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Poliomyelitis Occurring After Antigen Injections

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I. POLIOMYELITIS OCCURRING AFTER ANTIGEN INJECTIONS*

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During the past year several investigators have reported the occurrence of poliomyelitis within a few weeks after injection of some antigen. Martin in England[1], McCloskey in Australia[2], Geffen in London[3], Hill and Knowelden in England[4] and Banks and Beale in England[5] have all recorded such cases, uniformly noting a high degree of association between the location of the paralysis and the site of recently antecedent antigen injections. McCloskey[2] and Burnet[6] have stressed the apparent association of such cases with multiple antigens containing a pertussis component. Banks and Beale[5] have stressed the apparent severity of such cases, while Hill and Knowelden[4] have suggested that certain cases might "not have been diagnosed if their inoculation had not brought them into the paralytic group." The present report is the first account of such cases occurring in the United States.

The present study is based on analysis of the epidemiologic case histories obtained on 2,709 cases of poliomyelitis during the 1946 outbreak in Minnesota. Among the items included in these histories was a question about all injections or immunizations the patient had ever received, date of injections and name of physician (or clinic) giving the injections. All histories of children seven years of age or under were selected for more detailed study of relationship to prior immunization. Inquiries were addressed to the physician or clinic in all cases which showed a record of receiving any antigen injection during 1946. Inquiry was made as to actual date of injection, nature and source of antigen used, and site of injection. In many cases the physician's records did not show the actual site but a probable site could be presumed from the standard practice of the physician or clinic as to sites of injection for children of a given age. All hospitalized cases were checked further by study of hospital records to verify the extent and site of paralysis.

Table I shows the number of cases on which there was a history of antigen injection during the six months antecedent to the attack of poliomyelitis. It will be noted that 85 cases are listed as "confirmed". This term is used here to include those cases on which the physician or clinic had a definite record of date of immunization. Forty-two cases are listed as "not confirmed". Ten of these listed as "no reply" were so classified because the physician or clinic failed to reply to repeated requests for information. The other 32 were classified as "date not confirmed" because the physician, though replying to the letter, could not confirm the fact that he had given an antigen injection on a given day. The 42 "not confirmed" cases have been distributed in Table I according to the probable month of onset as dated from latest prior antigen injection, but 20 have been put in a class of "unknown" interval as the history merely stated that the injection had been given in 1946; in five of these the case was clearly not in the first-month group though more precise estimate of interval was not possible. Of the 42 "not confirmed" cases seven could be classed as possibly immunized during the month preceding the onset of poliomyelitis. Since the dates could not be verified these "not confirmed" cases are omitted from further discussion.

Of 85 confirmed cases occurring within six months after injection of an antigen, 33 had had their most recent injection within the preceding month, 12 in the second preceding month and 15 in the third preceding month. This concentration within a month following injection suggests that there may have been some causal relationship. Two alternative hypotheses are, however, obvious. The first is that the parent would have been more likely to have

*Aided by a Grant from the National Foundation for Infantile Paralysis.

Table I

CASES OF POLIOMYELITIS APPARENTLY OCCURRING WITHIN SIX MONTHS AFTER ANTIGEN INJECTION

Minnesota - 1946

Onset by month after most recent injection	Confirmed	Not confirmed	
		Date not confirmed	No reply
1st	33	5	2
2nd	12	1	0
3rd	15	2	1
4th	11	4	0
5th	10	3	1
6th	4	1	1
7th	--	1	0
Unknown	--	15*	5
	85	32	10

*In five of these the history suggested that the immunization was at least two months prior to onset.

recalled an event occurring during the month immediately preceding the poliomyelitis than to have remembered a similar event in some earlier month. This seems unlikely since a specific question as to immunization was asked and the answer did not reflect the parent's initiative in suggesting an observation.

The other hypothesis is that the distribution of cases by month subsequent to injection is a reflection of the amount of immunization performed in the community during different seasons. The distribution of antigens from the State Department of Health suggests, however, that there was a concentration of immunizations in April and May whereas the cases here recorded occurred largely between July and October. To a high degree these represent children immunized in school clinics whereas most of those developed poliomyelitis in the month after immunization were under two years of age. Although no records of the total number of immunizations carried on in any particular month are available, the records of the 85 confirmed cases may be taken as a sample of probable seasonal distribution, as the fact that these children subsequently developed poliomyelitis could not have influenced the decision to give them antigen injections prior to the attack. The seasonal distribution of the 33 first-month cases and of the 52 second-to-six-month cases is shown in Table II, as compared with the number of antigen injections received by these children during the previous months. It is apparent that the seasonal distribution of injections does not coincide with or parallel that of the cases of poliomyelitis. There is thus nothing in these data to support the hypothesis that the larger number of cases developing within a month after immunization than in the second, third or fourth month is due to a larger amount of immunization being performed during the poliomyelitis season. It is logical to infer, therefore, that the concentration of cases within a month after immunization suggests some causal relationship operating only during that first month.

Further evidence of such a relationship is contained in Tables III and IV. The former shows the relationship between the site of the last injection and the localization of the paralysis. Those showing subsequent temporary or

Table II

SEASONAL DISTRIBUTION OF POLIOMYELITIS CASES IMMUNIZED IN 1946 AND OF IMMUNIZING INJECTIONS RECEIVED BY THEM IN 1946

Minnesota - 1946

	Seasonal Distribution of Cases by Month of Onset				Seasonal distribution of injections received	
	Developed poliomyelitis first month after injection		Developed poliomyelitis 2nd-6th month after injection			
	Age 0-7	Age 0-1	Age 0-7	Age 0-1	Age 0-7	Age 0-1
Jan.	0	0	0	0	14	14
Feb.	0	0	0	0	11	8
Mar.	0	0	0	0	18	12
Apr.	0	0	0	0	32	16
May	0	0	0	0	38	22
June	1	0	1	0	35	25
July	11	7	17	9	26	15
Aug.	9	6	20	5	6	2
Sept.	7	4	10	5	9	5
Oct.	5	2	4	0	3	1
Total	33	19	52	19		

permanent paralysis of the extremity into which the injection was given are listed as "correlated cases". Those in which the injected extremity was not involved are classified as "non-correlated cases". A few cases are listed as questionably correlated. These include those with involvement of the neck muscles following injection into the upper arm, bulbar cases following arm injection, and those with arm involvement following arm injection but without any possible estimate as to which arm had been injected.

It is apparent from Table III that of the 33 cases occurring within a month after antigen injection 19 (58%) were definitely correlated while of the 52 cases occurring 2-6 months subsequent to antigen injection only 8 (15%) were correlated. The difference between these two groups is significant, strongly suggesting a relationship between the site of injection and the localization of paralysis developing within the subsequent month.

This relationship is further borne out by Table IV showing the distribution of paralysis in children under eight years of age according to history of prior immunization. It will be noted that 20 (61%) of the 33 immunized during the preceding month had an arm involvement, as contrasted with only 11 (21%) of 52 immunized 2-6 months preceding. As a further basis for comparison, random samples were drawn for all histories of cases under eight years of age, divided into those who had been immunized before 1946 and those who had never been immunized. In each case the sample consisted of about one-third of the children in each category as determined by the original histories. Table IV shows that 19% of those who had been immunized before 1946 had arm involvement and 21% of those who had never been immunized. It is apparent that those who had received an injection during the month preceding the onset were more likely to have an arm involvement than were other children of comparable age.

Table III

RELATIONSHIP BETWEEN LOCATION OF PARALYSIS AND SITE OF ANTECEDENT ANTIGEN INJECTION

PATIENTS 0-7 YEARS OF AGE

Minnesota - 1946

Month after injection	Total cases	Correlated paralysis	Non-correlated paralysis	Questionable correlation
1st	33	19(58%)	12	2
2nd	12	1	9	2
3rd	15	4	10	1
4th	11	1	9	1
5th	10	1	9	0
6th	4	1	2	1
2nd-6th total	52	8(15%)	39	5

Table IV

PATIENTS WITH PARALYSIS OF CERTAIN LOCATIONS ACCORDING TO DATE OF ONSET AFTER ANTIGEN INJECTION

PATIENTS AGED 0-7 YEARS

Minnesota - 1946

Month post immunization	Number of cases	Arm paralysis	Leg paralysis
1st	33	20(61%)	16(48%)
2nd	12	3	6
3rd	15	5	8
4th	11	1	7
5th	10	2	5
6th	4	0	1
2nd-6th total	52	11(21%)	27(52%)
Immunized before 1946	267	51(19%)	165(62%)
Never immunized	95	20(21%)	57(60%)

This table is, however, open to the possible criticism that the age groups are not strictly comparable as the first-month cases tended to be younger than the others. Yet if a similar comparison is made of those under two years of age we find that 74% of the first-month group had arm involvement as contrasted with 21% in the second-sixth month group, 33% in those immunized before 1946 and 13% in those never immunized.

In view of the apparent concentration of cases during the first month after immunization and the tendency toward localization of the paralysis in the limb into which the latest injection had been given, it is logical to inquire if the resulting paralysis was any more severe than in those immunized more than a month earlier. Table V shows the distribution of such cases by type and severity of disease. Although 24 (73%) of the 33 first-month cases were classed as severe spinal cases as contrasted with 42% of the 2-6 month group, the age distribution of the two groups is quite different. The first-month group may be weighted with more severe cases because younger patients tended to have a more severe form of paralysis throughout the outbreak. To correct for this possible weighting, the group under two years of age has been analyzed separately in Table VI. Here also there is a definite suggestion that the first-month cases were more severe than the 2-6 month group.

Analysis of the time intervals between last antigen injection and onset of illness in those cases developing during the first month subsequent to injection lends further support to the idea of a causal relationship. Table VII shows that of the 33 cases, 17 developed in the 10-14 day interval and 20 in the 5-14 day interval. Eleven of the 19 correlated cases developed in the 10-14 day interval and 16 of the 19 in the 5-19 day period, while the intervals of the non-correlated cases showed less concentration. This concentration or correlated cases within the usual period of incubation of poliomyelitis further sug-

Table V

TYPES OF INFECTION OF POLIOMYELITIS CASES ACCORDING TO IMMUNIZATION HISTORY
AGES 0-7

Minnesota - 1946

	Immunized previous month	Immunized 2-6 mo. prior to onset	Immunized before 1946	Never immunized
Bulbar	2	9	57	9
Severe Paralysis	24	22	79	51
Mild Paralysis	7	18	100	22
Non-Paralytic	0	3	27	10
Total	33	52	263	92

Table VI

TYPES OF INFECTION OF POLIOMYELITIS CASES ACCORDING TO IMMUNIZATION HISTORY
UNDER TWO YEARS OF AGE

Minnesota - 1946

	Immunized previous month	Immunized 2-6 mo. prior to onset	Immunized before 1946	Never immunized
Bulbar	1	0	2	2
Severe Paralysis	17	10	6	21
Mild Paralysis	1	9	7	5
Non-paralytic	0	0	0	3
Total	19	19	15	31

Table VII

INTERVAL BETWEEN ANTIGEN INJECTION AND ONSET OF POLIOMYELITIS

Minnesota - 1946

Interval in days	Correlated cases	Non-correlated cases	Questionable correlation
0- 4	1	0	0
5- 9	3	0	0
10-14	11	5	1
15-19	2	3	0
20-24	1	4	1
25-	1	0	0
Total	19	12	2

gests the existence of a relationship between the location of paralysis and the recent antigen injection.

The foregoing observations strongly suggest that a recent antigen injection may be a factor in conditioning the location of paralysis if paralysis is to result from the poliomyelitis and may perhaps be a factor in tipping the balance toward paralysis of a case that might otherwise have been non-paralytic. It is logical therefore to inquire as to the factors that may enter into these relationships.

McCloskey[2] and Geffen[3] suggested a special relationship to pertussis antigen. Table VIII shows the antigen received by each of the several cases who developed poliomyelitis within six months after immunization. Table IX shows a more detailed breakdown of the cases receiving antigen during the preceding month. It will be noted that of the 19 correlated first-month cases 16 had not had smallpox vaccine during the preceding month, seven had not had pertussis vaccine, seven had not had tetanus toxoid and only one had not had diphtheria toxoid. This might suggest that the paralysis was more likely to be associated with the diphtheria toxoid than with any of the other antigens. More probably, however, this apparent relationship is due to the fact that diphtheria toxoid is the most extensively used of the antigens. This latter explanation is supported by study of antigens received by the non-correlated first-month cases and by cases who had been immunized 2-6 months prior. It will be noted that the distribution of antigens received as well as of antigens not received is quite similar for all three groups. The data of these tables does not bear out the suggestion of Burnet and of Geffen[7] that the correlation with prior antigen injections is associated with the pertussis component of a multiple antigen as only nine of the 19 correlated first-month cases had received such an antigen. The data would suggest that the conditioning of the paralysis observed in the month post-immunization was not related to any particular antigen but was rather a non-specific factor, possibly related to the presence of some irritant, acting as a foreign body. This latter hypothesis is suggested by the fact that so far as could be learned, all of the antigens were alum precipitated, except in one non-correlated case developing within one month after smallpox vaccination. Least of all is there any suggestion of incrimination of a living antigen operating in collaboration with the virus of poliomyelitis, as 16 of the 19 correlated cases had not received smallpox vaccine during the preceding month.

All previous reports have suggested that age may be a factor in the develop-

Table VIII

POLIOMYELITIS CASES DEVELOPING WITHIN SIX MONTHS AFTER IMMUNIZATION BY TYPE OF ANTIGEN LAST RECEIVED

Minnesota - 1946

	Developed 1st month post immunization		Developed 2-6th month post immunization
	Correlated cases	Non-correlated* cases	
Received Antigens Indicated			
Smallpox	3	3	24
Diphtheria	18	12	33
Pertussis	12	8	14
Tetanus	12	9	22
Did Not Receive Antigens Indicated			
Smallpox	16	11	28
Diphtheria	1	2	19
Pertussis	7	6	38
Tetanus	7	5	30

*Included the two "questionably correlated" cases. Both of these had had the combined diphtheria-pertussis-tetanus antigen during the preceding month.

ment of paralysis among those recently immunized. Of 33 cases occurring within the first month after immunization, 19 or 58% were under two years of age whereas of the 52 cases occurring 2-6 months post-immunization 19 or 37% were of this age. The 2-6 month group were distributed more or less at random among the first seven years of age, simulating the distribution of all cases of poliomyelitis of this age group during the outbreak. The data suggest that the younger children are more apt to have their subsequent reaction to poliomyelitis virus altered by the antigen than are the older children.

Speculation as to the nature of the effect of the antigen in conditioning subsequent paralysis immediately raises a question as to possible sensitization due to prior injections. Of the 33 first-month cases nine or 27% were receiving their first injections while of the 2-6 month group 13 or 25% out of 52 were receiving their first injection. The similarity of these percentages suggests that the high proportion who had received prior injections was a characteristic of the entire group and not peculiar to those developing paralysis within the ensuing month.

Although the data so far presented suggest that an antigen injection during the month preceding the onset of poliomyelitis may be a factor in determining the development or localization of paralysis, they do not suggest that the effect lasts beyond the initial month. To shed further light on the duration of this effect, an attempt had been made to determine whether there is any difference in the type of reaction to poliomyelitis among those who at some time in their lives have had an antigen injection and those who have never been immunized.

For this purpose all of the 2,709

Table IX

POLIOMYELITIS IN CASES DEVELOPING WITHIN MONTH AFTER IMMUNIZATION BY TYPE OF ANTIGEN RECEIVED IN PREVIOUS MONTH

Minnesota - 1946

	Correlated	Non-correlated***
Monovalent Antigens		
Smallpox	0	1
Diphtheria	3*	0
Pertussis	3* **	0
Tetanus	0	1
Multivalent Antigens		
SD	0	2
DP	2	2
DT	5**	2
DPT	5	6
SDP	1	0
SDT	1	0
SDPT	1	0

*One case had separate injections of diphtheria and pertussis antigens 5 days apart but both within one month prior to onset. Listed under both headings.

**One case had separate pertussis and diphtheria-tetanus antigens 15 days and 10 days respectively prior to onset. Listed under both headings.

***Includes the 2 questionably correlated cases, both of whom received DPT.

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case histories obtained during the outbreak were examined with respect to history of various types of immunization and types of response to poliomyelitis infection. Of the cases 539 or 19.9% were classed as bulbar, 940 or 34.7% as severe spinal, 911 or 33.6% as mild spinal and 292 or 10.8% as non-paralytic. Twenty-six could not be classified due to inadequate data.

In order to determine the possible effect of prior immunization (regardless of date) upon subsequent reactions to poliomyelitis virus infection, the number at each age that might have been expected to be of each type of infection was calculated for those who had received injections of diphtheria, smallpox or pertussis antigen, basing the calculation on the assumption that at each age in each immunization group there would be the same distribution of types of cases as in the total series. A similar calculation was carried out for the non-immunized cases. The expected results were then compared with the actual number of cases of each type who had received a particular antigen.

A simple example will further clarify the methods of calculation. There were 214 children aged five years on whom complete histories were obtained. Of these, 28 or 13.3% were classed as bulbar cases. Of the 214, there were 160 who had at some time received injections of diphtheria antigens. If the same percentage of these 160 had been bulbar as among the total series of 214, one

would have expected 21.0 cases of bulbar infection among those five-year-olds who had had diphtheria antigens. Actually 22 of the 160 cases were bulbar. Applying a similar process to each group one may obtain the expected number of bulbar cases among all patients who had had diphtheria antigen and compare it with the number of bulbar infections that actually occurred within this group. As shown by Table X, 383 cases would have been expected among those who had ever received diphtheria antigen and 384 actually occurred. By similar

Table X

PROBABILITY OF CERTAIN TYPES OF POLIOMYELITIS AMONG CASES HAVING EVER RECEIVED VARIOUS ANTIGENS

EXPECTED VS. ACTUAL NUMBERS OF CASES AND DEATHS

Minnesota - 1946

Antigen received	Fatal		Bulbar		Severe spinal		Mild spinal		Non-paralytic	
	Exp.	Act.	Exp.	Act.	Exp.	Act.	Exp.	Act.	Exp.	Act.
Diphtheria	118	114	383	384	623	604	648	667	214	212
Smallpox	138	132	410	413	626	608	652	668	212	211
Pertussis	36	30	139	144	271	248	269	292	89	85
Tetanus	39	38	111	113	192	195	186	183	57	55
None	26	22	75	63	184	207	147	132	45	48

processes applied to those receiving other antigens and others who had never received any antigens it is found that 410 bulbar cases might have been expected among those vaccinated against smallpox as compared with 413 actually occurring, 139 as compared with 144 among those receiving pertussis antigen, 111 as compared with 113 among those who had received tetanus toxoid and 75 as compared with 63 among those who had never received any antigen. Table X shows a summary of similar analyses with respect to the severe spinal, mild spinal, non-paralytic and fatal cases. The fatal cases are also included in the appropriate other tables (bulbar and severe spinal) according to their classification.

None of the differences shown in this table is statistically significant, nor is there any apparent trend of small differences. The tables show clearly that in this entire group, when corrected for differences in age, there was no difference in the reaction of those who had received various antigens, and those who had never received any antigens. Thus whatever effect the antigens may have had in conditioning paralysis during the first succeeding month is apparently not permanent. There is, hence, no reason to withhold immunization in the fear that it will cause the individual to respond badly to poliomyelitis when exposed in subsequent years, or even after the month immediately following the injection.

Further evidence of a lack of difference in response of the immunized and non-immunized groups is found in analysis of the cases of poliomyelitis in the University of Minnesota Hospitals during July through October, 1946 (Table XI). It will be noted that the proportions of bulbar and of non-paralytic cases were the same in each group, as was also the distribution of paralyses between arm and leg.

It will be objected that the foregoing data deal only with the type of response

to poliomyelitis virus and do not shed any light on altered susceptibility to recognizable infection. In other words, may a child who had previously been immunized in some earlier year be more or less likely to develop poliomyelitis?

To obtain an answer to this question,

Table XI

LOCATION OF PARALYSIS AND TYPE OF POLIOMYELITIS INFECTION BY HISTORY OF PRIOR IMMUNIZATION

UNIVERSITY OF MINNESOTA HOSPITALS

July-October, 1946

	Immunized					Never Immunized				
	Pts.	Arm*	Leg*	Bulbar	NP	Pts.	Arm*	Leg*	Bulbar	NP
0- 4	53	9	30	2	3	34	5	21	5	1
5- 9	68	7	22	18	5	13	2	8	0	2
10-14	49	8	20	11	4	7	1	3	2	1
15-16	13	1	6	0	0	2	1	0	1	0
	183	25	78	34	12	56	9	32	8	4

*A child having both leg and arm involvement is counted in both groups.

all cases of poliomyelitis cared for on the pediatric service of the University of Minnesota Hospitals during July, August, September and October, 1946 were compared as to immunization history with non-poliomyelitis cases on the same service during the same period of time. Using the same statistical methods outlined above, the total number of patients who had received each antigen as well as those who had received no antigen was determined and the probable number of poliomyelitis cases in each group compared with the actual number.

Table XII summarizes the results of such comparisons. None of the differences is statistically significant. The comparisons show clearly that for these two groups of patients the pattern of prior immunizations was identical when corrected for differences in age. There is, therefore, no evidence from these cases that poliomyelitis is any more or any less likely to attack the immunized child as contrasted with the non-immunized.

DISCUSSION

In spite of the magnitude of the 1946 outbreak, the number of cases among recently immunized children is small. There is no way to determine how many children of various ages were immunized against various diseases during the spring and summer of 1946, but it was obviously very large. Lacking such data one cannot determine precisely whether the attack rate of poliomyelitis was or was not higher among those recently immunized than among those who had not recently received an antigen injection. Few of either group would be expected to develop recognizable poliomyelitis. No importance can therefore be attached to the absolute magnitude of the figures here recorded. It must be recalled, however, that the cases here described occurred during a period of unusual prevalence, when almost 3,000 cases and 216 resident deaths were recorded in a state of barely 3,000,000 population.

Some significance must, however, be

Table XII

IMMUNIZATION HISTORIES OF ALL PATIENTS IN PEDIATRIC SERVICE
UNIVERSITY OF MINNESOTA HOSPITALS, JULY-OCTOBER 1946

NUMBER WITH HISTORY OF IMMUNIZATIONS WITH VARIOUS ANTIGENS COMPARED WITH EXPECTED NUMBER BASED ON WHOLE GROUP

Antigen received	Poliomyelitis cases		Non-poliomyelitis cases	
	Expected	Actual	Expected	Actual
Diphtheria	158	160	65	63
Smallpox	147	146	60	61
Pertussis	77	75	28	24
None	60	56	65	69

attached to the fact that the number of patients who had been immunized during the month prior to onset was appreciably larger than the number of those immunized in any one of the other recently preceding months. The different pattern of paralysis and the correlation with the site of prior inoculation are strongly suggestive of relationship to the antigen injection. Moreover, these data are in exact harmony with the several reports from the British literature. Considerable attention must be attached to the fact of uniformity of results in a series of independent observations even though each may be small. The conclusion seems inescapable that in a few cases the location of the paralysis occasioned by the virus of poliomyelitis is conditioned by recent antigen injections and there is at least some suspicion that such injections may be a factor determining the difference between a recognizable paralytic infection and an unrecognizable non-paralytic involvement.

Of even greater importance is the question of the duration of this effect. If it is merely transient, its influence can be avoided through more careful selection of the time for immunization, which is almost invariably an elective procedure. On the other hand, if the effect is lasting there would be reasons for re-evaluating the basic concept of immunization programs. The data indicate clearly that the responses of those who had been immunized more than a month earlier were no more severe than among those who had never been immunized. It is clearly apparent that there is nothing in the data reported here or elsewhere which can be interpreted as even suggestive of a permanent poliomyelitis hazard associated with immunization with any of the antigens here considered.

CONCLUSION

1. In poliomyelitis cases who have received some antigen during the month prior to onset there is a high degree of correlation between site of paralysis and site of injection.

2. Such cases tend to show a different distribution of paralysis and a more severe paralysis than do comparable children immunized 2-6 months previously, immunized in previous years or never immunized.

3. The time interval between date of injection and onset of illness suggests some relationship other than chance.

4. There is no evidence that this relationship is associated with any one antigen.

5. There is no evidence that the influence of the antigen persists, or in any way conditions the response to poliomyelitis virus for longer than one month.

6. Since immunization is an elective procedure, it can well be delayed during outbreaks of poliomyelitis; but there is no suggestion that the postponement should be more than temporary.

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II. MEDICAL SCHOOL NEWS

Coming Events

March 26 - 28 Continuation Course in Pediatrics for General Physicians

April 2 - 6 Continuation Course in Urology for General Physicians and Surgeons

April 5 - 7 Symposium on Lupus Erythematosus

April 5 - 11 Continuation Course in Gynecology for General Physicians

April 16 - 18 Diseases of the Blood in Infancy and Childhood

* * *

Faculty News

Dr. Ancel Keys, Professor and Director of the Laboratory of Physiological Hygiene, will journey to Rome, Italy, to participate in a conference on nutrition. The conference is sponsored by the World Health Organization and the Food and Agriculture Organization and will convene from April 10 to 17, 1951.

Dr. Austin Henschel, Associate Professor of the Laboratory of Physiological Hygiene, has accepted a post as Scientific Director of the Army's Climatic Research Laboratory in Lawrence, Massachusetts. Dr. Henschel will take over his new post on March 15.

The activities of the University of Minnesota's Department of Psychiatry were dramatized for the radio audience in a KUOM production created as a part of the University of Minnesota Centennial Celebration. The one-hour production, which is entitled "Station 60", is based upon a case history of one of the hospital's psychiatric patients. Dr. Roger Howell, Associate Professor of Psychiatry, acts as narrator in the presentation commenting on and interpreting the developments.

Soon to be released by the University of Minnesota Press is the book, "The Atlas for the Clinical Use of the Minnesota Multiphasic Personality Inventory," written by Dr. Starke R. Hathaway, Professor of Psychiatry, and Dr. Paul E. Meehl, Associate Professor of Psychology and Psychiatry. This 800-page work presents hundreds of histories of In-Patients at the University of Minnesota Hospitals together with their personality profiles. Doctors Hathaway and Meehl, together with other faculty members, will present on May 14 a continuation course for physicians on the use of the Minnesota Multiphasic Personality Inventory.

Dr. George N. Aagaard, Director of Continuation Medical Education and Associate Professor of Medicine, will attend the National Conference on Preventive Aspects of Chronic Disease March 12 to 14, 1951, in Chicago. The conference is sponsored by the Commission on Chronic Illness.

Thirty-five physicians, members of the Surgical Society of Western Canada, visited the University of Minnesota Medical School March 2 and 3. They were the guests of Dr. Owen H. Wangensteen and his staff at rounds and conferences and operative clinics presented in the University Hospitals.

III. UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
WEEKLY CALENDAR OF EVENTS

Visitors Welcome

March 11 - 17, 1951

Sunday, March 11

University Hospitals

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

10:30 - Surgical Conference; Todd Amphitheater.

Monday, March 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; M-109, U. H.

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

11:00 - 11:50 Physical Medicine Seminar; Central Nervous System Fatigue and Adaptation; William G. Kubicek; E-101, U. H.

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

12:00 - 12:50 Physiology Seminar; The Interaction of Calcium and Proteins; Charles W. Carr; 214 Millard Hall.

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

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

4:00 - Public Health Seminar; 113 Medical Sciences.

4:00 - Pediatric Seminar; ACTH Pictures; Sixth Floor West, U. H.

4:30 - 5:30 Dermatological Seminar; M-436, 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; Powell Hall Amphitheater.

Minneapolis General Hospital

9:00 - 10:00 Pediatric Rounds; Dr. Tobin; 5th Floor Annex.

10:00 - 11:00 Pediatric Rounds; Franklin Top; 7th Floor Annex.

Monday, March 12 (Cont.)

Minneapolis General Hospital (Cont.)

1:00 - 2:00 Staff Meeting; Classroom, 4th Floor.

2:00 - 3:00 Journal Club; Classroom, Station I.

Veterans Administration Hospital

9:00 - G. I. Rounds; R. V. Ebert, J. A. Wilson, Norman Shrifter; Bldg. I.

11:30 - X-ray Conference; Conference Room; Bldg. I.

1:00 - Metabolic Disease Rounds; N. E. Jacobson and G. V. Loomis; Bldg. I.

4:00 - Research Conference; Dr. Borden; Conference Room, Bldg. I.

Tuesday, March 13

Medical School and University Hospitals

9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, I. McQuarrie and Staffs; 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.

1:00 - 2:00 Physiology Seminar on Cardiac Metabolism; 129 Millard Hall.

3:15 - 4:20 Gynecology Chart Conference; J. L. McKelvey and Staff; Station 54, U.H.

4:00 - 5:00 Physiology-Surgery Conference; Todd Amphitheater, U. H.

4:00 - 5:00 Pediatric Rounds on Wards; I. McQuarrie and Staff; U. H.

5:00 - 6:00 X-ray Conference; Eustis Amphitheater, U. H.

8:00 p.m. Journal Club; E-101, U. H.

Ancker Hospital

1:00 - 2:30 X-ray Surgery Conference; Auditorium.

Minneapolis General Hospital

8:00 - 9:00 Pediatric Rounds; Forrest Adams; 4th Floor Annex.

8:30 - Pediatric Allergy Rounds; Dr. Nelson; 4th Floor Annex.

Veterans Administration Hospital

8:45 - Surgery Journal Club; Conference Room, Bldg. I.

8:30 - 10:20 Surgery Conference; Seminar Conference Room, Bldg. I.

Tuesday, March 13 (Cont.)

Veterans Administration Hospital (Cont.)

9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.

10:30 - 11:50 Surgical-Pathological Conference; Lyle Hay and E. T. Bell.

10:30 - Surgery Tumor Conference; Conference Room, Bldg. I.

1:00 - Chest Surgery Conference; J. Kinsella and Wm. Tucker; Conference Room, Bldg. I.

1:30 - Liver Rounds; Samuel Nesbitt.

2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.

3:30 - 4:20 Clinical Pathological Conference; Conference Room, Bldg. I.

Wednesday, March 14

Medical School and University Hospitals

8:00 - 8:50 Surgery Journal Club; O. H. Wangensteen and Staff; M-109, U. H.

8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Allen Judd and L. G. Rigler; Todd Amphitheater, U. H.

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; 113 Medical Sciences.

4:00 - 6:00 Ophthalmology Seminar; Todd Room, 5th Floor, U. H.

5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater.

5:00 - 7:00 Dermatology Clinical Seminar; Dining Room, U. H.

8:00 p.m. Dermatological Pathology Conference; Todd Amphitheater, U. H.

Ancker Hospital

8:30 - 9:30 Clinico-Pathological Conference; Auditorium.

3:30 - 4:30 Journal Club; Surgery Office.

Minneapolis General Hospital

9:00 - 10:00 Pediatric Rounds; J. D. Tobin; 5th Floor Annex.

11:00 - 12:00 Pediatric Rounds; Franklin Top; 7th Floor Annex.

Wednesday, March 14 (Cont.)

Minneapolis General Hospital (Cont.)

12:15 - Staff Meeting; Physiology of Vitamin D; Charles Lowe; 4th Floor Annex.

1:30 - Pediatric Rounds; E. J. Huenekens; 4th Floor Annex.

Veterans Administration Hospital

8:30 - 10:00 Orthopedic-Roentgenologic Conference; Edward T. Evans and Bernard O'Loughlin; Conference Room, Bldg. I.

8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker.

7:00 p.m. Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, March 15

Medical School and University Hospitals

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.

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

12:00 - Physiological Chemistry Seminar; Isotopic Studies of Insulin Activity; Alan Thompson; 214 Millard Hall.

4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hansen and Staff; E-534, U. H.

5:00 - Bacteriology Seminar; Some Characteristics of Growth and Biochemical Activity of Bacteria Grown at Low Temperatures; V. W. Greene; 214 Millard Hall.

5:00 - 6:00 X-ray Seminar; Eustis Amphitheater, U. H.

5:00 - 6:00 Radiology Seminar; Presentation of Cases from Miller Hospital; Doctors Peterson and Bauer; Eustis 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.

Minneapolis General Hospital

8:00 - 9:00 Pediatric Rounds; Forrest Adams, 4th Floor Annex.

11:30 - Pathology Conference; Main Classroom.

1:00 - 2:00 EKG and X-ray Conference; Classroom, 4th Floor Annex.

2:00 - 4:00 Infectious Disease Rounds; 8th Floor.

4:00 - 5:00 Infectious Disease Conference; Classroom, 8th Floor.

Thursday, March 15 (Cont.)

Veterans Administration Hospital

8:00 - Surgery Ward Rounds; Lyle Hay and Staff.

9:15 - Surgery Grand Rounds; Conference Room, Bldg. I.

11:00 - Surgery-Roentgen Conference; Conference Room, Bldg. I.

1:00 - Chest Rounds; William Stead.

Friday, March 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.

10:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, 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; The Use of Cortisone in Asthma; Jacob Blumenthal; 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 Neuropathology Conference; F. Tichy; Todd Amphitheater, U. H.

4:00 - 5:00 Clinical Pathological Conference; A. B. Baker; Todd Amphitheater, U. H.

4:15 - 5:15 Electrocardiographic Conference; 106 Temporary Bldg., Hospital Court, U. H.

5:00 - Urology Seminar; Hypertension in Unilateral Renal Disease; R. N. Krumback; Eustis Amphitheater, U. H.

Ancker Hospital

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

Minneapolis General Hospital

9:00 - 10:00 Pediatric Rounds; J. D. Tobin; 5th Floor Annex.

9:30 - Surgery-Pediatric Conference; O. S. Wyatt and T. C. Chisholm; 4th Floor Annex.

11:00 - 12:00 Pediatric Rounds; Franklin Top; 7th Floor Annex.

Friday, March 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. Myers; Ward 62, Day Room.

3:00 - Renal Pathology; E. T. Bell; Conference Room, Bldg. I.

Saturday, March 17

Medical School and University Hospitals

7:45 - 8:50 Orthopedic X-ray Conference; Wallace H. Cole and Staff; M-109, U. H.

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.

9:15 - 10:00 Surgery-Roentgenology Conference; J. Friedman, O. H. Wangensteen and Staff; Todd Amphitheater, U. H.

10:00 - 11:30 Surgery Conference; O. H. Wangensteen 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.

Ancker Hospital

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

Minneapolis General Hospital

8:00 - 9:00 Pediatric Rounds; Forrest Adams; 4th Floor Annex.

11:00 - 12:00 Pediatric Clinic; Charles May; Classroom, 4th Floor Annex.

Veterans Administration Hospital

8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.

8:30 - Hematology Rounds; P. Hagen and E. F. Englund.