WHAT ARE NEUROSURGEONS DOING OUTSIDE OF NEUROSURGERY?
Welcome to the summer issue of the CNSQ. In this issue, Daniel K. Resnick gives his President’s Message which discusses the changes in healthcare and how the CNS will address some of these topics at our Annual Meeting in Boston. The 2014 CNS Annual Meeting is further reviewed in detail by Steven N. Kalkanis and Elad I. Levy.

The issue focuses on how neurosurgeons are branching out to different fields and careers (SECOND ACT), while still using the skills they developed through neurosurgery training and practice. Steven L. Huhn reports on From Neurosurgery to Biotech — The Road Less Traveled. Catherine A. Mazzola narrates the experience of the first American female neurosurgeon, Ruth Kerr Jacoby, MD, FACS, FAANS, JD, and why she changed to a legal career. Nicholas M. Boulis details his philanthropic relief efforts in Going Back: Trying to Make a Neurosurgical Contribution Where the Need Is Greatest. Robert H. Rosenwasser details the changes in academic administration in Role Changes of an Academic Neurosurgeon and Chief. Have You Made a Strategic Plan for the Rest of Your Life? by James I. Ausman analyzes your financial preparation. Kathryn Ko writes on the use of art and paintings in Life Lines. Joseph C. Maroon details the interaction and challenges of a neurosurgical career in The Evolution of Life and Career.

The CNS Section News details several events that are relevant to our neurosurgical community. Robert E. Harbaugh, Julie G. Pilitsis, Daniel K. Resnick and Konstantin V. Slavin address, Spinal Cord Stimulation — In Response to The Wall Street Journal. Andre Machado explains in an obituary on Krishna Kumar why he was a “Neuromodulation Giant.” Lastly, Jennifer A. Sweet reports on Integrating Pain and Spine.

Several articles are part of our Featured Articles section. George M. Ghobrial, James S. Harrop and Christopher M. Maulucci review the recent inroads with Stem Cell Therapy for Spinal Cord Injury — What Have We Learned? While simulation-led education has been a focus of the CNS, it is also being developed concurrently around the globe. Ashish Suri details on Simulation in Neurosurgery in India — NETS. Richard C. Mendel reviews his experience with boxing and how it transformed into a neurosurgery career in Boxing and Head Injuries: Lifelong Interest Can Develop from Unimaginable Sources. William Mallon provides personal insight in Prologue to a Second Act — A Young Physician’s Actions and Aspirations.

In the Inside the CNS section, Alison Dye and Katie O. Orrico offer the Washington Update and lastly, Melissa B. Berbusse, Managing Editor of Neurosurgery provides an Update on Neurosurgery.

As always, the Congress Quarterly staff and I encourage your participation and interactions. Please do not hesitate to contact us with any ideas or suggestions.
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SUMMER 2014
Recently, with a fair amount of hoopla, the federal government released information related to Medicare billing for perusal by the general public. The stated purpose was to increase transparency to assist patients in choosing physicians and procedures. The stated rationale was to drive patients to high-volume providers based on the assumption that high-volume providers would provide better and more cost-efficient care (Associated Press, April 9, 2014, http://news.yahoo.com/medicare-database-reveals-top-paid-doctors-040203220--politics.html). This rationale appears to be the exact opposite of what the government has been promoting for the last decade regarding variation in care as described in the Dartmouth Atlas; however, I digress.

Regardless of the motivation, the data is now available, and interested parties are poking around in the treasure chest. According to the AP, 2% of physicians are responsible for approximately 25% of Medicare charges in the United States. Furthermore, a group of 300 or so physicians was identified, each of whom had been paid more than three million dollars by Medicare during 2012. The “poster child” of the group, Dr. Salomon Melgan, was paid over twenty million dollars by Medicare, and has the distinction of recently being in the news because of improper use of his private jet by a United States Senator from New Jersey for a trip to the Dominican Republic. Other top billers included an oncologist from Michigan who is facing trial for fraudulently diagnosing patients with cancer in order to justify chemotherapy charges. This is a public relations disaster for organized neurosurgery’s efforts to promote access to care through fair payment for appropriate services. With regard to neurosurgery in particular, the AP gave us a bit of a pass as the vast majority of high billers were ophthalmologists and cancer specialists.

Ben Eisler at CBS News has been doing a little poking around as well. Ben’s focus, however, has been on spine surgery, and in the course of his investigation into billing practices, he found that a very small number of spinal surgeons were doing a disproportionate number of lumbar fusion procedures in the Medicare population. Eliminating low-volume surgeons (less than 10 Medicare lumbar fusions per year), he found that the average number of Medicare fusions per year performed by high-volume surgeons was 46. However, a small group of surgeons did more than 10 times that amount. When he looked at referral patterns, he found that the average high-volume surgeon offered surgery to approximately 7% of the new Medicare patients seen, whereas the top billers were offering fusions to greater than 35% of new Medicare patients seen. When it came to fusions on four or more vertebrae, the discrepancy was even greater. Some surgeons performed more than 100 procedures, while the national average was less than seven. Nationally, 5% of the surgeons did 40% of the fusions on four or more vertebrae.

What does it all mean? To be sure, from an investigative journalistic perspective, this is pure gold — clearly these doctors are ripping off the system at the expense of vulnerable patients and should be hung up by their stethoscopes! From the perspective of a neurosurgeon active in the education and training of the next generation, and one who is active in advocacy for reasonable payment and policy decisions, I think we need to look a little deeper. The AP noted, responsibly, that some of their billing data described billing artifacts with no clinical importance. For example, one of the top billers named by the AP was a pathologist from the Mayo Clinic whose name is used for billing for the entire laboratory. He is a salaried employee and clearly made no personal gain from the billing practice. Administrative convenience inadvertently resulted in his being an apparent outlier. With regard to the spine surgeon issue, there are no such easily
explained “misunderstandings.” Surgeons were clearly doing many more operations, and many more aggressive operations, than their peers on a much greater proportion of patients seen in clinic. I was asked to review de-identified records from one such practice, and I found consistent discrepancies between radiologists’ and surgeon’s interpretations of imaging studies, with much more pathology identified by the surgeon in every case. I found consistent reliance on discography in the face of normal or near normal MRI to include, as opposed to exclude, patients as surgical candidates and to justify extra levels. I found gross oversimplification of biomechanical principles used to justify long segment fixation for minimal pathology.

I do not know who the practitioner is or who the patients are. I do not know how the charts were selected, or whether the designated charts are a truly representative sample of the practice. We all have cases that we wish we had done differently. I do not know when the operations were done, and acknowledge that there has been an evolution of thought regarding the use of discography and understanding of biomechanical principles over time. I also did not have access to the actual imaging studies in question, just the reports, so I cannot say whether or not the discrepancies between the surgeon and the (multiple) radiologists were reasonable. The patterns of surgeon-reported and radiologist-unreported pathology, reliance on overly sensitive diagnostic methods and seemingly over-aggressive surgery were consistent. I also know that this practitioner is not alone, and that this practitioner is a neurosurgeon.

The theme of the upcoming meeting is A Question of Balance. Through the development and promulgation of clinical practice guidelines, the CNS has provided the bulk of the information used by our Washington Committee to comment upon and modify payment and policy decisions which could potentially limit patient access to effective and timely care. Intrinsic to our arguments is the intimation that neurosurgeons are generally following these clinical practice guidelines, and that payment for these procedures is reasonable within the general spirit of the guidelines. In many cases, practices and procedures are not commented upon by the guidelines, either because there is not a sufficient literature base or simply because no one has gotten around to writing on that topic. The example above demonstrates practice far outside of the lumbar fusion guidelines which were published in 2005, and are directly relevant to the cases reviewed (these have been updated for publication this summer). These guidelines specifically address the limitations of discography and limit recommendations for fusion to specific procedures for specific patients. In Boston at the 2014 CNS Annual Meeting this October 18-22, I hope that a significant majority of neurosurgeons will join us in a discussion about how to balance access to care with responsible stewardship. I am hoping that you will educate me as to the best way to educate, coerce or otherwise influence our peers to adhere to guidelines when they exist.

I am pleased to announce Regina Shupak, CMP, MATD, as Chief Executive Officer of the Congress of Neurological Surgeons. Regina is a 14-year veteran of the CNS and formerly served as Deputy CEO. Regina will continue to bring a wealth of knowledge and experience to the CNS and I look forward to her leadership in this new role.
I was ten years into a career in pediatric neurosurgery at Stanford University when the opportunity arose to consider a completely/dramatically alternative pathway in medicine. Northern California is home to many biotechnology companies, and Stanford University maintains a policy that allows faculty to serve as consultants to industry. I was asked to provide scientific and clinical consultation to a publically traded biotechnology firm on what would ultimately become the first-in-human clinical trial of neural stem cell transplantation. The company, StemCells, Inc., founded by pioneers in stem cell biology (Irving Weissman at Stanford University, Fred Gage at the Salk Institute and David Anderson at Cal Tech), was exploring the therapeutic potential of human neural stem cell transplantation for CNS disorders. The role of consultant ultimately transformed into the offer of full-time employment with the company, and in 2006 I was confronted with the choice to either remain in clinical pediatric neurosurgery or devote the second half of my career to that of applied sciences and clinical translation in biotechnology. Letting go of the rail of an academic practice in an outstanding institution to join a biotechnology firm was not an easy decision, but the professional growth and challenge of such a major career change, along with the concept of directing clinical trials involving neural stem cell transplantation, seemed worthy of pursuit.

Compared to other disease classes, there are a disproportionate number of CNS disor-
orders that have no effective treatment, representing a significant burden on society. Solutions to these disorders will emerge from basic science laboratories in academia and industry, but ultimately, human testing to evaluate therapeutic potential will need to be conducted, i.e., applied sciences. These early steps in clinical research involve a confluence of considerations wherein the theoretical suddenly needs to become practical and feasible. The bench to bedside, or clinical translation, has historically been the domain of industry, and since joining a biotechnology company, I have become aware of the commitment and depth of the physicians’ industry, as well as the importance of research partnerships with institutions and clinician-scientists. Having many years of clinical experience, I am fortunate to understand the perspectives of both academia and industry. This perspective has made me realize how important a thriving biotech and pharmaceutical industry is to medicine, and that the advances required in addressing the unmet need disproportionately represented in neurosciences will come from successful translation of discoveries in partnership with clinical researchers.

As vice president of CNS Clinical Research at StemCells, Inc., my role covers a broad spectrum of research, clinical and administrative responsibilities intrinsic to the mission of a biotechnology firm. The essence of clinical translation begins with the understanding of the basic mechanism of action of the product under development, in this case a neural stem cell, which is then followed by selection of appropriate clinical targets and determining a feasible trial design and developmental pathway. Biotechnology firms must balance all the forces that can influence first-in-human testing including clinical, scientific and regulatory, ethical and financial elements. The nexus of unmet medical need, a provocative therapy (i.e., stem cells), and administration through an open neurosurgical procedure lends significant gravity to the interaction with principal investigators, institutional review boards and regulatory authorities.

Within the biotechnology company I have joined, StemCells, Inc., the clinical targets for neural stem cell transplantation have now included four distinct diagnoses (in order of initiation): a Phase I trial in a fatal lysosomal storage disease, neuronal ceroid lipofuscinoses; a Phase I trial in a fatal congenital myelination disorder, Pelizaeus-Merzbacher disease; a Phase I/II trial in thoracic spinal cord injury; and a Phase I/II trial in age-related macular degeneration. The results of the first two trials have been published, and it has been very encouraging to see human data that reflects observations in animal models. As the medical monitor of these trials, it has been exciting to see the early and diverse progress of a therapeutic approach that can be ultimately referred to as “cellular neurosurgery,” and the potential it may hold for some of the most challenging CNS disorders, perhaps even such neurodegenerative diseases as Alzheimer’s disease. There are many emerging technologies that may offer completely new approaches to disease, and possibly even breakthrough therapies. The potential to impact a disease through a one-time intervention, such as cellular transplantation, represents an elegant approach that will be beneficial for CNS disorders, even if it achieves only a fraction of the success of solid organ transplantation.

Life in biotechnology involves analyzing preclinical and clinical data, routine communication with PIs, scientists, ethics boards and regulatory agencies, as well as designing and monitoring clinical trials. While not as physically or emotionally taxing as clinical neurosurgery, the pace of the biotechnology industry can match that of any busy practice. My role incorporates routine discussions with the FDA in support of the clinical development programs, as well as explaining the very same research programs to investors. Some of the best days in my current role involve reviewing new human data and understanding that we may be one step closer to a new treatment.

Many of us pursue careers in academic medicine in the hope that we can make contributions to research that ultimately advance the field and improve the care of patients. My imagination has always been captured by the prospect of “the road less traveled,” and I consider myself fortunate to have the opportunity to dedicate the second half of my career in medicine to pure clinical translation within the biotechnology industry. Having left daily practice, I can say that the identity of a neurosurgeon remains deeply engrained, even when one may choose a non-operative profession. Although I continue to draw on my experience in clinical neurosurgery in this new role, I miss the unique satisfaction and challenge associated with surgery and direct contact with patients. This is a setting in which we are trained to combat disease one patient at time, but I have found that a career in biotechnology has been equally rewarding because of the potential to develop new treatments for entire classes of diseases. In the final analysis, it is the process of helping patients that drives forward those who practice medicine, whether by rendering care in the operating room or advocating for a clinical trial with the FDA.
I was asked to write an article for the CNS quarterly about “changing careers,” and immediately I thought about Dr. Ruth Kerr Jakoby. I created a PowerPoint slide presentation for CNS University a number of years ago, about being a woman in neurological surgery and some of the career and social issues encountered. I was interested, at that time, in discovering more about the first woman in neurosurgery in the United States, Ruth Kerr Jakoby, MD, FACS, FAANS, JD. I was surprised to discover Dr. Jakoby, after completing her residency in neurological surgery, had changed career paths, becoming a lawyer at the age of 53. I had learned about Dr. Jakoby through an interview done by Dr. Gail Rosseau, MD, FAANS, in San Diego, at the 1994 AANS annual meeting, which is available on CD through the AANS. When I decided to write THIS article, I knew I had to speak directly with Dr. Jakoby, who is now 84 years old.

Ruth Kerr spent most of her youth in New York City, and attended the Horace Mann School along with children from the LaGuardia and Sachs families. In first through sixth grades, Ruth had a co-ed education, but after sixth grade, her education was for girls only. Ruth had two uncles who were physicians, and according to Ruth, she became interested in medicine after reading her uncles’ medical journals. Although Ruth’s mother was a “stay-at-home” mother after leaving teaching to raise her children, she was supportive of Ruth’s career choice. Her father, a geologist, was also very supportive of continued education, regardless of gender.

Ruth graduated from Barnard College of Columbia University, and received her BA in 1949. Four years later she completed Columbia Medical School with 12 other female students. At the 40th reunion of her medical school graduation, many of the women commented that some of the “jokes played on them” would have been considered sexist in today’s society. Dr. Kerr became interested in the Neurological Institute at Columbia Physicians & Surgeons. In 1953, Dr. Diana Beck in London was the only other known female neurosurgeon, other than some female neurosurgeons in Turkey and Russia, but Ruth knew nothing of any of them while she was in college. She completed her internship at Yale and there, Dr. William German, a famous neurosurgeon, was an inspiration to her. He was a true gentleman, very kind, and very intelligent. Dr. German was trained at Hopkins by Dandy and Cushing and often commented that “Cushing’s form was better, but Dandy won the match.” Ruth recalls that her shifts were 36 hours on and 12 hours off for two months straight. Her interest in neurological surgery continued to develop.

Although there were about 20 training programs in the 1950s, none had ever accepted a female resident. Ruth was not even aware that she was the first female applicant. There was another male student in her medical school class who did not get into any of the neurosurgery programs that he had applied to, and he was surprised by Ruth’s acceptance. When Dr. Kerr decided to apply for neurological surgery residency, she applied to every residency program available. Only one accepted Ruth for an interview — Indiana University (IU) Medical School. Dr. Robert Heimberger, the Chief at IU, asked Dr. Paul C. Bucy at the American Board of Neurological Surgery if a female resident would be acceptable for the ABNS program. Dr. Bucy said that there were no rules “against it,” and so Ruth started at IU. John Russell, MD and L.W. Freeman, MD were the other two neurosurgeons at IU at the time. Her future husband, a Yale biochemist, would drive out and visit Ruth at IU. Her husband later got a job at the NIH in the Public Health Service, and asked Ruth to come to DC.

So, Ruth wrote to Dr. James Watts at George Washington (GW), who accepted her transfer as an intern, and she began her residency “all over again.” Dr. James Watts, Dr. Hugo Rizzoli (the last resident trained by Walter Dandy at Hopkins; now 97 years old), and later, another neurosurgeon, General George Hayes at Walter Reed Medical Center, became important mentors for Ruth during her residency. Ruth covered “staff” cases and “private” cases at DC General and GW Hospital. Ruth would also view and oftentimes scrub in on surgical cases at Walter Reed. Dr. Jakoby fondly recalls that Dr. Watts taught her much about the “art” of medicine and patient care. Ruth went into private practice after graduation from 1959 to 1975 in Washington, DC, and became an Associate Clinical Professor of Neurosurgery at George Washington University. According to Ruth, she became well known in her community by covering the emergency room at various hospitals. She also became the Chief Medical Officer of Neurosurgery at DC General, and supervised residents from GW and Georgetown.

Dr. Jakoby became the first female Diplomat of the American Board of Neurological Surgery in 1961 and later a Fellow of the American College of Surgeons.

Ruth had two sons: Michael (1964) and Robert (Bobby, 1965) that were born during her first few years in practice. Dr. Robert Mendelsohn, a neurosurgeon at GW, and...
Dr. Jakoby would cross-cover one another. Ruth recalls that Wednesday evenings were Dr. Mendelsohn’s poker nights, and that one Wednesday evening while covering for him, Ruth went over to Prince Georges Hospital to operate on a patient with an epidural hematoma. That evening, after surgery, she went into labor, and delivered her son the next morning. Two days later, she went to round on and follow up with her epidural patient, but he had been already discharged.

Ruth fondly recalls travelling across the country and internationally, learning specific techniques from various neurosurgeons. On one such trip, Dr. Jakoby met John Holter, the engineer, and Dr. Eugene B. Spitz, pediatric neurosurgeon, at Philadelphia Children’s Hospital. She went to Philadelphia with Dr. Harold Murphey to learn how to place a shunt. When her practice became very busy, Ruth hired a neurologist to help her cover her practice. Finally, she took in a partner, Dr. John Gulbransen, in 1970, but still the practice was “too busy.”

When her children were 5 and 6 years old, things changed. Dr. Jakoby and her husband separated and eventually divorced, and Ruth wanted to spend more time with her children. She had always had a live-in nanny, but she missed her children at that time. Ruth decided to leave her private practice to spend time with her children. When her practice became very busy, Ruth hired a neurologist to help her cover her practice. Finally, she took in a partner, Dr. John Gulbransen, in 1970, but still the practice was “too busy.”

So from 1977-1979, Dr. Jakoby was the Chief of the Spinal Cord Injury Service at the Veterans Administration Hospital in Houston. At the VA, there was a multidisciplinary team approach to managing spinal cord injury patients, with orthopedic surgeons, urologists and plastic surgeons, physical therapists, occupational therapists, dieticians, psychologists and social workers working together. There were acutely injured soldiers from Vietnam and also U.S.-based veterans. During this time, Dr. Jakoby held an academic appointment as an Associate Professor of Neurosurgery at Baylor College of Medicine and a joint appointment as an Associate Professor of Physical Medicine and Rehabilitation Medicine at the Texas Institute of Rehabilitation and Research (TIRR). Making this bold career change, she was able to spend much more time with her children, and she developed a strong interest in preventive medicine, healthcare policies, administration and law.

In 1979, Dr. Jakoby’s mother died, leaving her father who would not travel to Houston. Dr. Jakoby took her father to Arizona. As a geologist, her father enjoyed visiting the Grand Canyon and other rock formations. By the time of Dr. Jakoby’s father passed away in 1981, her older son had graduated from high school and started college at the University of Maryland, so Ruth and her younger son went to live in Maryland. In 1982, Ruth decided to go to law school and was accepted at Northern Virginia Law School.

Dr. Jakoby took some classes at Antioch Law School, a new school founded by Jean and Edgar Kahn. Antioch Law School specialized in the training of minorities. Ruth received her JD degree from Northern Virginia-Antioch Law School in 1986 at 53 years of age, becoming the first female neurosurgeon to also be a lawyer. Her special interests included antitrust issues and mergers of medical, legal and educational institutions. Dr. Jakoby later became the acting Dean of the Antioch School of Law in 1988-89 at a time when the American Bar Association, Antioch University and the city were trying to close Antioch Law School. Dr. Ruth Kerr Jakoby has been a lawyer now for over 25 years, and she believes that continued education is important at every age.

I had the pleasure of speaking with Dr. Jakoby on April 9, 2014, and she was bright as ever at 84 years old. Ruth is still involved with a “Mining and Development Company” in Chevy Chase, Maryland. Her interests in mining and minerals developed during her youth. She still owns some land in Arizona, as well.

Dr. Ruth Kerr Jakoby has been an inspiration and mentor to many medical students, residents and young attendings. Dr. Gail Rosseau and I are both in awe of all of her accomplishments and achievements. I am particularly impressed with her conversion of career paths, constantly changing herself and becoming a more enriched, contented and successful individual.
Going Back: Trying to Make a Neurosurgical Contribution Where the Need is Greatest

I don’t remember the full conversations, but I do remember that they always began with questions about what I did at home. I’d try to explain that I did research in neuroscience, and I always felt so much less useful than the nurses, electricians, plumbers and carpenters. And more specifically, I remember looking into their dark eyes as they ended with the entreaty, “You’ll come back and help, right?” I remember answering yes, even though I had no idea how. And I was haunted by that promise.

There is no shortage of good intention in the developed world. At the same time, there is no shortage of unskilled labor in the developing world. So for a time, I turned my back on science in order to gain that skill. I went to medical school to become “useful,” but by the time I finished my internship and stepped off into neurosurgery, there was a new problem: skills were not enough. Neurosurgery takes resources. Those resources don’t exist where people need the most help. They need to be collected in the developed world, and there are many who will argue that the resources can be better spent on nutrition, vaccinations and antibiotics.

However, taking that road is a slippery slope. It’s very hard to take a thousand dollars from someone, buy sacks of folate, transport them to countries that need them and distribute it effectively. Moreover, it is extremely difficult to demonstrate an impact, and without an impact it is hard to convince donors to give. There’s another critical point: as you attempt to distribute the vaccines and antibiotics, you begin to notice that slums and villages have inadequate sewage systems, absent garbage collection and poor or inexistent roads. The attempt to intervene at the primary or preventative level brings you face-to-face with the reality that the problems are political and economic — not medical — and to intervene as an individual at that level is difficult and dangerous.

At some point you have to decide where and how to fight the fight. So I decided to ignore that criticism and stick with what I am passionate about: neurosurgery. In 1996, I was approached by a nurse who worked with Healing the Children about caring for children in Central America suffering with hydrocephalus and spinal dysraphism. Healing the Children connected me with Fundación Pediátrica Guatemalteca, and with funding from Codman and Cordis, I launched an initial fact-finding trip to Guatemala City with the goal of answering two questions: first, would it be ethical to mount a mission to operate on hydrocephalic children? Second, was it feasible to mount such a mission? It had been said that placing shunts in children in the developing world was unethical because it created shunt dependence in children who would otherwise develop compensated hydrocephalus. Therefore, shunting these children would result in their death from shunt failure or infection, when they would otherwise have simply been disabled. Similarly, it was said that without the resources of a developed nation, repairing myelomeningoceles would leave children to suffer with unacceptable disabilities.

I spent a week with a nurse from the Fundación named Rosalita, evaluating children that were receiving care in the existing system. For the last three days of the trip, I flew a co-resident from the anesthesia department and the nurse in charge of our neurosurgical OR in to help assess feasibility. I emerged with the opinion that most children with untreated hydrocephalus die from the disease in an extremely unpleasant way. Furthermore, I came to the realization that disabled children are often accepted in a village environment better than in the cultures of developed countries. So, the answer to the first question was yes; intervening to operate on hydrocephalic and dysraphic children was ethical. The answer to the second question was no; mounting such a mission was absolutely not feasible. But then there was the story of Rosalita. She was trained as an engineer before becoming a nurse in Argentina. In the late 1980s, she had gone into the mountains of Peru to care for the sick during the guerilla war with the Shining Path. After four years, when she left Peru to join the Fundación in Guatemala, she was the last surviving member of the team. So when I asked myself whether I should try to mount the mission, despite its apparent impossibility, all I could think of was Rosalita — and my unfulfilled promise. “Yes, I will come back someday.”

Upon my return, I discussed the concept with my pediatric neurosurgical faculty member, Karin Muraszko. She agreed to lead the team, with one stipulation — that we provide a level of care equal to that which we provide in the United States. Throughout 1997, I rotated on service at the Ann Arbor VA, and entered my research years. During that time, I collected donated instruments and shunts from companies and retired surgeons. I solicited money from companies, family, friends and alumni of our training program. Despite these efforts, I remained well short of the necessary supplies and instruments. Then something happened that, to this day, inspires my personal sense of faith. Following up on a tip from a VA OR nurse, I drove to the...
abandoned West Haven VA Hospital in my wife’s Chevy Blazer. Upon constructing the new Detroit VA, the Veterans Administration had closed the post-World War II relic and moved the staff to the new hospital. For several years, the old hospital remained abandoned, but full of caches of equipment and surgical supplies. I was met by a woman who had been tasked with disposing of the old materials before the facility was converted to condominiums. As I wandered through the place, I found almost everything that was needed. It took eight trips, with the Blazer full of appropriated gear and supplies, to construct a mobile operating room in my basement.

In 1999, Karin and I took our first team to Guatemala City and performed 24 operations in one and a half ORs, with no air conditioning, over a five day period. Suresh Ramnath and I assisted Karin, working well after midnight every night, with team nurses staying overnight in the hospital with the Guatemalan nurses to care for the children. During the mission, we had to hotwire the donated autoclave, and one night the van was stopped by unmarked Guatemalan police at 2AM. Prior to departing, Julian Hoff had called me into his office. With that legendary smile, he looked me in the eye and said, “Nick, you must bring Karin back in one piece,” confirming who was, and who was not, expendable. As the van pulled over and my sphincter tightened, all I could think of was that if something went wrong and the Guatemalans didn’t kill me, Hoff would.

To this day, Project Shunt has performed over 300 free operations in Guatemala City on children who would not have otherwise received care. It has survived for two reasons; the organizational system for preparing for each year’s mission divides responsibility between motivated teams under the central control of a resident who answers to Karin. Moreover, Karin supported the mission financially for years by diverting to the project expert legal consultation fees that would have otherwise gone directly to her. To this day, I marvel at her willingness to allow me to take her to Guatemala in the years shortly after the civil war had ended. But then, no one has ever questioned her courage.

In 2010, I peeled myself away from Project Shunt, choosing instead to go to Haiti after the earthquake. Upon reaching Port-au-Prince, I stumbled into Barth Green’s Medishare Field Hospital. In Haiti, we face a different challenge; the need to provide comprehensive care, rather than preparing for a specific set of cases. After the earthquake, I served as Chief Medical Officer for Medishare’s Hospital for part of the time that I was there and returned to do more relief surgery eight months later. I helped to recruit other neurosurgeons to serve at Hospital Bernard Mevs where Medishare ultimately set up long-term relief work. In 2010, on my solicitation, Medtronic made the extraordinary gesture of donating an O-Arm to provide axial imaging for Medishare, which was a resource that was absent at the time of the earthquake.

At Emory University, we are working on a new concept for neurosurgical relief in Haiti, collaborating with Paul Farmer’s Partners in Health. We have proposed that six residency programs guarantee two months of coverage each year to ensure year-round coverage. Each month the resident will provide expert neurological and neurosurgical consultation in the hospital and train the local general surgeons in emergency neurosurgical care. In addition, the resident will gather elective cases that will be done during the third week of each month. Each resident will be paired with an attending, who will provide telemedical supervision. In addition, the attending will gather the appropriate supplies to complete the elective cases that are staffed during the first two weeks. As in Guatemala, skill is not enough to perform neurosurgery — a resource-intensive endeavor. We are planning for our first fact-finding hospital to be Hôpital Universitaire de Mirebalais, recently built by the Partners in Health team. So in the end, when I’m asked what I’m most proud of, it’s not the stem cell or gene therapy. It’s not being a leader in functional and peripheral nerve surgery. It’s the fact that I did go back, and I will continue to do so.
My father gave me two good pieces of advice. The first was to always pick individuals to work with who have played team sports — they understand the culture of teamwork, and that one individual cannot always carry the ball and score the winning point. The second piece of advice he gave me, I believe he borrowed from President Harry Truman, who said, “It is amazing what you can get done when you are not interested in taking the credit for it.”

I have used those two pieces of advice to guide me in both personal and professional endeavors. When I started in academic neurosurgery, my missions were very clear — practice good medicine, become a thought leader by expanding and developing new techniques, be a good surgeon and physician, and obtain funding for your research. Early in my career, I had two R01s and the funding rate was in excess of 50%, therefore, it was very easy to obtain extramural funding for bench research. At that time, it was possible to be a full-time clinician and full-time researcher if you will, but times have clearly changed, and new skill sets must be developed to survive.

As the economics of medicine changed, the first concern became funding of our research effort, both clinical and bench. During the 1980s and 1990s, it was still possible to put substantial amounts of money into research, and at that time, partnering with industry was still considered dealing with the devil. It also became more difficult to get to the laboratory as clinical demands became more onerous, leaving time for academics to be limited to nights and weekends — when not on call!

In a new administrative role as division chief for neurovascular surgery, the charge
was to build the division in its research and clinical arenas. Once again, finances became a driving force, but it was clear that using the principles and practice of developing a referral base consisted of “Availability, Affability and Ability.”

It became clear that many of the procedures we were doing were now being handled in the community. Our goal was to train individuals in general neurosurgical procedures, ensuring they would take what they have learned and apply their skills in their local environment and community settings.

When I returned to Philadelphia and came to Jefferson in 1995, I was essentially the first neurosurgeon in the region with an endovascular skill set. At that time, I had already completed a fellowship with Dr. Charles Drake and was obtaining referrals for open microsurgical procedures, but the endovascular arena really opened the floodgates. This necessitated a retooling of the skill set and infrastructure at our own institution in order to accommodate the volume and the stresses of the system in terms of ICU bed availability and ease of access and transfer. For the first time in my career, I was working one-on-one with senior hospital administration trying to straighten out these issues, and quite frankly, the only reason they would return my phone calls was because the balance sheet from the neuroscience transfers looked quite appealing. I had the good fortune of learning the art of business negotiation from my father and elder brother who run a very successful family enterprise. They taught me when going into a meeting with hospital administration, to be certain you have the correct numbers, so that you can negotiate from a position of strength — “never go to a meeting unprepared with the data,” which always rang true and will continue to do so. It was important to learn what the profit margins were, not only for the neurovascular cases, but for all general neurosurgical procedures. This was extremely helpful in negotiating my contract and renewal contracts as department chair. The academic mission to a hospital CEO has a very different connotation than the traditional one we all grew up with. What I cannot overemphasize is the fact that having statistical information, admitting and discharge data and profit margin information lends to successful and fair negotiations. I have also been blessed by working with hospital presidents and CEOs who are outstanding individuals and professionals.

As time marched on, it became clear that the general definition of patient centricity was changing, and my definition of patient centricity was taking the care that we deliver to the patient rather than having the patient come to the mothership. It became clear in our environment that a network of partnering with outside hospitals was critical to our growth and survival in a competitive environment. This led to our establishment of the Jefferson Neuroscience Network, which now includes 32 hospitals, five of which are comprehensive neuro/endovascular and general neurosurgical sites, staffed by our own full-time faculty members. The ability to interact and negotiate with five other hospital systems including our own became challenging, and it became clear that bridges needed to be built between leadership at the University Hospital and our partners in the community. Fortunately, after numerous dinner meetings, the transformation from being an academic chair to a business leader at the institution became necessary and important. Unfortunately, our training often does not in itself lend to new business skill sets necessary for today’s environment. There are several individuals in our own department who are now obtaining their MBAs, which I think is very helpful in guiding them in their future endeavors. The practice of medicine, even in an academic setting, has now become the business of medicine, and if we are to enhance and grow and maintain the academic mission, economic success is imperative.
Have You Made a Strategic Plan for the Rest of Your Life?

As young people, we all had goals. We wanted to do well in high school and get into a good college. Then, we wanted to do well in college and get into a good medical school. Then, do well in medical school to get into a good residency program. Then there were two choices: one, prepare to go into practice or two, become an academician. We all expected that we would make a good income from medicine and provide our families with what we wanted to give them. Then as physicians, either in practice or academia, we planned to retire in our 60s or early 70s, and to live comfortably for the rest of our lives. The human species is the only one of the animal species that has decided they need to retire. That is not a wise decision, nor is it a physiologically correct one.

Somewhere along the way, two things forced those plans to change. First, people started living much longer than their parents; some well into their 90s; which means you now have to have enough money to live on for 25 years post-retirement without collecting additional income. That is a quarter of your life, and evidence shows it will not be an easy goal to achieve, even for physicians.

The second change was that the United States turned toward socialism, and socialized medicine became a reality. A physician’s work, talent and education was now declared a “right” that everyone was entitled to have. The government forcibly took from some what they owned (intelligence as a product of years of education, judgment, talent, experience, all of which have value) and gave it to others, under the guise of “helping society.” What is wrong with that? Doctors are supposed to do that.
But, where does it say that anyone has the right to take what is yours and give it to someone else? The Constitution was implemented to protect our rights and liberties. The politicians had a different idea. No one told us that this change was going to happen so fast. Yes, doctors still make a better income than most. But, the majority of physicians’ incomes have not kept pace with inflation over the years, so many have, in fact, lost money.

What we do have in our favor, however, is a shortage of physicians that is expected to last for the next two decades. And there will be a shortage of excellent physicians, because many do not want to put in the work required to achieve that excellence. Studies show that the U.S. will be short 100,000 physicians by 2025, so there will be an increase in demand for our services, and an even higher demand for excellent services as the population expands. The U.S. will eventually become the third most populous country in the world after India and China.

So, what do you do? First, you have to work as hard as you can to be the best doctor you can be, regardless of the work hour limitation. Why? Because people will want to go to the best and will be willing to pay for that kind of care. In case you haven’t noticed, we are headed towards a two-tier health system; one for the rich, and another for the rest. It will be like the socialized system in England and that of many other countries. You have to know what is going on in the world — socially, economically and politically — so you can make sound judgments about your future.

The second thing to do is to think of what other interests you have and begin to devote time to developing skills in those areas. I know a physician and his wife who are interested in art and read and studied a great deal to amass an excellent collection of fine art. In addition, they are interested in horses, and one of their children started a successful horse-breeding business. Besides all of that, he is an excellent physician. Opportunities come by once, and if you do not take them, they will not come again — so you have to be open-minded enough to recognize a new opportunity when it knocks on your door.

Begin by discussing these plans with your spouse. If you plan together, it will help your marriage, for the short and long term, and you will grow and learn new things together. That is what I have done by developing multiple careers in neurosurgery, becoming editor of a journal, and studying the challenges of aging and developing a consulting company and a television series on that subject, all with the joint efforts of my wife of 53 years, Carolyn.

The 21st century is “The Century of Rapid Change.” It is time to think about that and make a strategic plan for your future. You may make another one in a number of years, as the world will continue to change. Standing still in the 21st century will not cut it. Carolyn and I have just made a plan for the next 10 years or more. It took us a full year to do all the research to put it together, and we are still refining it as other opportunities arise. Obviously, maintaining good health is critical.

Making a strategic plan for your future is no different than planning a complex operation on a patient. You need to get all the facts, speak with the involved parties, conduct research and then go through all the evidence and make a plan. You do this every day — and you do it well.

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The instructor comes around to my painting. She sighs at the muddy canvas and advises me to “stick to medicine.” Laughter rises up in the class and my spirit falls. In that airless moment I think, “Get out, interloper. Pack up the brushes.” I stare at my still life composition. It’s not breathing. My teacher threw me a lifeline — quit painting flowers and fruit. Best advice ever.

The landscape of neurosurgery is an artist’s wonderland of color and light. The headlight beam ricochets off the bevel of a #10 blade with such precision you can almost hear it.

The chiaroscuro of the living brain has light that tumbles off the gyri and uncannily fades to dark in the valleys. The foreboding ultramarine vein and the ferocious crimson within the surety of an artery are magical. Look for the complement, a near cobalt green, lurking in the shadows. The palette is full. There’s no need to squint. When the view becomes too overwhelming, withdraw home to the safe earth tones of the bones.

Art and neurosurgery each have their own set of rules and techniques to surmount, but they share the unremitting pressure to succeed. No surgeon or artist can survive with a beginner’s eye or unsure hand. Both surgeons and painters are masters of touch and observation. Neurosurgeons are experienced in value analysis for interpreting CT and MRI scans. These are a complex version of the artist’s linear value scale, which traces white to black and the in-between halftones. Neurosurgeons are also dimensional.
navigators who render 2D radiology slices into a 3D patient. Painting and drawing reverse this process. The 3D subjects are transferred to the flat canvas at the end of a brush.

Anatomy is a language best translated by its native speakers — surgeons. The anatomy of the operating room is special and different from the anatomy of the dissecting table. The absence of vital signs makes medical illustration static. The work of Harvey Cushing elevated medical illustration to art. He lived his drawings. During art graduate school, my professor advised, “Paint as if your life depended on it.” Cushing’s art teaches that the patient’s life depends on you. Medicine is both the medium and the message.

Of course, no art can completely capture what we do. If any field can match art in its passion, majesty and roller-coaster highs and depths, neurosurgery can. It is what calls me back to the easel night after night. There is unfinished treatment and time is short. The life line may not be enough to amend the outcome. I cannot depend on it this time around.

On occasion, my studio reminds me who I am and where true north lies. I hear Matisse’s ghost warning to keep my sight fresh; to look as if it is the first time. Even in the midst of brushes and paint, I sense it will be that early gaze at the operating field that I will remember last. If art is wondrously long, then this artist would humbly offer that neurosurgery, still young, is already beyond wonder. Here be magic. Lives will depend on it.
The Evolution of Life and Career

For the last decade, I have been intrigued and fascinated by the new science of epigenetics and its clinical implications for health and longevity. Epigenetics refers to those mechanisms resulting in differential gene expression of over 100,000 proteins not based on changes to the DNA sequence itself. In other words, through various epigenetic transcription factors, functionally relevant changes occur to the genome that does not involve a change in the nucleotide sequence itself.

What are some of these epigenetic factors that tell the genes what to do? Nutrition, physical activity, environmental factors (air, water, pesticides, radiation, smoking) and how we control stress all directly activate transcription factors to impact our health (Figure 1). The one factor in common with all of these is choice! In other words, we can literally choose to activate our genes — for better or for worse — through the choices we make in these four epigenetic categories.

This scientific reality has profoundly influenced my recent choices and activities. My heightened interest in nutrition, supplements and nutragenomics (how nutrition affects our genes) has led to publications and positions I could never have anticipated. My book, The Longevity Factor — How Reservatrol and Red Wine Activate Genes for a Longer and Healthier Life, was highly acclaimed by Dr. Sanjay Gupta, Dr. Mehmet Oz and Greg Norman, among several others. I was also invited to be the chairman of the medical advisory board for the General Nutrition Corporation (GNC) and head of the science and technology committee of Mylan Laboratories — the third largest generic drug company in the world. Working with top scientists in the nutrition and drug worlds has given me much greater insight into the role of preventive medicine, particularly as related to diet and exercise and the public health problems resulting from poor choices in these domains.

I also have reconfirmed that being physically active may be the single most important thing that we can do to improve and maintain our health. It is well known that regular exercise or movement decreases the risk of dying from heart disease, stroke and diabetes, and also prevents certain cancers, improves mood, relieves depression and builds stronger bones. Exercise is also the best stimulant for brain-derived neurotrophic factor (BDNF), which increases neurogenesis, neuroplasticity and synaptogenesis. To this end, I have continued a daily exercise regimen and also regularly compete in triathlons and other endurance events. This past October, I completed my eighth Ironman Triathlon in Kona, Hawaii (Figure 2). In February, I summited Mt. Kilimanjaro, the highest free-standing mountain in the world, with my 18-year-old daughter, Isabella, and six athletes with major disabilities due to amputations, and one with no arms due to phocomelia syndrome (Figures 3 and 4). They consider themselves “differently enabled,” not disabled, and will all compete in the 2016 Olympics in Brazil.
The control and/or elimination of dangerous environmental factors with their negative epigenetic consequences has also been of interest. Unrecognized even by many physicians, one CAT scan of the brain is equivalent to approximately 100-300 chest x-rays. Yet, in our concussion clinic at the University of Pittsburgh, we see thousands of patients every year with post-concussion syndrome that have had CAT scans, rarely, if ever in several years, showing an intracranial hematoma. To obviate this largely CYA syndrome, I have been working with a company that makes an infrared hand-held scanner, the Infrascanner, developed and field-tested in Iraq and Afghanistan, that can diagnostically eliminate the presence of a subdural or epidural hematoma with a high degree of reliability — without radiation.

Finally, we all know the deleterious effect of chronic stress on our bodies and brains. Prolonged elevated cortisol shrinks our brains, impairs memory, adds fat to our bellies and unravels our chromosomes. As the senior vice president of the American Academy of Anti-Aging Medicine, I have written and spoken on the importance of prayer, meditation, strong family units, yoga, tai chi, biofeedback and exercise — whatever works for the individual — to reduce stress and anxiety and decrease the overproduction of hormones and neurotransmitters that can become toxic.

These “outside” interests and avocations have made me a better surgeon, a better parent and a much better advocate for my patients. It has also reinforced my ultimate goal: to die young — as late as possible!

References
Spinal Cord Stimulation — In Response to The Wall Street Journal

On April 15, 2014, The Wall Street Journal published the article “When Spine Implants Cause Paralysis, Who Is to Blame?” by Joseph Walker. The story describes the case of a patient paralyzed after spinal cord stimulator surgery. The author raises a valid point that spinal cord stimulators (SCS) should be implanted by well-trained and educated physicians on carefully selected patients. The American Association of Neurological Surgeons (AANS), the Congress of Neurological Surgeons (CNS) and the CNS/AANS Joint Section on Pain recognize and have addressed many of the concerns of the article. Together, we are dedicated to improving the safety and effectiveness of the therapy through training, research and education in order to promote the highest quality of patient care. Throughout the year, the CNS/AANS Joint Section on Pain collaborates with our colleagues at the North American Neuromodulation Society, along with the companies that manufacture these devices, sponsoring courses on SCS to teach proper techniques and complication-avoidance to both new and seasoned implanters.

Although we believe the incidence of spinal cord and nerve root injury is low, it is difficult to determine the true complication rates, so we are seeking accurate patient outcomes data through our National Neurosurgery Quality and Outcomes Database. It is unfortunate that any patient would suffer neurologic deficit after SCS; however, we remain committed to this therapy, which is safe and effective when done by qualified surgeons. Furthermore, the risks are lower than or equal to repeat surgery, and the treatment reduces chronic opioid use.

Spinal cord stimulation is an exciting therapy which not only reduces back pain and improves function, but also holds promise to facilitate walking in paraplegics. America’s neurosurgeons are therefore committed to ensuring that this treatment option is appropriately utilized to improve the health status and quality of life of our patients.

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Neurosurgery Watch is a new CNS initiative that will provide members with a monthly brief of high-impact publications in neurosurgery. With neurosurgically-pertinent reports being published in over 50 journals, it is extremely challenging for every neurosurgeon to stay abreast of all of the available literature. Yet, it is critical that neurosurgeons are aware of high-impact studies that may and should affect clinical practice. To address this challenge, the CNS Education Committee has created Neurosurgery Watch — a team of neurosurgeons that will monitor over 50 journals every month to identify publications that every neurosurgeon should be aware of. Unlike other services, Neurosurgery Watch articles are identified by neurosurgeons for neurosurgeons, and are vetted by an expert team focusing on spine, tumor, vascular and functional neurosurgery.

The Neurosurgery Watch team provides a brief summary of each publication, describing why the study is critical and how it could impact neurosurgical practice. These critical studies, including the synopsis and a link to the report, are to be published monthly on the CNS Publications Website: http://www.cns.org/publications/neurosurgeryWatch/default.aspx.

Neurosurgery Watch provides a critical and simple means of staying up to date and ensuring patients are provided the best care.
Obituary: Krishna Kumar, Neuromodulation Giant

It is with great sorrow that we announce the passing of Dr. Krishna Kumar, a pioneer of neuromodulation and world-recognized leader in the neurosurgical treatment of pain. Dr. Kumar led seminal studies in deep brain stimulation for chronic pain and established the safety, efficacy and cost-effectiveness of spinal cord stimulation. Among his many important contributions are the PROCESS and PROMISE studies. The PROCESS study established the effectiveness, superiority and long-term efficacy of spinal cord stimulation compared to medical management alone in patients with failed back surgery syndrome. The PROMISE study is the first prospective randomized multicenter study designed to assess the effects of spinal cord stimulation combined with medical management compared to medical management alone in patients with predominantly axial lower back pain.

Born in Jabalpur, India, Kumar emigrated to Canada in 1957 where he received neurosurgery training in Halifax, Edmonton and Saskatoon before settling in Regina in 1962. For five decades, he led a vibrant and highly recognized program in Regina, where there is a street named after him. Among many honors, Dr. Kumar was named Saskatchewan’s Physician of the Year in 2008. He is also a recipient of the Queen’s Diamond Jubilee Medal, the Saskatchewan Order of Merit, the Order of Canada, and the Giant of Neuromodulation award in 2011 from the International Neuromodulation Society.

Dr. Kumar is survived by his wife Shubha, their two sons, Rajeev and Ashok, their daughter Usha Nath, six grandchildren and three great-grandchildren.

We will miss Dr. Kumar. He was not only a great physician, husband, father, grandfather and great-grandfather, but a mentor, teacher and inspiration to us all.
Integrating Pain and Spine

While the vast majority of practicing neurosurgeons habitually treat chronic pain patients with spinal pathology, a minority of these surgeons consider that what they have is a pain practice. As neurosurgeons, we are trained to objectively evaluate neurological signs and symptoms and correlate these with radiographic findings. With such concrete evidence, we are then able to provide surgical solutions to assuage their symptoms. However, when there are no discernable abnormalities on imaging, and complaints of pain become less objective and more subjective, we are less inclined to suggest surgical intervention. Though most surgeons appropriately refer pain patients for physical therapy, spinal injections and additional conservative measures, few go a step further in treating these patients with spinal cord stimulation, intrathecal pain pumps or other pain management techniques. This results in an incongruous gap in the overall management of our patients.

Neurosurgeons are uniquely positioned with respect to our understanding of the pathophysiology of nociceptive and neuropathic pain, and our ability to critically evaluate and surgically treat these patients. Though our specialty has become increasingly subspecialized, we must remember that on some level, we are all pain surgeons. Irrespective of whether we choose to implant stimulators and pumps, we should all be familiar with the indications for each, such that our patients can be suitably referred to those who do perform such procedures. In order to facilitate this, it is essential that these skills are taught in our residency training programs, and that we continually aim to familiarize ourselves with updated practices in pain.

Accordingly, among the primary objectives of the AANS/CNS Section on Pain is increasing both faculty and resident awareness and participation in pain meetings and initiatives. Under the leadership of Julie Pilitsis, we recently experienced an impressive attendance at the AANS/CNS Joint Section on Pain Biennial Symposium, entitled Integrating Pain with Your Spine Practice, which included pertinent lectures by respected faculty as well as a hands-on training session. We have also seen a dramatic rise in subscribers to Pain News, our section newsletter, and have just launched a new website dedicated to the practical management of pain, applicable to both general and subspecialty neurosurgeons. Moreover, we hope to improve resident exposure to surgical pain techniques early in their training, and promote further collaborations between pain anesthesiologists, physiatrists and neurosurgeons alike. With these efforts, we hope to continue to bridge the gap between the pain and spine community and incorporate pain management into our daily practices.

> THROUGH OUR SPECIALTY HAS BECOME INCREASINGLY SUBSPECIALIZED, WE MUST REMEMBER THAT ON SOME LEVEL, WE ARE ALL PAIN SURGEONS. <
Improvements in the quality of care delivered in spinal cord injury (SCI) over the past several decades have been largely focused on rehabilitative measures. This has resulted in improved longevity and a ballooning prevalence of SCI patients in the North American population, estimated to be as high as one million people. Nationally, the early age of onset, high morbidity and limited functional independence has made this a costly problem. For this reason, the promise of significant functional recovery using cellular replacement therapy (CRT) in the field of SCI is a highly attractive option. Stem cell therapy (SCT), a subset of CRT, is the first potential treatment aimed at targeting the primary injury through the repair of disrupted axonal architecture, and replacement of lost neuronal and glial tissues.

### Stem Cell Therapy for Spinal Cord Injury — What Have We Learned?

**Fetal-derived embryonic and adult-induced pluripotent stem cells**, as well as directly reprogrammed cells, represent the various potential cell stocks for spinal cord therapy. Delivery of these cells can result in restoration of anatomic pathways, promote neural plasticity and improve neurologic function. These cells can be further differentiated into committed neural lineages such as with neural stem cells (NSC) or their progenitors, resulting in a number of hopeful cellular therapies that could be of clinical interest in future trials.

### Marrow Stromal Cells

Marrow stromal cells (MSCs) are harvested from the bone marrow, and are mesenchymal stem cells by nature because of their capacity for differentiation into mesoderm-derived tissues such as bone, fat, muscle and cartilage. Since these cells are among the easiest to gather autologously, either through peripheral venous harvest or bone marrow aspiration, recipients can forego immunosuppression. As a result of this relative ease of use, the majority of registered clinical trials involve the use of MSCs. However, limited data has demonstrated the efficacy of achieving neural differentiation from MSCs. Overall, bone marrow-derived stem cells have been studied in small Phase I trials demonstrating a limited morbidity. However, their results are confounded by small sample size, lack of controls and a relatively short-term follow-up.

### Olfactory Ensheathing Cells

Olfactory ensheathing cells (OECs) are derived from the nasal mucosa. These cells are an attractive transplant option since it is believed that they may promote recovery through the relaying of information across an injury site by direct axonal repair. However, they suffer from limitations of graft morbidity (potential anosmia) and limitations in the small neural cell stock derived from the nasal mucosa.

### Schwann Cells

Schwann cells can be harvested from a peripheral nerve, such as the sural or intercostal nerves, with limited morbidity to the patient (minimal sensory deficit). Schwann cells promote recovery through the support of axonal growth and myelination in the PNS. Further reports on Schwann cell use will be expected upon the conclusion of Phase I studies initiated at major US institutions.

### Neural Stem Cells

Of the aforementioned cell therapies, Neural Stem Cells (NSCs) have the capacity to replace lost neural cells, provide neuroprotection, serve as a relay, and provide a scaffold for mediating cellular traffic across the injury cavity. NSCs can be directly harvested from human fetal tissue, pluripotent human embryonic stem cells (ESCs) at the blastocyst stage, or induced pluripotent stem cells (iPSC) by way of the reprogramming of skin-harvested fibroblasts. iPSCs can be reprogrammed directly to NSC state or to earlier stage ESCs, and differentiated to committed neural or glial lineages. NSCs are a promising source for cell replacement therapy because of this multipotent nature; they have the ability to generate a glial-committed lineage for astrocytes and oligodendrocytes, as well as form new neurons. For these reasons, their applications are being realized in a number of CNS disorders in addition to SCI, such as amyotrophic lateral sclerosis (ALS) via astrocyte replacement, as well as with multiple sclerosis (MS) and other demyelinating disorders via oligodendrocyte replacement.
One prior case study has reported on the use of harvested fetal NSCs in the chronic SCI environment, with positive results. Based on preclinical data with the use of human fetal spinal cord-derived NSCs, and human embryonic-derived NSCs, respectively, Neural Stem Cells, Inc. (Rockville, MD) will be entering Phase I of their clinical trial for SCI in 2014. This is the first multicenter trial in the United States involving the transplantation of a cellular therapy for SCI since The Geron Corporation (Menlo Park, CA) discontinued patient enrollment in 2011 in their trial of human ESC-derived oligodendrocyte-precursor cells (OPC) in SCI.

Conclusions
Interest and understanding in this branch of SCI treatment is growing. Considerable advances have been made in the understanding of cellular therapies as a mechanism for SCI treatment, illustrated by a variety of treatment options that have been implemented in novel clinical trials including OECs, fetal-derived NSCs and Schwann cells, whose applications are not limited to SCI. Further refinement of these methods should be made in the future to limit patient morbidity.

Figure 1: Common experimental model for testing Stem Cell transplant. Adult Sprague-Dawley rats received once-daily subcutaneous injections of 10mg/kg Cyclosporine A, beginning four days prior to transplantation and continuing throughout the duration of the experiment.

Figure 2: Human nuclear immunofluorescence stain (HuNu) and GFAP staining show human transplant survival of human embryonic stem cell-derived neural stem cells into the injured rat spinal cord. (hESC-NSC) A, 10X montage, A, 40X. hESC-NSC survival is demonstrated, as well as graft migration. Also shown is transplant survival of human embryonic stem cell-derived glial restricted progenitors. A dorsal column hemisection lesion model of spinal cord injury that generates a distinct cavity was performed at the C4 vertebral level. H9-NSCs (Passage 12) or GRP (AHIF DIV17), suspended at 250,000 cells/uL in 50% Type I Collagen (PureCol)/50% Basal Medium Matrix were acutely transplanted into the lesion cavity. Dura was closed with 9-0 suture and covered with Biobrane Regenerating axons and traced with Cholera Toxin B subunit (CTB) injected into the ipsilateral sciatic nerve three days prior to sacrifice. Animals were sacrificed three weeks post transplantation for histological processing.
Neurosurgery operating rooms (ORs) are now under continuous surveillance of expert, social and legal cameras. Work hour restrictions, patient safety concerns, governmental policies, patient loads in ORs, increasing costs and rapidly changing technologies towards minimally invasive surgeries are the factors that demand radical changes in the training pattern. Gradually limiting opportunities to operate on patients is driving the development of simulation in different streams of surgery. In neurosurgery, this need is far more observed because of minimal margin of error and morbid consequences.

Simulation in neurosurgery in India has made a significant step in education and skills training on an academic and translational research platform. Neurosurgery Education and Training School (NETS) is the non-profit-based education and skills training platform established at the All India Institute of Medical Sciences (AIIMS), New Delhi, with Indo-German and medico-

Figure 1: Neurosurgery Education and Training School (NETS) Infrastructure and various learning activities. A. Microneurosurgery Skills Training Laboratory; B. 3D Microscope; C. High-Speed Drilling Laboratory; D. Neuroendoscopy Laboratory; E. and M. Microsuturing practice; F. High-speed drilling practice; G, N. and P. Endonasal skull base cadaver practice; H. Gross Anatomy Cadaver Dissection Laboratory; I. and K. Neuroanatomy demonstration over plasticated specimen; J. and O. Spine instrumentation; L. Video-based interactive lecture at workshop.
technological collaboration with Indian Institute of Technology (IIT), Delhi, India. The development of this platform is funded by extramural grants from the Government of India, namely, the Department of Science and Technology (DST), Department of Biotechnology (DBT), Department of Health Research (DHR) and the Indian Council of Medical Research (ICMR). NETS provides opportunities and learning materials for both trainees and trained neurosurgeons around the world. All content and learning materials undergo a strict content, resource, fact and construct validation, along with close surveillance by a national advisory board of experienced neurosurgeons and technologists.

Unlike other surgical specialties, neurosurgeons’ habitats can vary from conventional ORs to microscopic neurosurgery and neuroendoscopy ORs, as per the demand of approach. Under microscope, instruments move faster, the field is magnified several times over and tremors are more apparent. Transition from microscopic to neuroendoscopy habitat is further challenging as one operates at a distance looking at a monitor with only two dimensions of vision and a limited field of surgery. Simulation helps in adapting to the changed ergonomics of microscopic and neuroendoscopic ORs. The Neurosurgery Skills Training Facility (NSTF) comprises of well-established separate laboratories for microneurosurgery, high-speed drilling, neuroendoscopy and gross cadaver anatomy laboratories. Laboratories are equipped with operating microscopes, neuroendoscopes, microscopic and endoscopic instrument sets, pneumatic and electric high-speed drills, high-definition cameras and monitors with recording and storage facilities (Figure 1). Additionally, there are a spectrum of computer-based and non-computer-based simulations for neurosurgery education and skills training (Figure 2). The major objective is to develop skills training curriculum in neurosurgery under modular approach for training in microscopic neurosurgery, neuroendoscopy, 

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**DST+DBT+DHR*-Sponsored Neurosurgery Skills Training Facility**

**Microneurosurgery Modules**

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<td>• Cadaver vessel and nerve anastomosis</td>
<td>• Vessel anastomosis (live animal)</td>
<td></td>
</tr>
</tbody>
</table>

**High-Speed Drilling Modules**

<table>
<thead>
<tr>
<th></th>
<th><strong>BASIC</strong></th>
<th><strong>INTERMEDIATE</strong></th>
<th><strong>ADVANCED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flap design, burr holes, sheep scapula/sheep head drilling</td>
<td>• Sheep head split calvarial graft</td>
<td>• Microscopic drilling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Egg shell drilling</td>
<td>• Cadaver-anterior clinoid process and anterior petrous drilling, far-lateral</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Microscopic drilling (sheep head/sheep scapula)</td>
<td>• Endoscopic drilling</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Endonasal extended skull base</td>
<td></td>
</tr>
</tbody>
</table>

**Neuroendoscopy Modules**

<table>
<thead>
<tr>
<th></th>
<th><strong>BASIC</strong></th>
<th><strong>INTERMEDIATE</strong></th>
<th><strong>ADVANCED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts assembling</td>
<td>• Hand-eye coordination practice on models, capsicum, papaya (natural simulation)</td>
<td>• Hand-eye coordination practice on endo-trainer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Practice on Cadaver)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ventricular and skull base anatomy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• FESS model</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Endonasal extended skull base</td>
<td></td>
</tr>
</tbody>
</table>

**Spinal Instrumentation Modules**

<table>
<thead>
<tr>
<th></th>
<th><strong>BASIC</strong></th>
<th><strong>INTERMEDIATE</strong></th>
<th><strong>ADVANCED</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry points, laminoplasty</td>
<td>• Anterior cervical plate fixation (synthetic models)</td>
<td>• Occipito-cervical fusion, odontoid screw, C1-2 transarticular screw fixation, dorsal/lumbar pedicle screw fixation (synthetic models)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Skills training modules for basic, intermediate and advanced stage of learning.

*DST, Department of Science and Technology; DBT, Department of Biotechnology; DHR, Department of Health Research-DHR; SR, Senior Resident; MCh, Master in Chirurgical; DNB, Diplomate in National Board; PGY, Post Graduate Year
The training is executed on a structured, formulated, standardized and validated pattern, which allows for formative and summative assessments of task-based and procedure-based performances. Since its inception in 2010, 160 students have participated in 3,096 routine training sessions through December 31, 2013. Apart from that, there are quarterly, three-day-long organized Neurosurgery Skills Training Workshops for trained neurosurgeons (14-18 trainees per workshop) giving them the opportunity to revise and update their skills. Each training session consists of an interactive cognitive training regarding a procedure, a video demonstration, a recapitulation of techniques and finally, hands-on practice. Faculty members evaluate the trainees on subjective and objective criteria independently. Simultaneously, trainees evaluate the content and faculty, which helps in regular improvement of workshop and identification of candidates with instructor potential (Table 2). To date, 12 skills training workshops have been attended by 169 trainees and 21 trainers.

NETS also hosts a global, free access, open-source virtual learning platform available at http://www.aiimsnets.org and http://aiimsnets.cse.iitd.ac.in. This is a multi-authored, multinational, e-learning platform for synchronous and asynchronous neurosurgery training and learning (Figure 3). It consists of self-paced learning materials in the form of texts, webinars, PowerPoint presentations and operative videos with three-dimensional (3D) animation and graphics-based content to enhance the learning experience for the trainees. It covers topics from general to subspecialties in neurosurgery, e.g., vascular, skull base, pediatrics, neuroendoscopy, functional, peripheral nerve and neurotrauma, as well as recent advances. The edited operative videos are comprised of microscopic and endoscopic recordings of various neurosurgical procedures, e.g., aneurysms, arteriovenous malformations, neuroendoscopy, skull base tumors and neuro-oncology.

It also entails an open-source Moodle-based (Modular Object-Oriented Dynamic Learning Environment) restructuring of the e-learning system for the incorporation of a database of Computer-Based Tests (CBT) and Internet-Based Tests (iBT) to facilitate self-evaluation modules. A team of neurosurgeons, technologists and application specialists integrate the contents under the five modular approaches at the Neurosurgery Animation, Graphics and Video Editing Laboratory (NAGVEL). This computerized simulation material is then uploaded on the e-learning platform. Case-specific surgical approaches on animation-based modules have been designed, with the animated movements of high-end medical equipment (high-speed drills, neuroendoscopes, microscopes, etc.). We believe that with the help of these 3D animation/graphics-based videos, beginner trainees will become acquainted with the complex assembly of the equipment as well as...
Apart from NETS, several other cadaver-based simulation workshops are sporadically offered in India. NETS simulation workshops are rated high for quality learning materials, trainee attendance and feedback by trainees and trainers. Neurosurgery training in India is still apprenticeship-based — which is something that requires a radical change as per rapidly evolving surgical practices. Simulation may help to fill this gap if incorporated as a training curriculum in routine residency programs.

**Acknowledgements**

We give our sincere thanks to Professors P.N. Tandon, A.K. Banerjee, V.S. Mehta and A.K. Mahapatra for their untiring efforts and guidance in establishing this laboratory. We would like to acknowledge the efforts of technical and application specialists from Neurosurgery Skills Training Facility, Neurosurgery Education and Training School, All India Institute of Medical Sciences, New Delhi, India. We thank Mr. Subhas Bora, Mr. Ajab Singh, Mr. Ram Niwas, Mr. Shashi Shekhar, Mr. Trivendra Yadav, Mr. Aakash Sharma, Mr. Gaurav Bharadwaj, Mr. Suresh Kothari, Mr. Vikram Singh and Mr. Satish Kumar for their untiring and invaluable support.

**Table 2:** Evaluation of workshops by trainees separately for basic and advanced neurosurgery skills training workshops.

<table>
<thead>
<tr>
<th>Skills Training Workshop</th>
<th>Excellent</th>
<th>Good</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neuroendoscopy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic</td>
<td>481/672</td>
<td>175/672</td>
<td>16/672</td>
</tr>
<tr>
<td>Advanced</td>
<td>745/1077</td>
<td>299/1077</td>
<td>33/1077</td>
</tr>
<tr>
<td><strong>Drilling</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Basic</strong></td>
<td>503/743</td>
<td>206/743</td>
<td>34/743</td>
</tr>
<tr>
<td><strong>Microsuturing</strong></td>
<td>722/1010</td>
<td>251/1010</td>
<td>37/1010</td>
</tr>
<tr>
<td><strong>Spine &amp; Spine</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instrumentation</strong></td>
<td>467/645</td>
<td>162/645</td>
<td>11/645</td>
</tr>
<tr>
<td><strong>Advanced</strong></td>
<td>549/786</td>
<td>213/786</td>
<td>14/786</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td>1450/2060</td>
<td>543/2060</td>
<td>61/2060</td>
</tr>
<tr>
<td><strong>Advanced</strong></td>
<td>2016/2873</td>
<td>763/2873</td>
<td>83/2873</td>
</tr>
</tbody>
</table>

**Table 3:** e-Learning Platform: A. Integration of web-based components; B. Software architecture; C. Statistics of NETS education platform (CMS, Content Management System; LMS, Learning Management System; SCORM, Shareable Content Object Reference Model; NETS, Neurosurgery Education and Training School; Moodle, Modular Object-Oriented Dynamic Learning Environment)
Boxing and Head Injuries: Lifelong Interests Can Develop from Unimaginable Sources

Philadelphia is a very unique city and famous for a myriad of things; one of which is boxing, and it has been that way for well over a hundred years. Randall “Tex” Cobb, who came to Philadelphia from Texas in the seventies to pursue a boxing career, was asked by journalist Pete Dexter what it was that made Philly a boxing mecca, to which Tex replied, “It is the only city in the world where you will see bums and drunks fighting each other in alleyways working off a jab or a hook.” On the other hand, rural Pennsylvania (like Oklahoma, Iowa and Ohio) is famous for wrestling, but not in Philadelphia. In 1971, Joe Frazier was the heavyweight champion of the world, and in April, he had beaten Muhammad Ali who lived “right over the bridge” in Cherry Hill, NJ. Boxing has just been a completely full-blown subculture in Philadelphia for as long as anyone could remember.

As a 10-year-old growing up in Philadelphia, my favorites were the local fighters I saw at the Philadelphia Arena at 4530 Market Street, the Blue Horizon at 1314 North Broad Street and sometimes even in the Spectrum at 3601 South Broad Street in South Philadelphia. Eugene “Cyclone” Hart was my favorite of all. On September 21, 1971, Hart was 21 years old and was going to face former world champion Denny Moyer at the Spectrum. Hart had the upper body of a heavyweight, but very spindly legs as a result of polio as a child. His record was 21 wins with 20 knockouts and no losses. I am certain that my interest in head injuries is a direct result of what happened on that night 43 years ago. Hart and Moyer fell out of the ring in the seventh round, and both sustained closed head injuries. The fight was halted, and a no-contest was declared.

My interest in boxing horrified my mother, who steadfastly never attended a single amateur or professional bout I ever had. As the father of four sons, I now know why. Luckily, in my early twenties while I was an undergraduate (and also boxing as a professional), I listened to the one time it really counted and left boxing to pursue medical school. Dr. Thomas Generalli was doing primate research on head injuries at the University of Pennsylvania (which became front page news when PETA invaded the lab), and his colleague Michael J. O’Connor and I were watching a videotape of famous fights. Dr. O’Connor surmised that the videotape confirmed what was observed in the lab. The angular punches (like hooks, uppercuts, overhands) were the ones that most often placed the head in rotation and resulted in knockouts when compared to the linear punches (straight right or left hands) that resulted in a much smaller arc of rotation.

I have always loved boxing, even while knowing that it was a high-risk behavior. The vast majority of people participating in boxing often do not have much in the way of easily accessible resources. A surprisingly few fighters are on the fence between joining the church choir and boxing. I am a very happy father to four sons, but clearly remember how I was going to pitch to my first son (not even a week old at the time) why he should wrestle rather than box.

I have stayed as actively involved with boxing as I was able to over the years. I have cared for many fighters (and of course, their families as well) since about 1989. It has been very interesting to see how much closed head injuries have captured the headlines since sports with incredibly more resources, like the NFL, NHL, etc., have begun to get involved. I suppose it is natural that most of my involvement is with Philadelphia fighters since their trainers, managers and cut men were the people I boxed with as a kid. I spend quite a bit of time with cut men trying to help them with hemostatics, and with trainers and managers discussing return to sparring and training.

In 1971, “Cyclone” Hart fell out of the ring and sustained an injury that went undetected. That was the pre-CT era, and he seemed to recover back to baseline. Denny Moyer seemed to have a similar injury, but continued to fight for a few more years before retiring, and as is not unusual among fighters, developed dementia pugilistica and died in a nursing home near his home in Portland, OR in 2010. “Cyclone” Hart, who was about the hottest thing Philadelphia had seen in quite some time, was never the same after that night. He had never been knocked out in the hundreds of amateur bouts he fought, but after returning to the ring with a 21-0 start, he went 9-8-1 for the remainder of his career. In other words, he was knocked out in every loss after that night, except in one instance when he went the distance. He had lost some element of psychomotor skill that wasn’t detectable by physical exam or the technology available at the time.

After graduating from medical school in 1989 and pursuing a career in neurosurgery, who could have predicted the explosion of knowledge in neuroscience since then? At any rate, it’s often uttered among physicians and scientists that nothing has advanced neuroscience as much as war and motorcyles, and I’m sure that is correct, but in my own experience, boxing has had a hand in it as well.
Prologue to a Second Act — A Young Physician’s Actions and Aspirations

Benjamin Carson. Sanjay Gupta. William Mallon. I hope that I may someday join the ranks of these politically enthusiastic neurosurgeons in order to help advance and promote causes that will aid in the progression of our field, the greater field of medicine, and most importantly, our patients. I was very happy to write a piece for Congress Quarterly, however, I am not currently at a stage of my life where I would consider myself to be in a “second act.” I am still in the prologue of my career as a neurosurgeon. I have completed medical school and am undertaking a year as a general surgery resident at New York-Presbyterian Hospital/Columbia University Medical Center. While I was disappointed to receive a negative letter from the NRMP, I am committed to pursuing a career in this field and will be reapplying this coming September. There is simply no other branch of medicine that I find to be as exciting as this, and I know that I may utilize the position of being a neurosurgeon in the future to become a leader within the medical community, and simultaneously, the government.

In ten years’ time, I see myself as a specialist focusing on the spine and combining that with the new and rapidly expanding field of functional neurosurgery. My goal will be to help restore lost function to patients who have suffered traumatic injuries, amputations or neurodegenerative disorders. I would also like to become involved in local government wherever I end up practicing, which ideally would be in an underserved location like that of my medical education, a place where I can make a difference. During my time living in Newark, NJ, I have become interested in the local history and politics of the city, and I realize that there are a variety of factors that have contributed to its current status. It is an ideal city for trying out new ways and means of bringing a city out of poverty, reducing violence and combating poor health. I believe that physicians should not only be concerned with the health of their patients on an individual level, but they should as a whole try to influence policies that better enable us to treat or even prevent the medical issues that plague our society. I also believe that being a politician should come second, and that our leaders should maintain an identity outside of government, holding office as an act of service, not as a career.

Last year, our mayor left the city to become our senator, and likewise, a councilman left to become a congressman. This piqued my interest in possibly running for a position on the city council. Despite the fact that many Newarkers spoke with seemed to have a distrust of people from outside the city limits, they shared my vision, which gave me confidence and made me think I had a chance. Ultimately, given the hectic nature of the final year of medical school, I decided this was a noble fantasy. The election for the city council would be held in May 2014, and I figured that the possibility of not living in Newark would be a poor selling point for candidacy.

For the past three summers, I have been involved with Newark’s “Adopt-a-Lot” Program, which allows any resident of the city to transform a garbage-filled, overgrown, city-owned property into a prosperous garden. With the help of my brother, other medical and undergraduate students, and local residents from the neighborhood adjacent to my school, we revitalized an unoccupied corner lot and turned it into a very successful garden. Before I graduate I will improve it even more, and hopefully expand and construct another garden in the same neighborhood with the help of the local gardening network.

As far as my future political goals are concerned I have a few ideas I would like to see come to fruition. My ultimate objective would be to see an expansion of Medicare that would include all Americans. I know that many physicians are apprehensive about this, but that leads me to another important goal, which is maintaining and possibly increasing the reimbursement of physicians, most essentially, primary care physicians. Being overworked and undercompensated is a duality that is a reality for primary care physicians and it is an issue that needs to be addressed for what I consider to be the bedrock of medicine. Thirdly, I think the only way physicians can work together to change the system for the better is by having an idea of how it all works in the first place. During my time in medical school, I gained an understanding through personal study and peripheral explanations from physicians with whom I worked, and based on the knowledge I received I would love to assist in the development of a medical school course focused on the economics of healthcare. I have many other ambitions for which I would like to see advanced in America during my lifetime, but for right now my sights are set on becoming a neurosurgeon.

William Mallon, MD

Fairmount Garden at the corner of Fairmount Avenue and 13th Avenue, Newark, NJ.
President Signs Bill to Avert Medicare Pay Cut; Delays ICD-10 for One Year

On April 1, 2014, a 24% Medicare physician pay cut was averted when President Obama signed into law H.R. 4302, the “Protecting Access to Medicare Act of 2014.” In addition to preventing the pay cut, the bill delays the implementation of ICD-10 diagnosis codes for at least one year until October 1, 2015. When implemented, ICD-10 will have roughly 68,000 available codes in comparison to ICD-9, which has 13,000 codes.

The legislation includes other provisions of interest to neurosurgery, including:

- Extending the Centers for Medicare & Medicaid Services (CMS) “Probe and Educate” program for auditing hospital discharges related to CMS’ “2-Midnight Rule” through the first six months of 2015, and suspending the Recovery Audit Contractors (RAC) post-payment audits under the policy through March 2015;
- Requiring the Government Accountability Office (GAO) to conduct an independent evaluation concerning the implementation of the Children’s Hospital GME Program, outlining the number of hospitals receiving payments, amounts awarded and how the hospital used the payments;
- Mandating the utilization of appropriate use criteria for ordering diagnostic imaging beginning in 2017;
- Requiring CMS to reduce “misvalued” procedures, cutting values representing 0.5% of total Medicare physician program expenditures each year from 2017-2020; relative value reductions of 20% or more for existing codes will be phased in over a two-year period; and
- Increasing the mandatory Medicare sequester cut amount in the first six months of 2024 from 2% to 4%.

The CNS and AANS are disappointed that Congress was unable to move forward bipartisan legislation to repeal and replace Medicare’s sustainable growth rate (SGR) physician payment system. We will continue to press Congress to pass full SGR repeal this year.

CMS Publishes Medicare Data on Physicians

On April 9, 2014, the Centers for Medicare & Medicaid Services (CMS) released data on services and procedures provided by approximately 880,000 individual healthcare professionals. According to CMS, its intent in releasing the data is to improve transparency, affordability and accountability in the healthcare system. The data is organized by National Provider Identifier (NPI), Healthcare Common Procedure Coding System (HCPCS) code, and whether the service was furnished in a facility or office setting (place of service). The data set includes:

- Name, NPI and address of each provider;
- Number of services, identified by CPT code;
- Average submitted charges and standard deviation in submitted charges;
- Average allowed amount and standard deviation in allowed amount;
- Average Medicare payment and standard deviation in Medicare payment; and
- Number of the unique beneficiaries treated.

In both the agency’s blog post and its letter to the American Medical Association, CMS emphasized its commitment to beneficiary privacy. The data will not include any personally identifiable information about Medicare beneficiaries, and data will be redacted in cases where it includes fewer than 11 Medicare beneficiaries.

The CNS and AANS are concerned that the physician payment data could be misinterpreted. Because the data does not provide the context for the physicians’ payments, patients and/or researchers, the media or others may draw inaccurate conclusions. Neurosurgeons are therefore encouraged to review their data for accuracy. Although the agency has informed the medical community that it will not initiate a process for addressing data errors, it is important for neurosurgeons to be able to explain the details behind to their claims data. While the CMS spreadsheets provide these details, The New York Times and The Wall Street Journal have developed searchable databases that are more user-friendly.
> THE MEDIAN AND MEAN ERX INCENTIVE PAYMENTS PER NEUROSURGEON WERE $1,248 AND $1,539, RESPECTIVELY, COMPARED TO $1,021 AND $1,632 FOR ALL PHYSICIANS. <

Electronic Prescribing (eRx) Experience Report, highlighting a significant increase in participation in both the PQRS and eRx programs. According to the results in brief, overall participation in 2012 increased by 26% from 2011.

The following information pertinent to neurosurgery is included in the 2012 report:
- 1,632 neurosurgeons received a PQRS incentive payment;
- PQRS incentive payments totaling $1,117,878 went to neurosurgeons;
- The median and mean PQRS incentive payments per neurosurgeon were $557 and $685, respectively, compared to $295 and $548 for all physicians;
- 702 neurosurgeons received an eRx incentive payment;
- eRx payments totaling $1,080,659 went to neurosurgeons; and
- The median and mean eRx incentive payments per neurosurgeon were $1,248 and $1,539, respectively, compared to $1,021 and $1,632 for all physicians.

Additional Meaningful Use Hardship Exception Available to Physicians

The Centers for Medicare & Medicaid Services recently announced there will be an additional hardship exception available to physicians in order to avoid a financial penalty under the EHR Incentive Program. The exception applies to those who have not received or were unable to implement updated 2014 certified software. Some physicians, such as those new to Medicare or those in certain specialties, are exempt from the penalty and do not need to apply for a hardship in 2014. To review the hardship exemptions now available, click here.

New Report Shows Significant Increases in PQRS and eRx Program Participation in 2012

The Centers for Medicare & Medicaid Services (CMS) recently released the 2012 Physician Quality Reporting System (PQRS) and
The Neurosurgery® compendium has undergone some exciting developments in the first quarter of 2014, including a spin-off of Operative Neurosurgery® (ONS) as an independent publication and the selection of a new Managing Editor for both Neurosurgery and ONS.

Operative Neurosurgery (ONS) has been available as a printed supplement to Neurosurgery since January 2005 and is currently published quarterly. ONS complements the main journal by featuring technique-focused articles and videos that highlight the nuances of operative neurosurgical techniques, instrumentation, devices and new technology.

With the March 2014 issue, ONS officially became a separate publication, rather than a supplement to Neurosurgery. This joint decision was made by the Neurosurgery editorial board, the publisher (Wolters Kluwer Health, formerly Lippincott Williams & Wilkins) and the Congress of Neurological Surgeons to honor the different focus of ONS as a practical resource for cutting-edge material that connects directly to the operating room.

In order to properly distinguish the “red” and “blue” editions of Neurosurgery and ONS for authors and subscribers, Wolters Kluwer Health is in the process of developing a separate website for ONS. The editorial office will also release a separate submission and review website, where authors can send their articles directly to ONS. While it has always shared an identical editorial review board with Neurosurgery, ONS will also eventually have its own separate editorial board. These board members will focus solely on encouraging, reviewing and selecting the best manuscripts with an operative focus.

Potential authors are, of course, interested in publishing their work in a journal with the highest possible indexing and ranking designations. For the time being, ONS will proceed with the same indexing/ranking as the main journal, until three independent issues have been published. At that time — early 2015 — WKH will apply for separate MEDLINE®/PubMed indexing for ONS. After MEDLINE/PubMed indexing status is granted, we can then proceed with an application to Thomson Reuters for inclusion in their Journal Citation Reports®, which is what will provide an independent impact factor for ONS. When these steps are complete, ONS articles will be classified separately in all search, indexing and ranking services.

We cordially invite you to submit your manuscripts related to operative approaches, techniques or nuances, instrumentation and new devices, operating room design, complication avoidance and management and surgical anatomy to ONS. Please contact the editorial office with any questions via email to: managingeditor@1cns.org.

On a personal note, I was pleased to join the Congress of Neurological Surgeons in March 2014 as the new Managing Editor of both Neurosurgery and ONS. I was previously Managing Editor of Aesthetic Surgery Journal and the American Journal of Ophthalmology. I have 12 years of experience overseeing the production and marketing of peer-reviewed medical journals, and hold a Master’s degree in Adult Education for Health Professionals. I am looking forward to putting my experience and expertise to work for Neurosurgery, building on the incredible tradition of cutting-edge science and innovative publishing methods.
Boston, Massachusetts is one of those cities that offers something for everyone year-round, but it is especially breathtaking in the fall. As the foliage begins to turn, this beautiful city provides an exceptional backdrop for the neurological event of the year; the Congress of Neurological Surgeons Annual Meeting, October 18-22, 2014. The city is one of the oldest in the United States, and is rich with history dating back to the 17th century. It boasts of opening America’s first public schools and the first university (Harvard) in the 1630s, and in the 1700s, it played a large role in the American Revolution.

Today, Boston is home to some of the most prestigious universities and medical centers in the world. Boston’s economy is largely built on the education, healthcare, finance and technology (information technology and biotechnology) industries. It is home to numerous museums, the world class Boston Philharmonic and admirable sports teams.

Although it is a metropolitan city, Boston has an enormous amount of greenery, dubbed “Boston’s Emerald Necklace,” that is a six-mile stretch of green parkland, complete with waterways and wildlife. Boston is compact with many things to do within walking distance — you can actually walk from one end of the city to the other in just 30 minutes. That does not include, of course, stopping to take advantage of Boston’s plethora of sightseeing and entertainment options.

The real reason to come to Boston this fall is the Congress of Neurological Surgeons Annual Meeting. Neuroscience and neurosurgical technologies continue to evolve at a breakneck pace. How do we evaluate the merits of new technologies? How do we sift through the myriad of novel scientific advances? How do we remain current with our clinical practice? It is with these questions in mind that we designed cutting-edge and timely scientific content for the CNS 2014 Annual Meeting. Through multiple forums for education, such as the debate-style controversy session, neurosurgeons will assess varying perspectives on treatment paradigms of diverse clinical disorders, such as lumbar spine disease (conventional versus minimal invasive surgery), unruptured aneurysms (surgery versus endovascular intervention versus observation) or Chiari malformations. Live surgical cases will highlight innovative and traditional surgical approaches such as expanded endonasal endoscopy, lateral approaches to the lumbar spine and aneurysm repair.

The Affordable Care Act has changed the landscape of medicine for both practitioner and patient. Healthcare economics have become a critical part of neurosurgical practice. In order to understand pivotal and relevant components to the Affordable Care Act, the scientific program has incorporated lectures and sessions (in the Hot Topic segment) to provide insight into practice changes resulting from the Affordable Care Act.

Neurosurgery is also becoming increasingly technology-dependent. As a specialty, neurosurgery is becoming interdependent on other disciplines in integrated healthcare systems. The scientific program for the 2014 CNS Annual Meeting is aimed at understanding this rapidly changing landscape, and we hope to provide you with the necessary tools to find the balance that is right for your practice. Please join us in Boston for what will be our most novel and riveting meeting yet!
High-resolution confocal scanning laser microscopy of a layer II/III cortical pyramidal neuron from a patient with temporal lobe epilepsy.

Submitted by:
Farid Hamzei-Sichani, MD, PhD
Mount Sinai Medical Center
Ashwini D. Sharan, MD
Thomas Jefferson University
Benefits of attending:

• Explore and review relevant neurosurgical topics
• Identify topic area strengths and weaknesses
• Become acquainted with the Board Exam format
• Develop test-taking strategies
• Participate in a variety of presentation formats including lectures, panel discussions, case-based discussions and smaller tutorial sessions

Esteemed Faculty:
Costas G. Hadjipanayis, MD
Bernard R. Bendok, MD
Julie Pilitsis, MD
Robert J. Spinner, MD
James S. Harrop, MD
Jamie S. Ullman, MD
Patricia B. Raksin, MD
Tord D. Alden, MD
Jose Biller, MD

Learning Objectives

Upon completion of this educational activity, participants will be able to:

• Identify strengths and weaknesses in neurological surgery knowledge.
• Integrate information from the many subspecialties of neurological surgery.
• Implement changes in clinical practice in accordance with recent advances and clinical guidelines.

Space is limited. Register today! www.cns.org