The 1960s

The Yale Epilepsy Center began about 40 years ago (1969) and was one of the very first such centers in the world. Dr. Gilbert Glaser, Chairman at Yale, recruited Dr. Richard Mattson in 1967 to join the faculty and develop a clinical epilepsy program to complement an ongoing basic science research activity. Dr. Mattson had fellowship training in epilepsy and clinical neurophysiology at the Mayo Clinic and while in the USAF had led a team in pioneering studies of the effect of sleep deprivation on the EEG and epilepsy.

Initial plans at Yale called for an inpatient diagnosis and treatment unit in the Connecticut Mental Health Center (CMHC), a newly constructed facility in the heart of the Yale Medical Center. A change in leadership in the psychiatry department led to shift in focus from medically oriented psychiatry to psychosocial and psychodynamic issues making development on their inpatient unit no longer an option. However, Drs. Richard Mattson and George Henninger (now Professor Emeritus of Psychiatry) collaborated in clinical neurophysiological studies of emotional stress on seizures. Stress interviews were conducted while polygraphic recording was conducted in another room. Newly developed videotape machines made it possible to record and easily play back the events simultaneously with the electrographic recordings.

The need to find a new site led Drs. Gilbert Glaser and Lewis Levy, Chief of Neurology at the VA in West Haven, to enlist the help of Dr. Warren Huber, National Chief of VA Neurology, to campaign for funds to establish such a unit. Meanwhile, Dr. Mattson set up a rudimentary unit at the VA using the principles of closed circuit monitoring begun in clinical studies at the CMHC. Although the simultaneous recording of seizures and electrographic changes had been done before by using movies, the simplicity of recording and replaying, erasing and editing the video tape represented a major breakthrough of feasibility for everyday diagnostic study. Patients were studied using a polygraph and an in-room video camera video monitoring the patient. The EEG was recorded in a separate room and the paper write-out was recorded by a camera mounted on the polygraph. The clinical and EEG were then combined and recorded on the videotape. The video camera equipment had to be purchased from the Burns Detective Agency, there being no vendors in the medical field for such equipment. In the late 1960's and early 1970's CCTV/EEG monitoring at the Yale/VA Unit was primarily conducted during the daytime hours when the EEG technician was available. This was a limitation because many relevant episodes occurred at night. When the technician in the epilepsy unit became pregnant and needed maternity leave, Dr. Mattson decided to train the nurses serving the unit to be EEG technicians. This made a dramatic change in function because expert medical staff nurses were available 24-hours a day, 7 days a week.

The 1970s

In 1972 the Veterans Administration formally designated West Haven as an Epilepsy Center along with the Durham VA associated with Duke University under the leadership of Dr. Antonio Delguado-Escueta. Other centers were later initiated throughout the country at Dallas, UCLA, Madison (Wisconsin), Minneapolis and Seattle. With this official recognition came funding for more extensive video and polygraphic monitoring equipment as well as wiring and camera placement in four private rooms. In addition to the monitoring equipment, the funding provided for a dedicated nursing staff with no other responsibilities and a clinical nurse specialist, Jean Shope, R.N. A neuropsychologist, Dr. David Glass, was also recruited reflecting the common cognitive, affective and behavioral problems encountered by our patient population having resistant complex partial epilepsy as well as frequent non-epileptic problems.

In 1974 the Yale/VA Epilepsy Center hosted the first of a number of epilepsy workshops and representatives from worldwide attended. Many issues were presented including early review of videotaped seizures from several centers. These examples were later part of the data used by the ILAE to establish a classification of seizures. At this meeting it was also agreed the VA Epilepsy Centers should collaborate in clinical research to address unanswered questions. Dr. Mattson agreed to lead a study on comparison of antiepileptic drugs and Dr. Antonio Delgado-Escueta proposed a study of treatment of status epilepticus (later led by Dr. David Treiman, an Associate of Dr. Escueta).

Dr. Mattson collaborating with colleagues from VA Medical Centers throughout the U.S. began comparative studies with the executive direction of Joyce Cramer that evaluated all the standard antiepileptic drugs over a period of 15 years. These were the largest controlled trials ever conducted in the field of epilepsy.

About the same time a small research pharmacology lab was also set up in a nearby room to conduct levels of alcohol and folate being studied in clinical trials. Antiepileptic drug level determination initiated by Dr. Brian Gallagher on the Yale campus in the late 1960's were also conducted in this lab with the arrival of Joyce Cramer in the mid 70's. She conducted some of the original studies of protein binding and interactions of valproate with phenytoin and developed a quick simple method of ultrafiltration later utilized in commercial preparations.

Soon it became clear that the epilepsy unit capabilities far exceeded the local VA need and other VA hospitals did not send sufficient referrals to fully utilize the capacity of the center. At the same time the Yale Epilepsy Clinic staffed by Drs. Richard Mattson, Brian Gallagher and Dennis Smith had large numbers of patients who were appropriate candidates for admission to such a facility but were not veterans. A unique "sharing agreement" was set up with Yale-New Haven Hospital allowing Yale patients to be admitted to the unit. YNHH billed the patient and paid the largest portion to the VA to underwrite the costs of operation. Very soon the epilepsy unit was admitting a majority of the patients under this agreement including women and children. Because no other large facility existed south of Montreal or north of Duke (Durham, NC), many admissions were from the eastern U.S. via Yale.

The initial focus in the Yale/VA Center in the late 1960's and early 1970's was monitoring of events to establish the diagnosis of epilepsy and specific seizure type or non-epileptic events. Polysomnograms were also conducted for suspected sleep disorders. The unit was also used for clinical research studies of the effect alcohol, sleep deprivation and hormones on seizures. The facility and staff also provided the site for clinical pharmacokinetic studies of antiepileptic drugs. In collaboration with Dr. Brian Gallagher, many early studies of antiepileptic drug level testing and correlation with clinical effects were carried out.

In the early 1970's Dr. Peter Williamson returned to the Yale neurology department after military service, joined the epilepsy team and focused on evaluation of intractable epilepsy for epilepsy surgery. Working with the Yale Electronics Engineering Lab, he developed intracranial depth electrodes using a modification of the "Ray" probe initially developed at the Mayo Clinic. Working with Dr. John Van Gilder, a neurosurgeon, the surgery program was born.

In the mid 1970's Dr. Van Gilder's student Dr. Dennis Spencer completed neurosurgery residency at Yale and continued on the faculty with special interest in epilepsy surgery, replacing Dr. Van Gilder who had taken another position. Soon thereafter Dr. Susan Soloway (later Spencer) after completing neurology residency at Yale joined the team with a special interest in epilepsy surgery. She assembled the cases that had been studied and treated by Drs. Peter Williamson, Dennis Spencer and Richard Mattson, and reported one of the earliest outcomes of this diagnostic and therapeutic approach using intracranial recording. The Yale Epilepsy Center quickly became one of the largest and most important epilepsy surgery centers worldwide.

The 1980s

Throughout this decade Dr. Williamson, as well as Dr. Susan Spencer and others on the team, reported the semiology of multiple partial seizure types based on site of origin and in particular helped define complex partial seizures of frontal, temporal, parietal and occipital origin. Drs. Susan and Dennis Spencer and colleagues also assembled experience with corpus callosotomy and defined both the benefits and risks.

During the same period of the early 1980's Dr. Dennis Spencer introduced a new approach to temporal lobectomy that maximized removal of epileptic tissue in the hippocampus and spared important functional lateral cortex. The resected tissue was carefully studied by Drs. Nihal DeLanerolle, Jung Kim and Anne Williamson, among others to gain understanding of the pathology and pathophysiology of epilepsy, especially mesial temporal sclerosis.

During that period Dr. John Ebersole returned to Yale from the NIH and joined the team. With a primary interest in neurophysiology he was a pioneer in use of 24-hour ambulatory monitoring. He then turned his expertise to both conventional EEG and magnetoencephalography and utilized dipole source localization to refine the likely site of interictal and ictal discharges.

Although maintaining an interest in intensive monitoring and pre-surgical evaluation, Dr. Mattson, with Joyce Cramer, had increasingly directed their research efforts to pharmacokinetics and pharmacology of antiepileptic drugs. By the mid 1970's they had designed, developed and led the two large VA Multi-center COOP Studies comparing the standard antiepileptic drugs from the mid 1970's to the early 1990's with support from Dr. Williamson and later Dr. Ebersole.

By the mid 1980's, in view of the surgical emphasis of the epilepsy monitoring unit, Dr. Mattson appointed Dr. Peter Williamson to replace him as Director. Throughout most of that decade, 24-hour EEG recording was recorded on paper and required hours of exhaustive review for interictal and ictal events. The 24-hour attendance by expert nurses provided preliminary identification of important data which facilitated the review. By the end of the 1980's technical advances allowed the EEG to be digitized and recorded on a portion of the videotape thus locking the clinical and EEG events. This previously had been done on a split-screen but the number of channels and the resolution were limited.

Despite new equipment, increased efficiency of operation and the addition of two beds, the VA monitoring unit had a waiting time for admission of almost a year. It became clear for many reasons the VA would not expand the unit further because the hospital had begun a process of reducing, not increasing, bed size and plans were started to develop another epilepsy unit at Yale-New Haven Hospital.

In addition to the limited bed situation, many studies required patients to be transported to Yale-New Haven Hospital and back for diagnostic tests such as MRI and surgery because by that time the majority of patients were Yale "sharing" not VA patients. Further, although all epilepsy physicians worked and had appointments and responsibilities at both Yale and the VA, Drs.

Susan and especially Dennis Spencer had primary appointments and responsibilities on the Yale rather than the VA campus making daily travel difficult.

For all these reasons initiatives were set in motion to develop an epilepsy monitoring unit with a surgical emphasis at Yale-New Haven Hospital. Initially, a small surgical unit was established in the Neuro-intensive Care Unit for intracranial recording and surgery. Extensive planning simultaneously was undertaken to build a unit comparable to but larger than that at the VA in Yale-New Haven Hospital. Opening in 1990, under the direction of Drs. Dennis and Susan Spencer, the unit coexisted with the unit at the VA under the Directorship of Dr. Peter Williamson.

Also in the mid 1980's, Dr. Williamson began a formal epilepsy fellowship with the training of Dr. Paul Boon followed by Dr. Jacqueline French, both of whom have become internationally recognized epileptologists.

The 1990s

In 1992 Dr. Peter Williamson was recruited to Dartmouth College, his alma mater, to start an epilepsy center and Dr. John Ebersole was appointed to take his position as Director of the epilepsy unit at the VA. Dr. Williamson's third fellow, Dr. Vijay Thadani, who wrote important seizure semiology papers with Dr. Williamson (as had the previous fellows) went to Dartmouth with Dr. Williamson. (In 2004, Dr. Williamson's contributions were recognized when he was awarded the J. Kiffin Penry Award by the American Epilepsy Society.)

During this period, Dr. Susan Spencer began an epilepsy fellowship at the Yale-New Haven Hospital unit. In addition, Dr. John Ebersole had clinical neurophysiology/epilepsy fellows. Dr. Dennis Spencer also often had a neurosurgery/epilepsy fellow for a year of training. Many of these trainees have gone on to lead other programs around the country.

Dr. Richard Scheyer continued as a fellow after residency at Yale and brought special pharmacokinetic expertise to the team before leaving in the late 1990's. He contributed to a number of studies of antiepileptic drugs including monitoring of intracerebral pharmacology using microdialysis in epilepsy patients. As can be seen, the Yale Epilepsy Center was a fertile training ground for future leaders and practioners in epilepsy. In the late 1990's, Dr. Ebersole was recruited to develop an epilepsy program at the University of Chicago. About the same time, closure of the neurology bed service at the VA led to a closure of the epilepsy monitoring unit and all clinical activity was done at YNHH.

By then, the Yale Epilepsy Unit had grown to six adult and two pediatric monitoring beds. Dr. Edward "Rusty" Novotny headed up the pediatric epilepsy unit and was later joined by Drs. Susan Levy, M.D. and Francine Testa, M.D.

The equipment was periodically upgraded as technology advanced to allow automatic electronic spike and seizure detection. The epilepsy surgical team was able to incorporate the very latest other diagnostic methods including PET, SPECT, and fMRI, as well as the established surface and intracranial EEG, neuropsychological assessment and carotid amytal testing.

During these years, three separate NIH program projects were ongoing. Dr. Mattson and co-investigators inherited one of the first NIH epilepsy program projects begun by Dr. Gilbert Glaser in 1966. The PPG was always a mix of basic science and clinical research in what might now be viewed as translational research. During the decade of the 90's, he led one set of projects looking at the role of GABA in epilepsy using basic lab methods of AED mechanisms coupled with complimentary studies in humans using intracerebral microdialysis pioneered by Drs. Matthew During and Dennis Spencer. Nuclear Magnetic Resonance Spectroscopy was also begun in human epilepsy patients for the first time, measuring changes in cerebral GABA, in collaboration with Drs. Douglas Rothman and Ognen Petroff. Dr. Dennis Spencer led another NIH Grant focused on the surgical pathology and pathophysiology of pre and post operative tissue study also using these methods. Dr. Susan Spencer initiated another multi-center NIH supported project of surgical outcome.

This clinical research, carried out together with patient care, led to Drs. Richard Mattson, Dennis Spencer and Susan Spencer separately being recognized with the prestigious American Epilepsy Society/Millken Clinical Research Award, the only institution with as many awardees.

In the late 1990's, Dr. Robert B. Duckrow, the Director of the UCONN epilepsy program and an Alumnus of the Yale residency program, was recruited to bring special expertise in neurophysiology and electronic methods to the program. He now supervises an advanced program in neurostimulation.

The 2000s

Other epilepsy fellows including Drs. Ami Katz, James Thompson, David Tkeshalashvili, and Evan Fertig (recently worked with Dr. Fuki Hisama to identify a new genetic mutation in a family with autosomal dominant auditory temporal lobe epilepsy) stayed on the faculty temporarily to help the program for a few years before entering private practice.

More recently, Dr. Hal Blumenfeld stayed on the faculty and has had special interest in SPECT Imaging. His work on consciousness was recognized by the prestigious Dreifuss/Penry Award at the American Academy of Neurology in 2004 as the outstanding young investigator.

In 2000, Dr. Ken Vives, a former Yale Medical School graduate and Yale neurosurgery resident joined the team to work with Dr. Dennis Spencer. He followed earlier collaboration by Dr. Diana Kramer, an epilepsy neurosurgeon who left to practice in Seattle.

The Yale Epilepsy Center continues to have a multidisciplinary team of epileptologists, neurologists, neurosurgeons, neuropsychologists, nurses, and EEG technologists. Dr. Scott Winstanley and his team have continued a forty-year history of contributions initiated by Drs. David Glass, Robert Novelly, Richard Delaney and Michael Westerveld and others to diagnosis, research and care for epilepsy patients.

In summary, the Yale Epilepsy Center was one of the very first, a pioneer in epilepsy intensive monitoring, epilepsy surgery, antiepileptic drug pharmacology and clinical trial methodology. Associated clinical research has been an integral of the program. Many national and international awards have recognized this work. Finally, training the future leaders in epilepsy diagnosis, research and care continues to be a high priority.