occasions.

If the case is one which is considered suitable for radium treatment, the matter is discussed with Dr. Duane; the details in regard to dosage, screening, distance, duration and frequency are determined, and treatment is begun. Special methods of application are devised for special cases, and the progress of the case is followed both by the radium expert, and by the surgeon. Data, consisting of measurements, photographs, tracings, etc., are made, and the record is continued. No case is discharged "cured" or otherwise, until terminated by death. A follow-up system, under Miss Ruth Symonds, the Social Service Worker of the hospital, has yielded excellent results in tracing up "lost" cases. From April, 1912, till January 1, 1916, out of 1080 cases, the end-results (to within six months) were known in all but 39.

It has been the policy of the hospital to restrict the use of radium to patients that could be brought to the hospital to be cared for by the

staff; only in this way can the full benefit of the radium be secured to the patient, and the full benefit of the data obtained secured to the Commission.

In reporting the results of the use of radium in the treatment of cancer, some preliminary statements are advisable. When the first reports of the therapeutic use of radium were given out, a lapse of time sufficient for an unbiased and definite conclusion as to its benefits had not occurred. In certain clinics, also, the customary data for the surgical diagnosis of malignant disease in its different situations were not always obtained, and evidence in support of the statements that the cases treated were actually cancer was not provided. The sensational publications in the lay press relating to the wonderful effects of radium therapy, and the dramatic and interesting physical phenomena of radioactivity, all helped to rouse in the public, and among the profession at large, an expectation of brilliant results far in excess of what the facts now actually seem to warrant. Again, the obviously extravagant claims of some of the earlier exponents of radium therapy served to arouse in the more conservative members of the profession a natural pessimism, which led them to distrust its value altogether. As a fact, the real truth lies somewhere between these two extremes. Radium is not a cure for all kinds of cancer. There are many cases of cancer in which it can be said to be of no material benefit; but there are also many cases where its use prolongs life, relieves distressing symptoms, improves the general condition and the functional activities of the patient, and mitigates, as does no other agent which we have employed, the gradually progressive symptoms of advancing incurable cancer. There is a small group of cases of cancer where treatment with radium has apparently, so far as our observations extend, been capable of eradicating the clinical manifestations of the disease. It would be premature to use the word "cured" in this connection, as the time elapsed is not sufficient to conform to the arbitrary three or five year limits commonly accepted in surgical literature, which are admittedly themselves time standards too brief to cover the infrequent but well-established cases of late recurrence. This group of cases includes the more superficial and less rapidly metastasizing forms of carcinoma, together with a few cases of the deeper and generally more serious types of disease which appear to be, for some unknown reason, individually more susceptible to radiation than the usual cases of the same character. In the large group of cases in which radium has marked beneficial effect as palliative treatment, and in the smaller group in which its effects are more permanent and complete in eradicating the clinical signs of the disease, radium has already justified the very considerable outlay necessary for its purchase, and the further difficulties and dangers of its effective administration.

The 1080 cases included in this report are those which entered the hospital in the twenty-eight months from April, 1912, to January, 1916. Radium was not used for treatment here until September, 1913, but it was then applied to many of the cases which had entered the hospital before that time. 642 of the 1080 cases received radium treatment. The arbitrary date of January, 1916, was established in order that at least a year might have elapsed in every case reported before the results of treatment were assembled for study. The end results given, however, are carried up to date (January, 1917), and represent the results at periods from twelve to forty months after treatment was begun—an average of two years and two months.

During the period of time mentioned the Commission has been using only 235 milligrams of radium. This amount has since been greatly augmented through the kindness of friends of the University.

The tabular list of cases is as follows:

Carcinoma (A)	
Buccal Cavity (39A)	
Lip	39
Palate	8
Jaw (lower)	36
Jaw (upper—antrum)	11
Tongue and floor of mouth	33
Tonsil	7
Cheek (buccal surface)	5
TOTAL	139
Stomach, Liver, etc. (40A)	
Oesophagus	12
Pharynx	9
Gall-bladder and liver	2
Pancreas	1
Stomach	16
TOTAL	40
Peritoneum, etc. (41A)	
Peritoneum and omentum	2
Intestine (colon)	5
Rectum	9
TOTAL	16
Urinary Organs (45A)	
Bladder	3
TOTAL	3
G.-U., Male (45A)	
Prostate	5
Penis	2
TOTAL	7
G.-U., Female (42A)	
Vagina	6
Uterus	91
Ovary	12
Clitoris	1
Vulva	2
TOTAL	112
Breast (43A)	
TOTAL	143

Skin, Face, etc. (44A)	
Carcinoma	83
Epidermoid carcinoma	58
Rodent ulcer	34
"Epithelioma"	21
TOTAL	196

Other Sites (45A)	
Thyroid	7
Neck glands	14
Larynx	15
Glands of groin, axilla, etc.	5
Parotid	2
Nasal mucosa	3
TOTAL	46

Sarcoma and Allied Tumors (F)	
Bone	16
Soft parts	22
Melanotic	8
Endothelioma	2
Brain tumor	9
Myeloma	1
Mixed tumors	4
Hypernephroma	4
TOTAL	66

Benign Tumors	
Papilloma	31
Miscellaneous	10
Breast	5
Keloid	9
Naevus	15
TOTAL	70

Miscellaneous Conditions	
Keratosis senilis	33
Tuberculosis	11
Syphilis	11
Lupus erythematosus	6
Leukoplakia	8
Leukaemia { Lymphatic 7 }	29
{ Myelogenous 22 }	
Lymphoma	40
Effects of radium	9
Deafness	11
Apprehension	14
Fibrosis penis	3
Miscellaneous diseases (not radium)	53
Skin lesions—miscellaneous	6
Chronic inflammatory diseases	3
No diagnosis	5
TOTAL	242
GRAND TOTAL	1080

Certain groups of cases of cancer of special organs or regions have been allotted to different members of the staff for analysis. These more detailed analyses will be published under separate titles. It will be sufficient in this introductory statement to formulate briefly the general estimate which has been formed of the value of radium treatment of cancer in its more common and important situations, and the evidence in support of these conclusions.

39A—CARCINOMA OF THE BUCCAL MUCOUS MEMBRANES—139 CASES.

(a) Cancer of the lip, 39 cases; 19 treated with radium; 4 with complete success; 4 with

improvement, and 11 with no benefit. Squamous cell carcinoma in this situation is resistant to radium therapy. When the disease has metastasized to the regional lymph nodes no marked benefit from radium has been observed. Local recurrence, however, as in other superficial situations, can be affected favorably. It is our opinion that a grave responsibility rests on those who advocate radium treatment in preference to operation for cancer of the lip, in even its early stages.

Cancer of the palate, 8; tonsil, 7; buccal mucosa, 5; lower jaw, 36; upper jaw, 11; tongue and floor of mouth, 33—100 cases in all. Sixty-two of these received one or more treatments with radium; nine obtained some benefit from treatment. In the others the course of the disease was not materially affected. The best results were obtained in the cases of recurrent cancer of the jaw, where a neck dissection, performed at the time of the original radical operation, served to delay, if not to prevent, the glandular extension of the disease. In one such case local recurrence at the site of the original lesion on the jaw was destroyed with radium, and there has been no return of the disease in sixteen months. As a result of this experience we have recently treated a number of cases of otherwise inoperable mouth carcinoma by a primary neck dissection and subsequent radiation of the local tumor, and we are encouraged to hope that this method may prove effective in a certain number of cases not otherwise amenable to treatment.

40A—CARCINOMA OF STOMACH, LIVER, ETC.—40 CASES.

(a) Carcinoma of the esophagus, 12 cases. Five received radium treatment, and of these one obtained some relief of symptoms, although no permanent good was accomplished.

(b) Carcinoma of the pharynx, 9 cases. All treated with radium, and with no material benefit with the exception of one case which showed temporary improvement under prolonged treatment.

(c) Carcinoma of the gall-bladder, 1; pancreas, 1; and liver, 1—3 cases. The gall-bladder case and the pancreas case both received radium treatment, without notable improvement.

(d) Carcinoma of the stomach, 16 cases. Only one received radium treatment, which was given three times, with psychic, but no obvious physical benefit to the patient.

41A—CARCINOMA OF THE PERITONEUM, ETC.—16 CASES.

(a) Carcinoma of the peritoneum and omentum, 2 cases. No benefit from radium.

(b) Carcinoma of the intestine, 5 cases. Two cases were given radium without benefit.

(c) Carcinoma of the rectum, 9 cases. In 5 radical operation was advised; 3 accepted this

advice, and 2 of these are well four years and eight years* after operation; 3 received radium treatment, with but slight, if any, improvement in their condition.

45A—CARCINOMA OF THE URINARY ORGANS—3 CASES.

Carcinoma of the bladder, 3 cases. Two received radium treatment, and 1 obtained some relief and is still under treatment.

45A—CARCINOMA OF THE MALE GENITO-URINARY ORGANS—7 CASES.

(a) Carcinoma of the prostate, 5 cases. Four received radium treatment. All are dead, but one of these obtained definite, but temporary, relief.

(b) Carcinoma of the penis, 2 cases, of which one was advised to undergo operation, and the other received radium treatment without benefit.

42A—CARCINOMA OF THE FEMALE GENITO-URINARY ORGANS—112 CASES.

(a) Carcinoma of the vagina, 6 cases. Four received radium treatment; all are dead, the average duration of life being six months from the time of beginning treatment.

(b) Carcinoma of the vulva, 2; clitoris, 1—3 cases. All received radium. In none has there been marked benefit from treatment.

(c) Carcinoma of the uterus, 91 cases. These cases form the basis of a special report by Drs. E. H. Risley and G. A. Leland, Jr., covering the period up to June, 1916, bringing the number of cases to 113. Ninety of these cases received radium treatment, as follows:

Group 1. Cases considered inoperable, and treated with radium, improved enough to justify radical operation: 5 cases; 3 living, 2 without recurrence at twelve and eighteen months after operation, and 1 case free from recurrence for two years after operation, then local recurrence, and now under treatment.

Group 2. Cases received for prophylactic treatment after radical hysterectomy: 5 cases; 2 free from recurrence twelve and fifteen months after operation; 2 recurrent cases, and 1 untraced, but free from recurrence eight months after operation.

Group 3. Recurrence after hysterectomy, 37 cases: 1 apparently free from disease; 2 doubtful, 5 living with recurrence, and 26 dead.

Group 4. Recurrence after curette and cautery: 21 cases; 4 living with recurrence and under treatment; 1 living and without evidence of disease nineteen months after beginning treatment, but since then untraced.

Group 5. Inoperable cases: 22; none free of disease. Average duration of life after beginning radium, twenty-two months.

Of the 91 cases, 5 living and apparently free of

* Entered Collis P. Huntington Memorial Hospital for suspected recurrence, which did not exist. Original operation by Dr. C. A. Porter, 1909.

disease, six, twelve, twelve, fifteen and eighteen months after beginning treatment; 2 living and apparently free from disease eight and nineteen months after beginning treatment, but since then untraced. Of the 7, 2 were being treated on a prophylactic basis, and showed, after operation, no evidence of recurrence. The other 5 were recurrent or inoperable cases.

(d) Carcinoma of the ovary, 12 cases; five received treatment with radium in varying amounts; 1 case showed temporary improvement, and died fifteen months after beginning treatment; the others showed no marked improvement under radium.

43A—CARCINOMA OF THE BREAST—143 CASES.

Radical operation was advised in 14 cases and accepted in 11 cases, 8 of which show no evidence of recurrence to date; 49 cases received radium, and 27 received x-ray treatment; 3 of the radium cases showed definite local improvement, but the internal progress of the disease was not affected. It is our opinion that x-ray treatment with massive doses offers more than radium in the palliative treatment of recurrent cancer of the breast.

45A—MISCELLANEOUS CARCINOMA—46 CASES.

(a) Carcinoma of the thyroid, 7; parotid, 2; axillary glands, 1; glands of groin, 2; cervical glands, 14; nasal mucosa, 3—29 cases. Nineteen received radium; only one of these cases, a carcinoma of the nasal mucosa, is apparently relieved of his disease. In all of the others the progress of the disease was not materially affected.

(b) Carcinoma of the larynx: 15 cases; 7 received radium treatment, and all are dead, although temporary improvement was observed in two cases.

44A—CARCINOMA OF THE SKIN, FACE, EARS, HANDS, ETC.—196 CASES.

Carcinoma, 83; epidermoid carcinoma, 58; rodent ulcer, 34; "epithelioma," 21. It is in cases of this superficial type that radium produces its most marked and beneficial therapeutic effects. Of the first group, carcinoma, 33, or 39%, show no evidence of return of the disease. Eight cases were operated upon without recurrence, and only 10 cases, or 12%, failed to obtain definite benefit from radium treatment. Of the 58 cases of epidermoid carcinoma, 15, or 25%, were relieved of all evidence of their disease, and only 9 cases, or 15%, failed to show definite benefit from radium treatment.

Of the 34 cases of the rodent ulcer (basal cell) type of carcinoma of the skin, 12, or 35%, were relieved of all symptoms, and 6 cases, or 17%, showed only temporary benefit, or none at all.

Of the 21 cases of "epithelioma," 9 were permanently relieved, 44%. Only one case obtained no benefit, and in one the benefit was only temporary.

To sum up these 196 cases of superficial carcinoma of the skin, in 69, or 35%, the disease was apparently destroyed, and in only 27, or 14%, did it appear to be so little affected by radium that the patient obtained no benefit. In all of the other cases improvement was manifest, although in a limited number of cases the disease recurred after apparent destruction by radium, and is again under treatment.

F—SARCOMA.

Bone, 16 cases; soft parts, 22; melanotic sarcoma, 8—46 cases.

Bone sarcoma, 16 cases; 3 treated with radium, of which 1 showed no improvement, 1 slight improvement, and 1 apparently relieved of all evidence of the disease.

Sarcoma of soft parts, 22 cases; 9 treated with radium—4 showed no improvement, and in 5 slight palliative benefit was obtained.

Melanotic sarcoma, 8 cases; three treated with radium with some benefit, but no permanent results.

MISCELLANEOUS TUMORS.

Endothelioma, 2; brain tumor, 9; myeloma, 1; mixed tumors, 4; hypernephroma, 4—total, 20.

In this miscellaneous group of tumors no material benefit from radium has been observed.

BENIGN TUMORS.

Papilloma, 31 cases. These occur in two groups: the papillomata of old persons, associated with keratoses, 25; and those of younger persons, 16. In old people papillomata are readily susceptible to radium treatment. Twelve of the 25, or 48%, were destroyed by radium, and 5 by caustics. Of the other group, only 2 were subjected to radium, and both of these successfully.

Keloid, 9 cases. Seven treated by radium, and all with benefit, although prolonged treatment may be necessary, and a strong application, made sufficient to cause a superficial burn, the fibrous tissue of keloid can be made to disappear with radium, leaving a flat and atrophic scar. The process is painful, but reasonably sure.

Naevus, 15 cases. Ten treated with radium, and all with benefit. Here long-continued mild treatments are required, but with perseverance the common port wine mark, as well as more prominent cavernous angiomas, can be made to diminish in color and size, and become less conspicuous.

MISCELLANEOUS CONDITIONS.

Leucoplakia Buccalis, 8 cases. Four treated with radium. The common superficial cases of leukoplakia can be made to disappear with radium. The process, however, is painful, as a superficial burn is required to eradicate the disease. It is to be advised only in the more productive cases, where the tissues are heaped up in

papillary masses, and for the simple milky glossitis type, fulguration, as carried out by Dr. C. G. Mixter, has, in our opinion, proved most effective.

Leukemia, 29 cases. Lymphatic, 7; myelogenous, 22. These cases form the basis of a special report by Dr. Francis Peabody. The lymphatic cases have shown themselves resistant to treatment with radium, while those of the myelogenous type almost invariably show beneficial effects from radiation of the spleen. The blood picture returns toward, if not to, normal, the spleen shrinks, the red blood cells increase, the patient's general health and strength improve, he gains weight, and he is often able to resume his regular occupation. It is rare, however, for the myelocytes entirely to disappear from the blood smear, and the disease is subject to remissions and recurrences. It would be premature to claim anything more permanent than a temporary remission of symptoms as a result of radium treatment, but this temporary remission appears to be more lasting and more certain than that obtained by other methods of treatment which have been advocated for this disease.

Lymphoma, 40 cases. These cases form the basis of a special report by Dr. C. C. Simmons and Dr. George Benet. Twenty-one of these cases received treatment with radium. Of this number, 18 were cases of typical Hodgkin's disease, 1 was lymphosarcoma, and 2 were malignant lymphoma in situations other than in the lymph nodes. In the 18 cases of the Hodgkin's type, radium treatment almost invariably produced marked regression of the lymphomatous glands, with shrinkage of the tumor masses, and improvement in the general condition. The regression was most marked in the more accessible glands (neck) and was not obtained in the deeper lesions (mediastinum). Furthermore, the regression was almost invariably temporary, and sooner or later recurrence of the disease took place. It is our belief that more persistent and heavier treatment, especially of the mediastinal glands, may yield more satisfactory results. Of the lymphosarcoma group, one case, although glands are still present, has received marked benefit from radium treatment, and is now in good condition eighteen months after beginning treatment. Of the 2 malignant lymphoma cases, both have apparently obtained a disappearance of their disease,—one of the palate and one of the rectum. The palate case recurred, but the recurrence also disappeared, and the case is now thirty-three months without recurrence. The rectal case has been free of disease for twenty-four months.

It would appear that tissue of the lymphoma type was especially susceptible to the action of radiation, and the use of radium in such cases is to be advised.

Keratosis Senilis, 33 cases. One of the lesions most amenable to radium treatment. Twenty cases, or 60%, were relieved of the disease, one

case recurred and received further treatment, and only two proved entirely resistant to radiation. One or two mild applications are usually sufficient to eradicate the lesions, without the production of a burn, or, indeed, any material discomfort to the patient.

SUMMARY.

As a result of the use of about 235 milligrams radium in the treatment of 642 cases of cancer and allied conditions at the Collis P. Huntington Memorial Hospital, from September, 1913, to January, 1916, the following conclusions are justified.

1. Many cases of advanced, inoperable or recurrent cancer may be given benefit by treatment with radium.
2. In such cases the relief may include one or more of the following advantages: Relief of pain, diminution of discharge, rendering discharges less offensive, relief of hemorrhage, diminution in the size of tumor masses, even to their total disappearance; and the improvement in the general condition of the patient. To these must be added the undoubtedly beneficial psychic effect upon the patient.
3. In a very small number of advanced and apparently inoperable cases, improvement may occur such as to permit a radical operation to be performed.
4. In a certain proportion of cases of superficial non-metastasizing types of cancer (about 35%) and in a much smaller number of cases of metastasizing cancer, radium is capable of destroying the clinical manifestations of the disease. Time has not elapsed sufficient to report these cases as "cured," and they are being kept under observation. In a limited number of cases, recurrence, after apparent destruction of the lesion, has taken place. In certain situations, as on the eye-lids, radium treatment of these lesions is to be preferred to operation.
5. In keratoses, papilloma and other benign skin diseases regarded as "precancerous," radium is effective in destroying the clinical manifestations of the disease in from 48 to 60% of cases.
6. In myelogenous leukemia, the beneficial effects of radium are pronounced, and although recurrence of symptoms may take place, the clinical advantages of radium therapy are very marked.
7. In malignant lymphoma, lymphosarcoma, and Hodgkin's disease, the lesions appear to be especially sensitive to radiation, and definite, though temporary, benefit is obtained. When in accessible situations, it would appear that the disease could be controlled by radiation for a considerable period of time.
8. In the treatment of many other tumors and diseases radium has been used with benefit depending largely upon the extent of the disease, its depth in the tissues, and the practical ability to apply sufficient radiation to modify

or destroy tissue or tumor growth. Among the conditions in which radium treatment has proved of special value may be mentioned: recurrent or inoperable carcinoma of the cervix, or of the body of the uterus, Hodgkin's disease and malignant lymphoma, myelogenous leukemia, inoperable squamous cell carcinoma of the tongue, jaw and buccal mucous membranes, in non-metastasizing epidermoid cancer and in the more benign lesions of keratoses, papilloma, and other so-called precancerous conditions.

9. Radium therapy has proved, so far, to be of little benefit in recurrent carcinoma of the breast, carcinoma of the stomach and intestine, carcinoma of the glands of the neck, by extension from cancer of the tongue, mouth and lip, and in general in deeply seated metastatic extension of cancer from any region.

10. The use of radium in prophylaxis of recurrence after radical operation, for the cure of cancer, is not advised. Where serious doubt exists as to the complete removal of the primary tumor, and where the location of the suspicious area is superficial and accessible, and of small extent, radium may be used with benefit, but where a large area is to be considered, as after operation for breast cancer, the difficulties of covering the whole area with sufficient radiation are such that the treatment is not to be recommended.

11. The combination of radium therapy and operation, by which a tumor, otherwise inoperable, is excised as thoroughly as possible, the remaining tissues cauterized, and subsequently subjected to radiation, has yielded satisfactory results in several cases. This method of procedure is especially adapted to the more advanced cases of rodent ulcer, involving the face. After a period of radiation and observation of the open, granulating wound, extending over several months, secondary plastic operations have been performed to close the defects, and the results, up to the present time, in a very small number of cases, have shown no return of the disease.

12. Of 642 cases treated with radium in this series, 354, or 55%, received definite benefit.

13. Although many cases of advanced carcinoma show no appreciable benefit from radium treatment, it is also true that in no case yet observed has radium appeared actually to accelerate the growth of tumor tissue. Patients have suffered pain and inconvenience from the effects of radium burns in certain instances, but these have been of a temporary character. The constitutional effects of heavy doses of radium are unpleasant, and severe nausea and depression may occur; but these, also, are chiefly temporary in character. With continued and excessive dosage, very profound constitutional effects may be obtained. A serious diminution in the number of white cells in the blood is observed after continued heavy dosage. This is a more lasting phenomenon, and may be of serious im-

portance in relation to the patient's resistance to infection. On this subject we are not, as yet, ready to report. In no other respect have we found radium to exert an unfavorable action upon the patient.

14. The considerable expense of purchase and the difficulties and dangers of administration of radium therapy are more than justified by the results obtained.

MESOTHIORIUM AND COMBINATION METHODS IN THE TREATMENT OF CANCER.

BY F. D. DONOGHUE, M.D., BOSTON.

THE late Professor Czerny, who inspired the erection and conducted the first cancer institution in the world, where all cases of cancer were looked upon as hopeful, in reply to a critic, made the following answer:

"Only slowly can the seed ripen which experimenters and therapists have planted in the ground, to mature slowly the fruit of a chemico-therapy of cancer. Under many barren stones are to be found here and there kernels of gold, which possess permanent value. A careful and experienced chemist is required to separate the true gold from the dross."

In our treatment of cancer, we have looked too enthusiastically forward to a specific for cancer. The effort to combine and correlate the various methods of proven value is a comparatively new thing. The results of the Huntington Cancer Hospital show how much may be accomplished in a well-conducted institution.

The standpoint from which I speak is the standpoint of the practitioner without a large institution, but who is willing to learn, from institutional experimentation, that which is best and safest for private practice.

There is undoubtedly a large group of cases of malignant disease which are hospital cases, but the general surgeon in the general hospital still ignores the possibilities of therapeutic means other than surgical, and the special hospital is apt to get only such cases as are looked upon as hopeless and incurable by the surgeon in the general hospital.

The inadequacy of surgery alone in controlling cancer is manifest.

That no satisfactory method for the treatment of cancer has yet been determined is evinced by the number of curative methods which have been devised, and which are in use. I do not think it can be said that the early removal of all cancers is the surest and best method of treatment, nor can it be said that surgical removal of cancer does not still deserve the most prominent place in treatment.

The results of operative treatment of cancer, however, are painfully disappointing, and while here and there brilliant results are obtained, on the whole the large per cent. recurring after operation is discouraging.