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



Primary Carcinoma  
of the Vagina

BULLETIN OF THE  
UNIVERSITY OF MINNESOTA HOSPITALS  
and  
MINNESOTA MEDICAL FOUNDATION

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I. PRIMARY CARCINOMA OF THE VAGINA

Irwin H. Kaiser, M.D.

The therapy of primary carcinoma of the vagina at the present day continues to yield a shockingly low rate of cure. The disease is uncommon and not until recently have enough cases accumulated at the University of Minnesota to warrant study. The realization of the limitations of therapy has provided impetus to an effort to identify the factors responsible for therapeutic failure in this group of patients.

General Information

Fifty-five women with primary carcinoma of the vagina were seen at the University of Minnesota between 1927 and December 31, 1950. In every case, the diagnostic criteria suggested by the League of Nations have been met. Every patient has been followed until her death or until December 31, 1951. The cases are summarized in Table I.

At present there are 9 patients alive and well. The absolute five year cure rate, based upon the 38 patients seen through 1946, is 13%, and the relative five year cure rate, based upon patients treated, is 15%.

Irradiation has been relied upon as the main form of therapy during the period of this study. In order to evaluate its effectiveness, all patients who were given what is at present considered a suitable dose and distribution of irradiation, were set aside in a separate group which will be referred to hereafter as the treated series, summarized in Table II. All cases in the entire series who are excluded from the irradiation treated group are accounted for in Table III. The five year cure rate with irradiation therapy is 11%.

Characteristics of the Tumor

The data concerning the patients and their tumors are presented under two headings, one referring to the entire series and the other to the irradiation

TABLE I - Primary Carcinoma of the Vagina

Year seen	Total	Treated	Alive and free of tumor											
			1	2	3	4	5	6	7	8	9	10		
1927 to 1937	7	7	1	1	1	0								
1938	3	3	0											
1939	1	1	0											
1940	4	3	1	1	1	1	1	1	1	0				
1941	3	3	2	2	2	2	2	2	2	2	2	2	2	2
1942	4	2	1	1	1	0								
1943	3	3	1	1	1	1	1	1	1	1	1			
1944	4	3	0											
1945	2	2	0											
1946	7	7	3	3	3	2	1							
1947	6	6	3	2	2	1								
1948	8	7	4	4	3									
1949	2	2	1	1										
1950	1	1	0											
<b>TOTAL</b>	<b>55</b>	<b>50</b>	<b>17</b>	<b>16</b>	<b>14</b>	<b>7</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>		
Absolute survival %			31	30	27	16	13							
Relative survival %			34	32	30	18	15							

TABLE II - Primary Carcinoma of the Vagina

Results of Irradiation Therapy

Year seen	Total	Alive and free of tumor										Died of disease other than Vag. Ca.	
		1	2	3	4	5	6	7	8	9	10		
1927 to 1937	3	1	1	1	0								
1938 to 1940	7	1	1	1	1	1	1	0					1-pulmonary Tbc.
1941 to 1943	6	2	2	2	1	1	1	1	1	1	1		1-aplastic anemia
1944 to 1946	11	3	3	3	2	1							1-lymphosarcoma 1-myeloid leukemia
1947	6	3	2	2	1								1-ca. stomach 1-cerebral accident
1948	6	4	4	3									
1949	1	1	1										
1950	1	0											
TOTAL	41	15	14	12	4	3							
Survival %		37	35	31	12	11							

TABLE III - Primary Carcinoma of the Vagina

Cases Excluded From Irradiation Treated Series

<u>Year seen</u>	<u>Reason</u>	<u>Survival in months</u>
1932	Deep X-ray only, inadequate by present standards	6
1936	Same	6
1936	Same	11
1936	Same	12
1940	No therapy, far advanced lesion	10
1941	Surgical excision only	123
1942	No therapy - terminal on admission	0
1942	Treated elsewhere subsequently	84
1943	Prior treatment elsewhere	96
1944	Died of other disease before treatment	1
1944	Surgical excision only	7
1948	Surgical excision only	8
1948	No therapy - terminal on admission	0
1949	Surgical excision after irradiation elsewhere	6

treated series. This is done because the rarity of these tumors makes it desirable to report as much as possible concerning as many cases as possible. At the same time, it is necessary for purposes of evaluation to indicate in detail in what respects, if any, the irradiation series differed from the total group.

The recital of presenting complaints in Table IV requires little explanation.

TABLE IV - Primary Carcinoma of the Vagina

<u>Presenting Complaint</u>	<u>Total</u>	<u>Treated</u>
Vaginal bleeding	27	22
Watery discharge	6	5
Brownish discharge	5	3
Dysuria	4	2
Mass palpable	3	3
Vaginal itching	2	1
Urinary incontinence	1	
Constipation	1	
Pain in thigh	1	1
Prolapse	1	
Rectal pressure	1	1
None	<u>3</u>	<u>3</u>
TOTAL	55	41

For the most part, symptoms are produced by sloughing or bleeding from tumor itself. In only a few cases are symptoms due to a mass or involvement of other organs. Two of the three patients with no presenting complaint were transferred from institutions for the insane. In the third asymptomatic patient, the tumor was found in the course of an insurance examination.

The duration of symptoms prior to admission is presented in Table V. The

TABLE V - Primary Carcinoma of the Vagina

	<u>Duration of Symptoms</u>	
	<u>Total</u>	<u>Treated</u>
No symptoms	3	3
3 months or less	15	11
4-6 months	12	10
7-12 months	14	10
13 or more	9	5
Unknown	<u>2</u>	<u>2</u>
TOTAL	55	41

delay in seeking attention in almost every instance was the patient's responsibility. In only two cases could there have been said to have been physician delay and in neither instance did it appear to influence the eventual outcome.

The distribution of patients by age is shown in Table VI. An effort to estimate the age incidence of the disease in

TABLE VI - Primary Carcinoma of the Vagina

	<u>AGE OF PATIENTS</u>		
	<u>Total</u>	<u>Age Specific Incidence Index*</u>	<u>Treated</u>
20-29	2	0.8	1
30-39	3	1.5	2
40-49	11	6.1	9
50-59	12	8.8	8
60-69	18	22.4	12
70-79	6	14.0	6
80-89	<u>3</u>	<u>22.1</u>	<u>3</u>
TOTAL	55	6.1	41

\* See text

the population has been made by calculating an "Incidence Index". This was

done by stating the number of cases in each age group as a rate per 100,000 resident Minnesota females in the corresponding age group registered in the 1940 census. Since some of the patients in this study were admitted from neighboring states, and since certainly not all cases of carcinoma of the vagina occurring in Minnesota in this period were seen at the University of Minnesota, these figures do not indicate the actual incidence of the disease. However, the figures do indicate that the incidence of the disease tends to rise steadily to the seventh decade, following which it is apparently stable.

The complications on admission, in Table VII, are approximately what one would expect in a sample of females of this age distribution. One of the two diabetics was the only Jewish patient in the group of cases.

TABLE VII Primary Carcinoma of the Vagina

COMPLICATIONS ON ADMISSION

	<u>Total</u>	<u>Treated</u>
Hypertension	14	11
Cardiac disease	5	4
Anemia severe	3	2
Cachexia	3	1
Diabetes	2	2
Pulmonary tuberculosis	1	1
Pregnancy	1	1
Peritonitis	1	1
Paresis	1	1
Other malignancy	1	0

A clear-cut history of vaginal trauma was present in six instances, as noted in Table VIII. Vaginal prolapse of severe

TABLE VIII - Primary Carcinoma of the Vagina

VAGINAL TRAUMA	
Prolapse	5
Pessary	3
Other	<u>1</u>
TOTAL	9

degree occurred in five patients, 9% of the total group. In two of these the prolapse had become incarcerated because of a tumor mass on the exteriorized surface of the vagina. In one of these patients the tumor had eroded through the adjacent wall of the bladder to form a huge fistula through which the opposite wall of the bladder was easily visible. In another patient, a recurring prolapse of the vagina had been under prolonged treatment at another hospital because it had been observed there that there were numerous ulcers of the vaginal mucosa which failed to heal with replacement of the prolapse. They were finally proven to be due to carcinoma. Three patients had worn vaginal pessaries until shortly before admission. The ninth patient listed in Table VIII was originally admitted with a fibromyoma uteri which had delivered through the cervix and acquired a large area of attachment to the vaginal wall. When the tumor was removed, it was noted that the vaginal mucosa was ragged and proper healing of the vagina failed to occur. The presence of carcinoma was proven several months later.

The location of the primary sites is detailed in Table IX. It is unfortunately necessary to do a certain amount of injustice to the facts to construct any such table as this. The number of anatomic divisions has been kept as limited as it could be and still present the significant facts. Tumors designated as occurring on the anterior, lateral or posterior walls in some instances had spread to a minor extent to an adjacent

TABLE IX - Primary Carcinoma of the Vagina

LOCATION OF PRIMARY LESION IN VAGINA

	Total			Treated		
	Anterior	Lateral	Posterior	Anterior	Lateral	Posterior
Upper 1/3		1	13		1	11
Upper 2/3			10			9
Mid 1/3		1	1			1
Lower 2/3	5		1	3		
Lower 1/3	6	2		5	2	
Entire Wall	5	2	2	3	1	1
Annular midvaginal		1			1	
Entire vaginal wall		3			2	
Double primary site*		1			1	
Rectovaginal septum		1**				

\* One primary lesion in anterior upper 1/3, other posterior lower 1/3. Histologically adenocarcinoma

\*\* An additional patient had an identical lesion except that its vaginal surface was ulcerated at the site of a pessary. Both tumors were histologically adenocarcinoma.

wall. The longitudinal divisions do not overlap in this manner, however. It will be noted that six cases in the total series have been set aside in a separate part of Table IX because their location did not fit any of the fifteen categories established for the main body of the table.

It is immediately apparent that the overwhelming proportion of posterior wall tumors was confined to the upper vagina, and most of those of the anterior wall to the lower vagina. Two of the posterior wall tumors (7%) occupied the entire length of the posterior wall, while 5 of the anterior wall tumors (31%) occupied its entire length. There is no posterior wall tumor in the lower third of the vagina, and no anterior wall tumor in the upper third only. These obser-

vations are probably of significance in terms of routes of spread of tumor, methods of therapy and ultimate prognosis.

Characteristics of Spread

The sites of spread of the carcinoma by continuity with the primary site and by discontinuous metastasis are indicated in Table X. In this table spread observed after completion of therapy in the irradiation treated group is also noted. For the most part, the evidence for spread is clinical. The diagnosis of parametrial involvement was made on the same evidence as is employed for carcinoma of the cervix, and in at least one instance was demonstrated to be erroneous at operation. Bladder spread was diagnosed on the basis of vesico-

TABLE X - Primary Carcinoma of the Vagina

	<u>SITE OF SPREAD</u>		
	<u>Total</u>	<u>Treated</u>	<u>After treatment</u>
A. Continuous spread			
1. Parametria	23	18	1
2. Bladder	3		1
3. RV septum	2	1	1
4. Urethra-labia	3	2	
5. Labia	2	2	
6. Cervix	2	2	
7. Pubic ramus			(1 after surg.)
B. Discontinuous metastasis			
1. Lung	1	1	1
2. Supraclavicular node			1
3. Cervical polyp	1		
4. Inguinal nodes	5	3	5

vaginal fistula twice and by direct biopsy of the bladder mucosa once. The two instances of spread in the rectovaginal septum are in addition to the two tumors primary there. It is noteworthy that there is no instance of involvement of the rectal mucosa with tumor. The diagnosis in the patients with cervical spread conforms to the requirements of the League of Nations classification, since both areas of cervical disease healed during irradiation therapy while the primary site was still unhealed.

The diagnosis of inguinal gland involvement was based on the observation of enlarged nodes which continued to grow with improvement of healing of the primary lesion. In a few instances, confirmation of the diagnosis by biopsy was available.

The site of primary lesion in patients who developed inguinal metastasis is indicated in Table XI. Two facts emerge clearly. The first is that there is no instance of inguinal spread where the

primary lesion was present in the upper third of the vagina only. The other is that inguinal glands may be involved when the tumor is located primarily in any portion of the lower two thirds of the vagina. Comparison of Table IX with Table X demonstrates that the 10 instances of inguinal node involvement on admission occurred among the 40 patients with involvement of some portion of the lower two-thirds of the vagina. In the treated group, 5 instances of inguinal metastasis appeared following therapy among 29 patients with primary lesions in the lower two-thirds of the vagina. Since it has been a matter of policy to avoid biopsy of inguinal glands, in so far as possible, the actual incidence of involvement is probably higher than these figures indicate.

The relationship between evidence of spread of the primary tumor on admission and survival is indicated in Table XII, for the total series and the treated group. The figures are too small to be of significance, but they suggest that evidence of parametrial spread undoubt-



TABLE XI - Primary Carcinoma of the Vagina

SITE OF PRIMARY LESION IN CASES WITH INGUINAL METASTASIS		<u>Total</u>	<u>Treated</u>	<u>After treatment</u>
I.				
A.	a. Upper 1/3 of vagina	0	0	0
	b. Upper 2/3	1		1
	c. Lower 2/3	3	2	1
	d. Lower 1/3	1	1	1
B.	a. Anterior wall	2	2	1
	b. Posterior wall	2		2
	c. Lateral wall	1	1	
II.	Entire Vagina			1
III.	Double primary site			1

TABLE XII - Primary Carcinoma of the Vagina

RELATION OF SURVIVAL TO SPREAD

<u>No Spread on Admission</u>		
	<u>Total</u>	<u>Treated</u>
All patients	20	16
Observed 5 years	16	12
Survived 5 years	4	2
Survival %	25%	17%
<u>Spread Present on Admission</u>		
	<u>Total</u>	<u>Treated</u>
All patients	35	25
Observed 5 years	23	15
Survived 5 years	3	2
Survival %	13%	13%

edly influences this result. On the other hand, no patient with discontinuous metastasis (with the exception of the contact metastasis to a cervical polyp) survived five years.

Surgical Therapy

It is almost impossible to summarize the data concerning the surgically treated patients. Surgery has been employed only in six instances.

In three cases, tumor was found in the line of resection of vagina or vulva

at microscopic examination after operation and these patients died within one year of admission. One of them had a full course of irradiation therapy after operation and died of an aplastic anemia. Another patient was admitted for massive vaginal bleeding from a carcinoma of the anterior vaginal wall which had been treated with an unknown amount of radium. Radical excision was attempted, including cystectomy and ureteral transplantation, but the tumor rapidly recurred in the pelvis and the patient expired within 6 months. The fifth patient was given deep x-ray therapy until a severe persistent leucopenia developed. Radical surgery was then attempted but the patient did poorly and died after 7 weeks of a pelvic abscess. The sixth patient suffered a primary adenocarcinoma of the rectovaginal septum. An inguinal colostomy was done and one month later an abdominoperineal resection. Although revisions of the colostomy have been necessary, the patient was alive and well 127 months after admission.

Irradiation Therapy

The principal types of irradiation therapy employed in the 41 patients comprising the irradiation treated series are detailed in Table XIII. The planned

TABLE XIII-Primary Carcinoma of the Vagina

TYPES OF IRRADIATION THERAPY

X-ray and radium	27
X-ray and radon	6
X-ray alone	3
Radium and radon	2
X-ray, radium and radon	1
Radium alone	1
Radon alone	1
<b>TOTAL</b>	<b>41</b>

attack has consisted of a course of deep x-ray therapy followed immediately by local applications of radium or radon. X-ray was omitted only in the four pa-

tients whose lesions were in such proximity to the vulva that the anticipated vulvitis was prohibitive. X-ray alone was employed only in those cases whose reaction was so severe early in the course of treatment that any further attempts at irradiation had to be abandoned.

The significant complications of therapy are presented in Tables XIV and XV. In many instances it was difficult

TABLE XIV-Primary Carcinoma of the Vagina

COMPLICATIONS OF THERAPY

Irradiation ulcer	7
Vulvitis	6
Urinary tract infection	4
Leukopenia, severe	2
Fracture of femur	2
Interruption of therapy because of reaction	2

TABLE XV Primary Carcinoma of the Vagina

FISTULAE

	<u>Admission</u>		<u>After treatment</u>	
	Total	Treated	Due to tumor	Due to treatment
Recto-vaginal	1	1	3	0
Vesico-vaginal	2	0	0	1
Urethro-vaginal	0	0	1	0

to distinguish clinically between post-irradiation ulcer and carcinoma recurrence. These patients were hospitalized and adequate biopsy obtained. The fractures of the femur occurred many months after the completion of therapy; it is clear, however, that only a fraction of the treated group survived long enough to develop such fractures so that no conclusions can be drawn as to the po-

tential incidence of this complication.

The incidence of fistulae on admission and after treatment is quite low. This may indicate that the present group of patients presented themselves relatively early in the course of the disease. Both vesicovaginal fistulae resulted from massive tumors of the anterior wall, one in a 23-year old woman whose presenting complaint was incontinence and the other in a cachectic old lady with a carcinoma situated in the vaginal wall over a prolapsed cystocele. The rectovaginal fistula present on admission had occurred at the site of a biopsy of a lesion of the upper posterior wall, done a few weeks earlier.

The fistulae which appeared following therapy were of a somewhat different nature. The three rectovaginal fistulae appeared pre-terminally and were evidently due to uncontrolled local disease. The urethrovaginal fistula followed treatment of a small local tumor directly adjacent to the urethra and was apparently due to slough of the tumor in the course of healing. The vesicovaginal fistula appeared in a patient who also developed a recto-vaginal fistula. She was treated with deep x-ray and local radium from a single central portal and then retreated for a recurrence within 14 months with essentially the same physical arrangement but slightly smaller doses. It is likely that the anterior shielding of the radium portals was inadequate.

Only limited opportunity was afforded for the use of second courses of irradiation. As mentioned above, one patient received such a second course of therapy 14 months after the original treatment. One patient received a full course of deep x-ray as re-treatment and another a brief course of re-treatment by x-ray as palliation. One patient received re-treatment with radium for a hopeless recurrence. The patient with proven supraclavicular node involvement received deep x-ray to this area. Two patients, early in the series, received deep x-ray

to the inguinal lymph node area and their primary lesions were re-seeded with radon. There is not even a suggestion of any sort of benefit to the patients from these undertakings.

Among the patients with squamous cell tumors, which includes 89% of the total series and 93% of the irradiation treated series, the failure to achieve 5 year survival in a single patient with a primary tumor located elsewhere than in the posterior fornix is striking. While this location is indeed the commonest single primary site, it does not account for a majority of the patients in either the total or treated series, as is clear in Table IX. In no instance did a posterior fornix tumor involve the bladder, rectum or the inguinal nodes, except in the patient in whom rectovaginal fistula followed biopsy of the tumor. The posterior fornix group, by definition, excludes the massive tumors of the entire vaginal tube and the large growths so often found in the anterior wall. It does include several very large vaginal ulcers, up to 6 cm. in diameter. Size is definitely not the major factor concerned. With tumors of the anterior vaginal wall, or of the lower half of the vagina, or of the entire vagina, or involving other viscera or inguinal lymph nodes, not a single five-year survivor has been produced by either irradiation or surgery as they have been employed at the University of Minnesota to date.

#### Causes of Death

The causes of death among the 46 patients who have expired are listed in Table XVI. All of the cases listed under other causes came to autopsy except the last, and there is no question that these patients died of disease other than carcinoma of the vagina. For the most part the diagnosis in the 39 deaths attributed to tumor or its treatment is based on clear-cut clinical findings. The number of autopsies done on these patients is small and a survey of the autopsy material available has not

TABLE XVI - Primary Carcinoma of the Vagina

	CAUSE OF DEATH	
	<u>Total</u>	<u>Treated</u>
Tumor persistent	20	10
Tumor recurrent	5	5
Tumor metastatic	2	2
Therapy	2	2
No definite diagnosis	10	9
Deaths accredited to tumor - SUBTOTAL	39	28
Other cases:		
Pulmonary tuberculosis	1	1
Lymphosarcoma of cecum	1	1
Aplastic anemia	1	1
Myelogenous leukemia	1	1
Carcinoma gallbladder	1	
Cerebrovascular accident	1	1
TOTAL	46	34

yielded much information. The patients listed as having no definite diagnosis were not seen at the University of Minnesota close enough to the time of death to permit a conclusion as to the specific cause, and attempts to secure further data from other hospitals or from death certificates have not been fruitful. These deaths are all attributed to the known carcinoma of the vagina. In the remaining cases, adequate clinical descriptions are available and in some instances autopsy findings as well.

A few facts emerge from a consideration of the data in Table XVI. Although there is a 15% loss of patients from other causes during the period of observation, 43% of the patients in the total series and 29% of the irradiation treat-

ed patients died without ever having had the primary lesion eradicated. If, to this group of persistent tumor, are added those in whom local recurrence had been demonstrated and an appropriate portion of the group who died without definite diagnosis, the approximate figures are 65% of the entire group and 57% of the treated group who died of the effects of uncontrolled local disease.

#### Discussion

Detailed information about the biological characteristics of primary carcinoma of the vagina is not available at present. The rarity of the lesion is such that few clinics have the opportunity to observe and treat any large number of patients. The upshot has been

that, with the exceptions noted below, there are in the modern literature numerous reports of isolated and unusual instances of vaginal carcinoma, a relatively few reports of limited series from workers primarily interested in radiation therapy, and virtually no detailed gynecological studies based on groups of cases large enough to validate the significance of the observations. Way, in Britain, has suggested that carcinoma of the vagina centers be established there for the express purpose of accumulating experience in diagnosis and therapy. Livingstone's recent monograph, based on 110 cases seen at the Memorial Hospital in New York City has done much to fill in gaps in our knowledge. The University of Minnesota experience which comprises one-half as many cases, coincides so closely with that of the Memorial Hospital that there is no need to review Livingstone's observations here.

The Memorial series 5 year cure rate of 10.5% is based upon a group of 76 "determinate" cases and is not quite comparable to the Minnesota experience. Livingstone notes a loss of 60% of the patients in the first year following therapy and about 20% in the second year.

Huber, in 1950, reported 152 cases of carcinoma of the vagina observed at the University Women's Clinic at Kiel from 1922 to 1949. Since this is the largest series of cases reported from a single institution, it is unfortunate that data are not presented with the completeness found in Livingstone's monograph and that some of the Kiel cases did not have microscopic confirmation.

The Kiel series includes an impressive number of patients in whom there was evidence of vaginal trauma prior to the development of carcinoma. As has been noted, the incidence of prolapse and wearing of pessaries is high in the Minnesota group. Six of the Kiel patients had worn pessaries and nine others had had operative procedures for vaginal prolapse; of the latter, two had worn pessaries prior to operation

and one subsequent to a recurrence. Huber describes several other instances of trauma, among which he includes severe senile vaginitis. Livingstone points out that the role of trauma in the etiology of disease in an organ such as the vagina is difficult to evaluate and he is evidently not convinced of the role of prolapse and the pessary. Way, on the other hand, is much impressed with the role of pessaries. It seems not unlikely that continued vaginal trauma, especially in the older woman, plays a significant role in carcinogenesis. The factor of marital status and parity is much more difficult to evaluate because of the impossibility of obtaining adequate control material, and for this reason, no data on this matter have been submitted for the Minnesota series.

Beyond stating that the majority of the primary sites was located in the posterior vaginal wall, Huber gives no data on their localization, nor does he make any statements as to the nature of metastatic spread on admission. In connection with comments on etiology, however, he refers to three patients with "Zuckergusskrebs", all of whom were treated with local radium with the production of complete cures. Three of the Memorial cures may be comparable, since in each instance the vagina is described as occluded. There are no comparable cases in the Minnesota series.

Among the 104 patients available to Huber for 5 year evaluation, 18 survived, a cure rate of 17%. Most of the therapy was accomplished by irradiation, and all the successes were achieved by this means.

The principal reliance of the Memorial Hospital has also been on radiation therapy, and, indeed, all the successful cases were treated solely by radiation, 6 by x-ray and radium, one by x-ray and one by radium alone. The x-ray dosage in general has been smaller than in the Minnesota group. It is unfortunately very difficult to be certain of the amount of the short focal

distance therapy with radium from this report. Surgical experience at Memorial Hospital has been meager and the follow-up of patients inadequate to permit any conclusions based upon it.

In the Kiel series of patients up to 1944, 45% were dead within one year and 63% within two years. The corresponding figures for the Memorial group are 60% and 80% among treated patients, and for the Minnesota series, 55% and 70% for the entire group. Under these circumstances, it should be possible tentatively to evaluate new methods of therapy considerably before five years have elapsed.

The influence of primary site on prognosis which emerges so clearly in the Minnesota experience can be partially corroborated from Livingstone's tables. Among his eight successes three had carcinomas of the entire vagina, one a lesion of the lower posterior wall, three of the upper posterior wall and one designated solely as upper vagina. There is no five year survival in either group of cases in a patient with a primary tumor of the anterior vaginal wall except the Minnesota case with prior treatment by electro-coagulation.

Lederman and Mayneoard, and Way have also commented upon the considerably better prognosis of lesions of the posterior upper vagina. They, and Livingstone, are inclined to attribute this to more accurate distribution of irradiation in this area and to the possibility of giving larger radium doses since, they say, in the upper vagina, greater distance of the source of irradiation energy from the bladder and rectum can be achieved. This does not seem to be an entirely satisfactory explanation of the observation on the Minnesota series.

A determined effort has been made here to treat every tumor, regardless of its primary site, with a dose of 7000 gamma roentgens or more from a radium or radon source in addition to deep x-ray therapy. When the cases were studied in regard to evidence of healing of the

primary site, it was striking that almost every instance of healing during deep x-ray therapy occurred among the patients with posterior fornix lesions. Conversely, failure to heal after completion of all radiation therapy was noted much more frequently among the lesions located elsewhere in the vagina. With radiation dosage held reasonably constant as it has been in the Minnesota group, this implies that there is a variable in the local capacity of tissue to heal which adversely affects lesions located away from the posterior fornix.

Additional evidence from the Minnesota experience in regard to this matter is provided by the observation, based necessarily on small groups, that the mean survival in months among patients with posterior fornix lesions is twice that of patients with lesions elsewhere.

A further factor is obviously involved in prognosis. Inguinal lymph node metastasis is apparently a rarity among patients with a primary lesion located in the upper posterior vagina, whereas it occurs in up to 25% of patients with primary lesions elsewhere. A crucial observation in this regard was made by Schlund in 1913. Reviewing 273 cases of vaginal carcinoma in the literature, he found 48 in which the findings in the regional lymph nodes were correlated with the location of the primary tumor. Among the six patients in whom the entire vagina was involved there were two instances of inguinal metastasis. Among the seven patients with lateral wall primary sites, five had bilateral inguinal spread. Of the 15 with disease of the anterior wall, 7 patients had inguinal metastasis, an incidence of 47%. On the other hand, of the 20 patients with posterior wall involvement, only three had inguinal metastasis, an incidence of 15%. Since this series consists of accumulated individual case reports, these incidences are probably exaggerated, but they illustrate the relationships involved. There is no five year survival among patients with inguinal lymph node spread with any therapeutic attack employed up to the

present time.

The two factors noted, variations in local tissue healing, and the liability to inguinal lymph node metastasis, appear to be of at least as much importance as radiation dosage in the influence of location of primary site on the ultimate prognosis of vaginal carcinoma.

The results of irradiation therapy have been difficult to judge for two reasons. One is that radiation treatment centers have tended to report results only on the patients treated. The other is that often there is insufficient data about the physical factors of irradiation to allow accurate comparison of dosage and mode of administration. However, while the 5-year results at Memorial Hospital have been 10.5%, in the determinate group, at Kiel 17% in the total group and at Minnesota 14% in the reportable cases, it seems certain that others, in admittedly smaller groups of patients, have achieved much better salvage.

Courtial, who reported from the Radium Institute in Paris in 1939 described 10 cures among 22 patients treated. He has been widely quoted as the first to attain better than the almost uniform 15% salvage recorded by others. However, among Courtial's patients there was a wide range of deep x-ray and radium dosage and the physical factors concerned are not stated. Similar problems arise in consideration of the report by Fricke and his co-workers from the Mayo Clinic. Among 32 treated patients who were eligible for five year evaluation, 10 survived. These workers employed the Coutard type of radium administration and provide details on only one patient. They state that 4000 to 6000 gamma roentgens should be given to the entire growth over a period of one to two weeks without stating the dosage delivered to the depths of the tumor. Deep x-ray is given in addition and although physical factors are stated, the planned dose to depth is not. The dose of x-ray seems to be low.

Kahanpää and Gylling have recently

reported on 33 patients seen in Helsinki. Nine of their patients were not treated because the lesion was considered too far advanced. Among the 24 treated five or more years ago, 12 are alive and well. Since these are much the best results ever reported on a sizable group of patients, they merit detailed scrutiny. Of the 12 failures, two patients had primary lesions of the posterior wall while the other lesions were anterior or more widespread. The two patients who had limited posterior wall tumors died of other disease. The average dose of radium was 4490 mgm. hours (1760 to 7000) in one to five applications, while the average depth dose of deep x-ray, stated for only 5 of the 8 cases given deep x-ray, was 4086 tissue roentgens (3200 to 5538). Among the 12 cures, 9 of the primary tumors were on the posterior wall only, 2 were anterior and one occupied both walls. Most of the patients manifested some evidence of parametrial spread at least. The radium dose in this group averaged 5340 mgm. hours in 2 to 4 applications (3600 to 7300). Ten patients were given deep x-ray and the average of the nine for whom the dose was stated was 4458 tissue roentgens (2196 to 7000). Two of these patients developed small rectovaginal fistulae which the authors attributed to radiation. The calculated depth dose of radium radiation and duration of therapy are not stated.

Two features emerge from these observations. The higher cure rate with posterior wall and particularly posterior fornix lesions is confirmed by the Helsinki study. At the same time, it seems clear that the group in Helsinki must be employing radium and deep x-ray administered over a longer period of time than has been employed with the Minnesota, Memorial and Kiel series.

The report of Buschke and Cantril from the Tumor Institute of the Swedish Hospital at Seattle on the irradiation treatment of ten patients with vaginal carcinoma is of great interest because of the methods employed. A detailed account is given of the treatment of each patient, complete with all physical

data needed for comparison. Six of the patients are alive and well for three or more years, while the other four are dead. No more than two of the tumors in these patients would have been regarded as favorable on the basis of the criteria suggested by the Minnesota experience, although none had distant spread. The average estimated dose of deep x-ray to the central axis of the vagina among the cures is almost 5,850 r (3,800 to 7000), given over periods from 42 to 59 days. For most of the cases, 800 KV, filtered by 4.5 mm. of lead, with an HVL of 9.1 mm. of copper, were used. The average estimated maximum radium dose on the vaginal wall is 9,000 r (4,000 to 15,000), administered in one to three applications, varying from 50 to 127 hours each. The doses among the failures were similar, although one patient did not receive radium. Buschke and Cantril report no fistulae or strictures among their six cured patients. The oldest patient in this group was 67. In this report, then, it again seems that superior results are associated with radiation, particularly deep x-ray, administered over longer time periods than those which have been accepted as adequate in the past.

### Conclusions

At the present stage of our knowledge of primary carcinoma of the vagina, what inferences can safely be drawn as to the means by which therapeutic results can be improved?

The answer must be given in terms of the known biology of the disease and the capacities of the therapeutic weapons at our disposal. As has been indicated, the location of the primary lesion and the expected characteristics of spread from that site are the most important factors in establishing prognosis regardless of therapy. A high order of curability of the local tumor can be anticipated with adequate irradiation. On the other hand, radiation therapy is seriously limited in its ability to deal with tumor which has already spread to distant sites, including local lymph

nodes. Surgical attack worsens the prognosis, if it does anything at all, unless resection is accomplished with a wide enough margin around the tumor to include the anticipated spread and still allow the survival of the patient. Short of this, tumor will often be found unexpectedly in the line of section and, apparently, the patient's survival considerably abbreviated.

Irradiation therapy, as it has been employed in large numbers of patients at the University of Minnesota, at Memorial Hospital in New York and at the University of Kiel, has yielded very low rates of cure of vaginal carcinoma. Can these results be improved by increasing dosage of radiation?

This raises the difficult and perhaps unanswerable question of the relative importance of the physical dose and time factors as they relate to biologic dosage and cure rates. Increments can be made either by prolonging the duration of therapy or by increasing the dose of ionizing energy per unit time, or both. On theoretical grounds, there is reason to feel that the biologic effects may vary in an incalculable manner with the time and physically expressed dosage. In any event, it appears likely that maximum tumor destruction is obtained by administration to tumor of adequate physical doses of irradiation, within the limits of tolerance of adjacent normal viscera, in the shortest possible period of time.

Clinical experience in the therapy of carcinoma of the cervix, with a technique of deep x-ray identical with that employed for vaginal carcinoma, indicates that a daily dose of 300 to 400 roentgens in air to each field, to the delivery of 3000 to 3500 tissue roentgens diffusely to the pelvis in 28 days, is close to the level of tolerance for the majority of patients. Increase of the physical dose per unit time, therefore, seems to be out of the question, at least with presently available techniques. Prolongation of therapy may very well be feasible. The experience of Kahanpää and Gylling, and Buschke and



Cantril suggest that increases in total physical dose of deep x-ray in this manner may produce a higher rate of cure of vaginal carcinoma.

Analysis of these problems in relation to radium therapy is equally difficult, and a reliable solution more important. The cure of the local lesion is produced primarily by the short focal distance therapy, and it is failure to achieve this cure which determines the great majority of failures with vaginal carcinoma. There is some evidence, in the report of Buschke and Cantril, that increasing the dose of ionizing irradiation to the depths of the tumor, accomplished by increasing the amount of radium or altering its distribution without altering the duration of application, may yield a higher rate of cure of local lesions. At the same time, it may be noted that the large physical doses employed in the Helsinki series were achieved by the use of multiple applications of radium, at an unstated time interval which clearly involves increase in the time factor rather than the physical dose for each unit of time.

What goals can be set for future irradiation therapy of carcinoma of the vagina? At present, it would seem reasonable to plan for an increase of deep x-ray dosage, to the vagina, to 5,000 t.r., to be accomplished by prolongation of the time of therapy without changing the present daily dose. At the same time, the dose of radium can be increased to a calculated 10,000 gamma roentgens without varying the present time factor. It should be possible to achieve this without reducing the applicability rate or prohibitively increasing morbidity.

On the other hand, cure of a large proportion of patients with lesions of the lower vagina, particularly those with primary sites in the anterior wall, depends in part on solving the problem of distant metastasis, especially to the inguinal nodes. To achieve this purpose, the attack may have to be primarily surgical. The basic operation must include hysterectomy and vaginectomy with

pelvic lymphadenectomy combined with vulvectomy and inguinal lymphadenectomy. In appropriate patients, this would have to be combined with resection of the bladder or rectum or both. Such surgery is more radical than has heretofore been attempted. Its applicability will be low and primary mortality high. It can be discussed only because the salvage in this group in the past has been very close to nil. However, an increase in radiation dosage along the lines suggested may improve results even for these patients. It may be the part of wisdom to explore this possibility before attempting surgical procedures. There is no reason why increased irradiation could not be followed by inguinal and pelvic lymphadenectomy in suitable patients.

The past twenty-five years has seen a gradual improvement in the results of therapy of carcinoma of the cervix and the vulva, tumors embryologically, anatomically and biologically similar to carcinoma of the vagina. This has been accomplished by bold application of the maximum resources of irradiation and surgery. It seems only reasonable to expect the vaginal malignancy to yield, however gradually, to similar efforts directed toward it with equal determination and vigor.

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## II. MEDICAL SCHOOL NEWS

### Coming Events

- May 12-14 Continuation Course in Eye, Ear, Nose, and Throat for General Physicians
- May 13 Elias P. Lyon Lectureship; "Modern Conceptions on the Activity of the Chemoceptor Systems of the Carotid and Aortic Zone," Dr. Franz Brucke, Professor, Department of Pharmacology, University of Vienna, Austria; Owre Amphitheater; 7:45 p.m.
- May 15 Medical 6 O'Clock Dinner; Sponsored by the Medical Inter-Fraternity Council; Main Ballroom, Coffman Memorial Union.
- May 15-17 Continuation Course in Allergy and Hematology for General Physicians
- May 20 Minnesota Pathological Society Meeting; "Crime and the Doctor," Dr. C. Keith Simpson, Reader in Forensic Medicine, Supervisor of Medico-Legal Post-Mortems, and Home Office Pathologist, Guy's Hospital, University of London, London, England; Owre Amphitheater; 8:00 p.m.
- June 23-28 Continuation Course in Otolaryngology for Specialists

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### Continuation Course in Allergy and Hematology

The University of Minnesota will present a continuation course in Allergy and Hematology for General Physicians on May 15 to 17. Emphasis will be placed throughout the course on management of allergic and hematologic disorders. A demonstration of microscopic slides representing common hematologic disorders will be presented on the first day of the course, and the following day a practical demonstration of skin testing will be carried out. Our distinguished visiting lecturer will be Dr. Will Cook Spain, Professor of Clinical Medicine at New York University Postgraduate Medical School, New York City. The remainder of the faculty will include full-time and clinical members of the staff of the University of Minnesota Medical School and Mayo Foundation.

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### Medical 6 O'Clock Dinner

As previously announced, the annual Medical 6 O'Clock Dinner will be held on Thursday, May 15, at 6:30 p.m. This will be presented under the auspices of the Medical Inter-Fraternity Council in Coffman Memorial Union. The program promises to be an even more entertaining one than last year's. Be sure to set this date aside.

\* \* \*

### New Minnesota Medical Foundation Members

- |                                   |                                       |
|-----------------------------------|---------------------------------------|
| C. H. Holmstrom, M.D., Warren     | Harry Shuman, M.D., Rock Island, Ill. |
| I. Pearlman, M.D., Winnipeg, Man. | O. F. Mellby, M.D., Thief River Falls |

III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL  
WEEKLY CALENDAR OF EVENTS

Physicians Welcome

May 12-17, 1952

Monday, May 12

Medical School and University Hospitals

- 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; W-612, U. H.
- 10:00 - 12:00 Neurology Rounds; A. B. Baker and Staff; Station 50, U. H.
- 11:30 - Tumor Conference; Doctors Kremen, Moore, and Stenstrom, Todd Amphitheater, U. H.
- 11:30 - Physical Medicine Seminar; Metabolic Demand of Hospital Activities; Arthur Quiggle; Eustis Amphitheater, U. H.
- 12:15 - Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.
- 12:30 - Physiology Seminar; Studies on Endocrine Effects in Hypophysectomized Mice; Donald Ferguson; 214 Millard Hall.
- 1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U. H.
- 4:00 - Seminar on Fluid and Electrolyte Balance; Todd Amphitheater, U. H.
- 4:00 - Pediatric Seminar; Report of Meetings; Sixth Floor West, U. H.
- 4:30 - 5:30 Dermatological Seminar; M-346, U. H.
- 4:30 - Public Health Seminar; 15 Owre Hall.
- 5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staff; Eustis Amphitheater.

Minneapolis General Hospital

- 7:30 - Fracture Grand Rounds; Dr. Zierold; Sta. A.
- 10:30 - 12:00 Tuberculosis and Contagion Rounds; Thomas Lowry; Station M.
- 11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.
- 12:30 - Surgery Grand Rounds; Dr. Zierold; Sta. A.
- 1:00 - X-ray Conference; Classroom, 4th Floor.
- 1:30 - Pediatric Rounds; Robert Ulstrom; 4th Floor.

Ancker Hospital

- 8:30 - 10:00 Chest Disease Conference
- 1:00 - 2:00 Medical Grand Rounds.

Monday, May 12 (Cont.)

Veterans Administration Hospital

- 8:00 - 9:00 Neuroradiology Conference; B. J. O'Loughlin, R. C. Gray; 2nd Floor. Annex.  
9:00 - G. I. Rounds; R. V. Ebert, J. A. Wilson, Norman Shrifter; Bldg. I.  
11:30 - X-ray Conference; B. J. O'Loughlin; Conference Room, Bldg. I.  
2:00 - Psychosomatic Rounds; Bldg. 5.  
3:30 - Psychosomatic Rounds; C. K. Aldrich; Bldg. I.

Tuesday, May 13

Medical School and University Hospitals

- 8:30 - Conference on Diet Endocrines and Cancer; M. B. Visscher; 116 Millard Hall.  
9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, I. McQuarrie and Staff; Eustis Amphitheater, U. H.  
9:00 - 12:00 Cardiovascular Rounds; Station 30, U. H.  
12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 I. A.  
4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.  
4:30 - 5:30 Clinical-Medical-Pathological Conference; Todd Amphitheater, U. H.  
5:00 - 6:00 X-ray Conference; Presentation of Cases by University Hospital Staff; Eustis Amphitheater, U. H.  
\* 7:45 p.m. Elias P. Lyon Lectureship; "Modern Concepts on the Activity of the Chemoceptor Systems of the Carotid and Aortic Zone," Dr. Franz Brucke, Professor, Department of Pharmacology, University of Vienna, Austria; Owre Amphitheater.

Ancker Hospital

- 8:00 - 9:00 Fracture Conference; Auditorium, Ancker Hospital.  
8:30 - 9:30 Medical-Roentgenology Conference; Auditorium.  
1:00 - 2:30 X-ray-Surgery Conference; Auditorium.

Minneapolis General Hospital

- 8:00 - Pediatric Rounds; Spencer F. Brown; 5th Floor.  
10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station F.  
11:00 - Pediatric Rounds; Erling S. Platou; 7th Floor.  
12:30 - Neuroroentgenology Conference; O. Lipschultz, J. C. Michael, and Staff.  
12:30 - EKG Conference; Boyd Thomes and Staff; 302 Harrington Hall.  
1:00 - Neurology Grand Rounds; J. C. Michael and Staff.

Veterans Administration Hospital

- 7:30 - Anesthesiology Conference; Conference Room, Bldg. I.

Tuesday, May 13 (Cont.)

Veterans Administration Hospital (Cont.)

- 8:30 - Infectious Disease Rounds; Dr. Hall.  
8:45 - Surgery Journal Club; Conference Room, Bldg. I.  
9:00 - Liver Rounds; Drs. Nesbitt and MacDonald.  
9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.  
10:30 - Surgery Tumor Conference; L. J. Hay, B. J. O'Loughlin; Conference Room, Bldg. I.  
1:00 - Surgery Chest Conference; T. Kinsella and Wm. Tucker; Conference Room, Bldg. I.  
2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.  
3:30 - 4:20 Autopsy Conference; E. T. Bell and Donald Gleason; Conference Room, Bldg. I.

Wednesday, May 14

Medical School and University Hospitals

- 8:00 - 8:50 Surgery Journal Club; O. H. Wangenstein and Staff; M-109, U. H.  
8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Norman Jacob and L. G. Rigler; Todd Amphitheater, U. H.  
11:00 - 12:00 Pathology-Medicine-Surgery Conference; Surgery Case; O. H. Wangenstein, C. J. Watson and Staff; Todd Amphitheater, U. H.  
12:30 - 1:30 Permeability and Metabolism Seminar; Nathan Lifson; 129 Millard Hall.  
1:30 - Conference on Circulatory and Renal System Problems; M. B. Visscher; 116 Millard Hall.  
5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater, U. H.  
5:00 - 7:00 Dermatology Clinical Seminar; Dining Room, U. H.  
7:00 - 8:00 Dermatology Journal Club; Dining Room, U. H.  
8:00 - 10:00 Dermatological-Pathology Conference; Review of Histopathology Section; R. Goltz; Todd Amphitheater, U. H.

Ancker Hospital

- 8:30 - 9:30 Clinico-Pathological Conference; Auditorium.  
2:00 - 4:00 Medical Ward Rounds;  
3:30 - 4:30 Journal Club; Surgery Office.

Minneapolis General Hospital

- 8:00 - Pediatric Allergy Rounds; Lloyd Nelson; 4th Floor.  
10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.

Wednesday, May 14 (Cont.)

Minneapolis General Hospital (Cont)

- 11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.  
12:30 - Pediatric Staff Meeting; Report on Pediatric Meetings; 4th Floor Annex.  
1:30 - Pediatric Rounds; E. J. Huenekens and Robert Ulstrom; 4th Floor.

Veterans Administration Hospital

- 8:30 - 10:00 Orthopedic X-ray Conference; Conference Room, Bldg. I.  
8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker.  
2:00 - 4:00 Infectious Disease Rounds; Main Conference Room, Bldg. I.  
4:00 - 5:00 Infectious Disease Conference; W. Spink; Conference Room, Bldg. I.  
7:00 p.m. Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, May 15

Medical School and University Hospitals

- 8:00 - 9:00 Vascular Rounds; Davitt Felder and Staff Members from the Departments of Medicine, Surgery, Physical Medicine, and Dermatology; Heart Hospital Amphitheater.  
9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.  
11:00 - 12:00 Cancer Clinic; K. Stenstrom and A. Kremen; Todd Amphitheater, U. H.  
12:30 - Physiological Chemistry Seminar; Biosynthesis of Glycerides; James G. Hamilton; 214 Millard Hall.  
1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.  
3:30 - Medicine-Pediatric Infectious Disease Conference; Heart Hospital Auditorium.  
4:00 - 5:00 Physiology-Surgery Conference; Todd Amphitheater, U. H.  
4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.  
5:00 - 6:00 Radiology Seminar; The Effects of Radiation and Cortisone and Immune Reactions; Jack Friedman and Alvar Werder; Eustis Amphitheater, U. H.  
7:30 - 9:30 Pediatric Cardiology Conference and Journal Club; Review of Current Literature 1st hour and Review of Patients 2nd hour; 206 Temporary West Hospital.  
\* 6:30 p.m. Medical Six O'Clock Club Dinner; Sponsored by Medical Inter-Fraternity Council; Main Ballroom, Coffman Memorial Union.

Ancker Hospital

- 4:00 - Medical Pathological Conference; Auditorium.

Minneapolis General Hospital

- 8:00 - Pediatric Rounds; Spencer F. Brown; 5th Floor.

Thursday, May 15 (Cont.)

Minneapolis General Hospital (Cont.)

- 8:30 - Neurology Rounds; William Heilig; 4th Floor.
- 10:00 - Psychiatry Grand Rounds; J. C. Michael and Staff; Sta. H.
- 11:00 - Pediatric Rounds; Erling S. Platou; 7th Floor.
- 1:00 - Fracture-X-ray Conference; Dr. Zierold; Classroom.

Veterans Administration Hospital

- 8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.
- 8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.
- 11:00 - Surgery Roentgen Conference; B. J. O'Loughlin; Conference Room, Bldg. I.

Friday, May 16

Medical School and University Hospitals

- 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.
- 10:30 - 11:50 Medicine Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.
- 10:30 - 11:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
- 11:45 - 12:50 University of Minnesota Hospitals Staff Meeting; Vocational Rehabilitation; Annie Laurie Baker, Frederic J. Kottke, Ben Brainerd; Powell Hall Amphitheater.
- 1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.
- 2:00 - 3:00 Dermatology and Syphilology Conference; Presentation of Selected Cases of the Week; H. E. Michelson and Staff; W-312, U. H.
- 3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.
- 4:00 - 5:00 Dermatology Seminar; W-321, U. H.
- 5:00 - Urology Seminar and X-ray Conference; Eustis Amphitheater, U. H.

Ancker Hospital

- 1:00 - 3:00 Pathology-Surgery Conference; Auditorium.

Minneapolis General Hospital

- 11:00 - Pediatric Rounds; Franklin H. Top; 7th Floor.
- 11:00 - Pediatric-Surgery Conference; Dr. Wyatt, Forrest Adams; Classroom, Sta. I.
- 12:00 - Surgery-Pathology Conference; Dr. Zierold; Dr. Coe; Classroom.
- 1:00 - 3:00 Clinical Medical Conference; Thomas Lowry; Classroom, Station M.
- 1:30 - Pediatric Rounds; Robert Ulstrom; 4th Floor.



Friday, May 16 (Cont.)

Veterans Administration Hospital

- 10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.  
1:00 - Microscopic-Pathology Conference; E. T. Bell; Conference Room, Bldg. I.  
1:30 - Chest Conference; Wm. Tucker and J. A. Meyers; Ward 62, Day Room.  
3:00 - Renal Pathology; E. T. Bell; Conference Room, Bldg. I.

Saturday, May 17

Medical School and University Hospitals

- 7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.  
9:00 - 10:30 Pediatric Grand Rounds; I. McQuarrie and Staff; Eustis Amphitheater.  
9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; Heart Hospital Amphitheater.  
9:15 - 10:00 Surgery-Roentgenology Conference; L. G. Rigler, J. Friedman, Owen H. Wangenstein and Staff; Todd Amphitheater, U. H.  
10:00 - 11:30 Surgery Conference; Todd Amphitheater, U. H.  
10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.  
11:30 - Anatomy Seminar; Pulmonary Hemosiderosis; Frances E. Schaar; Experiments on Reticulo-endothelial Function; Samuel O. Cornwell; 226 Institute of Anatomy.

Ancker Hospital

- 8:30 - 9:30 Surgery Conference Auditorium.

Minneapolis General Hospital

- 8:00 - Pediatric Rounds; George Lund; 5th Floor.  
11:00 - 12:00 Medical-X-ray Conference; O. Lipshultz, Thomas Lowry, and Staff; Main Classroom.  
11:00 - Pediatric Clinic; C. D. May and Floyd Denny; Classroom, 4th Floor.

Veterans Administration Hospital

- 8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.  
8:30 - Hematology Rounds; P. Hagen and E. F. Englund.

\* 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.