GIANTS OF PAIN MEDICINE: The Movers and Shakers of a Profession

Lax Manchikanti

Of all the many current era physicians that have had an impact on the field of pain medicine, one in particular stands out because of his untiring efforts in the development of an organization dedicated to the advancement of pain medicine. Much of the professional life of Laxmaiah Manchikanti (known to most as Lax), has been spent with the efforts of the American Society of Interventional Pain Physicians (ASIPP), known in its early years as the American Society of Interventional Anesthesiologists. This organization, formed in 1998, has been seminal to the development of a political message about funding and safety of pain medicine, has an educational series of bio-skills hands on workshops for the training of pain physicians, has developed training manuals and courses on appropriate use of fluoroscopy, billing, prescribing of opioids, has a board certification process for pain physicians, and is involved in lobbying Congress for the advancement of the field. ASIPP also has the premier medical journal in the world dedicated to pain medicine (Pain Physician), and because of the leadership of Lax, has astonishingly remained free of charge throughout the years- much different than other pain journals charging $300-500 per year or $35-50 to access one article. Lax was one of the first pain physicians in the country to sound the alarm of concern about the hazards of excessive opioid prescribing for chronic pain conditions, and through educational efforts of ASIPP, has developed national guidelines for opioid prescribing and training courses to promote patient safety. Lax has been the CEO of ASIPP since its inception, and has led the organization and thousands of pain physicians through the years. He exhibits almost Herculean capabilities in pushing forward the education of pain physicians and advancement of science through his publication of 11 books and hundreds of scientific articles, that are quoted and referenced by physicians in and out of pain medicine throughout the world. His efforts have resulted in leadership positions throughout the years in several organizations of national prominence, and his efforts resulted in the adoption of a national law called NASPER that resulted in patient safety monitoring programs to combat drug addiction and substance abuse that are now active in 49 states. Lax's focus and drive have attracted many other leaders to ASIPP, who are themselves carrying on his vision for the specialty of pain medicine. No one has worked more diligently and tirelessly for a cause than Lax, who is revered throughout the world for his efforts that have had a major impact on all aspects of pain medicine, and have also influenced many other specialties.
Laxmaiah Manchikanti was born on July 10, 1947, in Bodangparthy, Nalgonda District, Andhra Pradesh, India. He is the son of Manchikanti Yadagiry and Manchikanti Laxmamma and is the oldest child of the family, with three brothers and four sisters. After early education in Bodangparthy, Pullemla, and Munugode of Nalgonda District, Manchikanti graduated from higher secondary school in Hyderabad in Andhra Pradesh. Lax attended medical school at Gandhi Medical College, Osmania University, graduating in 1972. He obtained his medical degree in 1973, following a one-year flexible internship. He completed his senior internship in internal medicine at Gandhi Hospital in Secunderabad from 1973-1974. In 1974, he began a two-year residency in anesthesiology at Osmania University, after which he received Diplomate Certification in Anesthesiology.

On June 4, 1975, he married Chandrakala, the daughter of Pampati Pedda Hanumanthu and Manikyamma. They have three children; Anupama M. Gomez, Sunil Manchikanti, and Kavita Manchiakanti, M.D. After his arrival in the United States, Manchikanti completed a one-year residency in anesthesiology with the Youngstown Hospital Association, affiliated with the Northeast Ohio Medical University, formerly known as the Northeastern Ohio Universities Colleges of Medicine. This was followed by a one-year residency in anesthesiology with the Allegheny General Hospital in Pittsburgh, Pennsylvania. In 1980, he completed a fellowship in anesthesiology and critical care medicine at the University of Pittsburgh School of Medicine.

In 1980, he earned Diplomate Certification from the American Board of Anesthesiology. He also holds subspecialty certifications from the World Institute of Pain (Fellow of Interventional Pain Practice, 2002); American Board of Interventional Pain Physicians (Diplomate, 2006); and the American Board of Anesthesiology (Subspecialty Certification in Pain Medicine, 1993-recertified in 2003 and 2011).

Lax continues his successful pain practice in Paducah Kentucky where he has been active for decades.

**P. Prithvi Raj**

Dr. Phulchand Prithvi Raj, one of the American Society of Regional Anesthesia’s (ASRA) five founding fathers and an inspiration to generations of physicians, passed away on February 27, 2016 at age 84.

Considered a pioneer in regional anesthesia and pain medicine and the founding father of interventional pain management, Dr. Raj had a tremendous impact on the field, authoring numerous textbooks, producing instructional films, setting up pain clinics across the
country—and world—and inspiring and mentoring countless physicians. He served as the second president of ASRA, from 1986-1987, and received the Gaston Labat Award in 1990, the ESRA Carl Koller award in 2000, the ASRA Distinguished Service Award in 2005, and the John Bonica Award in 2009. "Dr. Prithvi Raj was a pioneer and innovator in the field of both regional anesthesia and pain medicine," said colleague Richard Rauck, MD. "He taught several generations of pain physicians in the United States and worldwide and truly served as mentor in so many of our lives, mine included." Raj had connections with many of the major pain organizations, national and international, including the World Institute of Pain, ASIPP, and IASP.

Dr. Raj trained in India and England as well as at St. Mary’s Hospital in Waterbury, CT, and Parkland Memorial Hospital at the University of Texas Southwestern Medical Center in Dallas. He practiced in Norway, England, Texas, California, Ohio, and Georgia, eventually retiring in Cincinnati where he founded the University of Cincinnati Pain Clinic from 1979 to 1986. He was fortunate to have forged long lasting friendships all over the world. His significant research, many articles, books, lectures and demonstrations on regional anesthesia and pain management proved him to an international leader in the field. He is a founding member of American Society of Regional Anesthesia, Texas Pain Society, and the World Institute of Pain. Dr. Raj was dedicated to advancing the education and training of the next generation of pain management physicians. Throughout his years, he spread his knowledge to countless pain physicians to fight pain and suffering.

His research was in the field of drug metabolism, muscle relaxants, intravenous anesthesia, and the use of nerve stimulator for peripheral blocks. At a time when regional anesthesia was a curious alternative, Dr. Raj developed techniques to improve the success of the blocks and make regional analgesia more acceptable to the average anesthesiologist. His abundant research and numerous articles, books, lectures and demonstrations on regional anesthesia and pain management established him as a world leader in the field. He has described new blocks and new techniques of doing old blocks. He has described the mechanism of action of intravenous regional analgesia. He has improved education and training by opening pain centers across the country, each of which has offered pain fellowship opportunities. He has founded societies dedicated to research and education in regional analgesia and pain management. Regional anesthesia and pain management will forever be linked with the name of Dr. Prithvi Raj. He described new approaches to infraclavicular and sciatic blocks, which now are known as the "Raj modification."

Raj in his later years was a soft spoken gentle man with a keen wit, and practicality about him that served him well in his teaching of generations of physicians.
John Bonica’s greatest contribution to the advancement of the treatment of pain was the realization that a physician specialist treating pain in isolation of other specialists may not be offering optimal or even effective pain control for chronic persistent pain. This ultimately culminated in his development of the multidisciplinary pain clinic and in his founding of the International Association for the Study of Pain (IASP), the largest international pain organization. The multidisciplinary pain clinic began when the young anesthesiologist John J. Bonica (1917-1994), was assigned to take charge of pain control at Madigan Army Hospital in Washington State in 1944, and found himself seeing "cases that baffled me." He sent the patients for consultations with colleagues: an orthopedist, a neurosurgeon, a psychiatrist, but "they knew less than I did." He proposed that the four meet twice a week at lunch for conversation and exchange of information on difficult pain problems. The success of this informal collaboration prompted him to establish a multidisciplinary pain clinic at Tacoma General Hospital in 1947, which he brought to the University of Washington in 1960. He realized early on that not only was there a need for a multidisciplinary approach, but also appropriate education, prompting his 1953 book “The Management of Pain” that has become a classic work in the field of pain medicine. In this book, he analyzes the complexity of problems associated with intractable pain that resist any traditional treatment in a number of disciplines. He concludes”...any evaluation of pain must be carried out on both the physical and the psychological level”.

Bonica saw the idea of interdisciplinary collaboration as the key to the understanding of pain. He described his clinic as "a totally different thing, much more fruitful and efficient. . . The basis of my program is patient care; the frosting is the research." In 1973, encouraged by the response to the gate control theory, John Bonica (shown here at another conference in 1972) organized a highly productive scientific meeting of some 300 pain researchers in Issaquah, (Seattle) Washington, where he won their unanimous endorsement of a new International Association for the Study of Pain based on the concept of interdisciplinary collaboration. Ultimately, the IASP became the world’s largest pain collaborative organization that has chapters in more than 100 countries.
Dr. Fordyce completed his bachelors, masters, and doctoral degrees in psychology at the University of Washington in 1948, 1951, and 1953. Subsequently after spending his first six years employed at the Seattle VA Hospital, his professional career was primarily spent at the University of Washington from 1959 onward. He became an assistant professor in 1959, a full professor in 1970, and professor emeritus in 1993. A colleague of Dr. Bonica and instrumental in the development of the multidisciplinary pain clinic, Dr. Fordyce was also key to the development of the behavioral model of chronic pain. This contrasted with the disease model of chronic pain that had been prevalent prior to the early 1980s, that viewed chronic pain symptoms as a result of some process lying within the person. Once the underlying problem was identified through diagnostics, then action was taken to correct the problem. However there may not always be an identifiable cause, thereby thrusting the diagnosis into the realm of “central pain”. Typically the disease model (still used today by interventional pain physicians) seeks a “nociceptor” or pain source and affects it through injections, neuroablation, or neuromodulation. Causes that are not central pain or nociceptive pain are termed psychogenic, psychosomatic, hysteria, hypochondriasis, etc. On the other hand, the behavioral model perceives patient pain only as an alternative in behavior. If there is no visible or audible indications from the patient they are suffering, then there is no pain problem. The behavioral model of pain examines what influences the behaviors dividing people into respondents and operatives. Respondents have autonomically mediated responses to pain- as a reflex. Operants are elicited by a stimulus of pain, but operants have the important characteristic of learning or conditioning effects via reinforcement. Operants are called such because they operate on or influence the environment by leading to or causing reinforcing or aversive (avoidance). Reinforcement leads to increase in the frequency of occurrence. In the behavioral model, nociception (or tissue damage leading to pain) may not be present but the pain behaviors may occur due to positive reinforcement of behaviors. Pain behaviors lead to the consequence of avoiding aversive effects (e.g. avoiding exercise or activity that causes the person to splint, reduce range of motion, become stiff, motor and ligament tightening). Prior experience may also reinforce behavioral avoidance of functionality or activities that may be helpful for long term pain reduction. Fordyce stated a pain problem that exists for more than a few days or weeks can be seen as being vulnerable to conditioning effects. Evaluation of the pain problem and determining the factors influencing the persistence of the pain behavior is inadequate unless there is assessment of both intra-individual factors and individual-environmental contingency arrangements. Pain assessment therefore should always include a behavioral analysis. Ironically
attention from family members and the health care team attending to the patient’s pain may actually reinforce the pain behavior. Fordyce demonstrated in the early 1970s operant learning methods could be used to increase activity and reduce medication for people with chronic pain being treated on an inpatient admission.

In the multidisciplinary pain clinic of Bonica/Fordyce, Dr. Fordyce developed approaches to dealing with chronic pain that were unheard-of at the time. He encouraged chronic-pain patients to become active again and to cut back on the amount of pain medication used. He was a founding member of the International Association for the Study of Pain and the American Pain Society, which named an annual research award in his honor in 1995.

Wilbert “Bill” Fordyce was also a fellow of the American Psychological Association. He served on the IASP council from 1987 to 1993. Dr. Fordyce had over 90 publications of research articles to his credit beginning in 1956 with studies on the MMPI psychological test and his final publication was in 2001: *Pain in cancer and non-cancer conditions: similarities and differences*

**Benjamin Lane Crue, Jr. M.D.**

Benjamin Lane Crue, Jr. passed away on February 2, 2015, in Rocklin, California. He was 89.

Dr. Crue was a giant in his profession. He was a board certified neurosurgeon who practiced in southern CA. In the 70s and 80s he became interested in pain management. He was active in the American Pain Society (APS) and the International Association for the Study of Pain (IASP) founded by John Bonica, MD. In these venues he met some of the early pioneers (Bonica, John Fordyce) in what was then characterized as pain management. Concerns about what he felt was the “de-medicalization” of pain care he moved to found the American Academy of Algology (AAA) in 1983, becoming its first president. The name of AAA was later changed to the AAPM in 1988 by the “Lippe Declaration.” Dr. Crue worked hard to “re-medicalize” pain care. Without him and a few other dedicated pioneers, the field of Pain Medicine would not exist today. This paradigm shift was not only a conceptual exercise but led to major advances in pain education, research and clinical practice. His dream of creating a specialty certification board was partially accomplished by the establishment of the American Board of Pain Medicine in 1991. The ultimate goal of achieving ABMS recognition still awaits the success of a group
of dedicated individuals advocating for his dream. Ben had a vision: (1) to develop a new field of pain medicine that would be able to eventually join the pantheon of organized medicine (AMA); (2) to have pain medicine become an ABMS specialty some day.

Ben was a kind, compassionate and intelligent compatriot always willing to help and share his wisdom. He also was a fierce advocate of the principles he espoused. Although a giant in pain medicine, he was generally unassuming and hence often not recognized and all too often not even remembered. Hence I was delighted and honored when in 2008 he received the Philipp M Lippe Award.

While on active duty with the U.S. Navy, Ben attended the University of Chicago where he received his Bachelor of Science degree and M.D. in 1948 at the age of 22. He then completed a year of general residency in Oakland, California, before being sent by the Navy for a neurosurgical residency at Huntington Memorial Hospital in Pasadena, California. He further completed fellowships at Yale University and the Lahey Clinic. Ben went into private practice in 1960 in Pasadena, California. Along with many other noteworthy accomplishments he was especially proud to be on the faculty at the University of Southern California, School of Medicine, where in 1985 he was made an Emeritus Clinical Professor of Neurological Surgery. Ben served 34 years (13 years on active duty) with the U.S. Navy. During his medical career he was active in the treatment of patients with chronic pain and served as the Director of the Neurosurgery Department and Chairman of the Neurology Division at the City of Hope Medical Center for over twenty years. He started the City of Hope Pain Center and the New Hope Pain Center. He was a founding member of the International Association for the Study of Pain, a founding member and second president of the American Pain Society and a founding member and first president of the American Academy of Pain Medicine.

**Alon Winnie**

Born in May 16th, 1932 in Whitefish Bay, Wisconsin and died at age 82 in 2015 after a long life dedicated to the reduction of pain and suffering. Alon described his childhood as happy, and he had a passion for both music and medicine. His life was challenged greatly during his internship training at Cook County Hospital, IL, when the strong young man was incapacitated by poliomyelitis and confined to a wheelchair, a disability he lived with for the rest of his life and yet conquered.

He obtained his undergraduate degree from Princeton University. Princeton provided him the premedical courses required for medical school and, more importantly, provided him with the self-discovery essential to understanding one’s role in life and equipping one to meet its challenges. The four years at Northwestern University Medical School in Chicago furnished the knowledge necessary for a career in medicine, while the experience of medical school, enhanced by its unique extracurricular life, allowed Alon the opportunity to explore the world of music and
verse and to establish friendships that would last a lifetime. After completing his residency training, Alon remained on the faculty at Cook County Hospital until 1972, when he accepted the Chair of the Department of Anesthesiology at the University of Illinois Medical Center, a position he would hold for seventeen years. In 1989 he became Director of the University of Illinois Pain Control Center, and in 1992 he was recruited to return to Cook County Hospital to become the Chairman of the Department of Anesthesiology and Pain Management. Alon authored a textbook on "Plexus Anesthesia", which won the Anesthesia Foundation Award as the 1983-84 "Book of the Year". He served for five years as President of the Chicago Society of Anesthesiologists, one year as President of the Illinois Society of Anesthesiologists, and five years as President of The American Society of Regional Anesthesia, which he and a small group of "founding fathers" organized in 1975. Alon served as the President of the Dannemiller Memorial Educational Foundation since its founding in 1984 following the death of his close personal friend, Dr. Joseph Dannemiller. Alon received many awards throughout his career including the Distinguished Service Award, the William O. McQuiston Award, the Ralph Waters Award, the Gaston Labat Award, the Ellis Gillespie Award, the Nils Lofgren Award, the Duncan H. C. Ferguson Memorial Award, the Francis "Joe" Dannemiller Memorial Award, the Bernard H. Eliasberg Medal, and the Karl Koller Gold Medal. Alon was a diplomat of the American Board of Anesthesiology, with added qualifications in Pain Management, and a Fellow of the American College of Anesthesiologists. He was a Fellow of the Faculty of Anesthetists of the Royal Australasian College of Surgeons, and a Fellow of the Faculty of Anesthetists of the Royal College of Surgeons in England. When asked what he considered to be his greatest accomplishment in academic anesthesia, and the greatest reward, Dr. Winnie stated, "Categorically, the greatest accomplishment is the education and training of a multitude of young anesthesiologists," and he quickly added proudly, "All of whom have special skills in Regional Anesthesia and Pain Management. The greatest reward of academic anesthesia is unquestionably the multitude of friendships that one develops throughout the entire world."

Alon had an interest in anesthesia and proved, despite many naysayers, that he could master the specialty, regardless of his physical limitations. His love of human anatomy and keen desire to ease the pain in his patients would lead to one of the most celebrated careers in medical history. Among his many accomplishments, perhaps one of the most significant was his recognition that human nerve plexuses are enclosed in fascial compartments and this anatomical fact could be exploited through the injection of local anesthetics to render regions of the body insensate to pain. This discovery formed the basis of modern regional anesthesia, and Alon is credited with describing many of the block procedures that are still used today. Dr. Winnie’s career is distinguished for many other contributions, his mind was indeed tireless, but his work in pain would prove most influential to my career and impact on so many wounded military.

As the interest within the house of medicine turned to regional anesthesia, pain, and pain management, the influence and impact that Alon had on these fields of study were inescapable. Always the visionary, Alon commented to fellow residents after his first few successful brachial plexus blocks, "how useful such single injection
techniques would be on the battlefield, especially since the use of a catheter would allow analgesia to last as long as necessary.”

Melzack and Wall

In 1965, a collaboration between two self-described iconoclasts, Canadian psychologist Ronald Melzack and British physiologist Patrick Wall, produced the gate control theory. Their paper, "Pain Mechanisms: A New Theory," (Science: 150, 171-179, 1965) has been described as "the most influential ever written in the field of pain." Melzack and Wall suggested a gating mechanism within the spinal cord that closed in response to normal stimulation of the fast conducting "touch" nerve fibers; but opened when the slow conducting "pain" fibers transmitted a high volume and intensity of sensory signals. The gate could be closed again if these signals were countered by renewed stimulation of the large fibers. Ironically, the paper published came out of simply batting ideas back and forth and was subsequently proven with electrode stimulation of the forehead. The two had published a virtually identical paper 3 years earlier in a less well known journal, and it went completely unnoticed by the scientific and medical communities.

Steve Waldman M.D., J.D.

Steve Waldman has been active in pain medicine since the 1980s, and is founder of the Society of Pain Practice Management, an educational institute in which thousands of physicians have been trained in interventional pain medicine in bio-skills courses around the country. Steve is also active in writing best selling pain medicine text books, with a long series of illustrated texts serving as a primer for pain physicians. Waldman holds a Bachelor of Science degree in Geosciences from the University of Missouri-Kansas City and was among the first 100 students to be admitted in 1973 to its new medical school, He was elected a member of the Alpha Omega Alpha honor society and graduated from medical school in 1977, completed his internship at Mayo Clinic in 1978 and did his anesthesiology residency at Mayo in Rochester, Minnesota.

Waldman received Masters in Business Administration In Healthcare Administration from City University in 1993 and the J.D. law degree from the University of Kentucky School of Law in 1996. He founded multiple pain clinics in several Kansas City hospitals. He is a clinical professor of Anesthesiology and Professor of Medical Humanities and Bioethics at the University of Missouri-Kansas City School of Medicine and is the Chairman of the Department of Medical
Sam Hassenbusch

Samuel Hassenbusch III, MD, PhD, past AAPM President & Neurosurgeon, died Feb. 25th, 2008 from complications of a malignant brain tumor, glioblastoma. He was 54 years old.

Dr. Hassenbusch was a tenured professor in the Department of Neurosurgery at The University of Texas, MD Anderson Cancer Center, one of the best Cancer Centers in the country. He was a well-known, international expert in pain medicine, who was credited with developing novel techniques, therapies and methods for infusing drugs to block pain.

He received recognition for his contributions to pain medicine and research, including computer-guided stereotactic techniques for brain tumor biopsies, focused radiation therapy and direct injection of chemotherapy agents into brain tumors, defining the role of new non-opioid drug development for long-term spinal infusions, cingulotomy for severe cancer pain, and expanding the roles for long-term electrical stimulation, both at peripheral nerve and spinal levels. He also created a set of treatment algorithms for the use of different agents in long-term spinal infusions. And, he headed a consensus group to provide information and guidelines for the detection and treatment of possible granuloma formation at a spinal infusion catheter tip. The guidelines were then published in AAPM’s Pain Medicine journal.

In addition, Dr. Hassenbusch was one of 12 distinguished physicians on the American Medical Association’s CPT Editorial Panel for coding & reimbursements, where he was instrumental in implementing a number of new billing codes for pain medicine.

Over the course of his career, Dr. Hassenbusch authored more than 80 publications and 30 book chapters.

In 2003, he received AAPM’s Distinguished Service Award, at which time he told AAPM members...

"Through all of (my accomplishments), I am most proud of my work through AAPM, now as an officer, to help our society become maximally responsive to the needs of daily-practicing pain medicine physicians ... to achieve the best results for all of us. It is truly an honor to receive the Distinguished Service Award, and I hope my future work within our society will result in even better improvements for daily clinical practice in pain medicine."

Dr. Hassenbusch served as AAPM’s President in 2004 and used his office to continue to improve daily clinical practice of pain medicine. He was diagnosed with glioblastoma multiforme in May 2005 and spent most of his remaining days using...
his unique situation to advocate and inspire others through the media and other public forums.
In 2006, he received AAPM’s Philipp M. Lippe, MD Award, of which he was particularly proud.
Dr. Hassenbusch was certified by the American Board of Pain Medicine and the American Board of Neurological Surgery. In addition to his leadership in the American Academy of Pain Medicine, he held offices in other societies, including American Neuromodulation Society (Past President), Texas Pain Society (Past President), and Texas Association of Neurological Surgeons (Board of Directors).

**AAPM Leaders’ Comments:**
"Dr. Hassenbusch was known and respected throughout the pain community. He had a special knack for reaching out to pain specialists regardless of parent medical specialty, with his catch-phrase being ‘the sandbox is big enough for all of us to play in.’ He worked tirelessly to improve the quality and safety of care we provide our patients. We will always be grateful for his contributions. We extend our condolences to his family and friends.”
Kenneth A. Follett, MD, PhD
AAPM President

"I will never forget how hard Sam worked to promote pain medicine and in helping us with our reimbursement issues despite his illness. Sam was not just a leader; he was a mentor who contributed much though his spirit and knowledge to mould many of our present and future leaders in Pain Medicine."
Eduardo M. Fraifeld, MD
AAPM Secretary

"I first met Sam over ten years ago, but got to know him better as he followed my steps at the AMA CPT Editorial Panel and then as he became active in American Academy of Pain Medicine (AAPM) and American Board of Pain Medicine (ABPM). I had the privilege and pleasure of working closely with him for many years and on many projects. In 2006 Sam was awarded the Philipp M Lippe, MD Award by the AAPM. It was a proud moment for me.
I know that Sam bravely endured the indignities of his brain tumor with grace, strength and dignity. It is not easy for a physician, especially a neurosurgeon, to accept the known prognosis of this disease and to give up control to others in whose hands we all must learn to place our trust and our lives.
Sam enjoyed life, his family and his profession. His many accomplishments in service to his patients, to neurosurgery, to pain medicine and to his colleagues will never be forgotten. Sam was loved by all and loved all in return.
Consistent with Sam’s dedication to pain patients, he sought to inspire others. He shared his story about his cancer and the treatment he developed for treating his own cancer- a cancer that is almost universally fatal within a short amount of time. He spoke with news outlets, counseled newly diagnosed patients on what to expect and spoke at patient cancer functions. He began a book — the working title is Physician Heal Thyself — that his son Jason is working to finish.
Charlie Aprill

Dr. Aprill is one of the four founding members of the Needle Jockey Club in 1988 and subsequently one of the three founding members of the International Spine Injection Society that ultimately became the Spine Intervention Society. He graduated from LSU Medical School in June 1967, completed his internship at Charity Hospital of Louisiana in 1968, and a radiology residency at Ochsner Medical Foundation in 1971. He was certified in “Radiology” in 1972. After serving in the United States Naval Active Reserves, Dr. Aprill went into private practice of radiation oncology with nuclear medicine and oncologic interventional diagnostic and therapeutic special procedures with Dr. Vincent Collins in Houston.

Dr. Aprill practiced general radiology with emphasis on interventional special procedures for the next decade. In 1986 he opened a solo practice limited to diagnosis and conservative treatment of adult spine disorders. In May 1993 Dr. Aprill established Magnolia Clinic, a solo private interventional pain practice where he remained until Hurricane Katrina closed the doors in September 2005. His current practice, Interventional Spine Specialists, opened in Kenner, Louisiana in January 2006 and continues to this day.

Dr. Aprill is a founding member of the Spine Intervention Society and was recognized in 2003 with an SIS award for outstanding service and dedication as a teacher. He achieved the position of Clinical Professor of Radiology and Physical Medicine / Rehabilitation at Louisiana State University Health Science Center. Dr. Aprill has dedicated time to proctoring physicians in spine interventional procedures through fellowship programs at the University and with SIS education as an instructor since 1990. Clinical work in the private practice has generated about a dozen papers in peer-reviewed journals. Dr. Aprill has authored or co-authored about two-dozen more papers and about a dozen chapters on spine related issues. Charlie is very gifted as a teacher, especially on the fine nuances of the anatomical basis of spine injections and interventions as correlated with MRI, CT, and x-ray findings. He is a teacher's teacher, appreciated and revered across the world for his unique teaching style.

Nik Bogduk

Nik Bogduk is one of the most unique individuals in the field of pain medicine most of us have ever met. He possesses skills of oratory and debate that are unsurpassed- skills that he wields like a sword to disarm those with opposing views. Nik has an encyclopedic knowledge of the medical literature and
expansive experience as an anatomist in addition to being an outstanding pain physician. Dr. Bogduk received Bachelor degrees in Science and Medicine, and Medicine and Surgery from the University of Sydney. He received a Ph.D. from the University of New South Wales, a Doctorate of Science from the University of Sydney, and a M.D. degree from the University of New South Wales. Nik was one of the four founding members of the Needle Jockey Club, founded by doctors, Aprill, Bogduk, Derby and Tibiletti in 1988. By 1991 the Needle Jockey Club had become the International Spine Injection Society and Drs. Bogduk, Aprill, and Derby were the initial founding members. Subsequently the name was changed to the International Spine Intervention Society, then the present name, the Spine Interventional Society and Nik continues to serve as a permanent non-elected seat on the Board of Directors. Nik commenced research into spinal pain, in 1972, when essentially nothing was known about the problem. There being no established groups or departments working on this problem, he forged his own career, using borrowed resources. He commenced in a Department of Anatomy in Australia, where he pursued the innervation of the vertebral column, as a fundamental element in understanding the sources and mechanisms of spinal pain. Professor Jim Lance fostered this interest, and accommodated Nik’s PhD studies where he continued his Anatomy studies but was able also to commence clinical applications. He developed and tested new diagnostic and surgical procedures for back pain and for neck pain. While in Professor Lance’s Department he participated in laboratory studies of the mechanisms of migraine. At the University of Queensland he continued to develop and apply the diagnostic and surgical techniques that he started at the University of NSW, serving as an honorary medical officer at the Pain Clinic of Princess Alexandra Hospital. Meanwhile he supervised science and medicine postgraduate students who undertook basic science studies into the biomechanics of the back and neck. At the University of Newcastle, he established a reputation sufficient to attract a grant from the Motor Accidents Authority of NSW to investigate the cause and treatment of neck pain after whiplash. The grant supported three PhD students over a six-year period who performed studies that validated the diagnostic procedures and tested the surgical procedures in a placebo-controlled double-blind randomized trial. Having established an international standing in the development and testing of treatments for spinal pain, Nik participated in the design and analysis of controlled trials conducted elsewhere in Australia and in the USA. These tested the efficacy of: lumbar radiofrequency neurotomy for back pain, intradiscal electrothermal annuloplasty for back pain, prolotherapy for back pain, exercises for neck pain. He is now a consultant for the Spine Intervention Society for various studies of spinal diagnostic and treatment procedures. Most recently Nik and the SIS completed a placebo-controlled trial that validated the efficacy of transformaminal injections of steroids for sciatica. Between 1997 and 2002 he conducted the National Musculoskeletal Medicine Initiative which developed and tested evidence-based practice guidelines for the management of back pain, neck pain, shoulder pain, knee pain, and pain in the foot, wrist, and elbow. His work was awarded the Volvo Award for Back Pain Research (one of the highest honors in spinal medicine), the Research Prize of the Cervical Spine Research Society, the Award for Outstanding Research of the North American Spine
Society, and three times the Research Prize of the Spine Society of Australia. My students have been awarded research prizes by the International Association for the Study of Pain, the Australian Rheumatology Association, and the Australian New Zealand college of Anaesthetists. He never had a funded Department to which to attract investigators and academics, instead relying on scholarships for students, and the goodwill of private practitioners who wished to contribute to clinical research. Currently Nik is involved in studies of the long-term effectiveness of surgery for back pain and sciatica. Otherwise his professional time is occupied: serving the editorial board of Pain Medicine and two guidelines groups for the treatment of spinal pain and the management of musculoskeletal pain.

Nik developed the anatomical dissections of the medial branches of the dorsal spinal nerves that led to the development of radiofrequency neurotomy, an effective standard technique now in pain medicine to treat arthritis of the spine. He also has conducted research on the normal and abnormal biomechanics of the spine and worked to establish other causes of spinal pain. He has written several books and countless medical journal articles. One of his most important current projects is to educate physicians on statistical analysis of studies and how to evaluate scientific studies. He served on the Academic Boards or Senates of three universities. He has been an Assistant Dean in the Faculty of Medicine and served on the Vice Chancellor's Committee for University Development and Assessment, as the member elected by the Professors of the University of Newcastle. He also served as Acting Medical Superintendent of the Royal Newcastle Centre, and Director of Clinical Research in the Newcastle Bone and Joint Institute.

Richard Derby

Dr. Derby is the Medical Director of Spinal Diagnostics and Treatment Center and CEO of Comprehensive Spine Diagnostics Medical Group in Daly City, CA. He is a Board-Certified Anesthesiologist. Dr. Derby received his undergraduate degree from Stanford University and his Medical Degree from the University of California at Irvine. He completed his residency at the University of California San Francisco.

Dr. Derby is currently on the Executive Board as Past President and Founding Member of the Spine Intervention Society. He is an active member of several professional societies including the American Society of Anesthesiologists, North American Spine Society, International Intradiscal Therapy Society and the World Institute of Pain. He holds journal, editorial, and review committee memberships for several professional publications including Pain Medicine, The Spine Journal, Spine, The Clinical Journal of Pain, Pain Practice, and Pain Digest. Awards received include: Lifetime Achievement Award (2011), Best Doctor in America (2007-2008), Friend of ASIPP Award (2007), and Sofamor-Danek Posterior Award (1998).

Further, Dr. Derby has given more than 250 invited lectures, presentations, and workshops and is a prolific author with over 130 publications including 20 invited
book chapters. Rick is a pragmatist, but is willing to leap forward in the development of potentially new therapies. He is the US expert in the technique of discography and has developed “Derby Juice”, an intradiscal injection of growth substrates as a treatment for pain. He collaborates internationally with doctors from several countries to advance the science and safety of spinal interventions.

Gábor Béla Rácz

Gabor was born 1937, was a founder of the World Institute of Pain and their Board Certification for pain physicians. He is a board-certified anesthesiologist and professor emeritus at Texas Tech University Health Science Center (TTUHSC) in Lubbock, Texas, where he is also Chairman Emeritus of the Department of Anesthesiology and Co-Director of Pain Services. He has worked in the field of chronic back pain and complex regional pain syndrome (CRPS). In 1982, he designed the Racz catheter, a flexible, spring-wound catheter with a small fluoroscopic probe. In 1989, he developed epidural lysis of adhesions, sometimes referred to as percutaneous adhesiolysis, or simply the Racz procedure. It is a minimally invasive, percutaneous intervention for treating chronic spinal pain often due to scarring after post lumbar surgery syndrome, sometimes called failed back surgery, and also low back and radicular pain from spinal stenosis, a disease of aging. The procedure is somewhat similar to an epidural and is used when conventional methods have failed. The Racz procedure may employ the use of a wire-bound catheter to mechanically break-up or dissolve scar tissue, also called epidural adhesions or fibrosis, which have formed around the nerve roots, and allows for local anesthetics, saline and steroids to be injected into the affected area.

Racz was born in Hungary and, as a young man, had aspirations to become a medical doctor. He was a second-year medical student in November 1956 when he was forced to flee Hungary after the Soviets invaded Budapest in response to the Hungarian Revolution. He eventually arrived in England and resumed his education. He graduated from the University of Liverpool School of Medicine, and worked in the UK until 1963 at which time he moved to the United States. He completed his anesthesiology residency at SUNY Upstate Medical University in Syracuse, New York. He also worked as an associate attending anesthesiologist and respiratory consultant for other hospitals including the Veterans Administration Hospital, and the UHS Chenango Memorial Hospital in Norwich, New York before moving to Lubbock, Texas where he became the first Chairman of Anesthesiology for the then-new Texas Tech University Health Sciences Center (TTUHSC). Racz is also one of the founders of the World Institute of Pain.
Racz was born in Hungary to parents with a financially meager background which he attributed in part to his family's resistance to join the Communist party. He attended Semmelweis University Medical School, and it was during his second year there that the Hungarian Revolution of 1956 had begun. After seeing hundreds of injured people, he volunteered to help at the hospital. He said he received a signed directive to drive a truck and deliver sugar to the medical school clinics which he believed motivated the Hungarian Secret Police to seek him out for questioning. He also recalled a shooting incident where a bullet missed his head by "a few inches".

On November 27, 1956, he fled from Budapest to Austria with his future wife Enid, his sister, brother-in-law, and a few others after the Soviets invaded the city. He had no prior intention to leave Hungary until he learned from his mother that the Hungarian Secret Police were looking for him. Racz said if they found him, "That would have meant the end of my dreams to become a doctor. Perhaps I would have ended up in prison. Not that I had done anything but many other people ended up in prison following 1956 without committing any crime." He arrived in the Austrian town of Eisenstadt where buses were waiting to take refugees to their new homes. Racz chose the bus to England, and he along with his family and other members of his group were transported to a military base in the Midlands.

In 1957, as a former Hungarian medical student, Racz received a scholarship to attend second-year medical school in Liverpool, England. In 1962, he graduated from the University of Liverpool School of Medicine with Bachelor of Medicine (M.B.) and Bachelor of Surgery (Ch.B) degrees. Ian McWhinney and his wife helped Racz get his start as a doctor by providing him with rent-free lodging so he could finish his education. He said their generosity became a lifelong example in that "one must study and pass on knowledge and help the next generation. Racz later served as house surgeon and physician at the Royal Southern Hospital in Liverpool.

In 1963, Racz moved to the United States for an anesthesiology residency at SUNY Upstate Medical University in Syracuse, New York. Upon completion, he worked in several positions at SUNY, including associate attending anesthesiologist and respiratory consultant in the neurological head injury unit as well as a consultant for the Veterans Administration Hospital, and the UHS Chenango Memorial Hospital in Norwich, New York.

In 1977, Racz joined the then-new Texas Tech University Health Sciences Center (TTUHSC) and was designated as the Center’s first Chairman of Anesthesiology. He held that position until March 1, 1999. His work from 1977 to 2006 not only included treating patients, he also served as acting director of pain services at TTUHSC, and oversaw the expansion of operations and future development of the Messer-Racz International Pain Center named in recognition of Racz’s work and the Messer family’s financial contributions. In 2015, Racz held the designation of Professor and Chairman Emeritus, Director of Pain Services for Texas Tech University Health Sciences Center.
Throughout his career, Racz has also conducted research and co-authored articles with other experts in pain management to improve diagnosis and treatment of complex regional pain syndromes (CRPS), a long-term disorder of the nervous system which is a challenging pain problem that is often misunderstood and misdiagnosed.

John D. Loeser, MD

John D. Loeser is one of the deans of pain medicine, with a long history of involvement in the field, with many contributions that helped shape the specialty. He received his B.A. from Harvard University, his M.D. at the New York Medical School (NYU) in 1961, a surgical internship at UCSF, and completed his 5 year neurosurgical residency at the University of Washington. He served as a surgeon in the military, and was an Assistant Professor at the University of California, Irvine. Dr. Loeser is recognized as an expert in the surgical treatment of pain and multidisciplinary pain management. He was the Director of the Multidisciplinary Pain Center from 1982-1997. The University of Washington granted Drs. Loeser and Fordyce an independent yet multidisciplinary hospital ward for inpatient and outpatient pain management in 1983. The resulting Multidisciplinary Pain Center (MPC) implemented the biopsychosocial model of pain management that displaced the traditional biomedical model in the 1970s in Washington State [and Dr. Loeser believed nationally]. In the MPC, chronic pain was viewed as “a psychological and environmental disorder that is rarely amenable to biologically based ‘fixing’, especially by the time of referral”. He believed because pain could not be measured objectively, that we are relegated to treating pain behaviors instead of pain itself, since the VAS and other reported pain measurements are entirely self reported subjective measurements. The typical chronic pain patient treated at MPC came with diagnoses that did not explain their protracted pain, long beyond the usual time required for healing. According to Dr. Loeser, these patients were “like a billiard ball caroming off one cushion to another cushion, as each physician referred them to another physician. He believed finding a “cure” or reducing subjective pain is not as important as symptom relief and functional improvement. The MPC focused on reducing self-reported pain, improving psychological well-being and physical condition, and managing opioid use appropriately. The MPC required patients taking multiple opioids from different prescribers to relent that the medications were not solving the problem, as they all complained of pain and disability despite their heavy opioid use. A “pain cocktail” tapering strategy was used, and patients were informed they would be off opioids by the 21st day. However, in a 2014 American Pain Society lecture he admitted that none of these patients at the MPC were on the megadoses of opioids seen being used in 2014, and he has doubts the opioid strategy they used at the MPC would work for today’s patients. Nonetheless he concludes “multidisciplinary pain clinics remain the best available treatment for appropriately selected pain patients and the lessons learned at the MPC could be translated into an individual practitioner’s methods of
managing chronic pain patients”. He also noted in another lecture that the use of multidisciplinary pain clinics had peaked due to the high cost of rendering care in this model.

His career also focused upon pediatric neurosurgery. His research and teaching efforts have included the development of the human nervous system, neuropathic pain, low back pain and multidisciplinary pain management. His contributions to the field of pain medicine included laying the groundwork for pain fellowships, establishing the multidisciplinary approach to pain, and synthesis of taxonomy of pain. Dr. Loeser is connected with virtually all facets of the modern pain organizations and has spent much of his professional career at the University of Washington where he held professorships in both the Department of Neurosurgery and the Department of Anesthesiology, and served as director of their multidisciplinary pain clinic from 1982-1997 and since 2008 has been Professor Emeritus, yet is still very active in the pain world. In 2012 in an IASP Update, he discussed “Five Crises in Pain Management” that included (1) the lack of evidence for the outcomes of most of the things providers do for patients, (2) the inadequate education of primary care providers about pain and how to treat it, (3) the largely unknown value of opioid treatment for patients with chronic nonmalignant pain, (4) funding for the providers of pain management, and (5) access to multidisciplinary care.

A 2017 address by Dr. Loeser entitled “Illuminating the Path to Multidisciplinary Pain Management” for the APS distills his philosophies of pain medicine: “Pain professionals face a real challenge of acquiring new knowledge and applying that to patient care. But we also have to make use of the knowledge that is already available today and organize that into effective patient care strategies. For chronic pain patients we need to recognize the increasing evidence that it is not due to a broken part that can be fixed, but is the result of central processing of information that is not only acquired through nociceptors, but also through afferent and environmental factors. We know that for example, anticipated consequences and past experiences can strongly influence the perpetuation of chronic pain. Chronic pain is a brain disease, and we can not only modify the disease by drugs or surgery, but also by psychological techniques and making use of environmental contingencies. Multidisciplinary pain management utilizes all these principles and thus far has been the best treatment for chronic pain patients that is available today. Chronic pain is a disease of the brain, and there are tools to manipulate the brain and reduce the amount of pain and suffering that a patient has, beyond and above injections and drugs. Cognitive and behavioral strategies have been proven to be effective in the management of chronic pain patients.”

Since 2007, the University of Washington has held an annual John D. Loeser Pain Conference. He continues to be active as a warrior in the world of chronic pain. His publications include over 150 articles of original research, another 90 review articles, 128 book chapters, and is editor or author of eight books. His early 1970s publications were pediatric neurosurgical, but beginning in 1979 began a series of seminal pain management publications including Dorsal column and peripheral

Menno Emanuël Sluijter, M.D, Ph.D.
Menno was born 31 July 1932, in Haarlem, a city in the western Netherlands. He has the wealth of several lifetimes of experience in pain medicine, with a twinkle in his eye and whimsical wit that comes from profound self assurance and decades of practice experience. Menno grew up in an era that was a prelude to and including World War II, living in fear of the Nazis, and spending most of his time alone (since his older brothers were very fearful of the Nazis and hid from them a great deal of time). He credits this independent thought to his later development of pain techniques. After the war, Menno worked very hard at University since his parents sacrificed greatly to pay for his and his brother’s college education. The family motto was work. His brother became a general practitioner and Menno followed afterwards.

Sluijter obtained his MD at the University of Amsterdam in 1957. During medical school he worked part time as a ship's doctor, traveling to different countries. In Rotterdam, he was worked as a “vacationing resident”, the youngest position, and therefore was relegated to giving the anesthetics. Menno was offered a surgery residency in Rotterdam, but instead chose an anesthesiology residency in Amsterdam. As a ship’s doctor, he learned English from an English diplomat because sometimes he would be on the ship for weeks without anything to do because of workers strikes preventing them from coming on shore. He received his PhD at the same institution in Amsterdam in 1963 with the dissertation The treatment of carbon monoxide poisoning by administration of oxygen at high atmospheric pressure. Dr. Sluijter attended a hyperbaric oxygen conference in Ireland in 1963 where he met Harry Beecher, and was asked to spend a year with him at the Massachusetts General Hospital 1963-64. Harry Beecher did a lot of pain practice during that time and was doing some work with Ron Melzack at the time. Shortly thereafter he entered an appointment as an assistant professor of experimental anesthesiology in Amsterdam, running computer models on the distribution of halothane. Menno was asked by general practitioners in the community to speak to them about chronic pain. He was not trained specifically in pain medicine since the specialty did not exist, but heard of treatments and attempted to incorporate them in his practice by 1969, including bezitramide. By
1970 he began to receive referrals from general practitioners for chronic pain, and had as one his first referrals a 60 year old lady with coccydynia that he attempted to treat with this medicine but caused intractable vomiting without any improvement in pain during her 2 week hospitalization. He then sought out the teachings of John Bonica in a book format. He opened a consulting practice for pain shortly thereafter in a hospital outside of Amsterdam, but the medical staff were opposed to it because they believed treating pain would be bad for the reputation of the hospital (since pain, like fever was thought to be a symptom). Because there was no one to train him, he began attending pain conferences, the first being in Florence in 1975. By then he had developed a technique of administering epidural steroids with a 23 ga needle and this was presented at the conference. At that conference he met an American neurosurgeon [most likely Dr. H Blume] doing “Occipital denervation” with approximately 60 lesions being made in the ligaments of the splenius capitus, cervicus and other areas of the occiput with a radiofrequency machine. Dr. Sluijter met Eric Cosman at that conference (worked for Radionics) and bought a RF machine at that conference. He tried the “Occipital denervation” technique but because the needles were a very large diameter (12 ga.), he found it to be tantamount to torture, and abandoned the occipital technique. The RF machine came with an instruction booklet (possibly by Kline) that was very useful, identifying multiple uses of the RF generator, however the needle size made it difficult to perform procedures. Menno continued to travel and learn. He visited Mark Mehta in Norwich, England in 1977 who was doing percutaneous cordomies for cancer. Using a Pole needle to locate the nerve of interest (insulated all except the very tip), Dr. Sluijter created an active longer tip by using a scalpel to remove insulation at the end of this needle at the Lutheran Deaconess Hospital in Amsterdam. Subsequently Radionics developed the SMK RF system with much smaller needle diameters: 20 and 22 ga., making it possible to reach structures in the neck, DRG, and others for application of RF energy. The SMK stands for Sluijter-Metha cannula and created an explosion of RF due to the simplicity of the system, the ability to inject local anesthetic without a separate needle (unlike the prior TIC and TEW cannulas), and were available with different active tip lengths and curvatures. Sluijter taught other physicians the advantages of using the system for longer term pain control compared to a local anesthetic injection. By the 1980s, experience with RF taught him what did and
did not work, and unlike other physicians using RF, Menno did not see a placebo effect. It either worked or did not work. He was in a private practice setting and stated he did not have time to do studies. At that time, the Universities in Holland were forming multidisciplinary groups for the treatment of pain but Menno effectively was a pure interventional clinic. The physicians using each of these approaches criticized the other approach but there was no clear evidence once was superior over another. In the early 1980s Menno was doing cordotomies, trigeminal ganglion treatments, as well as medial branch RF, sympathetic nerve and DRG RF. He had a steady stream of other doctors coming from around the world to visit him at his practice and learn. The two camps were finally united when Co Greep, a surgeon at the new university at Maastricht believed there needed to be a unification of the two divergent approaches. He was instrumental in appointing Dr. Sluijter as Professor of Invasive Treatment of Pain at the University of Maastrict where he remained from 1989-1998, where he worked with Maarten van Kleef who became his close friend and colleague. This collaboration resulted in several publications. But Dr. Sluijter kept his private practice in Amsterdam, doing 25 procedures a day, and having most days 1-4 visiting physicians from North and South America, Australia and Europe. Because of his age (65) Sluijter could no longer be paid for doing medical work in Holland (insurance companies stopped paying physicians at age 65 in Holland at that time). Therefore, he moved to Switzerland. From 1998 to the mid 2000s he was a Consultant at the Pain Unit, Swiss Paraplegic Center, Nottwil, Switzerland. He is involved in research related to chronic pain. He is also affiliated with the Jan van Goyen Clinic in Amsterdam. He has helped to work on shifting how physicians deal with long term pain from 'pain management', to 'pain treatment.' Sluijter is credited with the development of pulsed radiofrequency treatment. Since the late 1990s, he uses almost exclusively pulsed RF.

Menno had worked with Eric Cosman, Ph.D., an engineer at Radionics since at least 1977 in the development and use of their radiofrequency generators. Following a meeting with a Soviet-block scientist, Dr. Sluijter and Mr. Rittman, and engineer were fascinated by the magnetic field idea of neurological disruption, since Menno was convinced heat was not the only element causing pain relief (he noted performing lesions distal to a disc herniation frequently provided relief of disc
herniation pain, an effect that cannot be attributed to direct nerve destruction by heat). Subsequently, it was discovered the magnetic field strength was negligible and only the electric field was responsible for producing biologic effects in pain reduction, outside that of the known radiofrequency heating effects. Thus the theory was tested by manually shutting down the electric field, but the results in clinical testing was not effective. Dr. Sluijter then suggested a stream of pulses. Thus was born pulsed radiofrequency- a method of providing very short pulses of energy lasting only milliseconds, and time for thermal relaxation (the temperature would drop below that which would destroy nerves).

Radionics built the first pulsed RF unit in 1995 by engineers Raymond Fredericks and Jack Thomasian, then the unit was transported to Dr. Sluijter for clinical evaluation that began in 1996 with positive results. Tissue temperatures are kept on the average, below those that would cause neural injury or destruction. He has used PRF extensively since that time, and the science surrounding C-Fos expression using distal nerve RF has been explored in scientific experiments.

Dr. Sluijter has received numerous awards and honors in his lifetime, including the Knight in the Order of the Dutch Lion and Noordenbos award. He has written several books on radiofrequency techniques and has 40 published articles, the latest being the Treatment of Joint Pain with Intra-articular Pulsed Radiofrequency published in 2013.

C. Norman Shealy, M.D., Ph.D.
Born in 1932 in South Carolina, by the time he had reached four years of age, C. Norman Shealy (Norm) had already decided he wanted to be a physician and by age sixteen, a neurosurgeon. He entered Duke University at age 16 and Duke Medical School at age 19. He spent his internship year in Internal Medicine at Duke, then did a year of internal medicine at Banes Hospital, then completed
a five year neurosurgical residency at Harvard and Massachusetts General Hospital. His first publication discoverable was from 1957 on the Amygdaloid Nucleus of the Cat. In 1961 he worked at the Australian National University with Sir John Eccles, a Nobel Laureate. During his time in Australia, he developed an interest in afferent nerves and motor neuron dissections, and had several publications around that time in traditional neurosurgical realms. Beginning in 1962 through 1965 he worked at Western Reserve Medical School performing research that led to the development of TENS (transcutaneous electrical therapy) and dorsal column stimulation. In 1966, he published a paper on the physiological evidence of the bilateral spinal projections of pain fibers in cats and monkeys. Also that year he published an article in JAMA “Dangers of spinal injections without proper diagnosis” and in Headache “The physiological substrate of pain”. In 1966 he became Chief of Neurosciences at Gundersen Clinic.

The year 1967 brought a publication with Mortimer (a graduate engineering student from Case Western Reserve) entitled “Electrical inhibition of pain: experimental evaluation” published in Anesthesia and Analgesia. 1967 The first human dorsal column stimulator (later termed spinal cord stimulator) was implanted in April 1967 by C. Norman Shealy, M.D. of the Gunderson Clinic in LaCross Wisconsin and designed by Mortimer after experimentation in a feline model. The first patient suffered thoracic chest wall and abdominal pain from widespread metastatic cancer from a primary cancer of carcinoma of the lung. He had a single cathode electrode implanted "approximating the dorsal columns" by suturing the electrodes to the dura after laminectomy at T2-3 for exposure. The anode was intramuscular, both electrodes being made of Vitallium. The stimulator was external and connected to the implanted leads via hypodermic needles that were placed through the skin into the lead jacks. The stimulator was turned on only for an hour the first day, changing the frequency when the patient began to experience pain again. The second day the patient used the dorsal column stimulator for 10 out of 12 hours, again changing the frequency when he began to experience pain. The following day, the patient was too ill for stimulation and died that night. Later publications mistakenly purported the device was used for the last several months of the patient’s life, when in actuality was for only 11 hours over the last 3 days of the patient’s life. The autopsy demonstrated the patient suffered
from endocarditis with cerebral embolism that resulted in paraparesis and death. The first spinal cord stimulator could not be measured as a success given the short amount of time used in stimulation and the unrelated death of the patient with cancer, but it spurred further interest since there was a reduction in pain during the stimulation. But having to plug in to jacks that were being accessed with needles placed through the skin was not an optimal way to deliver power to a stimulation system. Mortimer knew this, and set out to improve his system. Mortimer subsequently contacted an engineer, Norm Hagfors of Medtronic, where he had interviewed two years before for a job. Mortimer surmised the Medtronic radiofrequency (external) powered cardiac generator could be used to power a spinal cord stimulator. The second stimulator powered by the Medtronic cardiac generator modified Barostat, provided pain relief for four years from chronic pain. In the July/August 1967 edition of Anesthesia & Analgesia, Shealy published the results of his first human trials of dorsal column stimulation. The prestigious journal Neurosurgery rejected this paper, therefore Anesthesia & Analgesia, first published dorsal column stimulation. The following year 1968 he published an article entitled “Stimulation vs. ABLATION” in Headache and in Lancet published “Physiological standardization of analgesics and anesthetics”. By 1969 he published a paper entitled “Dorsal column electrohypalgesia” in Headache and in 1970 finally got his J. Neurosurgery publication “Dorsal column electroanalgesia”.

In 1971 he founded the Shealy Institute, the first comprehensive pain and stress management clinic in the US, providing cost effective care. It is a center designed to provide research and treatment of chronic pain and is purportedly the first comprehensive holistic clinic in the US for depression, migraine, fibromyalgia, and back pain treatments. He claims to have treated over 30,000 chronically ill patients there with a success rate of 85%. His interest in surgical implantation for dorsal column stimulation quickly diminished and by 1975 (apparently due to “complications”), he had abandoned spinal cord stimulation, instead focusing on TENS unit development. TENS or transcutaneous electrical nerve stimulation, was based the idea from Electrotreat, a DC powered device first patented in 1911, and used to treat a variety of maladies. In 1938, the year the FDA was formed, Electrotreat was the first device tackled by the FDA for fraudulent advertising. Eventually the FDA
limited the claims to be for the use of pain. Shealy believed this device operated in the gigahertz range (although this was never proven) but subsequently led to the development of TENS. He published a paper in 1972 entitled “Transcutaneous electroanalgesia” in Surgery Forum. Following were several other publications on TENS. In 1974 he published an article on facet joints as a new approach to pain medicine and in 1976 Dr. Shealy published a paper on facet denervation in the management of back and sciatic pain that surveyed over 800 patients. He claims to be the discoverer of the technique of “facet rhizotomy” however RP Pawl published an article in 1974 on “facet rhizotomy”. Dr. Shealy continued publishing articles on facet denervation and dorsal column stimulation in the 1970s.

Norm earned a Ph. D in psychology in 1977 from Saybrook Institute, a Humanistic Psychology school [a largely correspondence institute started in 1971] and subsequently received a Doctor of Science degree from Ryodaraku Institute [an organization offering courses in acupuncture-we were unable to find any accreditation information for this “Doctor of Science” institute]. In 1978 he began moving away from the traditional approaches to pain, publishing articles in biofeedback and in 1979 articles on holistic medicine and the “Psychology of responsibility”. Thereafter, his publications have been primarily on holistic, psychological approaches to pain, energy healing, distance healing, etc. He is board certified in Neurosurgery.

Since the mid to late 1970s, Shealy has veered far from organized medicine, embracing “energy medicine”, Biogenics (a biofeedback system), and several alternative products such as Shealy “RelaxMate glasses”. The latter prompted a warning letter by the FDA September 16, 1998 for claims made that are prohibited under federal law, and that the device may pose a “significant risk”. One of his latest “discoveries” is RejuvaMatrix, designed to “rejuvenating telomeres”. He currently sells “Bliss Oils” that he claims is his latest discovery of “Sacraments of the Nemenhah Native American Church”. These essential oils that Shealy claims stimulate the “circuits” which enhance DHEA, oxytocin, calcitonin, and reduce free radicals. The most popular is “Air BLISS” that is claimed to provide “detached calmness and relief from both depression and anxiety” (obtained from the website myhealingroomscom/norman-shealy on Feb 11, 2017 Shealy also
claims to have demonstrated transdermal application of magnesium is much more effective than oral supplementation. However, in spite of his divergence away from neurosurgery and traditional pain medicine, Dr Shealy has continued to do quality research on alternative healing methods, most recently in a 2009 publication that distance healing had no significant effect on the “Pain Rating Index”, and only a slight effect on the visual analog scales.

He has published over 320 articles and 25 books, and holds 10 patents in the treatment of pain. He was the founding president of the American Holistic Medicine Association in 1978, the founder and CEO of the National Institute of Holistic Medicine, President of the Holos Energy Medicine Education, “Professor Emeritus of Energy Medicine” Holos University Graduate Seminary and he has been at the forefront of alternative health care for more than 30 years. [Holos University as of 2017 is an organization located in Missouri that is not accredited by any major university accrediting organization but is accredited by the “New Thought Accreditation Commission” and offers “graduate” and doctoral degrees specializing in energy healing, holistic health and theology as a largely email and webinar based university with a few core courses require a “1-3 day residency program”.] He is a believer in the use of “Energy Medicine”, “Medical Intuition” and “Holistic Healing”. Shealy was founder of the Ambrose and Olga Worrall Institute for Spiritual Healing, founder of Holos Institutes of Health, founded the American Board for Scientific Medical Intuition, Founded the Holos University Graduate Seminary. He was “Holistic Person of the Year” in 1985 and won the “Stress Award” in 1997 from the American Institute of Stress. He claims to have acted as a consultant to leaders in “every specialty” including the personal physicians of Presidents Kennedy and Eisenhower. He is a member of the Practical Pain Management Editorial Board

Interestingly, Dr. Shealy firmly believes he is the reincarnation of John Elliotson, a physician of the early 19th century, and inventor of the discredited fad called phrenology (reading the impressions on the bones of the skull). Elliotson was also an advocate of mesmerism that was subsequently found to be fake. Dr. Shealy discovered his reincarnation while sitting in a lecture at the Neuroelectric society meeting in Jan 1972 when John Elliotson was mentioned in a lecture and he had a
revelation that he had lived a past life as John Elliotson. Subsequently he believed he had this confirmed numerous times by “intuitives”.

Tony Yaksh, Ph.D.

Tony Yaksh is not a medical doctor, but few others have had more influence on the basic and clinical science behind analgesia and pain. He is the worldwide recognized expert in this area of science. For many years, his primary focus was on spinal opioids, that subsequently created a significant clinical use of opioids in epidural injections and infusions and also intrathecal opioids (in implanted infusion pumps). His subsequent studies provided a basis for understanding the pharmacology of the spinal gating of pain information. He is an expert on issues related to spinal drug kinetics and the evaluation of the safety of spinally delivered agents. His laboratory has been preeminent in studying the safety of spinal agents and mechanisms of their toxicity, a unique academic endeavor that has established essential criteria for spinal drug development. He comes from an extraordinary academic pedigree beginning with William Osler at Johns Hopkins/McGill and William Stewart Halsted at Johns Hopkins. These giants medicine trained Harvey Cushing from Yale who trained John Fulton from Yale, who trained Patrick Wall of UCL (co-discoverer of the gate theory) who trained Tony Yaksh.

Dr. Yaksh obtained his B.S. degree from Georgia Institute of Technology (1966) and his M.S. from University of Georgia (1968). In 1968 he published his first scientific paper. In 1971 he received the Ph.D. degree from Purdue University, and continued publishing six more scientific articles during that time. He served in the U.S. Army, (Biomedical Laboratory, Edgewood Arsenal in Maryland from 1971-73). He was a research scientist in the School of Pharmacy, University of Wisconsin (1973-76) where he began research into the effectiveness of morphine on the primate brain. He was an Associate Research Scientist in the Anatomy Department at University College London (1976-77). He worked at the Mayo Clinic, Rochester, MN, (1977 to 1988), reaching rank of Professor in Pharmacology and Neurosurgery. Dr. Yaksh joined UCSD in 1988 as Professor and Vice Chairman for Research in the
Department of Anesthesiology and Professor of Pharmacology and became distinguished professor in the School of Medicine in 2007. The focus of Dr. Yaksh’s research has been in the area of the physiology and pharmacology pain processing. He has published over 800 papers. He has been a mentor to more than 100 post-graduate fellows and has been funded consistently by the NIH since 1977.

He has twice been a Javitz award recipient. He has received several honors and awards, including: John J. Bonica Lecture -American Society of Regional Anesthesia, Boston, 1989; FWL Kerr award-American Pain Society (1991); American Society of Anesthesiology Award for Excellence in Research (1995); Joris De Castro Memorial Award-Belgian Society of Anaesthesia and Reanimation (1998) John Liebeskind Award for Pain Research-American Academy of Pain Management, 1999; Torsten Gordh Award-Swedish Society of Medicine/Swedish Society for Anesthesia and Intensive Care (2000); Rovenstine Award-NY Society of Anesthesiologists (2001); Seldon Memorial Award-IARS (2007); German Promotion Award for Pain Research(2007); the John J. Bonica Award–IASP (2008); and was presented with the North American Neuromodulation Lifetime Achievement Award in 2015.