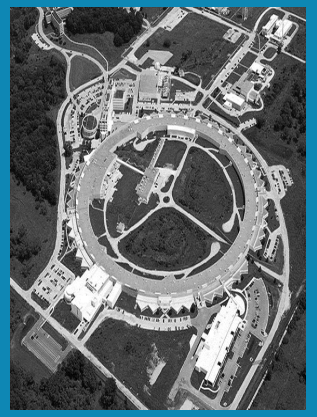
AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE
THE MIDWEST CHAPTER

Created in 1956



Midwest Chapter Officers 2016
Mark Pankuch, John Fan, John Mathai, Murat Surucu, John Roeske, Yixiang Liao, Jagan Venkatesan, Tianming Wu, Allen Hrejsa, Abbie Diak, Ina Sala

About the AAPM Midwest Chapter

The first organization was called “The Radiation and Medical Physics Society of Chicago” which had its first meeting on September 17, 1956 in Chicago, IL. The original Charter Members were the following: Louis Chandler, Don Charleston, Robert K. Clark, Ted Fields, P.F. Gustafson, F. Heinments, R.S. Landauer Sr., L.H. Lanzl, Alice McCrea, Walter S. Moos, Daniel G. Oldifeld, Jacques Ovadia, William T. Powers, Martin Rosenfeld, Glen Sandberg, Lester S. Skaggs, and G. Theodore Wood.

By May 20, 1957 the organization had a total of twenty (20) full members and eight (8) associate members. The annual dues for the organization were one dollar the first year and 2 dollars the following year. The name of the organization was later changed to “The Radiation and Medical Physics Society of Illinois”. After a lengthy discussion, in May 6th of 1965 the Radiation and Medical Physics Society of Illinois finalized its previous discussions about affiliating with the American Association of Physicist in Medicine. The proposed Constitution for the Midwest Chapter of the American Association of Physicist in Medicine was drafted on May 17, 1965.

Graduate Program

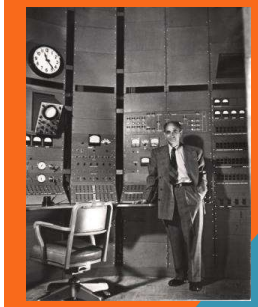
THE UNIVERSITY OF CHICAGO

Graduate training in medical physics was established in the department of radiology in 1955 with Professor Lester Skaggs as director, to provide master's-level training in radiotherapy physics and health physics. When Kurt Rossmann joined the department of radiology, this program was broadened to offer the Ph.D. degree and to include diagnostic imaging. The graduate programs in medical physics were headed by Charles Metz from 1979 to 1985 and now continue, with Kunio Doi as director, as a collaborative effort between the department of radiology and the department of radiation & cellular oncology, which was established as a separate entity in 1984. A unique aspect of these graduate programs is their integrated focus on diagnostic and therapeutic applications of medical image research. Twenty Ph.D. degrees and 19 S.M. degrees have been awarded since 1969 in the physics of diagnostic radiology, physics of nuclear medicine, and physics of radiation therapy. Currently, approximately 20 students are working toward the Ph.D. degree, several of whom are supported by a training grant from the National Cancer Institute.

https://radiology.uchicago.edu/page/history-graduate-programs-medical-physics

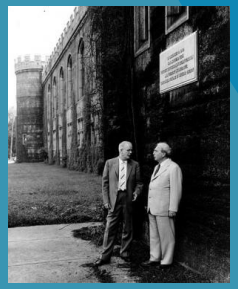
Miguel Awschalom, Radiation Physics, Donald E. Young, who directed development of Fermilan's (formerly NAL) linac, and Professor Lester Skaggs, of the University of Chicago, discuss cancer therapy unit proposal during a meeting at NAL.

Photo by Tim Fielding, NAL



Enrico Fermi, Italian-born American nuclear physicist, constructor of the first working nuclear reactor, in the control room of the Chicago synchro-cyclotron, c1942.

Source: Oxford Scientific Library.
https://radonc-sites.uchicago.edu/page/history-department



Dr. Norman Hilberry (left) and Dr. Leo Szilard stand beside the site where the world's first nuclear reactor was built during World War II. Both worked with the late Dr. Enrico Fermi in achieving the first self-sustaining chain reaction in nuclear energy on December 2, 1942, at Stagg Field, University of Chicago.

radonc-sites.uchicago.edu/page/history-department

Fermi Lab Neutron Therapy

INTRODUCTION
Modern medicine employs three primary forms of cancer treatments: surgery, chemotherapy (medication), and radiation therapy. The location, type, and size of the cancer determine the treatment method(s) employed. One type of radiation treatment, neutron therapy, was offered for over 30 years at Fermilab. To offer this therapy the Laboratory established a Cancer Therapy Facility (CTF) later known as the Neutron Therapy Facility. This research program, together with other centers in the U.S., tested the effectiveness of neutron beams by comparing them with conventional radiation in the management of certain tumors. This eventually evolved into a standard clinical therapy for certain types of tumors.

NEUTRON THERAPY
The Fermilab CTF opened in September 1976. It evolved from studies on laboratory animals and patients that have undergone neutron therapy a Fermilab, elsewhere in the U.S., and across the world.High energy neutrons, x-rays, and high energy charged particles can be used to cause damage to tumor tissues. Oxygen deficient (hypoxic) cells are known to be more resistant to x-rays. Thus, hypoxic cells were thought to be responsible for tumor recurrence after conventional (x-ray) therapy. However, hypoxic cells are less "resistant" to fast (high energy) neutrons. Hence, the use of a neutron beam possesses potential to increase tumor control probability. Cancers treated with neutron therapy were those in which conventional therapy was less likely to provide local control. The hope was that neutron therapy results would be better or, at least, similar to conventional x-ray radiation. Patients who participated in neutron therapy helped advance medical knowledge by clinically establishing the effectiveness of this new treatment modality.

At its inception, Fermilab's IRB comprised of three radiation oncologists, a medical physician, an attorney, two medical oncologists, a social worker, an oncological nurse, and a professor of theology. The cancers treated were described in study protocols designed by a national group of radiation oncologists under the auspices of the National Cancer Institute. Patients were referred to the study only if they were identified as having a cancer which would potentially benefit from fast neutron therapy. This further assured that neutron therapy was in the best interest of the patient.

Certain tumors of the mouth and upper respiratory passages, advanced cancers of the cervix, prostate, bladder, and some brain cancers were treated at U.S. neutron centers. In addition, at Fermilab some lung and pancreatic cancers as well as certain bone and soft tissue malignancies were irradiated. Treatment with neutrons at the Fermilab facility was delivered in a sitting or standing position. Special devices were used to correct the position of and immobilize patients. Treatments, including set-up and irradiation, required 20 to 30 minutes depending on the tumor location. During treatment the patient was observed by closed circuit TV and communication was maintained by an intercom system. Generally, treatment was given 1-4 times a week and lasted from 3-7 weeks. After the course of neutron therapy was completed, the patient returned to their referring physician and radiation oncologist for evaluation and follow up. Patients were also asked to report periodically for check-ups at Fermilab; these follow-ups were done without charge. As each patient contributed to the research, all data were recorded and analyzed by modern computer techniques. Personal privacy was assured.

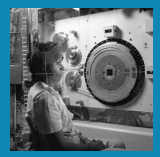
FACILITIES
Fermilab operates the most powerful particle accelerator in the U.S. and was built for high energy physics research. . The Cancer Therapy Facility was possible because the beamline was used for only about 30% of the time to supply protons for research purposes. During the remaining time, the beam was available for use by the CTF for cancer treatment,. To create the CTF, a small area parallel to the linear accelerator was remodeled. After a year of initial dosimetry and radiobiology studies, patient therapy was started in September 1976. It contained the heavily shielded treatment room and other rooms for reception, examination, and controls. The treatment room had two levels. The n upper level contained x-ray equipment used to confirm that the patient was properly positioned. A platform then lowered the patient to the first level and the target was placed at the isocenter of the neutron beam, defined by four lasers. Neutrons are produced isotropically when protons diverted from the linear accelerator strike a beryllium target. An absorbing wall with appropriately-tapered holes (collimators) was placed between the neutron source and the patient. The proper collimator assured that only the target would be actually irradiated. Neutron beam therapy was typically suitable for patients who are ambulatory since patients walked into the treatment room and needed to maintain their treatment position for the duration of therapy.

COST
No charge was made to patients for the use of the beam or the facilities at Fermilab during the initial clinical trials. Patients provided for their own transport. Sometimes the Illinois Cancer Council and volunteers of the American Cancer Society helped in patient transport.

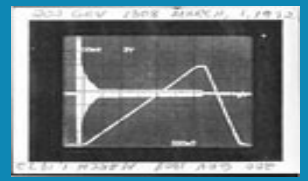
FUNDING
Beginning June 13, 1975 the National Cancer Institute granted $816,000 for 3 year operating funds for the CTF. After an independent on-site review, NCI awarded a second three-year grant effective August 1, 1977 of $2,186,953, for operating expenses. The Illinois Division of the American Cancer Society made two research and instrumentation grants totaling slightly over $35,000 to finance dosimetry equipment, beam time, travel and other expenses.
Through the efforts of medical professionals in the Chicago area, led by Dr. Samuel Taylor III, private funds in excess of $175,000 were contributed for building modifications to accommodate the new facility and for some equipment.

EPILOGUE
Operation of the Neutron Therapy Facility (NTF), as it later came to be called, continued for over thirty years until April of 2013. During that period, clinical operations were conducted in partnership with Rush-Presbyterian-St Luke's (Now Rush University), Provena Saint Joseph Hospital (Now Presence Saint Joseph Hospital) in Elgin, and Northern Illinois University.

[1] Special Thanks to Dr. Thomas Kroc for providing editorial comments on the above historical source.
[2] This history has been edited from the following source:
http://history.fnal.gov/Neutron_Therapy/#radiologicadl



A patient undergoing neutron therapy at the Fermilab facility in Batavia, IL. In 1976, Fermilab established the Cancer Therapy Facility to treat patients by using the beamline when it was not being used for high energy physics research.



Milestone of 200 GeV reached at Fermilab on March 1, 1972

history.fnal.gov/brochure.html

Current Members

Two AAPM Midwest Chapter members were honored with awards at the AAPM National Meeting held in Anaheim.

Vythialingam "Seelan" Sathiaseelan, PhD, Chief Physicist of Northwestern Memorial Hospital was elected as a Fellow of the AAPM, recognizing his distinguished contributions to medical physics by his peers.

Gage Redler, PhD, Radiation Physics Resident at Rush University was awarded 2nd place in the Young Investigator's Symposium for his talk entitled "A Novel Scatter Imaging Modality for Real Time Image Guidance During Lung SBRT."

Gage Redler, PhD (left) and Vythialingam "Seelan" Sathiaseelan, PhD (right).