Bulletin of the
University of Minnesota Hospitals
and
Minnesota Medical Foundation

Absorbable Bronchographic Contrast Media
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. ABSORBABLE BRONCHOGRAPHIC CONTRAST MEDIA</td>
<td>154 - 162</td>
</tr>
<tr>
<td>CHARLES M. NICE, Jr., M.D., Instructor,</td>
<td></td>
</tr>
<tr>
<td>ISMAIL NIKNEJAD, M.D., Medical Fellow,</td>
<td></td>
</tr>
<tr>
<td>MANOUCHEHR AZAD, M.D., Medical Fellow;</td>
<td></td>
</tr>
<tr>
<td>Department of Radiology,</td>
<td></td>
</tr>
<tr>
<td>University of Minnesota Medical School</td>
<td></td>
</tr>
<tr>
<td>II. MEDICAL SCHOOL NEWS</td>
<td>163 - 165</td>
</tr>
<tr>
<td>III. WEEKLY CALENDAR OF EVENTS</td>
<td>166 - 173</td>
</tr>
</tbody>
</table>

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I. ABSORBABLE BRONCHOGRAPHIC CONTRAST MEDIA

Charles M. Nice, Jr., M. D.
Ismail Niknejad, M. D.
Manouchehr Azad, M. D.

Bronchography may be defined simply as contrast roentgen visualization of the bronchial tree. The clinical value of the procedure has been firmly established. The prime indication for bronchography is to outline the bronchial tree in patients with bronchiectasis. The pre-operative location of diseased bronchial segments is indispensable since it is impossible to determine this at the time of surgery.

In relatively localized bronchial disease, such as may be encountered in the right middle lobe syndrome, the strict localization of the pathologic change is also of value. In patients suspected of having bronchial carcinoma, planigraphy, bronchoscopy, and cytologic examination of the sputum are usually performed. If these examinations are equivocal, bronchography may yield signs leading to a positive diagnosis. The bronchogram may be of little value in demonstrating welldelineated lesions unless they are centrally located.

Bronchography is also of value in demonstrating diseased bronchial segments in patients with pulmonary tuberculosis who may be potential candidates for resection. The possible presence of a non-opaque foreign body in the tracheo-bronchial tree may be an indication for bronchography if fluoroscopy, simple roentgenography and bronchoscopy yield incomplete information.

Bronchography is probably contraindicated in those patients with limited pulmonary reserve, acute pneumonia, acute lung abscess and severe renal dysfunction. The latter should be considered especially when the contrast agent is excreted largely through the kidneys.

HISTORICAL DATA

In the early part of this century accidental aspiration of the barium suspension used in roentgen examination of the stomach resulted in contrast visualization of the bronchial tree. This, in turn, stimulated bronchographic experiments on animals. Springer attempted bronchography in dogs in 1906. In 1918, Jackson produced a suitable bronchogram in man by insufflating bismuth powder through the bronchoscope. In 1921, Lynah and Stewart demonstrated a lung abscess by a suspension of bismuth in oil which they introduced through a bronchoscope. These contrast agents were completely unresorbable and, therefore, failed to gain clinical acceptance. Collargol, thorium and sodium bromide were tried on animals and were considered unsatisfactory.

The suggestion to use iodized oils in bronchography stemmed from the work of Waters, Bayne-Jones and Rowntree, who, in 1917, injected an iodoform emulsion into the trachea of dogs. In 1922, Sicard and Forestier introduced iodized poppy-seed oil (lipiodol) as a contrast medium to be used in myelography and bronchography in human subjects. Following this, bronchography with various iodized oils became a routine clinical procedure.

Although bronchograms of diagnostic quality have been obtained with the iodized oils, many disadvantages have been attributed to their use. The principal disadvantages may be listed as follows:

1. There is excessive alveolar filling with contrast medium with resultant detriment to bronchographic diagnosis. Dormer attempted to avoid this by combining sulfanilamide powder with iodized oil.

2. The iodized oils are only partially removed from the pulmonary tissues by means of coughing and postural drainage, and are absorbed largely by a process of phagocytosis over a period of several months. This interferes with serial
roentgenographic study in chronic diseases such as tuberculosis and silicosis, and in patients undergoing thoracic surgery.

3. The slow release of the iodized oils leads to the formation of granulomatous changes (25) which enhance pathologic changes already present.

4. The accidental swallowing of expectorated iodized oil leads to the liberation of iodide ion in the acid environment of the stomach. The subsequent absorption of the iodide ion may lead to symptoms of iodism, or may cause serious reaction in the iodine-sensitive patient.

5. A rarely encountered, but grave, disadvantage is the danger of embolism.17

The slow disappearance of the iodized oils from the pulmonary fields and the rather frequent formation of granulomatous reaction in the lung have been the chief factors which have stimulated the search for a more satisfactory contrast medium for bronchography.

DEVELOPMENT OF ABSORBABLE CONTRAST MEDIA

For over 20 years many investigators have been searching for a bronchographic contrast agent which would be fully resorbable, water-soluble, and innocuous to pulmonary tissues. Beginning in 1931, several contrast agents, many combined with varying viscosifying compounds were tried, and for some time none were generally acceptable.

The first significant advance in a search for a good absorbable medium occurred in 1948. At that time the Swedish workers, Morales and Beiwinkel reported on the use of Unbradil (diethanolamine salt of 3,5 di-iodo-4-pyridone) combined with sodium carboxymethylcellulose. The latter is added to increase viscosity. It should be noted that Unbradil is similar to Iodopyracet, U.S. P., Diodrast brand. The following year, Fischer introduced a somewhat similar medium, Ioduron B. Properties of these and other similar media are summarized by Niknejad, et al.19 In addition to the two principal classes of ingredients, i.e., radiopaque substances and viscosifying agents, various workers have added local anesthetics, antibiotics, chemical buffers, wetting agents and preservatives.

Morales17 published the results of further studies with viscous Unbradil. He noted that in spite of its rather high viscosity, the surface tension is relatively low so that it can reach small pockets and very narrow channels. The roentgen-opaque substance, Unbradil, is excreted by the kidneys. The elimination of sodium carboxymethylcellulose is also of importance. Hellström and Holmgren, using toluidin blue to stain tissue sections, showed that this substance is taken up by phagocytes within the alveoli, and only traces were seen within the phagocytes after three weeks. These same workers also showed, in experiments performed on animals, that a certain degree of irritation is produced by the Unbradil component particularly, as manifested by an increased amount of fluid within the bronchial tree. No permanent histologic changes were recorded.

In the search for an absorbable contrast medium of definitely less irritating nature and of slightly slower rate of absorption, Tomich, Basil and Davis26 examined several contrast media and finally chose the normal propyl ester of 3:5-di-iodo-4-pyridone-IV-acetic acid (propyliodone, Dionosil brand). The chemical structure of this compound is:

\[
\begin{align*}
O- & \quad \text{N.CH}_2. \quad \text{COO-CH}_2. \\
& \quad \text{CH}_2. \quad \text{CH}_3
\end{align*}
\]

Tomich and his co-workers26 described the chemical properties of this compound, performed studies on toxicity and metabolism of propyliodone in animals, and later performed metabolic studies in human subjects. The pulverized crystals can be suspended either in aqueous media with a mixture of sodium carboxymethylcellulose and a suitable wetting agent or in vegetable oils. The term "aqueous propyliodone (Dionosil)" refers to a 50
per cent W/V suspension in an aqueous medium, and "oily propyliodone (Dionosil)" refers to a 60 per cent W/V suspension in arachis oil. These two preparations contain respectively 30 and 34 per cent of iodine by weight.

It was found that the degree of irritability produced by both the aqueous and oily suspensions of Dionosil was about the same as that produced by iodized oils, and was definitely less than that produced by other absorbable contrast media. There was less tendency to alveolar filling and the opaque compound, propyliodone, largely disappeared in three days. No toxic symptoms were observed after intratracheal or oral administration of propyliodone. Apparently propyliodone is hydrolyzed and completely eliminated by the kidney. Iodine and iodide ion have not been detected in animal or human urine, so that apparently iodine-sensitive individuals could tolerate bronchography with propyliodone. Sodium carboxymethylcellulose and arachis oil are removed by expectoration and phagocytosis within five days.

Brief reports on the clinical use of Dionosil in human adults and children have originated in England, South Africa and Canada.1,14 In the United States, Norris and Stauffer20 have reported their experience. These reports have been uniformly favorable.

At the University of Minnesota and associated hospitals our experience with absorbable bronchographic contrast media have been confined to the use of Xumbradil Viscous B and Dionosil. Bronchography with Xumbradil Viscous B has been carried out at Ancker Hospital, Saint Paul, and bronchography with both the aqueous and oily suspensions of Dionosil has been carried out at the University Hospitals and Ancker Hospital. This experience has been assembled and combined for this report.

EXPERIENCE WITH XUMBRADIL VISCOS B

During a two-year period (1952 and 1953) Xumbradil Viscous B was used as the contrast medium for bronchography at Ancker Hospital. Altogether 80 examinations were carried out in 72 patients. Since satisfactory clinical and roentgenological records could not be obtained in some of these patients, the present report covers only 74 examinations in 64 patients. Most of these studies were done for the purpose of anatomical localization of the diseased bronchial segments in patients with tuberculosis or bronchiectasis or as a diagnostic procedure in patients whose pulmonary disease could not be satisfactorily explained by other more routine methods of investigation.

A. Technique of Examination. We have used the European technique for bronchography in our examinations. It differs from the usual technique currently in vogue in this country in that all roentgenograms are obtained by means of spot film device under direct fluoroscopic vision. This technique has been necessitated by the rapidity of absorption and disappearance of Xumbradil Viscous B from the bronchial tree. We have also found it necessary to subject the upper tracheo-bronchial trees of our patients to a deeper surface anesthetization than is required for bronchography with iodized oil.

B. Analysis of our Findings. The ages of our patients ranged from five to 80 years; however, the majority of them were between the age of 20 and 60 years. We have encountered more difficulty in obtaining good bronchograms in patients in extreme age groups. This is naturally attributed to poor tolerance of patients in these groups to sedative drugs and local anesthetics. The diagnostic quality of our bronchograms was entirely dependent upon the degree and adequacy of anesthetization of the upper tracheo-bronchial tree. We were able to obtain diagnostic bronchograms in 93 per cent of our patients. Failure occurred in only five patients; in all of these cases the failure could be attributed to violent coughing which occurred immediately after the introduction of the contrast medium into the bronchial tree. This was attributed to inadequate anesthetization in spite of the use of the maximum permissible dose of pontocaine.
We have found that Xumbradil Viscous B can be used in all bronchographic examinations regardless of the nature of pulmonary disease. This is attested to by our demonstration of a variety of pulmonary diseases by means of this medium. This is in contrast to the view held by Metras et al. who reserve the use of water-soluble media for patients with severe pulmonary insufficiency. In general, we feel that this medium can be used in all instances where a bronchographic examination is indicated regardless of the nature of the pathologic process within the lungs.

C. Complications. Most of our complications have been of the types which are inherent in a bronchographic procedure regardless of the nature of the contrast medium. In 59 per cent of our cases, a pyrexia ranging from 0.2 to 3 degrees F. occurred during the 24 hours following the examination. In the great majority of these patients, the temperature seldom exceeded 100 degrees F. The few patients who exhibited post-bronchographic pyrexia above this level were patients with advanced pulmonary tuberculosis with extensive cavitation. Since we have also noted pyrexia in patients following bronchoscopic examinations without bronchography we feel that the transient rise of temperature is at least partially due to endobronchial manipulation rather than due to the effect of the contrast medium per se.

D. Follow-up Studies. Post-bronchographic roentgenograms of the chest in patients who had bronchographic examinations with Xumbradil Viscous B failed to reveal any discernible roentgenological changes within the lungs that could be attributed to the use of this medium. Similarly, histologic examination of the surgically removed segments of the lungs in patients who had bronchographic examination prior to operation failed to reveal any findings that could not be related to the disease for which surgery was undertaken.

No fatalities were noted during the bronchographic procedure or in the period immediately following examination. Severe dyspnea and cyanosis developed in one of our patients during the procedure which necessitated cessation of the examination. However, he was revived promptly by artificial respiration and administration of oxygen. The accident was attributed to inadvertent filling of the entire tracheo-bronchial tree by the contrast medium. It may be that temporary coating of the major portion of pulmonary epithelium by sodium carboxymethyl-cellulose had impeded an adequate ventilatory exchange. Another possibility is that widespread bronchial spasm occurred.

Considerable divergence of opinion exists with regard to the wisdom of carrying out a bronchographic examination in a patient with known pulmonary tuberculosis. In an era where no effective antibiotic agent existed against the tubercle bacillus the risk of spreading the disease to the healthy segments of the lungs constituted the main contra-indication to the use of bronchography. However, a review of recent literature indicates that the occurrence of such accidents is rare. The advent of chemotherapy and the wide acceptance of surgical resection in the treatment of pulmonary tuberculosis have made bronchographic examination imperative for the accurate localization of the diseased pulmonary segments.

Our series includes 36 bronchographic examinations in 32 patients with proved pulmonary tuberculosis. During a follow-up period ranging from one to 27 months, we failed to demonstrate any clinical or radiological evidence of reactivation or exacerbation of the disease that could be attributed to this roentgenologic procedure. Exception is made in one instance where a new pulmonary infiltration was observed two weeks following a bronchographic examination which demonstrated the presence of a broncho-pulmonary fistula. The relation of this examination to the occurrence of the new pulmonary change was at best inconclusive. We emphatically condemn the injudicious and unnecessary use of bronchographic examinations in patients with...
known active pulmonary tuberculosis. However, we feel that whenever this procedure is indicated the examination should be carried out and Xumbradil Viscous B offers several obvious advantages over iodized oils for use as the contrast medium.

E. Discussion. Notwithstanding the fact that we have obtained diagnostic bronchograms in the great majority of our examinations, we believe that Xumbradil Viscous B is by no means ideally suited for bronchography. It has the following serious drawbacks:

1. It produces an immediate irritating effect upon the pulmonary epithelium, and necessitates deep surface anesthesia. At times, it appears that the maximum permissible dose of local anesthesia such as cocaine or pontocaine fails to produce sufficient anesthesia to permit an unobstructed study of the tracheo-bronchial tree.

2. The rapidity of alveolarization and clouding of the lung fields, as well as the rapidity of absorption do not permit the use of the routine method of roentgenography which is rightly favored by most radiologists in this country.

3. Its irritant effect upon the pulmonary tissue sometimes produces severe spasm of the smooth muscles of the bronchioles. This phenomenon often results in incomplete filling of the smaller bronchi which may mislead the radiologist in his interpretation.

In spite of the above shortcomings, we feel that Xumbradil Viscous B is a satisfactory medium for the demonstration of endobronchial disease. Its easy elimination, its rapid mixture with bronchial secretion, its adequately visible radiographic density, together with the absence of any delayed pulmonary reaction make it suitable for use and preferable to the iodized oils.

EXPERIENCE WITH DIONOSIL

The combined experience of the radiologic staffs of the University Hospitals and Ancor Hospital includes the performance of 61 bronchograms in 55 patients, of all age groups, using both aqueous and oily Dionosil.

A. Technique of Examination. The contrast medium is injected through a tracheal catheter inserted at the termination of bronchoscopy. No special anesthetic procedure other than the routine premedication and anesthetization preceding bronchoscopy is used.

In the fluoroscopic room the patient is first placed in the lateral recumbent position corresponding to the lung to be examined. As the Dionosil is being injected the position of the patient is altered to fill the desired lobar and segmental bronchi. Although we prefer to perform the examination as quickly as possible, undue haste is not necessary. We have found that neither suspension of Dionosil is any more irritating than the iodized oils, and the relatively slow rate of absorption (compared with Xumbradil Viscous B) allows thorough examination. Aimed spot films are obtained as indicated during the fluoroscopic procedure. Following fluoroscopy three 14 x 17 inch roentgenograms are taken, utilizing the postero-anterior and relevant oblique and lateral projections. Following bronchography postural drainage is practiced and the patient is observed for 24 hours. After this time patients who were admitted to the hospital only for bronchoscopy and bronchography are discharged if no unusual event has occurred.

B. Clinical Observations and Diagnostic Results. In our hands the use of both aqueous and oily suspensions of Dionosil allows the unhurried performance of a bronchogram of good diagnostic quality. The oily form is possibly slightly less irritating but also tends to produce more alveolar filling.
Routine posterior-anterior roentgenograms were taken when possible at 24, 43 and 72 hours following bronchography in order to estimate the degree of clearance of opaque shadows from the pulmonary structures. When this was not possible a roentgenogram was obtained at the earliest possible date. For various reasons we were unable to obtain a single roentgenogram following seven bronchographic procedures. From a composite study of the remaining 54 examinations, it was estimated that over 75 per cent of the contrast material had disappeared from the pulmonary fields within 24 hours. In 48 hours, over 90 per cent of the contrast material had disappeared, and in 72 hours usually only a trace of or no contrast agent was seen. When a moderate degree of alveolar filling was observed, especially with the oily suspension, one or two more days is required for absorption of the greater part of the contrast material, and traces may be seen for as long as a week or more.

The diagnostic results of 61 bronchograms are listed in Table I. Pathologic confirmation of the roentgenologic diagnosis following surgical extirpation of diseased tissue has been obtained in one of eleven patients with bronchiectasis, in three patients with bronchial carcinoma, in three of four patients with right middle lobe syndrome, and in one patient who demonstrated extrinsic pressure on a bronchus who proved to have metastatic carcinoma involving the lymph nodes. There were eleven examinations in which minor deviations in the bronchial pattern were considered to be due to non-specific inflammatory charges and 27 examinations were interpreted as normal. In one patient, a bronchopleural fistula was demonstrated. In three instances, unsatisfactory bronchograms resulted from technical failure, but upon subsequent examination a diagnostic bronchogram was obtained in each patient.

Good roentgenographic visualization

TABLE I.

DIAGNOSTIC RESULTS OBTAINED IN 61 BRONCHOGAMS WITH PIONOSIL PERFORMED IN 55 PATIENTS

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number of Cases</th>
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<tr>
<td>Bronchiectasis</td>
<td>11</td>
</tr>
<tr>
<td>Bronchial carcinoma</td>
<td>3</td>
</tr>
<tr>
<td>Right middle lobe syndrome</td>
<td>4</td>
</tr>
<tr>
<td>Non-specific inflammatory changes</td>
<td>11</td>
</tr>
<tr>
<td>Extrinsic pressure on bronchus</td>
<td>1</td>
</tr>
<tr>
<td>Bronchopleural fistula</td>
<td>1</td>
</tr>
<tr>
<td>Normal</td>
<td>27</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>61</td>
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</table>
of the bronchial tree was obtained in those bronchograms interpreted as normal and in those demonstrating various pathologic processes. The demonstration of constricted bronchi, such as occur in patients with the right middle lobe syndrome, was also excellent. In one of the latter patients, an unsatisfactory bronchogram was obtained at the first examination and the roentgenologist requested that the examination be repeated after a few days. By mistake, the patient was anesthetized and sent to the roentgen department the very next day. At this time a spot film demonstrated quite well the constriction of the right middle lobe bronchus. Bronchial obstruction and the so-called "rat tail" deformity of bronchial carcinoma were also graphically portrayed.

C. Complications. A slight cough was present during or immediately following bronchography in about ten per cent of the patients. In this regard, the oily suspension was slightly less irritating than the aqueous suspension; however, in our experience, this difference has been negligible. A transient temperature elevation, usually not exceeding 100°F., was also noted in approximately ten per cent of the patients, and this was usually confined to the day following bronchography. Slight headache, sore throat and shortness of breath were noted in three patients, the symptoms subsiding the following day. These complications differ little from those following bronchography with iodized oils. No symptoms of iodism or of iodine sensitivity have been noted following the use of Dionosil in our series not in those reported in the literature.

GENERAL DISCUSSION

Xumbradil Viscous B is superior to the iodized oils used in bronchography in that the contrast agent in the former disappears rapidly from the pulmonary tissue. However, Xumbradil Viscous B is very irritating, requires meticulous deep tracheo-bronchial anesthesia, and the contrast agent disappears from the lungs so rapidly that it may cause undue haste in performing the bronchogram. The factor of alveolar filling, insofar as it interferes with immediate bronchographic diagnosis, is almost equally disturbing with both Xumbradil Viscous B and the iodized oils.

Dionosil is much less irritating than Xumbradil Viscous B, and exhibits a behavior much like the iodized oils in this respect. Less alveolar filling is encountered following Dionosil than is noted with the other two. Dionosil is absorbed less rapidly than Xumbradil Viscous B, thus allowing more time to execute a more satisfactory bronchogram.

The contrast agents of both Xumbradil Viscous B and Dionosil are hydrolyzed and excreted in the urine without the formation of iodide ions.

Sodium carboxymethylcellulose and arachis oil, the principal non-opaque substances in aqueous and oily Dionosil respectively, are largely eliminated from the lungs within five days, and are therefore much less likely to incite granuloma formation than are iodized oils. Sodium carboxymethylcellulose, in combination with a more irritating contrast agent, may produce pulmonary changes.

From the above material and discussion presented it appears that Dionosil is the contrast agent of choice for bronchography. Oily Dionosil is possibly slightly less irritating than aqueous Dionosil, but the former exhibits greater tendency to alveolar filling and requires a few more days for complete absorption. At the present time we are inclined to favor use of the aqueous form.

SUMMARY AND CONCLUSIONS

Our experience with absorbable contrast agents in bronchography, viz., Xumbradil Viscous B and both aqueous and oily suspensions of Dionosil is presented.

The complete absorption of these media offers a definite advantage over the iodized oils in serial roentgenographic studies of the chest in patients
with chronic thoracic disease and in those patients undergoing thoracic surgery.

Xumbradil Viscous B is much more irritating than Dionosil and the iodized oils, and therefore requires meticulous anesthesia. Further, the contrast portion is absorbed within a few minutes, which interferes with the roentgenographic procedure.

Both aqueous and oily forms of Dionosil produce about the same degree of irritation noted with the use of iodized oils. Both forms are more completely absorbed than the iodized oils, exhibit less alveolar filling than the other contrast agents, and allow the unhurried execution of excellent roentgenograms.

Dionosil is the agent of choice for clinical bronchography. The aqueous form of Dionosil exhibits slightly less tendency to alveolar filling and is absorbed a little more rapidly, and therefore is slightly preferred to the oily form of Dionosil.

ACKNOWLEDGEMENTS

1. Xumbradil Viscous B was supplied by Astra Pharmaceutical Products, Inc.

2. A considerable portion of the Dionosil used in these studies was supplied by the Picker X-Ray Corporation, distributors of Dionosil in the United States.

3. We are deeply indebted to Dr. E. P. Engels, Medical Fellow in Radiology and presently on service at the Ancker Hospital, for clinical data on many of the bronchographic procedures performed with Dionosil at Ancker Hospital.

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II. MEDICAL SCHOOL NEWS

Coming Events

November 18 - 20  Continuation Course in Infectious Diseases for General Physicians
November 18  Journal-Lancet Lecture; "Mechanism of Action of Penicillin;"
Dr. Harry Eagle, Chief, Section of Experimental Therapeutics,
National Microbiological Institute, U. S. Public Health
Service, Bethesda, Maryland; Mayo Auditorium; 8:15 p.m.

November 22 - 24  Continuation Course in Fractures for General Physicians
December 2 - 4  Continuation Course in Obstetrics for Specialists

* * *

Problems of the Record Room

The Committee on Hospital Records wishes to draw the attention of the staff to
serious problems being created for the personnel in the Record Room by the negli­
gence of some of the physicians on the hospital staff.

Health, accident and hospital insurance have become exceedingly popular. Hos­
pital Administration is desirous of furnishing reports to the insurance companies
immediately after the discharge of each patient. This is in many instances impos­
sible because the physician responsible for discharging the patient fails to write
the diagnosis on the face sheet of the chart prior to discharge. As a result,
insurance forms cannot be filled out. This often results in injustices to the pa­
tients and in delay in collection of funds by the hospital. It is hoped that the
cooperation of the staff can be enlisted to such an extent as to make it unnecessary
to establish a rule that no patient may be discharged until the diagnosis is on the
face sheet.

Another problem is posed by physicians who wrongfully impound hospital charts,
taking them home or hiding them in their offices. As a consequence, it is frequent­
ly impossible to find the chart of a patient who has come to the clinic. Such pa­
tients often sit unattended for hours while Record Room personnel waste their time
trying to run down a chart misplaced in this fashion. Here it is hoped to be able to
dissuade physicians from the practice of taking charts away from the Record Room so
that no arbitrary and bureaucratic rule will need to be made.

C. D. Creevy, M.D., Chairman
Hospital Records Committee

* * *

Continuation Course

Fractures will be the subject of a continuation course to be presented by the
University of Minnesota next November 22 to 24, 1954, at the Center for Continuation
Study. Intended primarily for physicians engaged in general practice, the program
will stress the practical management of the types of fractures most commonly met.
Registrants will be invited to bring their own films to a "consultation session."
The faculty will include Doctors J. Vernon Luck, Clinical Associate Professor, Divi­
sion of Orthopedic Surgery, University of Southern California School of Medicine,
Los Angeles; and Harrison L. McLaughlin, Clinical Professor, Department of Ortho­
pedic Surgery, Columbia University College of Physicians and Surgeons, New York
City. The program will be presented under the direction of Dr. Wallace H. Cole,
Professor, Department of Surgery, and Director, Division of Orthopedic Surgery,
University of Minnesota.
Faculty News

Dr. Lyle A. French, Associate Professor, Division of Neurosurgery, attended the meeting of the American Academy of Neurological Surgery which was held in Colorado Springs, Colorado, from October 20 to 23. He also attended the meeting of the Executive Committee of the Neurosurgical Society of America in Cleveland on October 30 and 31. Dr. Purdue Gould, Howard Chandler, and Shelley Chou attended the Congress of Neurological Surgeons which was held on November 3 to 6 in New York City.

Dr. Arnold Lazarow, Professor and Head of the Department of Anatomy, attended a Symposium on the Growth Hormone in Detroit from October 27 to 29.

Dr. Cecil J. Watson, Professor and Head, Department of Medicine, gave the Plummer-Judd Memorial Lecture in Rochester, Minnesota, on October 15. His subject was "Some Fundamental and Clinical Studies of the Porphyrin and Porphyria." October has been a busy month for many members of the Department of Medicine. On October 25, Doctors Wesley W. Spink, F. W. Hoffbauer, Robert S. Howard, Robert I. Wise, Paul Winchell, Paul Frick, Paul S. Hagen, James Myhre, R. S. Xlvisaker, Charles Metzler, Robert Abernathy, Heinz-Dietrich Bick, Fouad Bashour, Alfred Doscherholmen, Naip Tuna, and Martin Vogel attended the semi-annual meeting of the Minnesota Society of Internal Medicine which was held in Rochester. Meetings of the Central Society for Clinical Research, the American Association for the Study of Liver Disease, and the American Federation for Clinical Research were held in Chicago later in the same week, from October 28 to 30. Those who attended these meetings included Doctors Cecil J. Watson, F. W. Hoffbauer, Samuel Schwartz, Robert B. Howard, Louis Tobian, Paul Frick, M. J. Murray, J. B. Carey, Jr., Fouad Bashour, Francois Roux, M. K. Campbell, K. Ikeda, B. Wajchenberg, and Mary Goepfert.

Mr. Richard Bond, Associate Professor in the School of Public Health, and Public Health Engineer for the Student Health Service, presented a paper before the Engineering Section of the American Public Health Association at its 82nd Annual Meeting in New York last month. On November 1, Mr. Ralph O. Wollan joined the staff of the Student Health Service where he will serve as Health Physicist in the Environmental Health Department.

The Department of Medicine was recently host to two distinguished visitors from the University of Chile in Santiago. Dr. Hernan Alessandri, Professor of Medicine, and Dr. Juan Allamand, Professor of Surgery, visited the University for over a week under the sponsorship of the Rockefeller Foundation.

On Wednesday, October 20, more than 60 participants in the Sixth Mental Hospital Institute visited the psychiatric facilities of the University of Minnesota Hospitals. The Institute, sponsored by the American Psychiatric Association, was presented for mental hospital administrators.

The Division of Psychiatry and the entire Medical School faculty is pleased to welcome a new medical fellow in psychiatry, Dr. Pieter de Vryer, a native of Rotterdam, The Netherlands.

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Physicians Welcome  
November 15 - 20, 1954  
Monday, November 15

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 Hitchcock, Zimmermann, and Stenstrom; Todd Amphitheater, U. H.

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

12:30 - 1:30 Physiology Seminar; Experimental Alteration of Ultra-Structure in the Central Nervous System; J. F. Hartmann; 214 Millard Hall.

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

1:30 - 3:30 Dermatology Hospital Rounds; H. E. Michelson and Staff; Dermatology-Histopathology Room, M-434, U. H.

4:00 - 6:00 Anesthesiology Conference; F. H. Van Pergen and Staff; Room 100, Mayo Memorial.

4:30 - Public Health Seminar; Signs of the Times in Hospital Care; James Hamilton; 15 Owre Hall.

4:30 - Pediatric-Medicine Infectious Disease Rounds; Station 33, U. H.

5:00 - 6:00 Physiology-Surgery Conference; Todd Amphitheater, U. H.

5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creavy, O. J. Baggenstoss and Staff; Eustis Amphitheater.

Ancker Hospital

8:00 - 9:00 Pediatrics Contagion Rounds; L. R. Critchfield; Contagion 5.

8:30 - 10:30 Medical and Surgical Chest Conference; Dr. Gehlen and Staff; Auditorium.

10:00 - 12:00 Surgery Grand Ward Rounds; Begin Floor E4.

11:00 - 12:00 Medicine Resident Rounds.

11:00 - 12:00 Pediatric Rounds; Harry Orme; Contagion 1.

12:30 - 2:30 Surgery Out-Patient Clinic; Room 6.

2:00 - 3:00 Routine EKG Interpretation; Dr. Summers and House Staff; Medical Record Library.

2:30 - 3:00 Discussion of Problem Case; Auditorium.
Monday, November 15 (Cont.)

**Ancker Hospital (Cont.)**

3:00 - 4:00 Surgery Journal Club; Classroom.
3:00 - 4:00 Lectures on Electrocardiography; Ben Sommers; Auditorium.

**Minneapolis General Hospital**

9:30 - Pediatric Rounds; Richard Raile; Station K.
10:30 - 12:00 Medicine Rounds; Thomas Lowry; Station F.
11:00 - Orthopedic and Fracture Rounds; Drs. John Moe and Arthur Zierold; Station B.
11:00 - Pediatric Seminar; Erling Platou; Classroom, Station M.
12:30 - Surgery Grand Rounds; Dr. Zierold, Station E.
1:30 - 2:30 Tuberculosis Conference; J. A. Myers; Station M.
2:00 - Pediatric Rounds; Stations I and J.

**Veterans Administration Hospital**

9:30 - Infectious Disease Rounds; Drs. Zinnemann and Middlebrook.
1:30 - Cardiac Conference; Drs. Smith, Berman, Hoseth, Simonson, Swordlow, Shapiro, and J. Brown; Conference Room, Bldg. I.; Rounds immediately following conference.

Tuesday, November 16

**Medical School and University Hospitals**

9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, Irvine McQuarrio and Staffs; Eustis Amphitheater, U. H.
12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 104 Jackson Hall.
12:30 - Bacteriology and Immunology Seminar; Present Status of the Nucleus; A. G. Eiring; 1050 Mayo Memorial.
12:30 - Anatomy Seminar; Separation of the A Chain of Insulin from Islet Tissue by Paper Electrophoresis; Arnold Lazarow; 226 Jackson Hall.
3:30 - Pediatric Seminar; Peptic Ulcer in Childhood; Warren Rudy; 1450 Mayo Memorial.
4:00 - 5:00 Pediatric Rounds on Wards; Irvine McQuarrio 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 Veterans Hospital Staff; Eustis Amphitheater, U. H.

**Ancker Hospital**

8:00 - 9:00 Pediatric Rounds; Edward Strom; Contagion 1.
8:00 - 10:00 Visiting Staff Rounds.
Ancker Hospital (Cont.)

9:00 - 12:00 Practical Diagnostic Clinic; Harry Orme; Out-Patient Department.
11:00 - 12:00 Medical X-ray Conference; Auditorium.
4:00 - 5:00 Medical-Pathological Conference; W. F. Mazzitello; Auditorium.

Minneapolis General Hospital

9:30 - Pediatric Rounds; Elizabeth Lowry; Station J.
10:00 - Psychiatry Grand Rounds; R. W. Anderson, Station H.
11:00 - 12:00 Medicine-Surgery Conference; Classroom, Station M.
12:30 - 2:30 Dermatology Rounds on Clinic; Carl W. Laymon and Staff.
12:30 - EOG Conference; Boyd Thomas and Staff; 302 Harrington Hall.
1:00 - Tumor Clinic; Drs. Eder, Coo, and Lipschultz; Classroom.
3:30 - Pediatric-Psychiatry Rounds; Jack Wallinga; Station I.

Veterans Administration Hospital

7:30 - Anesthesiology Conference; Surgical Conference Room, Bldg. 43.
8:30 - Hematology Rounds; Drs. Hagen and Wexler.
8:30 - Surgery Journal Club; Conference Room, Bldg. I.
9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.
10:30 - Surgery-Tumor Conference; D. Ferguson and J. Jorgens.
1:00 - Review of Pathology, Pulmonary Tuberculosis; Conference Room, Bldg. I.
1:30 - Combined Medical-Surgical Chest Conference; Conference Room Bldg. I.
2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff; Bldg. III.
4:00 - Thoracic Surgery Problems; Conference Room, Bldg. I.
5:00 - Fluid Balance Seminar; Conference Room, Bldg. I.
5:30 - Physiology Seminar; Surgical Conference Room, Bldg. 43.

Medical School and University Hospitals

8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Paul Leber and L. G. Rigler; Todd Amphitheater, U. H.
11:00 - 12:00 Pathology-Medicine-Surgery-Pediatrics Conference; Todd Amphitheater, U. H.
12:30 - 1:20 Radio-Isotope Seminar; John Anberg; Potatron Room in Cobalt Underground Section, U. H.
1:00 - 2:00 Dermatology Clinical Seminar; F. W. Lynch; 300 North Clinic.
Medical School and University Hospitals (Cont.)

1:30 - 3:00 Pediatric Allergy Clinic; Albert V. Stoesser and Lloyd Nelson; W-211, U. H.

3:30 - 4:30 Dermatology-Pharmacology Seminar; 3rd Floor Conference Room, Heart Hospital.

4:30 - 5:50 Dermatology-Infectious Disease Seminar; 3rd Floor, Conference Room, Heart Hospital.

5:00 - 6:00 Residents Lectures; Retrospectoscope; Leo G. Rigler; Todd Amphitheater, U. H.

5:00 - 5:50 Urology-Pathological Conference; C. D. Creasy and Staff; Eustis Amphitheater, U. H.

5:30 - 7:30 Dermatology Journal Club and Discussion Group; Hospital Dining Room.

7:30 - 9:30 Dermatology Seminar; Review of Interesting Slides of the Week; Robert W. Goltz; Todd Amphitheater, U. H.

Ancker Hospital

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

9:00 - 10:00 Contagion Rounds; L. R. Critchfield; Contagion 5.

11:00 - 12:00 Medicine Resident Rounds.

1:30 - 2:30 Pediatric Rounds; Ray Anderson; Contagion 1.

3:00 - 5:00 Infectious Disease Rounds; Wesley W. Spink; Auditorium.

Minneapolis General Hospital

9:30 - Pediatric Rounds; Henry Staub; Station I.

10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.

12:00 - Surgery-Physiology Conference; Arthur Ziord and E. B. Brown; Classroom.

12:15 - Pediatrics Staff Meeting; Classroom, Station I.

1:30 - Pediatric House Staff Seminar; Erling Platou; Station I.

1:30 - Pediatric Rounds; Erling Platou; Classroom, Station I.

Veterans Administration Hospital

8:30 - 10:00 Orthopedic X-ray Conference; E. T. Evans and Staff; Surgical Conference Room, Bldg. 43.

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

9:00 - Gastro-Intestinal Rounds; Drs. Wilson, Zieve, Ferguson, Brakel, Konig and Swenson.

10:30 - Psychosomatic Conference; C. K. Aldrich; 7th Floor, Bldg. 43.

12:30 - Medical Journal Club; Doctors' Dining Room.
Veterans Administration Hospital (Cont.)

12:30 - X-ray Conference; J. Jorgens; Conference Room, Bldg. I.
1:30 - 3:00 Metabolic Disease Conference; Drs. Flink and Latts.
3:30 - Urology Pathology Slide Conference; Dr. Gloason; Conference Room, Bldg. I.
7:00 - Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, November 18

Medical School and University Hospitals

9:00 - 11:30 Medicine Ward Rounds; C. J. Watson and Staff; Room 3.148; Mayo Memorial.
11:00 - 12:00 Cancer Clinic; K. Stenstrom, A. Kromon, and E. Zimmermann; Todd Amphitheater, U. H.
12:30 - Physiological Chemistry Seminar; Effect of Thyroxine on Enzymes; Carl Friz; 214 Millard Hall.
12:30 - 1:30 Endocrinology Seminar; Report on papers presented at the meeting of the Central Society for Clinical Research; E. B. Flink; Adrenals, Electrolytes, Corticoids; R. Dou and E. F. Flink; 271 Lyon Laboratories.
1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.
4:00 - 5:00 Anesthesiology Seminar; E. H. Van Buren and Staff; Room 100, Mayo Memorial.
5:00 - 6:00 Radiology Seminar; Thoracic Surgery Conference; Dr. Garamolla, et al.; Bustin Amphitheater, U. H.
7:30 - 9:30 Physiology 114A Seminar; Hemodynamic Problems; M. B. Visscher and Robert Evans; 271 Lyon Laboratories.
*8:15 p.m. Journal-Lancet Lecture: "Mechanism of Action of Penicillin;" Dr. Harry Engle, Chief, Section of Experimental Therapeutics, National Microbiological Institute, U. S. Public Health Service; Bethesda, Maryland; Mayo Auditorium.

Ancker Hospital

8:30 - 9:30 Medical Grand Rounds; Auditorium; Visiting Staff Rounds immediately following Grand Rounds.
11:00 - 12:00 Medicine Resident Rounds.
2:00 - 3:00 Routine ECG Interpretation; Ben Sommers; Medical Record Library.

Minneapolis General Hospital

9:30 - Neurology Rounds; Heinz Fruhl; Station I.
9:30 - Pediatric Contagion Rounds; R. F. Raile; Station K.

* 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.
Thursday, November 18 (Cont.)

Minneapolis General Hospital (Cont.)

10:00 - Psychiatry Grand Rounds; R. W. Anderson and Staff; Station H.
11:30 - 12:30 Clinical Pathological Conference; John I. Coe; Classroom.
12:30 - 2:30 Dermatology Rounds and Clinic; Carl W. Laymen and Staff.
1:00 - Fracture X-ray Conference; Drs. Zierold and Moe; Classroom.
1:00 - House Staff Conference; Station I.

Veterans Administration Hospital

8:00 - Experimental Surgery Laboratory Meeting; Conference Room, Bldg. I.
8:30 - Hematology Rounds; Drs. Hagen and Williams.
9:00 - Surgery Grand Rounds; Conference Room, Bldg. I.
9:00 - Surgery Ward Rounds; D. Ferguson and Staff; Ward 11.
11:00 - Surgery-Roentgen Conference; J. Jorgens; Conference Room; Bldg. I.
1:00 - Infectious Disease Conference; Conference Room, Bldg. I. (Rounds immediately following conference.)
4:00 - 5:00 Medical-Surgical Conference; Conference Room, Bldg. I.

Friday, November 19

Medical School and University Hospitals

8:00 - 10:00 Neurology Grand Rounds; A. B. Boker 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 - 1:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
11:00 - 12:00 Vascular Rounds; Davitt Fielder and Staff Members from the Departments of Medicine, Surgery, Physical Medicine, and Dermatology; Eustis Amphitheater, U. H.
11:45 - 12:50 University of Minnesota Hospitals Medical Staff Meeting; Epidemiological Studies on Antibiotic Resistant Staphylococci; Drs. Wiso, Spink, and Caroline Cranny; Mayo Auditorium.
1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.
1:30 - 2:30 Dermatology Grand Rounds; Presentation of Cases from Grouped Hospitals (University, Anchor, General and Veterans) and Private Offices; H. E. Michelson and Staff; Eustis Amphitheater, U. H.
2:30 - 4:00 Dermatology Hospital Rounds; H. E. Michelson and Staff; Begin at Dermatological Histopathology Room, M-434, U. H.
3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.
3:30 - 4:30 Dermatology-Physiology Seminar; 3rd Floor Conference Room, Heart Hospital.
Friday, November 19 (Cont.)

Medical School and University Hospitals (Cont.)

4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hanson and Staff; E-534, U. H.
5:00 - Urology Seminar and X-ray Conference; Eustis Amphitheater, U. H.

Ancker Hospital

8:00 - 9:00 Pediatric Rounds; Edward Strom; Contagion 1.
11:00 - 12:00 Contagion Rounds; Harry Orme; Contagion 5.
3:00 - 4:00 Medical-Surgical-Pathological Conference; Auditorium.
4:00 - 5:00 Medical Journal Club; Conference Room, E5.
4:00 - 5:00 X-ray Surgery Conference; Auditorium.

Minneapolis General Hospital

9:30 - Pediatric Rounds; Elizabeth Lowry; Station J.
10:30 - Pediatric Surgical Conference; Tague Chisholm and B. Spencer; Classroom, Station I.
12:00 - Surgery-Pathology Conference; Drs. Zierold and Coo; Classroom.
1:00 - 3:00 Clinical-Medical Conference; Thomas Lowry; Classroom, Station M.
1:30 - Pediatric Contagion Rounds; L. Wannamaker; Station K.

Veterans Administration Hospital

10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.
12:30 - Urology X-ray Conference; X-ray Department.
1:00 - Autopsy Conference; E. T. Bell; Conference Room, Bldg. I.
2:00 - Pathology Slide Conference; E. T. Bell; Conference Room, Bldg. I.

Saturday, November 20

Medical School and University Hospitals

7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.
9:00 - 9:30 Pediatric Grand Rounds; Eustis Amphitheater, U. H.
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, Cwon H. Wangensteen and Staff; Todd Amphitheater, U. H.
10:00 - 11:30 Surgery Conference; Todd Amphitheater, U. H.
10:00 - 12:50 Obstetrics and Gynecology Rounds; J. L. McKelvoy and Staff; Station 44, U. H.

Ancker Hospital

8:30 - 9:30 Surgery Conference; Auditorium.
9:30 - 11:00 Medicine Grand Ward Rounds.
Saturday, November 20 (Cont.)

Minneapolis General Hospital

8:00 - Urology Staff Conference; T. H. Sweetser; Main Classroom.
9:00 - Psychiatry Grand Rounds; R. W. Anderson; Station H.
9:30 - Pediatric Rounds on all Stations; R. B. Raigo.
11:00 - 12:00 Medical X-ray Conference; O. Lipschultz, Thomas Lowry and Staff; Main Classroom.

Veterans Administration Hospital

8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.
8:30 - Medical X-ray Conference; Conference Room, Bldg. I.