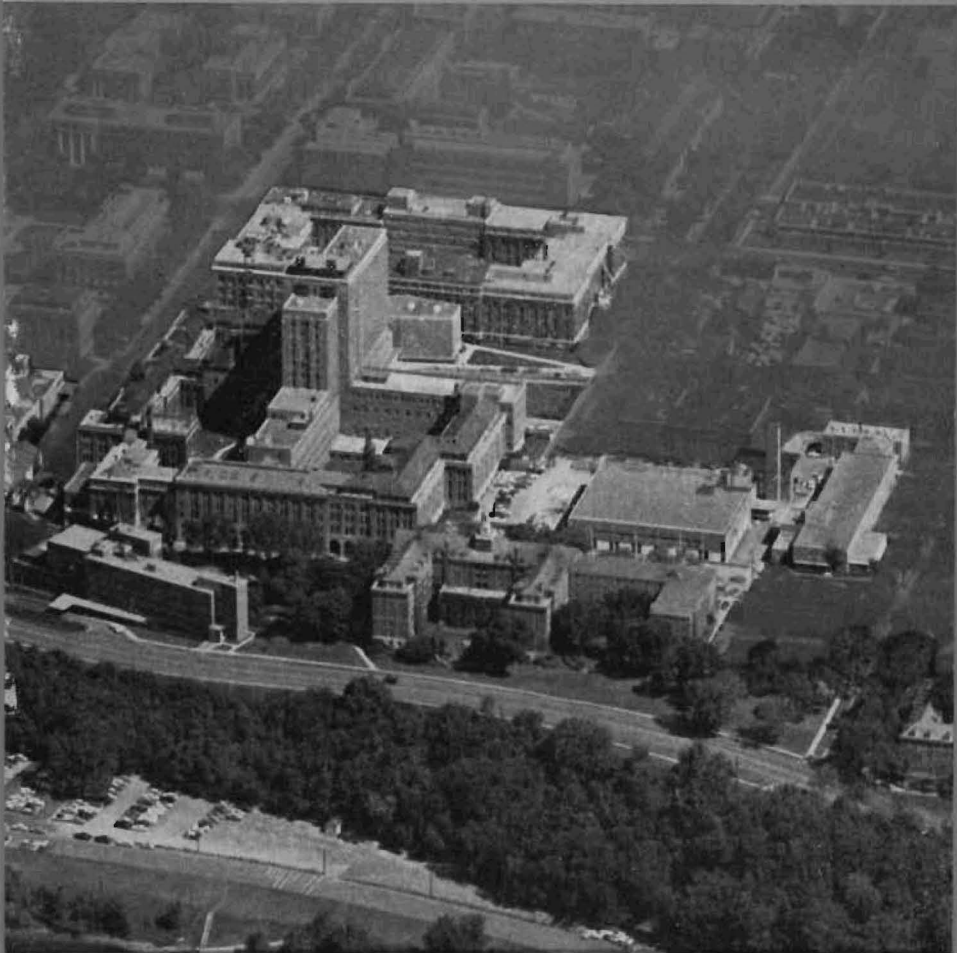


University of Minnesota
MEDICAL BULLETIN



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Blood Supply of the Bone

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— *Off the
Dean's Desk*

Robert B. Howard, M.D.
Dean, College of
Medical Sciences



A distinguished and colorful colleague has, in the essay that follows, epitomized the past quarter century of the history of the University of Minnesota Medical School, skillfully analyzing the factors responsible for its growth and its present stature. His own professional career has been inseparably intertwined with this same period in the history of our School, and the autobiographical portions of the essay provide an important insight into the development of an academic scientist. Finally, he has offered some stimulating and thoughtful comments about medical education in general and about medical practice.

Wesley Spink's contributions to medicine are notable for their breadth as well as their depth. They have brought him richly deserved recognition at local, national, and international levels, from medical and other scientific groups, government agencies, academic institutions, and lay organizations. Here at home we know him as one of our finest scholars, a devoted teacher, and imaginative investigator. By precept and by rigid insistence on the highest standard of performance, he has left an indelible imprint on a score or more of highly selected graduate students, many of whom now themselves occupy prominent academic posts.

National recognition of his research work is evidenced by an impressive list of society member-

ships and by past service as president of the Central Society for Clinical Research and the American Society for Clinical Investigation.

He has served his government and the World Health Organization as a distinguished medical consultant in Asia, in Africa, in South America, and in Europe on both sides of the Iron Curtain. Of various academic honors he has received, he undoubtedly treasures most highly the honorary D.Sc. awarded him by his alma mater, Carleton College.

Now he is about to assume one of the most important posts in American medicine, the presidency of the highly respected and influential American College of Physicians. This honor — which also carries with it a remarkably heavy burden of official duties — reflects much more than Wesley Spink's research contributions, outstanding as they are. His colleagues in this national body have recognized in him the quality of the true physician, his humanitarian spirit, his broad understanding of the goals of medicine, and his capacity for stimulating those with whom he becomes associated. Wisely they have chosen him to speak for them during the coming year.

I would be remiss if I were to close these prefatory remarks without a word of personal acknowledgement and gratitude. Wesley was one of my earliest clinical teachers, my first "staff man" as I assumed the duties of a Fellow on the medical wards. Always helpful, always stimulating, almost always right and occasionally maddening, he evoked my best efforts, for it was clear that nothing less would satisfy him. In retrospect, I have come to appreciate his teachings even more than I did at the time. In more recent years, as the nature of my own responsibilities has changed, I have appreciated the counsel, the encouragement, and friendship of this knowledgeable and understanding faculty member. His words reproduced on the following pages are worth marking well.

Special Address

"After 25 Years"*

WESLEY W. SPINK, M.D.†

This is a memorable occasion for me and for my family. I deeply appreciate this recognition by friends—friends of long duration. Minneapolis has been our home for almost 26 years.

Over 300 years ago when William Harvey reached the twilight of his career he looked back upon his successes and failures. He also looked into the future, and decided to perpetuate his ideals in medicine by endowing an annual lecture for the Royal College of Physicians.¹ He exhorted the lecturers to commemorate the benefactors of medical science, because it was through them that society in general benefited. Mindful of the injunction of Harvey, I am deeply grateful to many benefactors, some of whom are here tonight. I am particularly grateful to the University of Minnesota, an institution that has given me so much, although all of my formal undergraduate and graduate training was obtained elsewhere.



W. W. SPINK

When your President, Dr. Robert Green, asked me to give the Annual Address of this Society on any subject of my choice, the execution of the assignment was not easy. It appeared inappropriate to use this occasion to talk to friends about some of our scientific studies, most of which are known to you. A talk given over to a philosophical

* *Annual Address, Minneapolis Society of Internal Medicine, March 13, 1963*

† *Professor, Department of Medicine, University of Minnesota Medical School*

¹ *See Himsworth, H., Brit. Med. J., P. 1557, December 1962*

rambling might imply that I was summing up things, getting ready to step down, when in reality I am preparing to accept one of the most challenging tasks in my career, the Presidency of the American College of Physicians. Since this occasion is in the nature of a "birthday party," and since my efforts have been largely in the field of medical education and research, it seems more appropriate to take you back to the time of my arrival on the scene here at Minnesota. With the intervening 25 years as a background, we could then look at some of the problems in medicine that challenge us now and try to look into the future.

In selecting the subject, "After 25 Years," I thought that I was being original. But while browsing among my books I found that Osler had penned a famous address under the same title. The occasion was his return to McGill University 25 years after he had departed from there to assume the Chair of Medicine at the University of Pennsylvania. Like many others, I have a deep respect for the writings of Osler, and I have kept the title, although enclosing mine in quotation marks.

THE MEDICAL SCHOOL—1937

My career at Minnesota began on August 1, 1937 as an Assistant Professor of Medicine. The events leading up to my coming here are rather interesting, and emphasize the point that major decisions in our lives are not always based upon prolonged thought and careful planning, but rather upon the opportunity of the moment and the influence of one's teachers. These events go back to the start of my fourth year at Harvard Medical School, when I thought that I was headed for pediatrics. My course was then abruptly changed because of the influence of a great teacher. I was a clerk in Medicine in the fall of 1931 on Harvard's Fourth Medical Service at the Boston City Hospital. On a Saturday afternoon a new patient was assigned to me. He was a young man who worked in a tuberculosis sanatorium in Boston and was sent to the Boston City Hospital because of facial edema, albuminuria, and fever. The diagnosis of his physician was acute glomerulonephritis. After he had been admitted to the ward,

the tentative diagnosis was scarlet fever because of the presence of an erythematous rash and he was placed in isolation. The House Staff told me not to bother with an immediate history and physical examination, but to get the laboratory work on the way! (Times haven't changed much — at least in some quarters.) His blood film revealed a marked eosinophilia. The staff beamed at each other; the patient had trichinosis. I was then requested to prepare the patient for presentation on Monday morning to our visiting physician, Dr. George Minot, Director of the Thorndike Memorial Laboratory and Professor of Medicine. Also, I was told that it wouldn't harm me to dip into the literature on the subject in the meantime. This assignment took care of my Saturday night and Sunday. Dr. Minot was most intrigued with my history and with the patient. I later found out that one of his first scientific papers was on the subject, "Respiratory Signs and Symptoms in Trichinosis," published in 1915 with his cousin, Dr. Francis Rackemann, while they were residents at Johns Hopkins Hospital. Dr. Minot asked me to come to his office, where he spoke at length on the significance of eosinophilia in human disease. He said that we needed more information on the subject. Why didn't I look into the matter, etc.? Did I have any free time in my senior year? Yes? Why not see Dr. Donald Augustine in the Department of Comparative Pathology at the Medical School, and see if I couldn't carry out some research on trichinosis in animals, with particular reference to the eosinophilia. The result of this and subsequent conversations was that I spent three happy months with Dr. Augustine in his laboratory. Upon graduation, I was with him for six more months. My first published papers were on trichinosis.

It was in this manner that Dr. Minot led me into Internal Medicine. After a straight internship of 18½ months in medicine on the Fourth Medical Service, Dr. Minot invited me to be an Assistant Resident on the Thorndike Staff at \$500 a year. Most fortunately, my chief was Dr. Chester Keefer because of my interest in infectious diseases. The next three years were exciting and stimulating, working directly under Dr. Keefer and associated with Dr. George

Minot, Dr. William Castle, Dr. Soma Weiss and with younger men such as Dr. Max Finland, Dr. Arthur Patek, Dr. Eugene B. Ferris, Jr., Dr. William Bean, Dr. Richard Capps, Dr. Robert Wilkins and Dr. Hale Ham. I became Chief Resident on the Thorndike Service, and in the spring of 1937 faced a decision on a permanent course in Medicine. I was 32, recently married, and earning \$1500 a year. This salary reflects the fact that my postgraduate training was during the severe economic depression and in the era of prohibition.

And then a chance conversation took place with another great teacher, which was to involve a fateful decision for me. Dr. Soma Weiss came into my laboratory one morning and asked if I would be interested in a position at Minnesota. Did I know Cecil Watson? I had never met him, but I knew of his work. I then exchanged correspondence with him; the position pleased me, but I was told that no funds would permit my coming to Minnesota to look over the Medical School. (On the other hand, Minnesota was passing up a chance to look me over.) My wife and I decided within 24 hours to go to Minnesota. I never did meet the President of the University, Lotus D. Coffman!

Having never attended a state university, and as a newcomer to the University of Minnesota, several features made a deep impression upon me after I had joined the staff. My pre-medical education had been at Carleton College, a small liberal arts college with a warm and intimate relationship between the students, and between the students and faculty. I was then exposed for ten years to the Harvard tradition, which had evolved over a period of more than 300 years under the influence of Oxford and Cambridge Universities. The transition from being a student at Carleton and Harvard to being a teacher at Minnesota was rather abrupt. The large land-grant state universities in the Midwest had come into being after the Civil War. Their scholarship and tradition were considerably influenced by the highly successful German universities. Many of the leading scholars at Minnesota had been trained in Germany. Perhaps because of this continental influence and perhaps because of the size, I observed the

relationship between students and faculty to be more reserved and formal than I had previously experienced. There was more dogmatism attached to the lectures of the Professors, and the students were a bit more timid in questioning what they heard. But I found the students to be competent and hard working. In the intervening years, the student-faculty relationship has gradually warmed up, and a more intimate and a more informal association has developed.

But my most lasting impression has been the scholarship and the research manifested in the basic science departments. This feature is one of the major reasons why Minnesota has become a great medical school. I am firmly convinced that the stature of the clinical departments of any medical school is based upon the strength and scholarship of the basic science divisions. It is upon such a structure that students acquire a sound scientific outlook for the practice of medicine. I believe the fundamental goals of the student during four years in medical school should be a sound and intensive study of the basic sciences; the development of the ability to procure a history and to carry out a thorough physical examination; and to acquire the habit of using the library. Broad clinical knowledge and technical skills depend upon years of further experience with patients.

The basic science departments at Minnesota that particularly impressed me in 1937 were the Departments of Anatomy and Microbiology. The former department was perhaps the most outstanding in the country at the time, having such scholars as Jackson, Downey, Scammon, Rasmussen and Boyden. The Department of Microbiology was headed by Larson, and had Henrici, Green and Halvorson. I received much encouragement and help from this latter group of men. And I cannot forget E. T. Bell in Pathology, who promoted a good teaching program. In the ensuing years, Visscher in Physiology and Armstrong in Biochemistry have developed outstanding departments. Lazarow and his group are continuing the tradition of scholarship in the Department of Anatomy.

The stature of the basic science group at Minnesota is reflected in its influence on postgraduate medical education. Residents in the clinical fields, or fellows as they are so designated, must be academically acceptable for registration in the Graduate School of the University. As they pursue their specialty in clinical medicine, the fellows have a unique opportunity to take formal courses in a basic discipline and to carry out research by applying the tools of a basic science to a clinical problem. In this manner, an advanced academic degree may be acquired. One may question that part of the program in which one obtains another degree, or degrees, but experience has proved the basic soundness of such graduate training. Minnesota pioneered in this type of program, and it is one of the most outstanding achievements of the Medical School. Out of this program have come such leaders on our own staff as Visscher, Wangensteen, Watson, Baker, Good, Anderson, Armstrong, Varco, Lillehei and Creevy. The close relationship of the basic science group and the clinicians has not only resulted in the training of leaders in medicine, but has yielded outstanding advancements in the care of patients. I have always admired the liaison between physiology and surgery in our medical school. One of the products of this common pursuit of knowledge has been the achievements in gastrointestinal and cardiovascular surgery.

I should like to cite one other unusual feature of the Medical School, and it relates to the University Hospitals. I have spent most of my waking hours for the past 25 years in this hospital. A hospital, like any other organization, is made up of people, and like people, a hospital projects an image. I have always found the hospital to be warm, friendly and good to the patients. The success of the hospital in the care of patients, the training of personnel, and the accomplishments in research, are due in large part to those who administer the institution. I cannot speak too affectionately about my respect for and gratitude to Mr. Ray Amberg, the Director of the University Hospitals during my entire career at Minnesota, and to his assistant Miss Gertrude Gilman. Mr. Amberg has not only been interested in

running a good institution for patient care, but he has recognized the aims and needs of a professional staff that wanted to advance the knowledge of medicine through better teaching and research. Ray will retire in a few years; he will be missed; but his influence will endure for a long time.

One of the great advantages of the Medical School is that it sits in the midst of a large University community of over 30,000 students and faculty. The cross-fertilization of ideas among scholars; the extensive library facilities; the good relationships that exist between the School and the practitioners of the Twin Cities and with the Mayo Clinic; and the stature of the University Hospitals, have all contributed to an outstanding medical center.

THE MEDICAL SCHOOL TODAY

Under the leadership of Dean Harold Diehl, who had the strong support of President James L. Morrill, the physical facilities of the Medical School expanded remarkably and the number of new faculty members increased during the past 25 years. This expansion of bricks and personnel — along with budgets — has brought additional recognition to Minnesota, but along with it have come the disadvantages of an increase in size. This implies a certain loss of intimacy, warmth and coordination of effort.

Does the School have problems? I am reminded at this point of a statement made by J. A. Hughes, Superintendent of Schools in Forest Lake (Minn.), in the *Minnesota Journal of Science* (6:2, Dec. 1962):

"The past five years have been characterized by a great deal of moving and shaking in the field of education, particularly at the elementary and secondary levels. There has been a great deal more shaking than moving, but this seems to be characteristic of periods of perturbation."

There has also been much shaking in the colleges and graduate schools of this country, including the medical schools. Our own medical school shares with other institutions some mutual problems. One of these relates to the

contents of the curriculum and methods of teaching. No standardized curriculum for all of the schools in the country is possible. Each school is unique, and a state-supported school has an obligation to train physicians that will meet the demands of the local area. This challenge is reflected in educational procedures. At present Minnesota is expending considerable effort in changes that involve the clinical years, especially the senior year. The basic principle is to give the student more responsibility under competent supervision in the care of the ambulatory patient. This is an expression of a more personal patient-doctor relationship than often exists among hospitalized patients and simulates everyday conditions found in the practice of medicine. The student is the patient's doctor and follows him through the clinics and in the hospital, if necessary. Changes are also being contemplated in the teaching of the basic sciences. Some of the changes are experimental in nature, and the final approach will depend upon more experience and a critical evaluation of the results. A major feature of these changes is that much thought is being devoted to the needs of the student, and to the future demands upon him in practice.

Another critical problem that has confronted many medical schools relates to the full-time clinical faculty and their remuneration for the treatment of private patients. It has been clearly recognized at Minnesota for years that the salaries of the clinical men, as well as those in the basic sciences, have been inadequate. Consultation privileges in the University Hospitals have been permitted for the staff. During the past decade an increasing number of patients in the private category have been referred to the University Hospitals. Two important factors have contributed to this influx of patients. One is the increasing number of people who have some type of insurance program for illness. A second cause is the competence of the staff. More and more private patients are being referred by doctors desiring help in the treatment of their patients. Under these circumstances income of the staff from private sources has risen. This has created problems obvious to all, the most pertinent of which is, what limit shall be attached to the private income of a geographical full-time University man? Also,

is the care of private patients interfering with his teaching and with his research? For several months a senior faculty committee has been hard at work on this problem. Their recommendations and the action of the Board of Regents will constitute an important decision in this Medical School.

These and other problems perpetually afflict the faculty and administration of a school, and bring me to a final point about our Medical School.

The greatness of the School is due primarily to an outstanding faculty that is supported by a sympathetic and wise administration. Educational policies should and must be created, tried, discarded or incorporated into the policies of the School by the faculty. A competent faculty will attract desirable students and financial support. The everyday efforts of a faculty and students create a tradition, which may be excellent — or mediocre. Let us hope that the next 25 years will find a Medical School with the standards of excellency and accomplishment that I have witnessed during the past 25 years.

MEDICAL EDUCATION IN GENERAL

Looking back over 25 years I believe that the two most significant developments in medical education in the United States have been the establishment of a working relationship between the nation's Veterans Administration hospitals and its medical schools, and the emergence of the tremendous support of medical research by the National Institutes of Health. These developments have taken place since the conclusion of World War II. The functions of almost every medical school in the country would be seriously curtailed if Federal support in these two general areas would suddenly stop. Federal aid to education and research will not cease. It will very likely expand. The major question is — can this aid be adequately controlled in the best interests of medical education?

We have been fortunate at Minnesota in the excellent bond that exists between the University and the Minneapolis VA Hospital. Minnesota was appointed as one of the first medical schools in the country to have a "Dean's Committee" select the professional personnel and develop

the program of teaching and research at a VA hospital. The standards have been high and the patient care, teaching, and research all superbly carried out. One could only wish that the VA Hospital was geographically closer to the Medical School. One of the most commendable projects carried out by the VA on a national scale has been a critical evaluation of chemotherapy in tuberculosis. I believe that this is the finest study of its kind ever made, and several of our local group participated in this study.

The full impact of medical research supported by the National Institutes of Health is almost beyond comprehension. The annual Federal appropriation for medical research and teaching is approaching one billion dollars. In general, the results have been worth the expenditures. In my opinion the National Institutes of Health have been wisely directed by competent people, and the quality of research in the various Institutes is good. However, the expenditure of large sums for the support of medical school programs has created problems at local levels. I shall discuss only two of the major problems common to most medical schools.

Sizable grants for training purposes and awards for research projects have been gladly accepted by most medical schools because they have provided a means for the expansion of facilities and the addition of teaching personnel. These are worthy objectives. But many administrators have been quite concerned over the magnitude of the support, and what might happen if the funds were curtailed. These grants represent "soft money" in the school's budget. This source of revenue must be balanced by a reasonable amount of "hard money" that can take an institution through a period of economic adversity.

The second problem engendered by these Federal grants is that they are awarded largely for medical research. Some have expressed concern over this philosophy of Federal aid to medical education, because the efforts of the faculty might be too greatly occupied with research, and only passing attention given to teaching medical students. This concern cannot be dismissed too lightly. Make no mistake about it, Committees on Research Grants will not renew research applications of individuals who are neither produc-

tive nor show evidence of competence. I am convinced that up to this period the support of NIH has been good for medical education and has benefited the American people. The outstanding teacher, who is also competent in research, will not let his investigations interfere with the welfare of the students. In fact, he is a better teacher in fulfilling a creative role while carrying out his usual academic duties at the same time. But some excellent investigators are poor teachers for undergraduates, and this fact should be recognized in assignments. Likewise, many persons are superb teachers but have little interest in pursuing research problems. Nevertheless, these individuals are aware of the advancements in science and are competent to transmit the information with enthusiasm to young people. A medical school should have room for all types of intellectually alert people.

Is the recent emphasis on medical research diverting students away from medical practice and channelling them into academic or institutional posts? There is no question that a considerable number of undergraduates engage in research projects. In the process, many express desire that this is what they would like to do in the future. The alarm over this tendency is probably greater than the facts should permit. The experience with a research project can only be beneficial for the student, making him more critical and developing him as a scientist. There is a need for competent people in academic posts. But by the time most medical students finish their training they will be headed for practice, either in the community or in institutions. I would venture to guess that not more than 10 or 15 per cent will end up in permanent careers of teaching and research. The competition for good academic posts is keen, and significant research is difficult and frustrating much of the time. And so, while our society does need more doctors, this temporary shortage cannot be seriously ascribed to the present emphasis on medical research.

PROBLEMS IN MEDICAL PRACTICE

Let us turn briefly from medical education to medical practice, because our major aim in the Medical School is to

turn out doctors for the practice of medicine. The charge commonly levelled at medical schools is that the faculty encourages the students to specialize and gives little support to the needs of general practitioners. Let us look at the facts. Firstly, medical students are mature graduate students, and the majority of them are married before they leave school. Most of them will do what they want to do, regardless of what they hear. As long as I have been at Minnesota, more students have elected to go into general practice than into any other branch of medicine. That is not to say that they remain in general practice. Subsequently, a good proportion have specialized after further training. Secondly, the urgent need for general practitioners is in the less populated areas in the country. In travelling about the United States, I have heard many times from medical educators and from doctors that in certain areas in their state there is a need for general practitioners. Some small communities could use two or three doctors, but the available financial return for their effort is sufficient for only one. Thirdly, general practice is failing to enlist the interest of young men because neither they nor their families look forward to working seven days a week, while the rest of the population enjoys a 40-hour week. Doctors, like other parents, desire the best of educational opportunities for their children, and the excitement and attractions of urban localities are more appealing than isolated rural areas. Fourthly, an educated public gravitates toward clinics and specialists in urban centers for the more serious ailments, leaving the general practitioner to treat minor ills and complaints.

There probably will always be a need for general practitioners—or family doctors. Part of the solution to the present dilemma is more training and a continued process of education such as the American Academy of General Practice is fostering. Possibly more and more groups and clinics will embrace within their members a certain proportion of well-trained general practitioners.

I have already touched upon the subject of specialization. The public often complains that American medicine has become too highly specialized, and the bewildered patient or family hardly knows where to turn. There may be some

truth in this viewpoint, but specialization is a product of this century, and not the hallmark of medicine alone. Specialization through the various boards of certification has brought a desirable standardization of excellency and reliability for the benefit of the public. I am still mindful of the disapproval by many outstanding internists at the time when a certifying Board of Internal Medicine was proposed. Just a few months before I migrated to Minnesota 25 years ago, Dr. Thomas R. Boggs, Professor of Medicine at Johns Hopkins inveighed against a Board of Internal Medicine in his Presidential Address at the annual meeting of the Association of American Physicians. Here are his opening remarks:

"In these years of change which affect all avenues of human endeavor it is not strange that the medical profession should feel the pressure of new philosophies of human relations. Of these none is more powerful than the trend toward compulsion, by organized efforts, into a conformity called standardization. This standardization with excellent ideals as its rallying point may yet contain in its logical development methods which can but lead to bureaucratic stereotypism far worse than the evils it is set up to correct."

I was advised at the time by several of my superiors not to seek certification, and many of my contemporaries followed the advice. However, I thought otherwise and did become certified, and subsequently I have so advised every young resident who has asked my opinion.

Dr. Boggs and the Association of American Physicians represent a select group of 250 internists and those from allied disciplines, most of whom are associated with university of institutional medicine. I have always valued my membership in this group. On the other side of the coin is the American College of Physicians. The College is less restricted in its membership, though only Board-qualified internists usually achieve Fellowship. The purpose of the College can almost be summed up in one word, EDUCATION. Through regional scientific meetings, postgraduate courses, the support of research fellowships, the publication

of its journal, *Annals of Internal Medicine*, and an annual scientific session, the College endeavors to keep its approximately 12,000 members abreast of the advances in medicine. The College is not officially associated with sociopolitical movements, leaving such choices and decisions up to the individual members.

As an officer of the College I have had the opportunity to visit medical schools and their affiliated hospitals, as well as to meet with leading internists in various parts of the United States. Especially impressive is the uniformly excellent work being done in the medical schools. The program of medical education, and the good care of patients in private institutions are also appealing. The average physician is alert and aware of the recent advances in medicine. I was also a member of the Board of Directors of the Hennepin County Medical Society in Minneapolis for four years, which comprises one of the largest memberships in the country. This proved to be an unusual experience for a full-time University man because it gave me an opportunity to hear the everyday problems of the men in practice, especially the general practitioners. I learned that the magnitude of the problems of practice are no greater than those confronting the University man; but the problems are different.

Medical care in this country is excellent, but a major problem in patient-doctor relationships today is economic. How can the patients pay for good medical care? The medical profession has sought to maintain its independence by embracing nongovernmental prepayment insurance programs. Whether this approach is adequate, the public will probably decide. Let us hope that they decide wisely through their elected representatives in the state and national legislatures.

A CONCLUDING NOTE

My associates at the Medical School, the students, and I have been the recipients of a young, though rich tradition of medical science at the University of Minnesota. We have had an opportunity to contribute to that tradition. Our benefactors, the people of Minnesota, have shared in the

activities of our state-supported School. Properly trained physicians have moved out into the communities, and the advances of medical research have quickly reached the people. Largely through the influence of the Medical School and the Mayo Clinic, the standards of medical practice and the quality of care are unusually good in this state. I hope, and anticipate, that some grateful faculty member can express the same sentiments 25 years from now.

Staff Meeting Report

Evacuation of the Neurogenic Bladder by Direct Electrical Stimulation*

WILLIAM E. BRADLEY, M.D.†
SHELLEY N. CHOU, M.D.‡
LYLE A. FRENCH, M.D.ϕ

The management of the neurogenic bladder is frequently complicated by chronic and recurrent urinary tract infection with subsequent progressive impairment of renal function. Thus, the mortality and morbidity rate are high. It follows that any method which would materially improve vesical evacuation will benefit those whose bladders are paralyzed. The purpose of this report is to describe a method to empty the neurogenic bladder by means of direct electrical stimulation. This has been done by the use of an implantable, externally-powered receiver stimulator. This device has been successful in emptying neurogenic

* Presented at the Staff Meeting, University Hospitals, on March 1, 1963

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‡ Instructor, Division of Neurosurgery, Department of Surgery

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bladders in a series of paraplegic dogs. The longest survival among this group is now over one year. This dog, and many others of shorter periods of observation, show no evidence of urinary tract infection or of impairment of renal function.

In the development of this device, several aspects of bladder function were considered. It is known that the excitability of the bladder muscle to electrical stimulation is independent of neural control. It is also known that the vesical sphincters open sequential to contraction of the

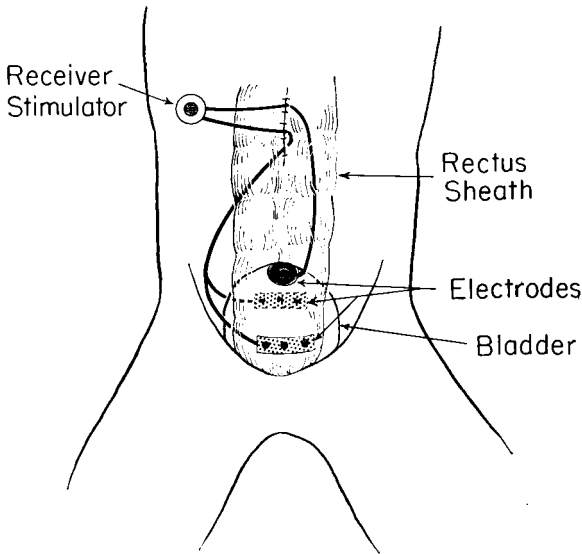


Fig. 1

Illustration of method of implantation of the receiver stimulator and attachment of electrodes to the external surface of the bladder. The superior electrode consists of a coil of platinum wire embedded in Silastic.[®] The two inferior electrodes are platinum wire coated with Silastic, with the coating perforated at regular intervals.

detrusor. Therefore, it was felt that if adequate contraction of the detrusor could be evoked, the sequence of bladder evacuation would ensue. Experiments using dogs were then carried out to determine the parameters for evacuation of the neurogenic bladder. An implantable receiver stimulator which could be activated by an external transmitter was developed. (Fig. 1) This arrangement was thought most desirable because: 1) the disadvantage of wires passing through the abdominal wall could be eliminated and 2) with the receiver deriving power from an externally transmitting source, no batteries were necessary.

The efficacy of this method has been demonstrated in chronic experiments using paraplegic dogs. The bladders of these dogs have been regularly and completely emptied. Periodic cystograms, urine cultures and renal function studies have been made. No deleterious effects have been observed.

This device has also been used in a group of paraplegic patients. One was a successful acute trial. Two patients, a 16 year old quadraplegic female and a paraplegic male infant, had the unit implanted. The bladders of these two patients emptied consistently to repeated stimulation. Residual urine measurements and cystographic studies have been made in these patients. The infant showed complete evacuation but the 16 year old quadraplegic showed a small amount of residual urine. Some of the earlier patient studies have been failures in that the evoked contraction of the bladder was not adequate for evacuation.

CONCLUSION

An implantable externally powered receiver has been demonstrated to be of value in long term management of the neurogenic bladder in dogs. This experience has now been extended to patients. The experience with patients has been brief but it is felt that with further improvement in power supply and in electrode placement, this unit will aid in the long term care of patients with neurogenic bladders.

Staff Meeting Report

Adolescent Personality and Behavior: Delinquency*

STARKE R. HATHAWAY, PH.D.†

ELIO D. MONACHESI, PH.D.‡

Although it is evident that most boys and girls live through their teens with only minor difficulties, one has only to look at newspapers, magazines, and social science and medical journals to realize the extent and severity of adolescent maladjustment. The consequences of technological developments and of a rapidly expanding population, such as the increased number of binding rules and laws established to safeguard complicated property and personal rights, place a heavy burden on boys and girls as they become more and more a part of the outside world in their teens. Moreover, these years are the period of the most rapid and radical physiological change for the individual.

More than fifteen years ago we began a study of the careers of a random sample of 15,000 children from Minnesota. We gathered school and family information and MMPI data when the children were in the ninth grade. Our intent was to explore the extent to which delinquency and later mental illness show precursor evidence useful for treatment and prevention. We have followed the careers of those in our sample until some of them are now 30 years old. In this brief report we can only give some very generalized data on delinquency.

Boys and girls from farms have the lowest delinquency rates. Professional families have a rate for boys that is more than twice the farmer rate and that is not much different (.25) from that for day-laborer families, where the

* Presented at the Staff Meeting of the University Hospitals on March 8, 1963

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‡ Professor and Chairman, Department of Sociology

highest rate occurs (.30). The sources of the delinquent group are also of interest. Of the delinquent boys, 46 per cent come from skilled and semi-skilled families; their rate, however, is .27. Only 8 percent of the delinquent boys come from professional families, and 11 percent from day-laborer families.

We have found little correlation between delinquency and intelligence. The highest rate, .26, occurs with medium low intelligence, but the high intelligence group still has a rate of .20. Boys who drop out of school have a rate of .39; those from broken families a rate of .37. Although the latter rate is high, only 10 percent of all delinquent boys come from broken families, but 31 percent of them come from the school dropout group.

These figures seem to us to suggest that demographic data provide little encouragement for formulating any single urban or suburban community plan to decrease delinquency. These data warn us that delinquency is not now, if it ever was, a low income, low intellect, subcultural outcome. It is a phenomenon almost as significant in suburbia as anywhere. Our fast-diminishing rural population is the only remaining low group.

The main bulk of delinquency comes from the children who are like those cases we diagnose as sociopathic personalities. They seem immune to learning the rules of society, or at least they seem to be so free of inhibiting shame or other sentiment that they develop no fear of the consequences of their acts. Not unhappy in detention, they seem relatively untouched by loyalty to anyone—free to con anyone for whatever they want. If they get it, they are not particularly grateful; if they don't, they aren't very spiteful. The police can handle these children rather well (but they are likely to carry this approach over indiscriminately to other delinquents for whom their treatment is tragic). We are fascinated by these cases but are impotent so far to change them much. Fortunately the problem is one of youth, and by even their early twenties the majority are past the peak of the disorder and disappear from the public records.

But among these delinquents doing similar things such as stealing, robbery, and assorted other conventional delinquencies, is a subgroup—dysocial individuals who are rebelling against family, cultural restrictions, or both. They are angry youths. They are immature or sometimes they have developed under a severe cultural handicap of poor neighborhood, broken home, or unfortunate parental influence. Time will help many of them also, but if we can recognize them from among the sociopaths, and recognize the diagnostically significant fact that they are stormily emotional instead of cold, then it seems as though we should be able to help.

Along the masculinity-femininity variable, boys or girls with feminine interest patterns are not likely to be delinquent. Neurotic and even schizoid children, although they are not frequent among adolescents, also are not especially prone to delinquency. But when schizoid children do get into trouble, it is likely to be bad. They may be lone vandals or apparently unmotivated thieves or sex perverts. Their delinquencies, like their other behavior, are not so likely to be conforming—they don't steal cars, rob, or gamble. Much the same are the brain-damaged children. In extreme minority among all delinquents, they also fail to behave in conventionally delinquent ways. The neurotic, the schizoid, and the brain damaged are loosely designated as mentally ill or handicapped. Treatment by psychotherapy is rather ineffective with the brain damaged, for example, but is effective for the young neurotics who need help in achieving a psychological separation from family or a place among their fellow students. It appears that these several types should be better understood to encourage more appropriate treatment.

The physician is more likely to be faced with individual problems that highlight the relationships between personality and delinquency. Here, while mass decrease of the community problem is not an expected outcome, considerable value can come from professional contributions to individuals and families. This approach has been much talked about, but real evidence of it is hard to find.

Staff Meeting Report

The Effect of Intramedullary Nailing on the Blood Supply of the Diaphysis in Long Bones in Mature Dogs*

RAMON GUSTILO, M.D.†

GEORGE E. NELSON, M.D.‡

JOHN H. MOE, M.D.ϕ

The effect of intramedullary nailing as a method of treatment in fractures in long bones on the medullary vessels in relation to fracture healing is still controversial. The assumption of Kuntscher that intramedullary nailing stimulated callus formation unfortunately is incorrect, as proven by several investigators. The relative importance of the periosteal vessels and nutrient artery in supplying the diaphyseal cortex is likewise an unsettled issue.

Trueta and associates maintained that the outer one-third of the cortex is supplied by the periosteal vessels and the inner two-thirds by the nutrient artery. Brookes and Hoarri-son believed that the entire cortex is supplied solely by the nutrient artery. This study is an attempt to shed light to this interesting basic problem.

Method of Study

Thirty-one mature dogs were treated with intramedullary nailing after creating an experimental fracture at the mid-shaft of the femur. Roentgenograms of the fracture site, gross dissection, histological transverse section of the diaphysis, and dye perfusion to study the blood vessels were done at regular intervals until the fracture was healed.

*Presented at the Staff Meeting of the University Hospitals on March 15, 1963

†Medical Fellow, Department of Surgery

‡Clinical Instructor, Division of Orthopedic Surgery

ϕClinical Professor and Director, Division of Orthopedic Surgery

After creating a fracture, six dogs had plates put in place on one side and intramedullary nails on the other and x-rays were taken to compare the rate of healing. After perfusing the limb with micropaque or india ink, the bone was decalcified and subsequently transverse sections were cut. These were studied under the dissecting microscope and photographs were taken.

Results and Discussion

The blood supply in long bones in man and laboratory animals is divided into three vascular patterns: (1) The nutrient artery which forms the medullary and cortical vessels. (2) Epiphyseo-metaphyseal anastomoses from both ends of long bones. This anastomotic complex joins with the medullary and periosteal vessels. (3) Periosteal vessels which come from the surrounding soft tissues around the diaphysis.

The nutrient artery was usually singular in number in dogs (two in man) and pierced the femur at the linea aspera. After traversing the cortex, the artery divided into one ascending and two descending branches. This in turn branched out transversely, piercing the cortex to supply it. By micropaque injection study it appeared that the periosteal vessels did not penetrate the cortex.

Intramedullary nailing completely destroyed the intramedullary vessels; and consequently, the blood supply to the diaphyseal cortex. The sequence of events were as follows:

1. Avascularity of almost the entire diaphyseal cortex was demonstrated at four to twelve weeks after intramedullary nailing.
2. Concomittant development of a marked periosteal proliferation of the entire shaft with the greatest thickness at the fracture site. This proliferative woven bone was vascular.
3. Absence of endosteal callus formation throughout the entire phase of fracture healing.
4. Necrosis of the cortex could be demonstrated from six

to twelve weeks after intramedullary nailing. At five to six months when the fracture appeared united by x-ray, a few small areas of necrosis were still seen.

5. The proliferative periosteal bone was maximum at three months and gradually diminished as the cortex revascularized and the fracture was healed.

6. Roentgenographic comparisons between plated femoral shafts and those treated with intramedullary nailing showed delayed union on those cases treated with nailing. In plated fracture after three months, the fracture was healed while the nailed side showed evidence of gross motion and delayed union by x-rays.

We believe the cortex was revascularized from the epiphyseo-metaphyseal anastomosis from both ends through the haversian canals and not through the periosteal vessels. There was absence of endosteal callus formation throughout the entire phase of fracture healing. However, there was some proliferation of the periosteal vessels at the fracture site and this was responsible for the callus formation at that area. The periosteal proliferation observed along the entire shaft had been observed by other workers in this field. Pitts *et al.* postulated that the periosteal proliferation was caused by pressure of the nail in the inner cortex and its disappearance was due to absorption of bone and release of pressure. We believe this was a secondary protective mechanism to preserve the integrity of the diaphyseal cortex during its avascular state. The physiological explanation for this phenomenon is not clear at the moment.

If blood supply is essential to fracture healing, then intramedullary nailing which destroys the entire blood supply to the cortex is an unphysiological treatment of fractures. Other factors such as adequate immobilization and contact of fracture ends are just as important as blood supply in fracture healing. However, when adequate immobilization can be obtained by other means without intramedullary fixation, the latter procedure should not be done following anatomical and physiological principles.

Conclusions

1. The blood supply to the diaphyseal cortex of long

bones was mainly from the nutrient artery and the epiphyseo-metaphyseal anastomosis. The periosteal vessels contributed very little if any to the blood supply of the diaphyseal cortex.

2. Intramedullary nailing destroyed the medullary vessels and resulted in necrosis and avascularity of the entire cortex at four to twelve weeks. There was absence of endosteal callus formation. The cortex was revascularized through the haversian canals from the epiphyseal-metaphyseal anastomosis at both ends.

3. Intramedullary nailing delayed healing of fractures.

NOTICE TO READERS

As a service to graduates of the Medical School, the physicians practicing in Minnesota, and to towns in Minnesota, the MEDICAL BULLETIN will accept brief notices for publication regarding towns desiring physicians, physicians desiring locations to practice, physicians desiring associates, etc.

Notices will be limited to 50 words, and are subject to the usual editorial privilege.

There will be no charge for publication. Submit notices to:

Managing Editor
University of Minnesota Medical Bulletin
Box 193, University Hospitals
Minneapolis 14, Minnesota

Medical School News

DR. EUGENE BERNSTEIN APPOINTED MARKLE SCHOLAR

Dr. Eugene F. Bernstein, fellow in surgery, has been named a Markle Scholar in Academic Medicine by the John and Mary Markle Foundation, New York City, N. Y. He was one of 25 individuals at U.S. and Canadian medical schools named winners of 1963 Markle awards. All are engaged in research and teaching.

Dr. Bernstein is the 14th Minnesotan to be named a Markle Scholar. His award consists of a \$30,000.00 grant to the University of Minnesota, which will be used at the rate of \$6,000.00 annually in support of his research and his faculty salary. Markle Scholarships are intended to help relieve the faculty shortage in medical schools by providing young teachers and investigators with academic security and financial assistance early in their careers.

Dr. Bernstein is a native of New York, and 1954 graduate of the College of Medicine at Downstate Medical Center of the State University of New York. He received an M.S. degree in physiology from the University of Minnesota in 1961, and in July will complete six years of training in surgery at this institution.

He has had a prominent role in developing the technique of gastric freezing for treatment of peptic ulcer, which was originated recently at the University of Minnesota Medical Center by a team headed by Dr. O. H. Wangensteen in the Department of Surgery. Dr. Bernstein is 32 years old, married, and has three children.

Others named Markle Scholars while at the University of Minnesota include Drs. Leonard Peltier, Gilbert Campbell, Lloyd MacLean, Mitchell Spellman, Richard Egdahl, George E. Moore, Russell Nelson, William Scherer, Robert



EUGENE BERNSTEIN

Ulstrom, Robert A. Good, Richard C. Lillehei, Paul G. Quie, and Ward O. Griffen. All hold positions in academic medicine at various medical centers in the United States or Canada.

Student News

STATE DOCTORS AWARD RURAL MEDICAL SCHOLARSHIP

Roland Roy Larter, Medical School freshman, is the recipient of the 1962-63 Rural Medical Scholarship awarded by the Minnesota State Medical Association. He will receive \$1,000.00 per year for each of four years in medical school, in return for his agreement to practice medicine for at least five years in a rural Minnesota community in need of a physician.



ROLAND LARTER

Dr. Charles G. Sheppard (Med. '35), Hutchinson, Minn., chairman of the MSMA Scholarship and Loan Committee, said the annual scholarship is intended to provide financial assistance to a worthy and outstanding student, as well as to insure a future supply of physicians for non-metropolitan areas of Minnesota.

Larter graduated from Lancaster, Minn., high school in 1957. He holds a B.S. degree, awarded with distinction in 1960 from the University of Minnesota. He attended graduate school for one year, then entered Medical School in September, 1962.

Larter is the 12th person to receive the MSMA Rural Medical Scholarship. Other present medical students still receiving support under the program include G. Bruce Gerstenkorn, senior; Donald S. Asp, junior; and Charles I. Benjamin and Elton Wing, sophomores.

THE
BULLETIN BOARD
Special Medical School Lectures

- April 1, 1963 8 p.m., Mayo Auditorium
"The Shakespearean Image of
Renaissance Man"
Robert S. Hoyt, Professor of History
University of Minnesota
- April 15, 1963 8 p.m., Mayo Auditorium
"Mirror of Man in the Age of Reason"
Hylton Thomas, Professor of Art
University of Minnesota
- April 29, 1963 8 p.m., Mayo Auditorium
"Tentative Modern Man"
Julius M. Nolte, Dean, General
Extension Division
University of Minnesota
- May 2, 1963 4 p.m., Mayo Auditorium
"The Genetic Code"
Dr. Sevro Ochoa, Professor
of Biochemistry
New York University College
of Medicine
- May 16, 1963 4:30 p.m., Mayo Auditorium
GEORGE S. FAHR LECTURE
"Cardiovascular Surgery"
Dr. Alfred S. Blalock, Professor
of Surgery
Johns Hopkins Medical School
- May 22, 1963 4:30 p.m., Mayo Auditorium
J. S. BLUMENTHAL MEMORIAL LECTURE
"Hypersensitivity to Small Molecules
Including Penicillin"
Dr. Herman Eisen, Professor
of Microbiology
Washington Univ. School of Medicine
St. Louis, Mo.

PHYSICIANS AND ALL OTHER
INTERESTED PERSONS WELCOME

ALUMNI DEATHS

▲ 1898

Dr. Eric P. Quain, Salem, Ore. Died Sept. 11, 1962, age 92 years. He was a Fellow of the American College of Surgeons, and a veteran of World War I.

▲ 1903

Dr. George D. Rice, St. Cloud, Minn. Died Sept. 22, 1962, age 82, of pernicious anemia and cancer. A psychiatrist, he had retired from Veterans Administration medical practice in 1950.

▲ 1905

Dr. Winslow C. Chambers, Blue Earth, Minn. Died Nov. 8, 1962, at the age of 85. He was a native of Owatonna and had practiced in Minnesota more than 50 years. Dr. Chambers was among the founders of Minnesota Blue Cross, and was prominent in community affairs at Blue Earth, Minn. for many years.

▲ 1910

Dr. Monte C. Piper, LaCanada, Calif. Died February 15, 1963, age 80. He was an internist and obstetrician-gynecologist on the Mayo Clinic staff for 30 years, retiring in 1950. A native of Garden City, Minn., he also had been in private practice in Sanborn, Minn., and served with the Army medical corps during World War I. One of his chief interests was the history of medicine in Minnesota.

▲ 1916

Dr. Carl Fiske Jones, Oak Park, Ill. Died Oct. 17, 1962 of myocardial infarction, age 74. A member of the American College of Obstetricians and Gynecologists, he was associated with the West Suburban Hospital, Oak Park, Ill., where he died.

▲ 1926

Dr. Barrett A. Nelson, Manhattan, Kans. Died June 10, 1962 of myocardial infarction, age 67 years. He was a fellow of the American College of Surgeons, and past president of the Kansas Medical Society.



A. A. BIEDERMAN

▲ 1931

Dr. Albert A. Biederman, Puyallup, Wash. Died February 16, 1963, of cerebral hemorrhage. He had retired in 1962 following 28 years of service with U. S. Army medical corps. Col. Biederman interned at Minneapolis General Hospital. He was former commanding officer of the Walson Army Hospital and post surgeon at Fort Dix, N. J. He is survived by his wife, Marguerite, and two daughters.

▲ 1933

Dr. John L. Noble, St. Paul, Minn. Died February 5, 1963. He was 69 years old, and had been pathologist at Ancker Hospital, St. Paul, since 1924. He was a professor emeritus of pathology, University of Minnesota. He is survived by a sister, Mrs. Harold Erskine, Pittsburgh, Pa.

▲ 1941

Dr. Lewis M. Reid, Evansville, Minn. Died February 11, 1963 at the age of 52. He had practiced 15 years in Excelsior, Minn., and was practicing in Evansville and Hutchinson, Minn. at the time of his death. Dr. Reid was a native of Minneapolis.

Memorial Gifts

Memorial gifts to the Minnesota Medical Foundation have been received recently in memory of:

Mr. Jerry D. Gamble
Minneapolis, Minn.

Mr. Leopold Hirsch
Bronx, New York

Miss Phoebe Gordon
Minneapolis, Minn.

Mrs. Mary Mark
St. Paul, Minn.

Mrs. Esther Swedenborg
St. Paul, Minn.

Memorial contributions are a practical means of honoring the memory of a friend or loved one, while helping the Minnesota Medical Foundation in the advancement of medical education and research.

Coming Events

University of Minnesota Medical School

CONTINUATION COURSES FOR PHYSICIANS

1963

University of Minnesota
Center for Continuation Study

- March 1-2Neurosurgery
- March 22-23Trauma
- April 18-20Otolaryngology
- April 25-27Obstetrics
- April 29-May 1Ophthalmology
- May 16-18Surgery
- May 27-29Psychiatry
- June 3-5Anesthesiology

The University of Minnesota reserves the right to change this schedule without notification.

Courses are held at the Center for Continuation Study or the Mayo Memorial Auditorium on the campus of the University of Minnesota. Usual tuition fees are \$45 for a two-day course, \$65 for a three-day course, and \$80 for a one-week course.

Specific announcements are sent out about two months prior to each course to all members of the Minnesota State Medical Association and to any physicians who request information for a specific course. For further information write to:

DIRECTOR
DEPARTMENT OF CONTINUATION MEDICAL EDUCATION
THE MEDICAL CENTER (BOX 193)
UNIVERSITY OF MINNESOTA
MINNEAPOLIS 14, MINNESOTA

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