



Bulletin of the
**University of Minnesota Hospitals
and
Minnesota Medical Foundation**



**Therapy of Carcinoma
of the Cervix**

BULLETIN OF THE
UNIVERSITY OF MINNESOTA HOSPITALS
and
MINNESOTA MEDICAL FOUNDATION

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I. RESULTS OF AN EXPERIMENTAL THERAPY OF CARCINOMA OF THE CERVIX

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It is generally agreed that irradiation therapy of cervical carcinoma offers the most effective therapeutic approach presently available. That it is not an ideal solution to therapy is obvious. But until a better approach becomes available, the therapeutic tools which are at hand must be used with a maximum efficiency. A great variety of techniques is being used. These show variations in time factors, in dosage and the accuracy with which this is determined and reported, in the relative stress given to x-ray and to radium and in the technical details of controls and patient care. It has been publicly stated that all of these are producing similar results but a careful examination and biometric testing of reported results show that this is not so. Since statistically significant differences can be demonstrated, it would seem essential that the details which led to such differences be carefully examined with the object of establishing wherever possible at least general principles which can be accepted. There are many difficulties which lie in the path which leads to such a goal; but one has only to look at the older figures from the League of Nations reporting clinics and to compare them with what is being achieved today to realize that enormous improvement has been made. The door is not closed to still further progress.

The present report deals with part of a larger study which has been going on since 1939. This report deals only with the results of therapy. The techniques and dosages which were chosen for the study are admittedly arbitrary and were applied after some preliminary exploration. There is no adequately based theory on which to determine the finer details although much interesting work has been done in this field. This is not the place to argue the theoretical advantages or disadvantages concerned. It was decided to

apply deep x-ray daily except Sunday over as close to twenty-eight days as possible and to follow this immediately by the application of radium. Clinical experiments were run to determine the dosages of each which under these circumstances would be tolerated by the average patient. With minor variations, as individual study programs arose, this has been carried out on the whole group.

It was decided to deliver 3,000 tissue roentgens by x-ray diffusely to the whole pelvis including the tumor over as close to twenty-eight days as possible. Each patient is measured and, by the application of standard charts, the number and size of fields and the amount of irradiation given per treatment are determined. In preliminary studies, ionization chambers were placed in the craters of suitable tumors and the reality of the dosage determined. There is a very considerable variation between the calculated and the actual dose to the tumor area even under circumstances where accurate calculations are made. To guess what the tumor area gets from some arbitrary decision as to the dosage which is given to arbitrarily determined sizes of skin fields is a method so grossly inaccurate that it should not be used. It usually results in gross underdosage for purposes of medicolegal safety which is a poor basis for determination of dosage. In the earliest part of the study the tumor dosage often fell between 2,600 and 3,000 tissue roentgens because of fear of the larger dosage. Recently, as a separate study, the League of Nations Stage III tumors have been treated with a total of 3,500 tissue roentgens. There are not enough of either of these to influence significantly the end results.

During the time under consideration, relatively small changes in the roentgen therapy technique have been made. Between January, 1939, and June, 1942, the factors were: 220 kv., 1 mm. copper + 1 mm. aluminum filter, half value layer 1.7 mm. Copper; 60 and 70 cm. target-skin distance. Since June, 1942, the factors have been: 400 kv., .44 mm. tin + .25 mm. copper + 1 mm. aluminum filter, half value layer 3.9 mm. copper; 70 and

80 cm. target-skin distance.

As a rule, five fields were used: one anterior 18 by 20 cm., one posterior right oblique 14 by 18 cm., one posterior left oblique 14 by 18 cm., one right lateral 12 by 18 cm., and one left lateral 12 by 18 cm. One field was treated each day, 300 to 350 r./air. A total dose of 3,000 tissue roentgens was given to the center of pelvis in a period of 28 days. All these factors were, of course, varied somewhat to suit the individual. The only thing that was supposed to remain constant was the calculated dose of 3,000 tissue roentgens to the center. At first the dose was, however, somewhat lower and was gradually raised from a minimum of 2,500 to a routine of 3,000 tissue roentgens. An effort was made to limit the time to 28 days but a variation became necessary from about 25 to 35 days. Patients with large anterior-posterior and lateral diameters were given additional fields (perineal, anterior oblique fields). Two fields were sometimes treated the same day. Complications such as a drop in the patient's white blood count below 2,000, fever, or symptoms of uremia made it occasionally necessary to interrupt the treatments for a few days.

With 3,000 tissue roentgens to the center, a higher dose was obtained in certain portions of the pelvis and the maximum reached about 3,600 tissue roentgens.

The radium dosage, as in all other surface radium irradiation in the Department of Obstetrics and Gynecology, has been given over 100 hours. This is an arbitrarily chosen time with some vague theoretical advantages. But the standardization allows avoidance of one variable in the relationship between physical and biological dosage and so aids in accuracy. Multiple radium portals are used in order to get a maximum dose at as great a distance in the lymphatic drainage system as possible while still remaining within the tolerance of the local tissue which must be left so that it will heal. Compound isodose curves for an ideal setup show the cervical tumor it-

self to receive 15,000 to 25,000 gamma roentgens. This is more than is required and is not the determining factor in dosage. The cervix and vagina in the well-nourished patient will tolerate this and heal. A Kaplan colpostat is used in the vagina with as many portals to a maximum of three as the individual vagina will take. Radium in tandem is placed in the uterine cavity in an uncovered platinum container 5 to 6 cm. in length. One millimeter of platinum or its equivalent filtration is used. The vaginal colpostat has approximately 0.75 cm. of focal distance. When anatomically possible, two portals in tandem of 10 mg. of radium each are used in the uterus and three similar portals in the two arms and the central cork of the Kaplan colpostat in the vagina. Thus 50 mg. are applied for 100 hours. This dosage will vary somewhat with individual circumstances of the tumor and the patient. The dosage is of necessity decreased as the number of portals has to be decreased in the presence of vaginal shrinkage or absent uterus. The radium is applied on the day of the last x-ray treatment and is held in position by gauze moistened by an emulsion of 1 per cent neutral acriflavine to decrease bacterial growth.

The patients are hospitalized throughout the whole course of therapy. They are fed a high-protein, antianemic, low-residue, high-caloric diet. The usual studies are carried out to recognize abnormalities and usual treatment carried out for these when they occur.

The material consists of all patients who have come under control of the department from January, 1939, to the end of 1947. The League of Nations Cancer Committee rules have been applied and their staging used. Thus all patients with carcinoma of the cervix who have come to the gynecological department have been considered but those who had been treated previously for this condition are placed in a separate group referred to as nonreportable cases. A few patients have been excluded. Those who have been treated elsewhere and have come for follow-up are not included if

they showed no tumor and so were not treated by this department. Almost all of the reportable cases had had no previous treatment. Two patients are included as reportable though a biopsy was taken elsewhere, a negligible quantity of radium applied, and the patients immediately referred. This was not considered as treatment elsewhere since it was not such as to be taken into any consideration in our own therapy and did not interfere for more than a few days with referral.

The patients with adenocarcinomas of the cervix are included since, surprisingly enough, they showed similar results to those with the squamous-cell tumors and so do not influence the conclusions. The three adenoma malignum cases all fall into the nonreportable group.

Every patient has been followed to death or to January, 1949. The department has been fortunate in the availability of funds to support a full-time trained secretary whose only duty is the organization of the follow-up of the gynecologic malignant disease patients. Multiple addresses of relatives and friends, preferably those who own property or are otherwise relatively geographically fixed, are taken on recognition of the tumor and this list is kept up to date. It is a simple procedure which has been of significant aid in an otherwise difficult and uncertain task.

The diagnosis has been made or confirmed by biopsy in every case. For all of those who have passed five years since treatment, the histologic material has been passed upon by the late Dr. Robert Meyer. There is no questionable carcinoma in the series.

A few patients have been treated by primary surgery for a variety of reasons. There were but seven of these and only two of them were treated more than five years ago. The results in these do not vary from the results in the general group sufficiently to change the rates. They are left in with the irradiation group for completeness.

In addition, there were eight patients who were treated more than five years ago by irradiation followed by surgery and two in whom the tumor was microscopic and found in the surgical specimens. These latter were irradiated after surgery. Five of these ten were alive and free of tumor at the end of five years. Since they, again, do not change the figure for the general material, they are included.

Results

The results are shown in Tables I to V. The absolute five-year cure rate is 53.6 per cent (S.D. \pm 2.8 per cent). For Stage I, this was 80.2 per cent (S.D. \pm 4.0 per cent); for Stage II, 54.1 per cent (S.D. \pm 4.8 per cent); for Stage III, 29.5 per cent (S.D. \pm 5.2 per cent); and in Stage IV, a single patient of 16 survived. The standard deviations were determined on each year's survival figures. The proportions of the total material in each of these stages is shown at the bottom of the tables.

Two patients with Stage III tumors were not treated. One refused and one died with uremia and septicemia before treatment could be begun. Six patients with Stage IV tumors were not treated. Four of these had hopeless distant metastases and two died of intercurrent disease before treatment. All of these are included in the calculation of the absolute survival rate. All are dead. An attempt was made to treat all others but, for various reasons, a further 15 patients had therapy which was stopped before what could be considered adequate therapy had been delivered.

The individual types of tumor will be the subject of separate study but it might be worth noting here that considering only those who have passed the five-year interval since treatment, 52 per cent of 274 patients with squamous-cell tumors, 50 per cent of 10 with adenocarcinomas of the cervix, and 69 per cent of 13 with squamous-cell carcinomas of the cervical stump were alive and clinically free of tumor after this interval.

Table I

REPORTABLE CARCINOMA OF CERVIX UTERI, STAGES I-IV. ABSOLUTE RESULTS

Patients			Survival in Years								
			1	2	3	4	5	6	7	8	9
1939	52	No.	48	42	38	36	35	34	33	32	31
		%	92	81	73	69	67	65	63	61	60
1940	68	No.	47	40	36	36	34	34	32	32	
		%	69	59	53	53	50	50	47	47	
1941	72	No.	55	43	36	34	34	31	31		
		%	76	60	50	47	47	43	43		
1942	61	No.	49	42	39	37	35	33			
		%	80	69	64	60	57	54			
1943	44	No.	33	26	21	21	21				
		%	75	59	48	48	48				
1944	70	No.	53	43	37	35					
		%	76	61	53	50					
1945	71	No.	48	44	36						
		%	68	62	51						
1946	58	No.	42	34							
		%	72	59							
1947	81	No.	60								
		%	74								
Irradiation total			577	496	438	367	297	253	192	120	52
Survival			435	314	243	199	159	132	96	64	31
Absolute percentage			75	63	55	54	53.6	54	50	53	60
Surgery only			7	6	5	3	2	2	2	2	2
Survival			5	5	4	2	1	1	1	1	1
Total absolute			584	502	446	373	299	251	194	122	54
Survivals			440	319	247	201	160	133	97	65	32
Absolute cure rate			77	64	55	55	53.6	53	50	53	59
Patients seen 1939-1943							299				
Patients treated 1939-1943							291				
Relative cure rate							55%				

Table II

REPORTABLE CARCINOMA OF CERVIX UTERI, STAGE I. ABSOLUTE RESULTS

Patients			Survival in Years								
			1	2	3	4	5	6	7	8	9
1939	15	No.	15	15	15	15	15	14	13	12	12
		%	100	100	100	100	100	94	87	80	80
1940	16	No.	14	14	14	14	14	14	12	13	
		%	87	87	87	87	87	87	81	81	
1941	22	No.	21	18	15	15	15	14	14		
		%	95	82	68	68	68	64	64		
1942	28	No.	27	25	23	22	22	21			
		%	96	89	82	78	78	75			
1943	13	No.	12	11	10	10	10				
		%	92	85	77	77	77				
1944	12	No.	11	11	10	9					
		%	92	92	83	75					
1945	15	No.	15	13	13			Irradiation alone, 86			
		%	100	87	87						
1946	23	No.	18	16				Irradiation plus surgery, 8			
		%	78	70							
1947	36	No.	31								
		%	86								
Irradiation total			180	144	121	106	94	81	53	31	15
Survival			164	123	100	85	76	63	40	25	12
Absolute percentage			91	85	83	80	81.1	78	76	81	80
Surgery only			5	5	5	3	2	2	2	2	2
Survival			4	4	4	2	1	1	1	1	1
Total absolute			185	149	126	109	96	83	55	33	17
Survivals			168	127	104	87	77	64	41	26	13
Absolute cure rate			91	85	83	80	80.2	77	75	79	76

Table III

REPORTABLE CARCINOMA OF CERVIX UTERI, STAGE II. ABSOLUTE RESULTS

Patients			Survival in Years								
			1	2	3	4	5	6	7	8	9
1939	19	No.	18	14	11	10	10	10	10	10	10
		%	95	74	58	53	53	53	53	53	53
1940	31	No.	25	21	17	17	17	17	16	16	
		%	81	68	44	44	44	44	52	52	
1941	26	No.	23	18	15	14	14	12	12		
		%	88	69	58	54	54	46	46		
1942	15	No.	13	10	10	10	9	8			
		%	87	67	67	67	60	53			
1943	18	No.	14	12	9	9	9				
		%	78	67	50	50	50				
1944	31	No.	25	21	18	17					
		%	81	68	58	55					
1945	29	No.	27	21	16						
		%	93	72	55						
1946	18	No.	14	12							
		%	77	67							
1947	27	No.	20								
		%	73								
Irradiation total			214	187	169	140	109	91	76	50	19
Survival			179	131	96	77	59	47	38	26	10
Absolute percentage			84	70	57	55	54.1	52	50	52	53
Surgery only			2	1	0						
Survival			2	1	0						
Total absolute			216	188							
Survivals			181	132							
Absolute cure rate			84	70							

Irradiation only, 107

Irradiation plus surgery,
2

Table IV

REPORTABLE CARCINOMA OF CERVIX UTERI, STAGE III. ABSOLUTE RESULTS

Irradiation Only			Survival in Years								
			1	2	3	4	5	6	7	8	9
1939	17	No.	14	12	11	11	10	10	10	10	9
		%	82	71	65	65	59	59	59	59	53
1940	15	No.	7	4	4	4	2	2	2	2	
		%	47	27	27	27	13	13	13	13	
1941	23	No.	11	7	6	5	5	5	5		
		%	48	30	26	22	22	22	22		
1942	12	No.	7	6	6	5	4	4			
		%	58	50	50	42	33	33			
1943	11	No.	7	3	2	2	2				
		%	64	27	18	18	18				
1944	24	No.	16	11	8	8					
		%	67	46	33	33					
1945	21	No.	16	10	7						
		%	76	47	33						
1946	13	No.	9	5							
		%	69	38							
1947	13	No.	6								
		%	50								
Irradiation			149	136	123	102	78	67	55	32	17
Survival			93	58	46	35	23	21	17	12	9
Absolute percentage			62	43	38	34	29.5	31	31	38	53

Table V

REPORTABLE CARCINOMA OF CERVIX UTERI, STAGE IV. ABSOLUTE RESULTS

Irradiation Only			Survival in Years								
			1	2	3	4	5	6	7	8	9
1939	1	No.	0	0	0	0	0	0	0	0	0
		%	0	0	0	0	0	0	0	0	0
1940	6	No.	1	1	1	1	1	1	1	1	
		%	16	16	16	16	16	16	16	16	
1941	1	No.	0	0	0	0	0	0	0		
		%	0	0	0	0	0	0	0		
1942	6	No.	2	1	0	0	0	0	0		
		%	33	16	0	0	0	0			
1943	2	No.	0	0	0	0	0				
		%	0	0	0	0	0				
1944	3	No.	1	0	0	0					
		%	33	0	0	0					
1945	6	No.	0	0	0						
		%	0	0	0						
1946	4	No.	1	1							
		%	25	25							
1947	5	No.	2								
		%	40								
Irradiation Total			34	29	25	19	16	14	8	7	1
Survival			7	3	1	1	1	1	1	1	0
Absolute Percentage			21	11	4	5	6	7	12	14	0

The patients with nonreportable tumors, or those who had been treated elsewhere prior to observation in the Department of Obstetrics and Gynecology of the University of Minnesota show little of interest. They are not grouped under the League of Nations four stages but those described as local tumors are roughly comparable to Stages I and II while the extensive tumors correspond to Stages III and IV.

NONREPORTABLE CARCINOMA
OF THE CERVIX

	<u>No. of Patients</u>	<u>5 year Survival, Free of Tumor</u>
"Local"	14	8 or 57 %
"Extensive"	31	3 or 9.7%
Total	45	11 or 24 %

Comment

The results of treatment of cervical carcinoma prior to 1939 have not been listed. As in other clinics, these show a steady improvement with no significant change in degree of clinical extension of the tumors over the years. Toward the end of this period about half the x-ray dosage and two-thirds of the radium dosage which has been given in the present study series were exhibited. The present study series shows a significantly greater cure rate. The cure rate reported here is significantly greater than that reported by a number of other investigators using different techniques but has been equaled by still others.

One would like answers to two questions. What are the significant features of the present techniques which have improved the results in our own material? What are the circumstances under which failure occurs and what next move might be made to recognize and attack these?

There is at present no simple answer to these questions. On the other hand, there can be no doubt but that gradual and steady improvement in end results is being made. The actual problem lies in what could be called the critical group

of tumors or those which can be almost cured by a given technique. This involves a very few Stage I tumors but considerable numbers of Stages II and III. It is here that attention to detail and accuracy will yield a reward in producing the difference between ordinary and good results.

In this critical or borderline group, there can be little question but that accuracy of x-ray dosage to the tumor plays a significant role. The dosage which can be delivered to the tumor is limited by the tolerance of the intervening normal structures. It is only a fraction of that which has been experimentally determined as a so-called "tumor destructive dose." Because of the inevitable short focal distance of the vaginal and uterine radium application, and the inverse square of the distance law which limits the amount of irradiation energy delivered to depth, one is largely dependent on the x-ray with only a small contribution from the radium for the destruction of tumor at distance in the pelvic lymphatic system. Overdosage may destroy the patient directly, or, what amounts to the same thing, so interfere with normal tissue healing that its contribution in the final choking off of partially damaged tumor cells is interfered with and tumor recurrence results. Under-dosage can lead to an occasional cure but the possibilities, particularly in this critical group, are not exhausted. Calculation of dosage, then, should start with the area at depth to be treated. Our studies have shown that a diffuse dose to the pelvis of 3,000 to 3,500 tissue roentgens over about 28 days represents the maximum reasonably safe dose. The dosage to skin, the sizes and numbers of fields, are calculated for each patient to supply this. This should also be the basis for reporting. The total amount of irradiation energy supplied to the skin is not a useful expression of the tumor dose. An accurate expression of depth dose is essential. If there be any doubt about the inaccuracy of the tumor dose which is based on a guess as to how many units should be given to the skin, the actual measurement of the dose which arrives at the cervical

tumor is a simple undertaking and may prove surprising. It is true that what is finally required is an expression of effect on the tumor or of biological dosage and that this is varied by many other considerations than dosage expressed in physical units alone. But unless this latter is as accurate as possible for the tumor-bearing area at depth under consideration, then all subsequent controls of accuracy fail. To interpret into a tumor dose the statement that 10,000 roentgens in air have been given to the skin produces a sense of frustration not unlike reaching out the window for the moon.

A similar word of warning should be said in regard to radium dosage. Again, the biological effect and not the physical dosage must be considered. Both normal tissue and tumor recover from the effects of appropriate amounts of irradiation energy. Unfortunately, there is reason to believe that the recovery of tumor from sublethal doses is more rapid than that of normal tissue. If this were the only factor concerned, the more rapid the delivery of a tolerated dose, the greater the advantageous differential of sensitivity might be expected to be. Clinical testing of this has led to the conclusion that there are other factors concerned and that something between single dose and infinitely prolonged therapy is desirable. It was somewhat arbitrarily decided to use for this study continuous therapy with about 28 days of x-ray followed immediately by 100 hours of radium application. The time factor is excluded as a variable from one patient to another. The results which it has produced are presented. They seem to have been significantly better than the reported results of some other types of time distribution and consequently are recommended. To prove that this is the most important feature of the results obtained is of course impossible.

The value of hospitalization throughout treatment is difficult to assess. It is expensive. But it allows the early recognition of sometimes dangerous disturbances. It has allowed treatment of the tumor to

be driven through where considerations of safety would have demanded interruption in the out-patient. It has allowed dietary control, particularly of the protein intake, which may well be important, and which is now being studied. In general, it contributes to the accuracy of the handling.

In what direction should one turn for further improvement? It is obvious that surgery and irradiation must both eventually be supplanted by a more effective attack. In the meantime, the search must go on for methods of improving the effectiveness of the tools which are presently available. There can be no doubt but that accurately applied irradiation offers the most effective of such tools and that the surgical approach should be restricted to special circumstances. The problem now is to define objectively these special circumstances and some progress is being made here. It is hard to become concerned about the very early tumors since they can be effectively treated by either surgery or irradiation. Irradiation has consistently failed with the Stage IV tumors in spite of the fact that in a significant proportion of them, the host may be destroyed while the tumor is still apparently localized to non-vital though useful pelvic structures. Information as to the effectiveness of very radical surgery for these tumors must be obtained as soon as possible. Most gynecologists have satisfied themselves that this sort of procedure can be done with reasonable safety and not too much in the way of undesirable aftereffects.

The study of the material here reported makes it perfectly clear that the greatest single improvement may be expected to come from the solution to two problems. Some method must be found which will allow recognition at least by the time therapy is complete of those tumors which will fail to respond to irradiation. Histological studies on material taken on the day x-ray is completed and radium applied have been of questionable value in our hands. And, second, one cannot study such material as is presented here without being impressed by the relation-

ship between the size of the tumor and its local persistence after irradiation. The large extensive tumor may, on microscopic study, look the same as others before treatment and apparently respond similarly to the same dose of irradiation only to persist locally with an exasperating frequency. There is too much detail for presentation here but it might be pointed out that of the fifty patients with Stage III carcinomas of the cervix in this series who died as a result of the tumor, only five were known to have died with the pelvis free of tumor. There is a strong suggestion of some interference by the massive tumor with normal tissue healing ability. Control of this difficulty would be extremely valuable.

Summary

1. Carcinoma of the cervix has been treated at the University of Minnesota Hospitals since the beginning of 1939 by means of daily x-ray therapy followed immediately by intravaginal and intrauterine radium. X-ray is given over as close to 28 days as possible and the details of this therapy are arranged so as to supply 3,000 tissue roentgens diffusely to the pelvis in this time. This is followed on the day of the last x-ray treatment by the insertion of radium which is left in place for 100 hours. Under ideal anatomical circumstances, two intrauterine portals in tandem and three vaginal portals in the Kaplan colpostat are used. Each contains 10 milligrams of radium for a total dosage of 5,000 milligram hours. This is decreased as the availability of space for these portals is decreased.

2. Every single patient has been followed to death or to Jan. 1, 1949. Every single patient has satisfactory biopsy control. There is no questionable carcinoma in the material.

3. The following results have been obtained on reportable material. The League of Nations classification is used.

Absolute, five-year cure rate, 53.6 per cent (S.D. \pm 2.8 per cent)

Stage I, five-year cure rate, 80.2 per cent (S.D. \pm 4.0 per cent)

Stage II, five-year cure rate, 54.1 per cent (S.D. \pm 4.8 per cent)

Stage III, five-year cure rate, 29.5 per cent (S.D. \pm 5.2 per cent)

Stage IV, only 1 patient of 16 cured.

4. Adenocarcinomas, carcinomas of the cervical stump, and a few cases which were treated with surgery as well as x-ray are included. Because of their small number and the surprising similarity of the results with them to those of the general group of squamous-cell carcinomas, they do not influence the expression of results.

5. The techniques described have significantly improved the results previously obtained and are recommended.

The essential follow-up studies on which this report is based were only possible because of financial support generously made available by the Minnesota Division of the American Cancer Society, Inc.

II. MEDICAL SCHOOL NEWS

Coming Events

- April 26 - Dr. A. C. Frazer, University of Birmingham, England, "The Mechanism of Fat Absorption," Medical Science Amph., 4:00 p.m.
- April 26 - Annual George Chase Christian Lecture - "Cancer and Intermediary Metabolism of Steroid Hormones," Dr. Leo Samuels, University of Utah Medical School, Medical Science Amph., - 8:00 p.m.
- May 9 - Duluth Clinic Lecture - "Metabolic Effects in Man of ACTH and Cortisone", Dr. Jerome W. Conn, University of Michigan Medical School - Museum of Natural History Auditorium - 8:00 p.m.
- May 11-13 - Continuation Course in Eye, Ear, Nose, and Throat for General Physicians.
- May 22-27 - Continuation Course in Proctology for General Physicians.

* * *

Dr. Leo T. Samuels to Give Annual George Chase Christian Lecture

Dr. Leo T. Samuels, Head of the Department of Biochemistry, University of Utah Medical School, will deliver the annual George Chase Christian Lecture on cancer on Wednesday, April 26 at 8:00 p.m. Dr. Samuels, formerly a member of the Department of Physiological Chemistry at the University of Minnesota Medical School, has been active in research in the field of endocrinology. He will speak on the subject, "Cancer and the Intermediary Metabolism of Steroid Hormones". All who are interested are invited to attend the lecture which will be held in the amphitheater of the Medical Science Building.

Dr. Cowling Elected Foundation Trustee

Dr. Donald J. Cowling, President Emeritus of Carlton College and Chairman of the Commission for the Mayo Memorial, was named Patron Member for Distinguished Service at the recent meeting of the Board of Trustees of the Minnesota Medical Foundation. The Board of Trustees created a special type of membership in order to honor Dr. Cowling for his great contribution to the Medical School. At the same meeting Dr. Cowling was elected to the Board of Trustees, thus becoming the first nonphysician member of this board.

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Faculty News

Dr. David Glick was recently elected Vice-President of the newly founded Histochemical Society of America at a meeting held at the University of Pennsylvania Medical School.

Doctors E. A. Boyden, Berry Campbell, Harold Haft, Arthur Kirschbaum, H. A. Matzke, and Dorothy Sundberg of the Department of Anatomy presented papers at the annual meeting of the American Association of Anatomists in New Orleans on April 5-7.

III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
CALENDAR OF EVENTS

April 23 - 29, 1950

No. 286

Sunday, April 23

9:00 - 10:00 Surgery Grand Rounds; Station 22, U. H.

10:30 - 11:00 Surgical Conference; Rm. M-109, U. H.

Monday, April 24

9:00 - 9:50 Roentgenology-Medicine Conference; L. G. Rigler, C. J. Watson and Staff; Todd Amphitheater, U. H.

9:00 - 10:50 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff; M-109, U. H.

10:00 - 12:00 Neurology Rounds; A. B. Baker and Staff; Station 50, U. H.

11:00 - Pediatric Rounds; Erling Platou; Sta. I, Minneapolis General Hospital.

11:00 - 11:50 Physical Medicine Seminar; E-101, U. H.

11:00 - 11:50 Roentgenology-Medicine Conference; Veterans Hospital.

11:00 - 12:00 Cancer Clinic; K. Stenstrom and A. Kremen; Eustis Amphitheater, U. H.

12:00 - 1:00 Physiology Seminar; The Nutritional Value of Plant Material; Max Schultze; 214 M. H.

12:15 - 1:20 Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.

12:30 - 1:20 Pathology Seminar; Lungs of the Newborn; J. W. Eliot; 104 I. A.

12:30 - 1:30 Surgery Problem Case Conference; A. A. Zierold, C. Dennis and Staff; Small Classroom, Minneapolis General Hospital.

1:30 - 2:30 Surgery Grand Rounds; A. A. Zierold, C. Dennis and Staff; Minneapolis General Hospital.

1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U. H.

4:00 - Public Health Seminar; Subject to be announced; 113 Medical Sciences.

4:00 - Pediatric Seminar; Report of Meetings of Federated Societies; Irvine McQuarrie, et al; 6th Floor West, Child Psychiatry, U. H.

5:00 - 5:50 Clinical Medical Pathologic Conference; Todd Amphitheater, U. H.

5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss and Staffs; M-109, U. H.

Tuesday, April 25

- 7:30 - 9:00 Fracture Rounds; General Hospital.
- 8:30 - 10:20 Surgery Seminar; Small Conference Room, Bldg. I, Veterans Hospital.
- 9:00 - 9:50 Roentgenology Pediatric Conference; L. G. Rigler, I. McQuarrie and Staffs; Todd Amphitheater, U. H.
- 10:30 - 11:50 Surgical Pathological Conference; Lyle Hay and E. T. Bell; Veterans Hospital.
- 11:00 - Contagion Rounds; Forrest Adams; Sta. L, General Hospital.
- 12:30 - Pediatric-Surgery Rounds; Drs. Stoesser, Wyatt, Chisholm, McNelson and Dennis; Sta. I, Minneapolis General Hospital.
- 12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 I. A.
- 1:30 - 2:30 Pediatric-Psychiatry Conference; R. A. Jensen and Staff; 6th Floor, West Wing, U. H.
- 1:00 - 2:30 X-ray Surgery Conference; Auditorium, Ancker Hospital.
- 2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III, Veterans Hospital.
- 3:15 - 4:20 Gynecology Chart Conference; J. L. McKelvey and Staff; Station 54, U. H.
- 3:30 - 4:20 Clinical Pathological Conference; Staff; Veterans Hospital.
- 4:00 - 5:00 Physiology Surgery Conference; Interference with Hepatic Circulation and Its Survival; F. Raffucci; Eustis Amphitheater, U. H.
- 4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.
- 5:00 - 6:00 Porphyrin Seminar; C. J. Watson, Samuel Schwartz, et al; Powell Hall Amphitheater.
- 5:00 - 6:00 X-ray Conference; Presentation of Cases by University Hospitals Staff; Todd Amphitheater, U. H.

Wednesday, April 26

- 8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-109, U. H.
- 8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; L. B. Thomas and L. G. Rigler; Todd Amphitheater, U. H.
- 8:30 - 9:30 Clinico-Pathological Conference; Auditorium Ancker Hospital.
- 8:30 - 10:00 Orthopedic-Roentgenologic Conference; Edward T. Evans and Bernard O'Loughlin; Room 1AW, Veterans Hospital.
- 8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker, Veterans Hospital.

Wednesday, April 26 (Cont.)

- 11:00 - Pediatric Rounds; Erling Platou; Sta. I, General Hospital.
- 11:00 - 12:00 Pathology-Medicine-Surgery Conference; Medicine Case; O. H. Wangensteen, C. J. Watson and Staffs; Todd Amphitheater, U. H.
- 12:00 - 1:00 Radio-Isotope Seminar; Uptake of P-32 by Nervous Tissue; E. Gasteiger; 113 Medical Sciences.
- 12:00 - 1:00 Surgery Problem Conference; General Hospital.
- 12:15 - Staff Meeting; Main Classroom, General Hospital.
- 3:00 - Pediatric Rounds; C. J. Huenekens; Sta. I, General Hospital.
- 3:30 - 4:30 Journal Club; Surgery Office, Ancker Hospital.
- *4:00 - Special Lecture: The Mechanism of Fat Absorption; A. C. Frazer, University of Birmingham (England); Medical Sciences Amphitheater.
- 4:00 - 5:00 Infectious Disease Rounds; Todd Amphitheater, U. H.
- 5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and staff; E-101, U. H.
- *8:00 p.m. George Chase Christian Cancer Lecture; "Cancer and the Intermediary Metabolism of Steroid Hormones"; Leo T. Samuels, University of Utah Medical School; Medical Sciences Amphitheater.

Thursday, April 27

- 8:30 - 10:20 Surgery Grand Rounds; Lyle Hay and Staff; Veterans Hospital.
- 9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; M-109, U. H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:30 - 11:50 Surgery-Radiology Conference; Daniel Fink and Lyle Hay; Veterans Hospital.
- 11:00 - 12:00 Cancer Clinic; K. Stenstrom and A. Kremen; Todd Amphitheater, U. H.
- 11:30 - Pathology Conference Clinic; Main Classroom; General Hospital.
- 11:30 - 12:30 Clinical Pathology Conference; Steven Barron, C. Dennis, George Fahr, A. V. Stoesser and Staffs; Large Classroom, Minneapolis General Hospital.
- 12:00 - 1:00 Physiological Chemistry Seminar; Tyrosine Metabolism Mechanisms; R. W. Von Korff; 214 M. H.
- 1:00 - 1:50 Fracture Conference; A. A. Zierold and Staff; Minneapolis General Hospital.
- 4:15 - 5:00 Bacteriology Seminar; Myocarditis in Poliomyelitis; Paul H. Loberg; 214 M. H.
- 4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.

Thursday, April 27 (Cont.)

- 5:00 - 6:00 X-ray Seminar; Terminology of the Bronchi; Edward Boyden, Todd Amphitheater, U. H.
- 7:30 - 9:30 Pediatrics Cardiology Conference and Journal Club; Review of Current Literature 1st hour and Review of Patients 2nd hour; 206 Temporary West Hospital.
- *8:00 p. m. Special Lecture: Normal and Abnormal Fat Absorption in Man; A. C. Frazer, University of Birmingham (England); Medical Sciences Amphitheater.

Friday, April 28

- 8:30 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.
- 9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:30 - 11:20 Medicine Grand Rounds; Veterans Hospital.
- 10:30 - 11:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
- 11:00 - Pediatric Rounds; Erling Platou; Sta. I, General Hospital.
- 11:00 - 12:00 Surgery-Pediatric Conference; C. Dennis, O. S. Wyatt, A. V. Stoesser, and Staffs; Minneapolis General Hospital.
- 11:45 - 12:50 University of Minnesota Hospitals General Staff Meeting; Social Service Reports; Annie Laurie Baker; Powell Hall Amphitheater.
- 12:00 - 1:00 Surgery Clinical Pathological Conference; A. A. Zierold, Clarence Dennis and Staff; Large Classroom, Minneapolis General Hospital.
- 1:00 - 1:50 Dermatology and Syphilology Conference; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.
- 1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.
- 1:00 - 3:00 Pathology-Surgery Conference; Auditorium, Ancker Hospital.
- 3:00 - 4:00 Neuropathology Conference; F. Tichy; Todd Amphitheater, U. H.
- 3:00 - 6:00 Demonstrations in Cardiovascular Physiology; M. B. Visscher et al; 301 M. H.
- 4:00 - 5:00 Clinical Pathological Conference; A. B. Baker; Todd Amphitheater, U.H.
- 4:15 - 5:15 Electrocardiographic Conference; 106 Temp. Bldg., Hospital Court, U.H.
- 5:00 - 6:00 Otolaryngology Seminar; Book Review - "The Nose"; R. W. Wheeler; Todd Memorial Room, U. H.

Saturday, April 29

- 7:45 - 8:50 Orthopedics Conference; Wallace H. Cole and Staff; M-109, U. H.
- 8:30 - 9:30 Surgery Conference; Auditorium, Ancker Hospital.
- 9:00 - 9:50 Medicine Case Presentation; C. J. Watson and Staff; E-221, U. H.
- 9:00 - 10:30 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amphitheater, U. H.
- 9:00 - 11:30 Child Psychiatry Conference; Legal Aspects of Underprivileged Children; Reynold A. Jensen; Powell Hall Amphitheater.
- 9:15 - 10:00 Surgery-Roentgenology Conference; F. Ruzicka, O. H. Wangenstein and Staff; Todd Amphitheater, U. H.
- 10:00 - 11:30 Surgery Conference; O. H. Wangenstein and Staff; Todd Amphitheater, U. H.
- 10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.
- 11:00 - Contagion Rounds; Forrest Adams; Sta. L, General Hospital.
- 11:00 - 12:00 Anatomy Seminar; Influence of Higher Centers on Spinal Integrative Mechanisms, Berry Campbell; Comparative and Phylogenetic Studies of the Cortex, William H. Boyd; 226 I. A.

* Indicates special meeting. All other meetings occur regularly each week at the same time on the same day. Meeting place may vary from week to week for some conferences.