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Bulletin of the
University of Minnesota Hospitals
 and
Minnesota Medical Foundation



**Degenerative Changes
 of the Cervical Spine**

BULLETIN OF THE
UNIVERSITY OF MINNESOTA HOSPITALS
and
MINNESOTA MEDICAL FOUNDATION

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I. A STUDY OF DEGENERATIVE CHANGES OF THE CERVICAL SPINE IN RELATION TO AGE: A PRELIMINARY REPORT

Frederic J. Kottke, M.D.
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INTRODUCTION

This study evolved in response to a group of clinical problems in patients who appear in Physical Medicine clinic with various complaints referable to the neck. "Pain in the neck" is so common that the phrase has become a cliché. For the confused patient the term expresses a multitude of differing complaints. For the discriminating physician the phrase designates a variety of related diagnoses. The complaints and diagnoses include headache, crick in the neck, stiff neck, wry neck, torticollis, neuritis of the arm, occipital neuralgia, cervical radiculitis, the scalenus anticus syndrome, shoulder-hand syndrome and the pathologic disc.

A common origin of all these conditions has been postulated by Stonehill¹ as a "stuck" posterior cervical joint. A "stuck" joint is defined as one whose movement is restricted partially or completely and whose restricted mobility is not necessarily associated with gross anatomic or pathologic changes involving the joint or its capsule. Rotation of such a joint produces torsion stress on the joint, side-bending or lateral flexion produces traction and compression stress, and flexion produces shearing stress. Each of these stresses results in pain in the neck and the patient presents himself with his neck in various degrees of voluntary splinting in an effort to avoid the discomfort that results from movement. The restricted mobility is obvious to the clinician as well as to the patient. The remaining range of motion is measurable, but how much has it been restricted? What was the limit in the range of motion for this patient prior to the onset of his disability?

Clinical problems such as these posed certain fundamental questions:

- a. What is the normal range of motion of the head and neck in its various planes of movement?
- b. Is there a progressive decrease in the normal range of motion accompanying advancing age?

It was in an attempt to determine the answers to these and other questions that the present study was originally proposed and recently undertaken.

GENERAL CONSIDERATIONS

Degenerative changes in the cervical spine, when advanced, are identical with the lesions found in the clinical entity formerly called osteoarthritis of the cervical spine². It is purely academic whether these changes are referred to as osteoarthritis, hypertrophic arthritis, senescent arthritis, or by the term which is replacing all others in this country--degenerative joint disease. And when this process involves the spine one may quibble about calling it spondylitis or, as in England, spondylosis and find authoritative support for either side. Regardless of the term used, this is a normal physiologic process of joint aging², universally present in the aged, just as much a part of the aging process as is gray hair or hardening of the arteries³.

This clinical entity has been defined by Hollander² as a chronic arthropathy characterized pathologically by degeneration and hypertrophy of cartilage and bone, and clinically by pain occurring generally on use and relieved by rest; usually unaccompanied by systemic manifestations.

This disease is as old as history itself, having been demonstrated in the skeletons of prehistoric dinosaurs of 200 million years ago, in the femora of the Java Man of 500,000 years ago, in the spine of the Neanderthal man who lived about 40,000 B.C., in Egyptian mummies and in the prehistoric remains of American Indians.

Eckner (1842) considered this process to be one of degeneration caused by

senile atrophy, excessive wear and attrition. Weichselbaum (1872) was the first to relate osteoarthritis to the physiologic process of aging. The consensus of present day students is that this is probably correct. Increased stresses and strains on joints comprise the most important etiological factor. These include both abnormal mechanics of joints resulting from chronic strain, and trauma, imperceptible, frequently repeated, on vulnerable joint tissues⁴. Recently Silverberg⁵ has shown that young mice reared on a high fat diet revealed accelerated skeletal growth and development associated with or followed by premature skeletal aging with changes in articular tissues interpreted as early manifestation of degenerative joint disease. The combination of advanced growth and regressive changes of various articular structures resulted in lesions considered to be analogs of human osteoarthritis.

Cumulative traumatic or degenerative forces culminating in musculoskeletal inadequacy and failure is commonly observed in the aged as an end stage of osteoarthritis⁶. The pathologic changes found in osteoarthritis are identical with those found in the normal physiologic process of joint aging. In the latter process abnormalities first appear in the second decade and increase with advancing age. The joint cartilage becomes opaque, yellow and less elastic; the surface becomes uneven and granular and reveals shallow furrows; later fibrillation occurs and the surface becomes partially detached in strips and shreds⁷. This is a steadily progressive process and by the sixth decade there is ulceration of the cartilage with deep erosions, pits and thinning. This cartilage has no blood supply, a low respiratory rate and very limited faculty of autogenous repair. It is eventually completely worn away with subsequent compression and vascularization of subchondral bone which becomes very dense. The articular margins become increasingly prominent after the first decade and with advancing age the perichondral margins become elevated and nodular. Marginal proliferation in the form of spurs, lipping, osteophytes, and exostoses occurs as early as the fourth decade and becomes increasingly evident in

later years. Eburnation, bone cyst formation and narrowing of the joint space complete the degenerative process of normal joint aging. X-ray manifestations are said to appear about the fourth or fifth decade². After the age of 50 years these characteristic changes are present almost universally. Yet only 5% of those beyond 50 years of age have clinical symptoms, and many individuals have symptoms without x-ray abnormalities. The extent of the degenerative process and the rate at which it progresses vary greatly among individuals. Some show more degenerative articular changes at age 35 than others do at age 60.

Osteoarthritis is the commonest type of joint disease and the spine is the most frequent site of these degenerative changes, the cervical region being second in order of frequency⁴. The most common type of clinical degenerative joint disease of the cervical spine is thinning of the intervertebral discs with marginal osteophytes producing radiculitis with radicular pain⁷. Thinning of the discs results in narrowing of the intervertebral foramina producing compression of nerve roots. In the cervical spine the foramina are small compared with the nerves which emerge through them and the nerves are easily compressed by foramen encroachment⁸.

In the normal foramen the oval nerve or its ganglion occupies $1/6$ to $1/4$ of the opening, surrounded by blood vessels, lymphatics, sympathetic nerve fibers, fibrous and fatty tissue. The reserve space, $3/4$ of the foramen area, constitutes a safety cushion allowing normal foramen constriction, incidental to all spinal movements, to take place without root compression. In the cervical region, extremes of lateral flexion, dorsal extension, and rotation decrease the size of the foramen by $1/3$ on the side toward which movement occurs. Pain in the arm or shoulder from brachial root pressure is aggravated by dorsal extension of the neck or rotation or flexion toward the affected side^{9,10}. The patient holds the cervical spine straight, eliminating the normal anterior curve⁸.

Any abnormal constriction in the size of the movable intervertebral foramen, if not actually producing nerve pressure, nevertheless decreases the reserve safety cushion space surrounding that nerve and may predispose to pressure. Subsequent development of edema or hemorrhage in the nerve will produce such pressure. Studies of cadaver specimens indicate disc degeneration to be the most common cause of foramen encroachment. In some cadavers the intervertebral foramen was almost completely occluded by bony outgrowths projecting backward from disc margin or forward from posterior articulation¹¹.

The anatomical characteristics of the cervical spine make it more susceptible to trauma than either the thoracic or lumbar spine and the end result of trauma is more marked. The spinal cord and nerve roots more nearly fill the canal and foramina. The nerve roots leave the cord at right angles and pass directly into the foramina. There is very little mobility of these nerve roots and much greater susceptibility to injury¹². Where a nerve is bound down or the space through which it emerges is narrow, a very little overstrain or inflammatory process in the ligaments through which the nerve exits could produce definite symptoms of pressure on the involved branch.

Mettier and Capp (1941)² examined in detail 30 patients with symptoms of cervical radiculitis. Ages ranged from 40 to 60 years. Symptoms of pain, neck rigidity and weakness of arms or hand were the most common. Onset in each case was abrupt, on awaking in the morning. In more than half of this group the pain was localized in and about the shoulder, especially the deltoid insertion. Symptoms had been present for months, and in several cases for years, before the complaint of neck discomfort. Symptoms were unilateral at first, later bilateral, and varied from a dull aching to excruciating in severity, described as stinging or prickling, sharp, jabbing, needle-like, penetrating. Numbness or tingling in the fingers occurred, with patients unable to comb hair, extend arm behind the back, write,

sew, or grasp. There was no restriction of neck movement but jarring of the body produced pain in the neck. Reflexes were normal and there was no muscle atrophy. X-rays revealed 18 to have marked hypertrophic changes, mostly of C₅₋₆ and C₆₋₇, with osteophytes producing foramen narrowing, more common on the left side. Seven showed minimal osteophytes with sclerosis of articular facets. Four showed no abnormality.

There have been many reports of degenerative disease of the cervical spine as a factor in the development of brachial pain syndromes and the occurrence of cord lesions in relation to this degenerative process is being given increasing attention by clinicians. Last year Russell¹³ reported a case of a 71 year old female with slowly developing paralysis of the legs and weakness of the arms which began in 1946 with an acute attack of pain in the legs which subsided spontaneously after a few days. In 1949 paroxysms of pain occurred which started from the toes and ran all the way up the front of the legs. In 1950 weakness of the legs and numbness of the right hand and forearm were noted. In December 1950 she experienced urinary incontinence and severe constipation which resulted in intestinal obstruction. In January 1951 spastic paresis of both lower extremities occurred, more severe in the right; reflex alterations included brisk ankle jerks, absent knee jerks, positive Babinski on the right, loss of postural sense in both lowers and loss of pain and temperature sense in the left lower extremity. The right upper extremity was weak with atrophy of intrinsic muscles of the hand. Right arm reflexes were markedly decreased. X-ray showed elevation of the right diaphragm and partial collapse of the right lung; degenerative changes of the spine including narrowing of disc spaces and osteophytic outgrowths, which were most conspicuous in the lumbar region but in view of the clinical picture the changes in the cervical vertebrae were thought to be more significant. The clinical status of the patient did not permit laminectomy and an attempt was made to apply neck traction but she expired

May 20, 1951. Necropsy confirmed the severity of cervical spine disease. Discs C₅ and C₆ were most prominent and formed well-marked ridges expanding laterally into two discrete osteophytic protrusions. The seventh cervical nerve passed over one of these spurs and was stretched and atrophic. All the cervical discs were degenerated and thin. There was osteophytic lipping around the entire rim of vertebral bodies with severe sclerosis of bone. Laterally the process encroached on the intervertebral foramina; oblique radiographs showed marked narrowing and distortion. The dura was adherent to the posterior longitudinal ligament at the C₆₋₇ protrusion and held against bone firmly enough for the spurs to produce indentation. The cord in the region of the cervical enlargement was markedly shrunken and the dura lay loosely over the dorsal surface of the wasted cord.

Microscopy of the cord revealed chronic degenerative lesions most severe in C₅ and C₆ segments with secondary degeneration ascending and descending from these levels. Degeneration of both white and grey matter, with diffuse loss of nerve cells and severe gliosis were observed. The pia, especially the denticulate ligament, was thicker and more cellular than normal. Demyelination was greatest on the right side of the cord, the degeneration in the lateral columns spreading medially from the attachment of the thickened denticulate ligament. There was a prominent area of demyelination in the anterior part of the posterior columns and the median septa was shifted to the right. All these appearances together suggest that traction on the cord by the right denticulate ligament played some part in the etiology of cord degeneration. The areas of degeneration did not correspond to the distribution of any major vessel and it is unlikely that ischemia from vascular disease had any great role in the pathology.

It seems reasonable to attribute, in some way, the progressive myelopathy to the degenerative disease of the cervical spine, but how the lesions were produced is uncertain. Spinal cord signs recede

in some cases if the neck is prevented from exercising normal movements and this suggests that the cord may become vulnerable to normal neck movements. Allen (1952) observed during surgery on such cases that the spinal cord may blanch when the neck is flexed. "A direct traumatic self-inflicted lesion of the neurones is the most likely explanation and fits in well with the slowly developing characteristics generally observed."¹³ The thickened denticulate ligament and most of the degenerated nerve roots were both closely related to the area of cord degeneration and it seems likely that a tethering of these structures had played some part in the production of the myelopathy.

APPROACH TO THE PROBLEM

Apparently normal male students were selected at random as they presented themselves at the Student Health Service for their periodic physical examinations. The investigation consisted of physical measurement of the range of motion of the cervical spine in various directions, lateral roentgenograms of the cervical spine and the issuance of a questionnaire with the request that it be completed and returned by mail. Individuals were accepted regardless of age up to a total of 40 in each 5-year age group, i.e., ages 15-19, 20-24, etc. The study was limited to males in order to avoid the necessity of equalization of sex distribution in the various age groups.

Physical measurements of active neck motion were made with the subject sitting upright in a chair with a back rest. Measurements were recorded at the limits of the following motions; rotation to each side in the horizontal plane, lateral flexion to each side in the frontal plane, flexion and extension as well as the erect position in the sagittal plane, and in addition the combined motions of flexion and extension with the neck in right rotation and also in left rotation.

Lateral roentgenograms of the cervical spine were made of each subject with the

neck in maximum flexion and maximum extension with the thought that those whose x-rays showed significant abnormalities would be recalled for more complete roentgenographic investigation, including oblique views.

The questionnaire issued to each subject was for the purpose of obtaining information in regard to a history of trauma, however trivial, which might have occurred to or affected the cervical spine, or of symptoms referable in any way to the neck. This included specific questions relating to injuries from sports or automobile accidents; and symptoms of pain, stiffness or limitation of motion of the neck, headache or shoulder pain associated with pain in the neck, and pain in the thoracic spine associated with pain in the neck. A copy of the questionnaire is included as Appendix A.

At the time of preparation of this preliminary report data had been obtained from 133 subjects with age distribution such that the quota of 40 had been filled for each of the three lower 5-year groups, 10 were in the 30-34 years, 1 in the 35-39 years, and 1 in the 55-59 years groups. Of the 133 questionnaires issued, 103 (77.5%) had been returned, and of these 42 (40.8%) indicated a history of trauma or symptoms or both of sufficient magnitude to disqualify them as "normal asymptomatic subjects".

The cervical roentgenograms were interpreted by Dr. R. J. Kurth of the Department of Radiology. Of the 129 subjects whose roentgenograms were available for study, 10 (7.75%) were reported as showing radiological evidence of degenerative processes, i.e., narrowing of joint space, eburnation of articular cortex, osteophytes, or calcification of ligaments. With one exception, there was no correlation between those who admitted a history of trauma or symptoms and those whose x-rays were interpreted as showing evidence of degenerative changes. This single exception was a man 56 years of age and had a history of rather frequent and occasionally very severe symptoms of pain, stiffness and

limitation of motion of the neck with pain radiating into the shoulder, arm and hand on the right. As would be expected in view of his age, this subject's x-ray revealed far more marked degenerative changes in the cervical spine than did any of the other subjects so far studied.

The measurements of range of motion in rotation were made with a specially constructed goniometer consisting of a semicircular scale graduated in degrees from 0 at its center to 90 at each end with a movable pointer arm fixed at its geometric center and a 20-inch bar attached across its open arc. The entire device was adjustably fitted to a horizontal rod which was clamped to a supporting stand. By this means the goniometer was positioned above the subject's vertex with the movable pointer arm at 0 on the scale and aligned with the subject's nose and the horizontal bar aligned and maintained parallel with the subject's shoulders. Active motion was then performed by the subject to the limit of rotation to the right and to the left, with the pointer arm again being aligned with the nose at the limit in each case. The degrees of motion were read directly from the scale and recorded for each side.

The measurements of range of motion in lateral flexion were made with the same goniometer. The pointer arm at zero on the scale was directed vertically and aligned as accurately as possible visually with the center of the skull posteriorly. The horizontal bar was manually maintained in aligned relationship with the plane of the shoulder girdle while the subject performed active motion to the limit of lateral flexion to the right and to the left, with the pointed arm again being aligned with the posterior center of the skull at the limits. The degrees of motion were read directly from the scale and recorded for each direction of lateral flexion.

As previously mentioned, measurements of neck motion were also made in other directions, i.e., flexion and extension in the sagittal plane and flexion and extension with the neck in right and left

rotation respectively. These measurements were made with a simple goniometer consisting of two arms hinged together at one end and the degrees of motion obtained by comparing the angle with a protractor scale. The points of reference for these measurements were found to be quite variable from subject to subject and the method of measurement was found to be subject to many errors which were non-compensable. It is not certain at this juncture that the data so obtained is not spurious and they will therefore not be included in this report.

Statistical analysis of the data collected to date has not been completed. The mean values of the measurements for the 3 lower age groups are presented in Table I and are based on all subjects included in each of these groups without regard to history of trauma and/or symptoms. It is expected that a more complete statistical treatment of the reportable data will be available for the oral presentation of this report than is possible at the time of publication. It is felt that the number of subjects in the 30-34 year age group is too small to be significant.

Table I

5-year age group	15-19	20-24	25-29
No. of subjects	41	40	40
Mean values of:			
Age	18.1	22.2	26.6
Right Rotation	77.7°	75.0°	70.8°
Left Rotation	76.4°	75.7°	72.0°
Total Rotation	154.0°	150.7°	144.5°
R. Lat. Flexion	43.1°	43.1°	40.8°
L. Lat. Flexion	40.3°	39.1°	37.1°
Total Lat. Flexion	83.5°	82.3°	77.8°

A superficial consideration of the raw data collected in measurements of individual subjects and the mean values of these three 5-year age groups without further statistical analysis would seem to indicate a trend in the direction of decreasing active range of motion of the cervical spine with advancing age, a trend which apparently begins near the close of adolescence. It remains to be seen in the immediate future whether this trend is statistically significant and in the somewhat more distant future whether this trend is a steadily pro-

gressive one directing many of the subjects of these groups into the clinical entity called by any of the synonyms of senescent arthritis.

This study is only in its initial stages and will be continued through ever-advancing age groups. Further investigation is needed to provide information concerning the effect of the normal aging process on the functional capacity of the musculo-skeletal system.

APPENDIX A

A study is being made of the normal changes that occur in the cervical spine due to the aging process. Data is being collected from individuals in several age groups in the form of x-rays of the cervical spine and measurements of neck motion. This data will be correlated with information obtained by questionnaire.

You are urged to answer each question in the attached questionnaire since the success of this study will depend upon the completeness and accuracy with which you are able to recall any injury or symptom referable to the areas indicated. Even though such injury or symptom may have seemed quite trivial and of short duration at the time of occurrence this information is of considerable importance to this study. Your full cooperation will be greatly appreciated.

Please take this questionnaire with you, fill it out at your earliest convenience and return it by mail in the attached envelope, within a week if at all possible.

NAME _____ DATE _____

AGE _____ NO. _____

PHYSICAL MEDICINE QUESTIONNAIRE

1. (Answer Yes or No). Have you ever had an injury of any type to your Head? _____. Neck? _____. Shoulder? _____. Upper back? _____.
2. (Answer Yes or No). Did such injury result from:
 - a. Engaging in sports such as football? _____. Basketball? _____
Golf? _____. Baseball? _____. Tennis? _____. Hockey? _____.
Diving? _____.
 - b. A car accident producing a blow? _____. A whiplash snapping of the neck? _____.
 - c. A sudden twisting of the neck to the side or rear, as in looking out the rear car window? _____.
 - d. Other cause? _____.

If any injury of the types listed, or of any type, has ever occurred at any time in the past, please describe briefly, giving the area injured, duration of discomfort, degree of present disability, approximate date of injury.

3. Have you ever had a wry neck or "crick in the neck"? _____.
 - a. When did this occur? _____.
 - b. How long did it last? _____.
 - c. What were the circumstances producing it? Describe briefly.
 - d. Has there been any recurrence? _____. When? _____.
4. Have you ever had a stiff neck or any limitation of motion of the neck as in bending the head forward or backward or to either side or in rotating the head toward either side? _____.
 - a. When did this occur? _____.
 - b. How long did it last? _____.
 - c. What were the circumstances producing it? Describe briefly.
 - d. Has there been any recurrence? _____. When? _____.

5. Have you ever had any pain in the neck? _____.
 - a. When did this occur? _____.
 - b. What area was involved? _____.
 - c. How often has this been noted? _____.
 - d. Did the pain radiate toward either shoulder? _____.
 - e. Describe briefly, stating the circumstances of its occurrence and the duration of symptoms.

6. Have you ever had a headache? _____.
 - a. How often has this been noted? _____.
 - b. What part of the head has been involved? _____.
 - c. Has this been associated with pain in the neck? _____.
 - d. Describe briefly, indicating the circumstances, severity and duration.

7. Have you ever had any pain in a shoulder? _____.
 - a. In which shoulder has this occurred? _____.
 - b. When and how often has this been noted? _____.
 - c. Has this been associated with pain in the neck? _____.
 - d. Did the pain radiate up toward the neck? _____.
 - e. Did the pain radiate down the arm? _____.
 - f. Describe briefly, stating the circumstances, severity and duration.

8. Have you ever had any pain between the shoulders? _____.
 - a. Was this associated with pain in the neck? _____.
 - b. Did the pain radiate up into the neck? _____.
 - c. When and how often has this occurred? _____.
 - d. Describe briefly, including the circumstances, severity and duration.

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II. MEDICAL SCHOOL NEWS

Coming Events

- March 27 Tape-Recorded Symposium: Is the Concept of Science Different in Biology than it is in the Physical Sciences? Owre Amphitheater; 3:00 p.m. (This is a tape recording of a discussion which was held on December 8, 1952, at the meeting of the Boston Society of Biologists. The participants were Dr. James B. Conant, Harvard; Dr. Phillip G. Frank, Harvard; and Dr. Paul Weiss, University of Chicago.)
- April 2 Special Lecture; "On the Possibility of Vector Analysis in Electrocardiography"; Dr. Hans Schaefer, Professor of Physiology, University of Heidelberg, Germany; Veterans Administration Hospital, Building 1, Conference Room; 8:15 p.m.
- April 3 Special Lecture; "Coronary Circulation"; Dr. Hans Schaefer, Professor of Physiology, University of Heidelberg, Germany; 129 Millard Hall; 4:30 p.m.
- April 6-11 Continuation Course in Proctology for General Physicians
- April 16-18 Continuation Course in Gynecology for Specialists
- April 27-29 Continuation Course in Gastroenterology for General Physicians
- April 28 Clarence M. Jackson Lecture; "Gastro-Intestinal Symptoms with Particular Reference to Motor Disturbance"; Dr. Chester M. Jones, Boston; Owre Amphitheater; 8:00 p.m.
- April 29 Family Doctors' Day; Powell Hall Recreation Lounge; 12:00 o'clock noon.

* * *

Dr. Russell J. Moe

The faculty of the Medical School and members of the Minnesota Medical Foundation were saddened by the recent death of Dr. Russell J. Moe of Duluth. Dr. Moe, who practiced in Duluth for many years, was one of Minnesota's outstanding obstetrician-gynecologists. He served on the Board of Trustees of the Minnesota Medical Foundation from 1940 to 1952 and was responsible for many of the arrangements for the Duluth Clinic Lectureship. Throughout his professional career he was a supporter and friend of the Medical School. The entire membership of the Foundation joins in extending sympathy to Dr. Moe's family.

* * *

Continuation Course

The University of Minnesota announces a continuation course in Proctology which will be held at the Center for Continuation Study from April 6 to 11, 1953. The course is intended primarily for physicians engaged in general practice. All aspects of ano-rectal disease will be covered, and two half-days will be devoted to operative clinics in which the registrants will take an active part. The visiting faculty will include Dr. Verne C. Waite, Chief of Proctological Unit, The Straub Clinic, Honolulu, and Dr. Clarence Dennis, Professor and Chairman, Department of Surgery, University of New York College of Medicine, New York City, who was formerly a member of the Department of Surgery at the University of Minnesota Medical School. The course will be presented under the direction of Dr. O. H. Wangensteen, Professor and Chairman, Department of Surgery; and Dr. Walter A. Fansler, Clinical Professor and Director, Division of Proctology. The remainder of the faculty will include clinical and full-time members of the University of Minnesota Medical School and Mayo Foundation.

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Faculty News

Dr. Wesley W. Spink, Professor, Department of Medicine, will deliver the Twenty-Ninth Annual James Anders Lecture before the College of Physicians of Philadelphia on April 1. He will discuss "Epidemiologic and Clinical Studies on Brucellosis: 1937-1952."

By special invitation of the Council of the International Association of Medical Museums, Dr. E. A. Boyden, Professor and Head, Department of Anatomy, will address the opening session of the two-day "Course in Pathologic Physiology of the Lung" to be held in St. Louis, March 31 - April 1, in conjunction with the annual meeting of the American Association of Pathologists and Bacteriologists.

Dr. Lewis Thomas, Professor of Pediatrics and Medicine, will depart on April 1 for a tour of the British Isles, France, the Netherlands, and Switzerland where he will make a survey of the rheumatic fever problem. He expects to return to the University shortly after June 1.

On March 11 Dr. Reynold A. Jensen, Professor, Department of Pediatrics and Psychiatry, spoke at a meeting sponsored by the International Council of Exceptional Children which was held at the Library of the Vocational High School in Minneapolis. His topic was, "Recognizing the Emotionally Disturbed Child in the Classroom." Dr. Jensen also recently visited the Institute of Logopedics in Wichita, Kansas, and in addition participated in a Postgraduate Assembly in Omaha, Nebraska, where he spoke on "The General Principles of Child Psychology" and served on a panel discussion on child behavior.

* * *

Publications of the Medical School Faculty

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III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL
WEEKLY CALENDAR OF EVENTS

Physicians Welcome

March 30 - April 3, 1953

Monday, March 30

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.
- 12:15 - Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.
- 12:30 - 1:30 Physiology Seminar; 214 Millard Hall.
- 1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U. H.
- 4:00 - Pediatric Seminar; The Familial Incidence of Congenital Heart Disease; Ray Anderson; Sixth Floor West, U. H.
- 4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
- 4:30 - Public Health Seminar; 15 Owre Hall.
- 4:30 - 6:00 Physiology 114A and Cancer Biology 140 -- Research Conference on Cancer, Nutrition, and Endocrinology; Drs. Visscher, Bittner, and King; 129 Millard Hall.
- 5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staff; Eustis Amphitheater.

Ancker Hospital

- 8:30 - 10:00 Tuberculosis and Chest Conference; Auditorium.
- 2:00 - 3:00 Surgery Journal Club; Classroom.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Eldon Berglund; Newborn Nursery, Station C.
- 10:30 - 12:00 Tuberculosis and Contagion Rounds; Thomas Lowry; Station M.
- 11:00 - Pediatric Rounds; Erling Platou; Station K.
- 12:30 - Surgery Grand Rounds; Dr. Zierold; Sta. A.
- 1:00 - X-ray Conference; Classroom, 4th Floor.
- 2:00 - Pediatric Rounds; Robert A. Ulstrom; Stations I and J.

Monday, March 30 (Cont.)

Veterans Administration Hospital

- 8:00 - 9:00 Neuroradiology Conference; J. Jorgens, R. C. Gray; 2nd Floor Annex.
11:30 - X-ray Conference; J. Jorgens; Conference Room, Bldg. I.
1:30 - Cardiac Rounds; Drs. Ebert and Berman.
2:00 - Psychosomatic Rounds; Bldg. 5.
4:00 - Cardiac Conference; Drs. Ebert, Berman and Simonsen.

Tuesday, March 31

Medical School and University Hospitals

- 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.
12:30 - 1:30 Physiology 114D -- Current Literature Seminar; 129 Millard Hall.
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.
4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
5:00 - 6:00 X-ray Conference; Presentation of Cases from General Hospital; Drs. Lipschultz and Blank; Eustis Amphitheater, U. H.

Ancker Hospital

- 8:00 - 9:00 Fracture Conference; Auditorium.
9:00 - 10:00 Medical X-ray Conference; Auditorium.

Minneapolis General Hospital

- 10:00 - Pediatric Rounds; Spencer F. Brown; Stations I and J.
10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station F.
12:30 - Grand Rounds; Fractures; Sta. A; Willard White, et al.
12:30 - Neuroroentgenology Conference; O. Lipschultz, J. C. Michael and Staff.
12:30 - EKG Conference; Boyd Thomes and Staff; 302 Harrington Hall.
1:00 - Tumor Clinic; Drs. Eder, Cal, and Lipschultz.
1:00 - Neurology Grand Rounds; J. C. Michael and Staff.

Veterans Administration Hospital

- 7:30 - Anesthesiology Conference; Conference Room, Bldg. I.
8:30 - Surgery Staff Seminar; Splenosis and Revascularization of Heart; J. J. Garamella; Medical Conference Room, Bldg. I.

Tuesday, March 31 (Cont.)

Veterans Administration Hospital (Cont.)

- 9:00 - Liver Rounds; Drs. Nesbitt and MacDonald.
- 9:30 - Infectious Disease Rounds; Dr. Hall.
- 9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.
- 10:30 - Surgery-Tumor Conference; L. J. Hay, J. Jorgens; Conference Room, Bldg. I.
- 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.
- 3:30 - 4:20 Autopsy Conference; E. T. Bell and Donald Gleason; Conference Room, Bldg. I.

Wednesday, April 1

Medical School and University Hospitals

- 8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Paul Lober 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 Staffs; Todd Amphitheater, U. H.
- 12:30 - 1:20 Radio-Isotope Seminar; 12 Owre Hall.
- 1:30 - 3:00 Physiology 114B -- Circulatory and Renal System Problems Seminar; Dr. M. B. Visscher, et al; 214 Millard Hall.
- 4:00 - 5:30 Physiology 114C -- Permeability and Metabolism Seminar; Nathan Lifson; 214 Millard Hall.
- 4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
- 5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis Amphitheater, 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.
- 12:30 - 1:30 Medical Journal Club; Library.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Max Seham; Stations I and J.
- 10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.
- 11:00 - Pediatric Seminar; Arnold Anderson; Classroom, Station I.
- 11:00 - Pediatric Rounds; Erling S. Platou; Station K.

Wednesday, April 1 (Cont.)

- 12:00 - Surgery Seminar; Dr. Zierold; Classroom.
- 12:15 - Pediatrics Staff Meeting; Classroom, Station I.
- 1:30 - Visiting Pediatric Staff Case Presentation; Station I, Classroom.

Veterans Administration Hospital

- 8:30 - 10:00 Orthopedic X-ray Conference; E. T. Evans and Staff; Conference Room; Bldg. I.
- 8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker.
- 9:00 - Gastro-Intestinal Rounds; Drs. Wilson, Nesbitt, Zieve, and Hay.
- 2:30 - 4:00 Psychosomatic Rounds; C. K. Aldrich; Conference Room, Bldg. I.
- 4:00 - Combined Medical-Surgical Conference; Drs. Flink and Hay; Conference Room, Bldg. I.
- 7:00 p.m. Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, April 2

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.
- 1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.
- 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.
- 4:30 - ECG Reading Conference; James C. Dahl, et al; Staff Room, Heart Hospital.
- 5:00 - 6:00 Radiology Seminar; Some Aspects of Biological Effects of Radiation; Halvor Vermund; 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.

Ancker Hospital

- 8:00 - 10:00 Medical Grand Rounds; Auditorium.

Minneapolis General Hospital

- 9:30 - Neurology Rounds; Heinz Bruhl; Station I.
- 10:00 - Pediatric Rounds; Spencer F. Brown; Station K.
- 10:00 - Psychiatry Grand Rounds; J. C. Michael and Staff; Sta. H.
- 11:30 - 12:30 Clinical Pathological Conference; John I. Coe; Classroom.

Thursday, April 2 (Cont.)

Minneapolis General Hospital (Cont.)

- 1:00 - Fracture - X-ray Conference; Dr. Zierold; Classroom.
- 1:00 - House Staff Conference; Station I.
- 2:00 - 4:00 Infectious Disease Rounds; Classroom.
- 4:00 - 5:00 Infectious Disease Conference; Wesley W. Spink; Classroom.

Veterans Administration Hospital

- 8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.
- 8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.
- 11:00 - Surgery-Roentgen Conference; J. Jorgens; Conference Room, Bldg. I.
- 1:00 - Metabolic Disease Conference; Drs. Flink, Heller, and Jacobson.
- *8:15 p.m. Special Lecture; On the Possibility of Vector Analysis in Electrocardiography; Dr. Hans Schaefer, Professor of Physiology, University of Heidelberg, Germany; Conference Room, Bldg. I.

Friday, April 3 (HOLIDAY)

Saturday, April 4

Medical School and University Hospitals

- 7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.
- 9:00 - 10:00 Infertility Conference; Louis L. Friedman, David I. Seibel, and Obstetrics Staff; Station 54.
- 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.

Ancker Hospital

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

Minneapolis General Hospital

- 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 - 11:15 Hematology Rounds; Drs. Goldish and Bolin.
- 11:15 - 12:00 Morphology Dr. Aufderheide.

* 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.