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THE HISTORY OF NEUROSURGERY AT THE HOSPITAL FOR SICK CHILDREN IN TORONTO

THE TRADITION OF selfless charity for children in Toronto was established by Elizabeth McMaster, founder of the Hospital for Sick Children, or "Sick Kids," in 1875. The tradition of fortitude and perseverance in trying to cure children who were deemed incurable by others was sealed into the history of the Hospital by early pioneering surgeons, including Drs. Clarence Starr, A.W. Farmer, and William Gallie. Dr. William Gallie recognized the importance of neurosurgery for the future of the Hospital and encouraged Dr. William Keith to acquire training in pediatric neurosurgery in Chicago and London. Dr. Keith began the practice of pediatric neurosurgery at Sick Kids in 1935 and worked in the primordial phase of the subspecialty for the next 20 years until he was joined by Dr. E. Bruce Hendrick in 1955. In time, Dr. Hendrick was joined by Drs. Harold Hoffman and Robin Humphreys who led a decidedly strong pediatric neurosurgery unit between 1975 and 1995. During this epoch, the pediatric neurosurgery service grew to become one of the busiest and most progressive units in the world. Over the years, numerous neurosurgery fellows and faculty from all over the world have trained at or have visited Sick Kids to learn how pediatric neurosurgery is practiced in Toronto. The purpose of this article is to review the history of the individuals who founded the Hospital for Sick Children and its Division of Neurosurgery.

KEY WORDS: Hospital for Sick Children, Medical history, Neurosurgery, Pediatric neurosurgery

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The pediatric neurosurgery service at the Hospital for Sick Children ("Sick Kids") has had a rich tradition of excellence devoted to children with neurosurgical disorders. Although the first neurosurgeon to perform surgery at Sick Kids was Dr. William Keith in 1933, it was not until the arrival of Dr. E. Bruce Hendrick, Canada's first fully trained pediatric neurosurgeon, who had trained under Dr. Donald Matson in 1952, that a full-time pediatric neurosurgeon was devoted to the care of children. Dr. Hendrick was subsequently joined by Dr. Harold Hoffman in the 1960s and Dr. Robin Humphreys in the 1970s at a time when pediatric neurosurgery was developing as a bona fide subspecialty in neurosurgery. Other centers that were developing pediatric neurosurgery services at this time were located in Boston, Chicago, Philadelphia, and New York.

The following is an account of the history of the Hospital for Sick Children, a haven where pediatric neurosurgery has grown and flour-

ished and where numerous fellows and faculty from all corners of the globe have come to seek specialty training in the field.

ELIZABETH MCMASTER AND MAGGIE: THE HISTORY OF THE HOSPITAL FOR SICK CHILDREN

Elizabeth Janet Wyllie, the daughter of Scottish immigrants, George Black Wyllie and Mary Ann Reid, was born on December 27, 1847, in Toronto. She married Samuel Fenton McMaster on June 1, 1865, when she was not yet 18 years of age. Samuel F. McMaster was a successful businessman in the dry goods importing industry. He was the nephew of Senator William McMaster, founder of McMaster University in Hamilton, Ontario. By 1874, Elizabeth McMaster had already borne three children.

During that time, the population of the city of Toronto was 68,000. For the most part, it was a wealthy, bustling city enjoying its eighth year

as the capital of Ontario. However, the streets were also filled with Torontonians who were desperately poor. There were no welfare, family allowance, health plan, unemployment insurance, or pension plans to help them. Children suffered the most, coughing from bronchopneumonia; hobbling from tuberculosis osteomyelitis; and dying from diphtheria, scarlet fever, typhoid fever, and septicemia (4). Elizabeth McMaster believed that general hospitals did not provide the special care children needed (4). Childrens' hospitals had already been established in 17 major European cities, but the only childrens' hospital in the British Empire was at Great Ormond Street in London. Elizabeth McMaster was determined to establish the second one in Toronto (Fig. 1) (4).

FIGURE 1. A portrait of Elizabeth McMaster, founder of the Hospital for Sick Children, still hangs in the main corridor of the hospital today.

In 1874, a group of deeply religious women who possessed a strong social conscience and cared a great deal for the condition of the poor met in the home of Mrs. Elizabeth McMaster to consider how they could help sick children. They decided to establish a hospital to help the poor and sick children of Toronto. The hospital they founded was opened on March 1, 1875. The group of women rented an 11-room house in downtown Toronto, where the Toronto General Hospital now stands, for \$320 a year. There, they set up six iron cots and declared the hospital open "for the admission and treatment of all sick children" (4). One month later, on April 3, 1875, Maggie, a victim of a scalding burn, became the first patient of the Hospital for Sick Children in Toronto.

The first Annual Report of the Hospital (4), dated July 1, 1876, stated that in the first year, the Hospital treated 111 patients. Forty-four children were inpatients; 67 were treated as outpatients. Of the inpatients, 21 were surgical patients and 23 were medical patients. Interestingly, this ratio between surgical and medical patients seen in the Hospital has been maintained to the present time (17).

The demand for services was so great that the hospital had to move to a larger building in 1876, another rented house at 206 Seaton Street. This house could accommodate 16 patients at one time. In 1891, under the leadership of John Ross Robertson, publisher of the *Evening Telegram* and chairman of the Hospital's Board of Trustees, the Hospital for Sick Children moved to a new four-story, 320-bed facility at the corner of Elizabeth and College Streets (Fig. 2). The Toronto city council asked that it be named "Victoria Hospital for Sick Children," but the new name was never officially

FIGURE 2. This building housed the third Hospital for Sick Children in Toronto in 1891. The hospital was to be named the "Victoria Hospital for Sick Children," but that name was never officially adopted. Today, the hospital is nicknamed "Sick Kids."

FIGURE 3. The Hospital for Sick Children as it stands today at 555 University Avenue. With the addition of the Atrium in 1993, the hospital occupies one entire city block.

adopted. Instead, the Hospital for Sick Children became known as "Sick Kids."

On February 4, 1951, the hospital moved to its current location at 555 University Avenue (Fig. 3), occupying the grounds where the childhood home of actress Mary Pickford once stood. At the same time, there was a switch in emphasis from nutritional research to the repair of congenital defects. Three years later, the Research Institute was established.

FIGURE 4. A view from inside the Atrium. The Atrium allows natural light into the hospital. Each patient room has exposure to natural sunlight, a great healing effect for the children.

In January 1993, a new inpatient facility was built, complete with an expansive Atrium just behind the 555 University Avenue site (Fig. 4). The Atrium was designed by Eberhard Zeidler of the Zeidler-Roberts Partnership. Believing that light is important to healing, Zeidler designed the building around a nine-story, glass-roofed atrium. Most patients now have their own room with natural sunlight, a washroom, storage, and a day bed so that a parent can stay overnight. With the addition of the new wing, the hospital now occupies an entire city block. The Atrium houses facilities to help provide enhanced care and improve the treatment and diagnosis of childhood disease. The critical care unit, where children with life-threatening illness and injury receive care, almost doubled in size to 36 beds. The emergency department has two trauma rooms and a six-bed observation room. The operating room now houses 15 operating rooms, each fully equipped to perform modern surgical practices across six different divisions. Most recently, on May 25, 2001, the imaging guided therapy department opened, enabling surgeons to perform interventional radiological and minimally invasive neurosurgical procedures under image guidance.

THE KEITH YEARS: THE BIRTH OF THE DIVISION OF NEUROSURGERY

Dr. William S. Keith, the second of four children, was born in Toronto on June 20, 1902. He was educated in Toronto and completed medical school at the University of Toronto in 1927. After graduation, he performed his internship at the Toronto General Hospital and had the opportunity to work with Dr. Kenneth McKenzie, Canada's first neurosurgeon (1, 69). It was this early experience working with Dr. McKenzie that inspired Dr. Keith to pursue a career in neurosurgery (12, 13, 26).

In 1929, Dr. Gallie, Surgeon-in-Chief at the Hospital for Sick Children, encouraged Dr. Keith to become a neurosurgeon and to work at the Hospital for Sick Children (14). He secured a Douglas Smith Fellowship for Dr. Keith, which allowed him to study at the University of Chicago with Dr. Roy Grinker, Professor of Neurology, and Dr. Percival Bailey, Professor of

FIGURE 5. Portraits of the fathers of neurosurgery at the Hospital for Sick Children: Dr. William Keith (A), Dr. E. Bruce Hendrick (B), Dr. Harold Hoffman (C), and Dr. Robin Humphreys (D).

Neurosurgery (26). Dr. Keith also had an opportunity to work with Dr. Paul Bucy who was finishing his residency as Dr. Bailey's Chief Resident.

Dr. Keith returned to Toronto in 1930 to work with Dr. McKenzie (1, 12, 13, 69). One year later, in 1931, the Hospital for Sick Children sponsored his studies at the National Hospital for Neurological Disorders at Queen's Square in London, England, as a Clinical Clerk to the Neurology Service (26). While in England, on April 2, 1931, he married Eleanor, a nurse who worked at the Hospital for Sick Children in Toronto.

He returned to the Hospital for Sick Children to become Chief Resident in Surgery. In 1933, he joined the staff at the Hospital for Sick Children with a primary interest in neurosurgery. At the time, neurosurgery was a fledgling specialty, and Dr. Keith was required to take call for general surgery and orthopedic surgery (14). In 1936, he organized an adult neurosurgical service at the Toronto Western Hospital. He continued to serve as Chief of Neurosurgery at both the Hospital for Sick Children and the Toronto Western Hospital until his retirement in 1964 (Fig. 5A).

TABLE 1. Major contributions to neurosurgery and Pediatric neurosurgery by Dr. William S. Keith and the “3 Hs”

Subspecialty	Contribution	References
Hydrocephalus	Management of shunt infections	93
	Experience with ventriculopleural shunts	39
	Lumboperitoneal shunt for hydrocephalus	37
	Percutaneous third ventriculostomy	31
	Slit ventricle syndrome	50
Epilepsy	Normal pressure hydrocephalus	61
	Lesional temporal lobe epilepsy	9
	Rasmussen's encephalitis	77
	Hemispherectomy	23, 33
Cerebrovascular	Posttraumatic epilepsy	21
	Moyamoya disease	28
	Management of arteriovenous malformations	57, 60, 63
	Pediatric hemorrhagic strokes	52
	Vein of Galen malformations	29
Neuro-oncology	Pediatric intracranial aneurysms	88
	Craniopharyngiomas	30, 42, 59
	Gangliogliomas	15, 72
	Low-grade astrocytomas	47
	Optic pathway/hypothalamic gliomas	43
	Dorsally exophytic brainstem gliomas	78, 89, 90
	Intracranial germ cell tumors	46
	Infratentorial ependymomas	71
	Thalamic tumors	3
	Congenital neoplasms	2
	Medulloblastoma	36, 40, 76
	Pineal region tumors	49
Spine	Tectal gliomas	67
	Tethered cord syndrome	24, 38
	Lumbar disc disease in children	16
	Hydrosyringomyelia	45
	Traumatic spinal cord infarction	5, 61
Congenital abnormalities of development	Whiplash injury	62
	Occipital neuralgia	62
	Separation of craniopagus twins	83
	Encephaloceles	66
	Colloid cysts	65
Neurotrauma	Lipomyelomeningoceles	48
	Surgical management of Chiari I malformations	35, 75
	Surgical management of Chiari II malformations	92
	Dermoid cysts of the anterior fontanelle	74
	Suprasellar arachnoid cysts	41
Craniofacial abnormalities	Complications of pediatric head trauma	22, 53, 58
	Significance of skull fractures	18
	Therapeutic benefit of hypothermia in severe head trauma	19
Infection	Lambdoid synostosis	70
	Early repair of craniofacial dysmorphism	32
	Management of unilateral and bilateral coronal craniosynostosis	44, 68
Surgical technology	Subdural empyema and epidural abscess	87
	Cerebral abscesses in infants	34
	Frameless stereotaxy	11, 25, 73

In May 1942, Dr. Keith volunteered to serve in the Canadian Armed Forces and organized a mobile neurosurgical unit. He returned to Toronto in May 1945 to resume his neurosurgical practice and his duties at the University of Toronto. He was a founding member of the Canadian Neurological Society and served as President from 1964 to 1965.

At the Hospital for Sick Children, he pioneered pediatric neurosurgery (*Table 1*). He was one of the early proponents of lumboperitoneal shunting for hydrocephalus, which he introduced to the Hospital for Sick Children in 1948. During these early years of pediatric neurosurgery in Toronto, Dr. Keith developed significant experience treating children with head trauma, craniofacial disorders, spina bifida, hydrocephalus, and stroke. He trained many young, aspiring pediatric neurosurgeons, including Dr. Harold J. Hoffman (26).

For almost 20 years, Dr. Keith maintained a hurried pace as the sole neurosurgeon for both the Hospital for Sick Children and the Toronto Western Hospital. He was joined by Dr. Ross Fleming at the Toronto Western Hospital and by Dr. E. Bruce Hendrick at the Hospital for Sick Children in 1954 and 1955, respectively.

Dr. Keith had a long-term friendship with Dr. Frank Mayfield, dating back to 1938, and the two were among several neurosurgeons who founded the American Academy of Neurological Surgery (26).

In 1964, he retired from the University of Toronto staff and from his position as Chief of Neurosurgery at both the Toronto Western Hospital and the Hospital for Sick Children. Dr. Keith continued general practice in aboriginal communities in Ontario, British Columbia, and Newfoundland, and as a camp doctor in northern Ontario for children with medical disorders (14) for many years. On December 27, 1987, at the age of 85, Dr. Keith died of Hodgkin's disease at his home in Toronto surrounded by his family. In his name, the annual William Keith Lectureship has been established at the Toronto Western Hospital in the Division of Neurosurgery. A listing of past Keith Visiting Professors in Toronto is shown in *Table 2*.

HISTORY IN THE MAKING: THE ERA OF “THE 3 H's”

E. Bruce Hendrick

Dr. E. Bruce Hendrick, a native Torontonion who was born, lived, practiced, retired, and died in the city (27). Apart from a brief absence during his residency, his unflagging loyalty to Canada had been sustained through his high school and University of Toronto education, the postgraduate surgical training (the famed Gallie Course) at that university, and a brief military career. He traveled to Boston in 1952 to begin a 2-year fellowship at the Children's Hospital and Peter Bent Brigham Hospital, where he studied under Drs. Franc Ingraham and Donald Matson.

The Hendrick aphorisms, of which there are many, such as the time he asked Dr. Matson's patient with a spinal cord tumor

TABLE 2. Past William S. Keith visiting professors

Year	Lecturer	City of residence
1976	Prof. Gilles Bertrand	Montreal, Canada
1977	Prof. Douglas Miller	Edinburgh, Scotland
1978	Dr. Robert Ojemann	Boston, MA
1979	Prof. Bryce K.A. Weir	Edmonton, Canada
1980	Prof. Lindsay Symon	London, England
1981	Dr. Blaine Nashold	Durham, NC
1982	Prof. Charles Drake	London, Canada
1983	Prof. Graham Teasdale	Glasgow, Scotland
1984	Dr. Douglas Long	Baltimore, MD
1985	Prof. Patrick Derome	Paris, France
1986	Dr. Charles Wilson	San Francisco, CA
1987	Prof. Kenichiro Sugita	Matsumoto, Japan
1988	Prof. Madjid Samii	Hannover, Germany
1989	Dr. Toralf M. Sundt	Rochester, MN
1990	Prof. Tyrone Hardy	Montreal, Canada
1991	Dr. George Ojemann	Seattle, WA
1992	Dr. Laligam N. Sekhar	Pittsburgh, PA
1993	Prof. André Olivier	Montreal, Canada
1994	Dr. Robert Martuza	Washington, D.C.
1995	Dr. Volker K.H. Sonntag	Phoenix, AZ
1996	Dr. Roberto C. Heros	Miami, FL
1997	Prof. Alim-Louis Benabid	Grenoble, France
1999	Dr. Edward Oldfield	Bethesda, MD
2000	Dr. Arnold Menezes	Iowa City, IA
2001	Dr. David Piepgras	Rochester, MN
2002	Dr. Mitchel Berger	San Francisco, CA
2003	Dr. Edward Benzel	Cleveland, OH
2004	Dr. David Roberts	Lebanon, NH
2005	Dr. Richard Fessler	Chicago, IL
2006	Dr. Webster H. Pilcher	Rochester, NY

and associated paresthesias if “[his] legs feel like ginger ale looks” (55, p 100) will remain with students and residents alike for generations to come.

Having completed his training in pediatric neurosurgery in Boston, Dr. Hendrick returned to Toronto in 1954 to begin neurosurgical practice at the Hospital for Sick Children. Although he also held responsibilities at the Toronto Western Hospital, his joy came from caring for children with neurosurgical disorders. Dr. Hendrick became Neurosurgeon-in-Chief at the Hospital for Sick Children in 1964 (*Fig. 5B*).

Dr. Derek Harwood-Nash, a young South African newly graduated from medical school, obtained a neurosurgical fellowship at the Hospital for Sick Children to work on a pediatric head injury project under the mentorship of Dr. Hendrick (51). From that time, he remained in Canada to complete a residency

in radiology at the University of Toronto and, after a fellowship, he joined the Sick Kids staff and dedicated himself to the emerging specialty of pediatric neuroradiology. After morning sessions performing ventriculograms, myelograms, and arteriography, Dr. Harwood-Nash would hold court in his tiny office cluttered with viewing boxes and bags of films. Without the benefit of modern neuroimaging techniques, he had to interpret inferential data, such as obscured air shadows and suspended droplets of contrast, and provide a learned opinion on the structural disorder in the child’s nervous system. Eventually, he championed the Hospital for Sick Children’s acquisition of computed tomographic and magnetic resonance imaging scanners, which are now ubiquitous in all pediatric hospitals. He was responsible for the training of more than 70 fellows in pediatric neuroradiology, many of whom were internationals (6, 51). Dr. Harwood-Nash, regarded by some as the “4th H” in the “3 H” era because of his major impact on the neurosciences at the time, died suddenly and unexpectedly from a basilar artery dissection on October 18, 1996 (6, 51).

Over the years, the relationship between Dr. Hendrick and his resident staff evolved into something truly unique. Eschewing complete reliance on gadgetry for clinical decisions, he taught residents to adhere to fundamental Oslerian principles of history gathering and physical examination or, as he said in a 1993 editorial, “Whatever mother says!” (20, p 193). He advised residents to be prepared to defend their own conclusions and not to be influenced by the “reckless courage of the noncombatant” (55).

Dr. Hendrick had been part of the nascence and maturation of the specialty of pediatric neurosurgery (*Table 1*) (80). He was on the founding committees of the International Society of Pediatric Neurosurgery and the American Society of Pediatric Neurosurgeons. He was President of the Canadian Neurosurgical Society and was a Board Member of the American Association of Neurological Surgeons, which honored him in 1998 as the first recipient of the Franc D. Ingraham Lifetime Achievement Award.

Dr. Hendrick’s most enduring contribution to pediatric neurosurgery was his devotion to his patients (27). He brought joy to the children for whom he cared. In return, they showered him with crayon drawings, stuffed toys, small soldiers, and large cigars. The Friday afternoon water gun fights (55) were serious business. Nurses, parents, and child life therapists joined patients to develop strategies on how to outdo “Uncle Bruce” in the water gun fights. Syringe barrels worked for patients who did not have their own water pistols. The children wore green garbage bags while Uncle Bruce took the soaking in his scrub suit.

A familiar sight late at night in the Hospital would be Dr. Hendrick sitting in his office with arms folded across numerous open books on his desktop, providing fatherly counsel to young parents seeking hope and reassurance concerning their child’s illness. Occasionally, at times when he had to disappoint and break bad news to parents, Dr. Hendrick, in expressing his own frustration, could be heard saying, “If I had distilled essence of moonbeams to give, I would” (55, p 101).

TABLE 3. Past E. Bruce Hendrick professors of pediatric neurosurgery

Year	Visiting professor	Institution
1986	Dr. Fred J. Epstein	New York University, New York, New York
1987	Dr. Luis Schut	University of Pennsylvania, Philadelphia, Pennsylvania
1988	Dr. Marion L. Walker	University of Utah, Salt Lake City, Utah
1989	Professor Maurice Choux	l'Hôpital des Enfants de la Timone, Marseille, France
1990	Dr. Michael S.B. Edwards	University of California San Francisco, San Francisco, California
1991	Dr. David G. McLone	Northwestern University, Chicago, Illinois
1992	Dr. R. Michael Scott	Harvard University, Boston, Massachusetts
1993	Professor Kiyoshi Sato	Juntendo University School of Medicine, Tokyo, Japan
1994	Dr. Warwick J. Peacock	University of California Los Angeles, Los Angeles, California
1995	Dr. J. Gordon McComb	University of Southern California, Los Angeles, California
1996	Professor Christian Sainte-Rose	University of Paris, Paris, France
1997	Dr. Derek A. Bruce	University of Texas Southwestern Medical Center, Dallas, Texas
1998	Professor Concezio Di Rocco	Catolica University Medical School, Rome, Italy
1999	Dr. Harold L. Rekate	University of Arizona School of Medicine, Phoenix, Arizona
2000	Dr. Tae Sung Park	Washington University, St. Louis, Missouri
2001	Professor D. Douglas Cochrane	University of British Columbia, Vancouver, British Columbia, Canada
2002	Professor Dominique Renier	University of Paris, Paris, France
2003	Professor Anthony D. Hockley	Diana, Princess of Wales Children's Hospital, Birmingham, UK
2004	Dr. W. Jerry Oakes	University of Alabama, Birmingham, Alabama
2005	Professor Alain Pierre-Khan	l'Hôpital Necker-Enfants Malades, Paris, France
2006	Dr. Robert A. Sanford	St. Jude Children's Research Hospital, Memphis, Tennessee

Throughout his professional career, Dr. Hendrick enjoyed the tremendous support of his wife, Gloria, to whom he had been married for 54 years, and his children, Michael and Sheelagh, who he described as always being there for him (55). Sadly, Dr. Hendrick died in 2001 from complications related to ruptured diverticulitis. The annual E. Bruce Hendrick Lectureship has been established in his honor at the Hospital for Sick Children in the Division of Neurosurgery. A listing of past Hendrick Lecturers at Sick Kids is shown in *Table 3*.

Harold J. Hoffman

Dr. Harold J. Hoffman was arguably the most famous pediatric neurosurgeon of his day (82). He set the standard for the treatment of many pediatric neurosurgical disorders by virtue of his understanding of the diseases that afflicted children, his unparalleled surgical skills, and his numerous publications in the scientific literature.

Dr. Hoffman graduated from the University of Toronto Faculty of Medicine in 1956. In 1957, he married JoAnn Shulman and became the loving father of Richard, Andrew, and Katie soon thereafter (82). Dr. Hoffman traveled to London in 1963 to complete a McLaughlin Fellowship before returning to Toronto.

He joined the Neurosurgical Staff at the Hospital for Sick Children in 1964. At that time, the neurosurgeon's day was occupied with the management and treatment of head trauma

and brain tumors. Therefore, the major focus of Dr. Hoffman's practice was the treatment of pediatric brain tumors. His major publications in the neurosurgical literature began to appear around 1976, after approximately 12 years of working diligently in the field. By that time, he had amassed a huge clinical experience at Sick Kids, which enabled him to become an authority on virtually every topic in pediatric neurosurgery (82). He was tireless in his documentation of clinical case materials, amassing thousands of slides and photographs of cases that chronicled the state-of-the-art treatment of children with neurosurgical disease at the time. Many of his slides and case materials have been preserved for posterity on the Division of Neurosurgery web site (www.surg.med.utoronto.ca/neuro/slides.html). By the time he retired from neurosurgical practice, he had published more than 200 peer-reviewed articles on pediatric neurosurgery topics on which he had become an authority such as craniopharyngioma, tethered cord, spina bifida, Chiari malformation, moyamoya disease, and epilepsy surgery (*Table 1*) (9, 25, 28, 30, 38, 42, 73, 77, 91). Dr. Hoffman's final major scientific contribution to pediatric neurosurgery was acknowledged in the August 2004 issue of *Child's Nervous System* (83), in which he pioneered the use of interventional neuroradiological and neuronavigation techniques to separate craniopagus twins in 1995.

Dr. Hoffman quickly demonstrated his inquisitive enthusiasm for the investigation and treatment of a child's nerv-

ous system disorder; he left no stone unturned in his quest for clinical solutions. He put in very long days, often joining the residents side-by-side in their ward and emergency room duties. He initiated a laboratory project to study the value of dexamethasone treatment for focal brain edema. Early in his career, when he was not in the laboratory, operating room, radiology, or his Monday morning clinics, he would be off to Sunnybrook Hospital for his once-weekly commitment there. For all of his tireless and inspirational confidence and enthusiasm, Dr. Hoffman was not without his foibles and eccentricities. For example, he was perhaps the only neurosurgeon who wore a monacle and, on formal occasions, pince-nez (82).

Another one of Dr. Hoffman's most notable characteristics was his desire to stay current with or, at times, ahead of the latest neurosurgical technologies. He had a passion for understanding mechanical gadgets that ranged from wristwatches to automobiles (56). It is no small wonder that he insisted that the Hospital for Sick Children would be at the forefront of acquiring cutting-edge technologies such as mouth-driven microscopes, lasers, ultrasonic tumor aspirators, and image-guided therapy. Regarding the latter, Dr. Hoffman secured the ISG-viewing wand (SNS, Inc., Toronto, Canada) in 1992, making Sick Kids the first pediatric neurosurgery service in the world to use neuronavigation in the resection of complex pediatric brain tumors (11). Dr. Hoffman's ingenuity also led to the design of new equipment for pediatric neurosurgery cases. He invented two types of shunt devices for hydrocephalus: the lumboperitoneal shunt, the so-called Hoffman T-tube shunt, and one of the world's first "uni-shunts," designed with his colleague and friend, Dr. Fred Epstein, to avoid problems of shunt disconnections and breakages.

During his career in pediatric neurosurgery, Dr. Hoffman received numerous honors, including the Lister Prize in the Department of Surgery at the University of Toronto and the Donald Matson Memorial lecture given by the American Association of Neurological Surgeons in 1996. He held several major offices in organized neurosurgery during his career. He was President of the American Society of Pediatric Neurosurgery from 1980 to 1982, President of the International Society of Pediatric Neurosurgery in 1983 and 1984, Chairman of the Pediatric Section of the American Association of Neurological Surgeons/Congress of Neurological Surgeons in 1983, and President of the Canadian Neurosurgical Society and Vice President for North America of the World Federation of Neurosurgical Societies from 1993 to 1996. In 1986, he was appointed Neurosurgeon-in-Chief at the Hospital for Sick Children (Fig. 5C) for a term that would span 10 years. In 1998, after his retirement, the Harold J. Hoffman/Shoppers Drug Mart Chair in Pediatric Neurosurgery was established at Sick Kids.

Dr. Hoffman died in 2004 from complications related to frontal lobe atrophy. In 2006, the Hoffman family established the Harold and JoAnn Hoffman lectureship in Pediatric Neurosurgery, which is delivered annually on the occasion of

the annual meeting of the American Society of Pediatric Neurosurgery.

Robin P. Humphreys

Dr. Robin Humphreys received all of his formal education in Toronto, where he graduated from the University of Toronto Faculty of Medicine in 1962. He began his internship in Toronto at St. Michael's Hospital in orthopedics but was captivated by a rotation in neurosurgery (81). After much soul searching, he made the fateful decision to change career paths and entered the neurosurgery training program at the University of Toronto. He became a Fellow of the Royal College of Surgeons in Neurosurgery in 1970 and a staff surgeon at the Hospital for Sick Children on the recommendation of the Neurosurgeon-in-Chief, Dr. E. Bruce Hendrick. Dr. Hendrick's plan for Dr. Humphreys to complete a 1-year fellowship with Dr. Donald Matson in Boston and then Mr. Kenneth Till in London, England went awry when Dr. Matson succumbed to a serious illness and Mr. Till organized his own retirement just before Dr. Humphreys' departure for his fellowship. Instead, Dr. Hendrick announced to Dr. Humphreys, "You might as well learn on the job" (55, p 100).

In the years that followed Dr. Humphreys' addition to the neurosurgical staff, the case volume accelerated exponentially (81). He initiated the Craniofacial Program at the Hospital for Sick Children along with Dr. Ian Munro and became an expert in the care of children with spina bifida and vascular malformations. He established a structured teaching program to help residents and fellows learn the nuances of pediatric neurosurgery. He continues to personally meet with the fellows and residents in monthly teaching sessions as an Emeritus Professor.

Dr. Humphreys was president of the American Society of Pediatric Neurosurgery in 1992 and 1993 and the International Society for Pediatric Neurosurgery from 1993 to 1994. He has been on the editorial boards for *Pediatric Neurosurgery* and **NEUROSURGERY**. He was awarded the Donald Matson Lecture-ship by the American Association of Neurological Surgeons/Congress of Neurological Surgeons Section on Pediatric Neurosurgery in 2003 and the Hospital for Sick Children Foundation Claus Wirsig Humanitarian Award in 2003 (79). He was Neurosurgeon-in-Chief at the Hospital for Sick Children from 1996 to 2003 and the Chairholder of the Harold J. Hoffman/Shoppers Drug Mart chair in pediatric neurosurgery at that time (Fig. 5D).

Dr. Humphreys retired after 33 years of devoted service to the Pediatric Neurosurgery Program at the Hospital for Sick Children, completing a glorious chapter in the history of pediatric neurosurgery at the Hospital for Sick Children that began with the "3 Hs" (81). Working with Dr. Hoffman, Dr. Humphreys helped to write the next chapter in the history of pediatric neurosurgery with the recruitment of Drs. James Drake and James Rutka (the "2 Jims") to the service (Fig. 6) (81).

It is almost impossible to describe the impact of the dynasty created at the Hospital for Sick Children by the union of the first three full-time pediatric neurosurgeons (82).

FIGURE 6. Historic photograph capturing “3 Hs” and “2 Jims.” From left to right: Dr. James Rutka, Dr. Harold Hoffman, Dr. James Drake, Dr. Bruce Hendrick, and Dr. Robin Humphreys.

The moniker, the “3 Hs” (82), short for Drs. Hendrick, Hoffman, and Humphreys, was actually coined by Mr. Kenneth Till (RP Humphreys, personal communication, September 7, 2006). Collectively, they coauthored some of the most important works published on pediatric neurosurgery topics in the literature (*Table 1*). Their worldwide visibility in pediatric neurosurgery placed the Hospital for Sick Children on the map for being one of the busiest services in the world. Accordingly, during their administration, the Sick Kids service in neurosurgery attracted fellows and faculty from all corners of the globe, a practice that has continued to this day (*Appendix 1*).

THE NEXT GENERATION: A FOCUS ON THE SURGEON-SCIENTIST

James M. Drake

Dr. James Drake (*Fig. 6*) attended Princeton University from 1969 to 1974, receiving a degree in aerospace and mechanical engineering. He then received his medical education at the Royal College of Surgeons in Ireland, graduating in 1979. In 1982, Dr. Drake entered the Neurosurgery Training Program at the University of Toronto. He received his Master’s degree in magnetic resonance imaging of hydrocephalus in 1987 at the University of Toronto. In the same year, he became a Fellow of the Royal College of Surgeons of Canada. After a Clinical Fellowship in Pediatric Neurosurgery at l’Hôpital Necker-Enfants Malades in Paris, Dr. Drake joined the neurosurgical staff at the Hospital for Sick Children in 1988. He promptly established the Hydrocephalus Research Laboratory and began working on the application of robotics to the resection of pediatric brain tumors (10). He is an author of more than 150 peer-reviewed publications, including the definitive textbook on cerebrospinal fluid shunts, *The Shunt Book*, which he coauthored

with Professor Christian Sainte-Rose of Paris. He is currently a Full Professor in the Department of Surgery and succeeded Dr. Robin Humphreys as the Division’s fifth Neurosurgeon-in-Chief on Dr. Humphreys’ retirement in 2003. He is the current Harold J. Hoffman/Shopper’s Drug Mart Chair in Pediatric Neurosurgery. His clinical practice focuses on hydrocephalus, spasticity, neuroendoscopic procedures, the pediatric spine, and peripheral nerve surgery. His research is devoted to engineering a better cerebrospinal fluid shunt design system and mathematical models of hydrocephalus.

James T. Rutka

Dr. James Rutka (*Fig. 6*) was educated at Princeton University from 1975 to 1977 and Queen’s University Medical School from 1977 to 1981. He entered the Neurosurgery Training Program at the University of Toronto in 1982. He undertook basic science research studies in Experimental Neuro-oncology at the Brain Tumor Research Center at the University of California, San Francisco, from 1984 to 1987 where he also received his Ph.D. in Experimental Pathology before returning to Toronto to complete his neurosurgery residency. He became a Fellow of the Royal College of Surgeons in Canada in 1989.

After a Clinical-Research Fellowship in Japan as a Kenichiro Sugita Fellow, Dr. Rutka joined the Neurosurgical Staff at the Hospital for Sick Children in 1990. His clinical practice is devoted to the care of children with epilepsy and brain tumors. In 1997, he helped to establish the first brain tumor research center in Canada with the generous gift of business magnate, Arthur Labatt, and his wife, Sonia. He is currently codirector of the Labatt Brain Tumor Research Center (www.sickkids.ca/BTRC/), which houses eight principal investigators and more than 50 research associates, graduate students, and fellows. Dr. Rutka became Chairman of the Division of Neurosurgery at the University of Toronto in 1999, a position he will hold for 10 years.

Peter B. Dirks

Dr. Peter Dirks (*Fig. 7A*) is a 1989 graduate of Queen’s University Medical School. He entered the Neurosurgery Training Program at the University of Toronto in 1990. During his neurosurgical training, he undertook research studies as a graduate student in experimental neuro-oncology in Dr. Rutka’s laboratory. He received a Ph.D. in Cellular and Molecular Pathology in 1998. Dr. Dirks became a Fellow of the Royal College of Physicians and Surgeons of Canada in 1998.

After a clinical fellowship in pediatric neurosurgery at l’Hôpital Necker-Enfants Malades in Paris in 1998, he began his neurosurgical staff appointment at the Hospital for Sick Children in 1998. He is currently an associate professor in the Department of Surgery at the University of Toronto.

His clinical practice is devoted to children with vascular, head injuries, spinal dysraphism, and neoplastic diseases of the nervous system. His research laboratory is within the Arthur and Sonia Labatt Brain Tumor Research Center at the Hospital for Sick Children where he is currently conducting

FIGURE 7. Portraits of recent recruits to the neurosurgical staff at the Hospital for Sick Children: Dr. Peter Dirks (**A**), Dr. Abhaya Kulkarni (**B**), and Dr. Michael Taylor (**C**).

research in stem cells and cell cycle pathways as a principal investigator (7, 8, 85, 86).

Abhaya V. Kulkarni

Dr. Abhaya Kulkarni (*Fig. 7B*) completed his residency in the Neurosurgery Training Program at the University of Toronto in 2002. During his training, Dr. Kulkarni published several peer-reviewed articles and was awarded numerous citations, including the Congress of Neurological Surgeons Resident Award and the McKenzie Prize in Clinical Neurosciences. He received specialized training as a clinical fellow at l'Hôpital Necker-Enfants Malades in pediatric neurosurgery. In Paris, Dr. Kulkarni completed and published a widely quoted study on the conservative management of children with spinal lipomas (64).

Dr. Kulkarni joined the neurosurgical staff at the Hospital for Sick Children in 2003. He successfully completed his graduate studies and has received a Ph.D. in Clinical Epidemiology from McMaster University. Dr. Kulkarni brings his expertise on evidence-based medicine and clinical epidemiology to the Hospital for Sick Children, where he continues his role in organizing and conducting clinical trials in neurosurgery. He also holds an appointment in the Hospital for Sick Children Research Institute in Population Health Sciences.

Michael D. Taylor

Dr. Michael Taylor (*Fig. 7C*) is a 2003 graduate of the University of Toronto Neurosurgery Training Program. He received his Ph.D. in Dr. Rutka's laboratory in the Labatt Brain Tumor Research Centre in Laboratory Medicine and Pathobiology in 2002. He completed a clinical fellowship in pediatric neurosurgery at Le Bonheur Hospital for Children in Memphis, Tennessee, under the auspices of Drs. Robert Sanford and Frederick Boop. That same year, he spent time as a post-doctoral fellow in the Department of Developmental Neurobiology at St. Jude's Children's Research Hospital.

Dr. Taylor joined the staff at the Hospital for Sick Children in 2004 as a faculty neurosurgeon in the Department of Surgery and as a principal investigator in the Labatt Brain Tumor Research Center where he is studying the molecular genetic underpinnings of medulloblastoma and ependymoma.

The Division of Neurosurgery at the Hospital for Sick Children today receives approximately \$2 million annually of peer-reviewed funding from various sources, including the National Cancer Institute of Canada, the Canadian Institutes of Health Research, the Ontario Cancer Research Network, the Pediatric Brain Tumor Foundation, and the Natural Sciences and Engineering Research Council of Canada (JT Rutka, personal communication, March 10, 2007).

THE TRAINEES: FROM FAR AND WIDE

In April 1988, more than 100 past residents and fellows gathered in Toronto at the King Edward Hotel for a Hospital for Sick Children neurosurgical reunion dinner (28). The men and women who have rotated through the Hospital for Sick Children as pediatric neurosurgical residents or fellows have brought their skills and knowledge to the Hospital. They have shared this knowledge with the medical students, other residents and fellows, and the staff. Their talents have been noted in the emergency room, operating room, intensive care unit, outpatient clinics, and inpatient wards. They have all added to the fabric of the institution by their interactions with the neurosurgical staff. A review of the locations of the trainees from Sick Kids reveals their positions in five provinces in Canada, 28 states in the United States, and 16 other countries around the world, including Argentina, Australia, Brazil, Great Britain, Ireland, Germany, Israel, Japan, Thailand, Taiwan, South Korea, the Philippines, Saudi Arabia, France, Italy, and South Africa.

In the Neurosurgery Office at Sick Kids, the portraits of former fellows and trainees are proudly displayed. The purpose of the fellowship program is to train, foster, and nurture tomorrow's leadership of pediatric neurosurgery. Some of the leaders of modern-day pediatric neurosurgery who have graced Sick Kids as fellows and residents are listed in *Appendices 1 and 2*.

CONCLUSION

Nine years after Dr. Kenneth G. McKenzie established neurosurgery in Canada at the Toronto General Hospital, Dr.

William S. Keith was appointed to the Hospital for Sick Children in 1933. He was the first neurosurgeon in the Hospital's 58-year history. Although his appointment was only part-time, he nevertheless began a tradition of pediatric neurosurgery that has flourished for seven decades at the Hospital for Sick Children in Toronto.

The future goals of the Division of Neurosurgery at the Hospital for Sick Children in Toronto are to maintain its position as an outstanding unit for the care of children with neurosurgical disorders and to continue research in the fields of hydrocephalus, congenital malformations, brain tumors, clinical epidemiology, and clinical trials design. It is expected that the neurosurgical service will continue to train the best and brightest for future careers in pediatric neurosurgery. It is hoped that the mandate for dedication to the academic mission will be maintained through the establishment of future endowed chairs to commemorate and honor the founding fathers who gave rise to the neurosurgery service. The final and perhaps most important mandate of the Division is to continue providing leading-edge clinical care to the youngest of patients and education for the next generation of pediatric neurosurgeons.

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APPENDIX 1. Chief fellows and visiting fellows trained at the Hospital for Sick Children in pediatric neurosurgery

Term of service	Fellows
July 1, 1969–June 30, 1970	Dr. J. Gary Ashby
July 1–December 15, 1970	Dr. Robin P. Humphreys
July 1, 1970–June 30, 1971	Dr. Miguel S. Garrote
January 1–December 31, 1972	Dr. Andrew J. Joaquin
January 1–June 30, 1973	Dr. John M. Crouch
July 1–December 31, 1976	Dr. Renn O. Holness
January 1–March 30, 1977	Dr. Edward Garrido
January 1–June 30, 1977	Dr. Michael Feely
July 1–December 31, 1978	Dr. Dachling Pang
July 1–December 31, 1979	Dr. Warren S. Ishida
April 1–December 31, 1980	Dr. Toru Shirouzu
January 1, 1980–February 28, 1981	Dr. Tai-Tong Wong
January 1–March 31, 1981	Dr. Toru Shirouzu
January 1–December 31, 1981	Dr. Diogenes A. Harris
April 1, 1981–March 31, 1982	Dr. Tae Sung Park
August 1, 1981–August 31, 1982	Dr. Shigetake Anegawa
January 1–December 31, 1982	Dr. Masafumi Yoshida
January 15–June 30, 1983	Dr. Akira Ishibashi
August 9, 1982–December 31, 1983	Dr. Chopeow Taecholarn
January 1–June 30, 1984	Dr. David S. Knierim
July 1–December 31, 1984	Dr. Beverly C. Walters
September 25–December 31, 1984	Dr. Shigeru Nemoto
October 1984–September 30, 1985	Dr. Joong Uhn Choi
January 1–June 30, 1985	Dr. Ann R. Stroink
July 1, 1985–June 30, 1986	Dr. Robert W. Griebel
January 1–June 30, 1986	Dr. Mitchel S. Berger
January 1–June 30, 1986	Dr. John Johnson
July 1–December 31, 1986	Dr. Corey Raffel
January 1–July 30, 1987	Dr. Robert J. Backer
January 1–March 31, 1987	Dr. Denis Ladoucer
January 1–July 30, 1987	Dr. Padraic O'Neill
July 1, 1987–June 30, 1988	Dr. Liliana Goumnerova
September 1, 1987–August 31, 1988	Dr. Akio Asai
July 1–December 31, 1988	Dr. Tai Ngar Lui
October 1–December 31, 1988	Dr. Carolyn Wright
July 1, 1988–June 30, 1989	Dr. Semion Rochkind
July 1, 1988–June 30, 1989	Dr. Richard E. George
July 1, 1988–June 30, 1989	Dr. Benicio Oton de Lima
April 1, 1988–December 31, 1989	Dr. Hiroshi Otsubo
January 23–July 31, 1989	Dr. Judith A. Murovic
July 1–December 31, 1989	Dr. Dong Won Kim
September 11–October 11, 1989	Dr. Anita North
July 1, 1988–June 30, 1990	Dr. Marcia da Silva
July 1, 1989–June 30, 1990	Dr. Antonio R. Mock
July 1, 1989–June 30, 1990	Dr. Samuel Keith St. Clair
January 1–June 30, 1990	Dr. Hiroshi Otsubo
January 1–June 30, 1990	Dr. Donald S. Soloniuk
July 1, 1989–June 30, 1991	Dr. Shalom D. Michowiz
July 1, 1990–June 30, 1991	Dr. Lewis W. Harris
July 1, 1990–June 30, 1991	Dr. Rosemaria Gennuso
July 1–September 30, 1991	Dr. Ian F. Pollock
July 1–October 31, 1991	Dr. Premkumar Pillay

APPENDIX 1. (continued)

Term of service	Fellows
July 1, 1991–June 30, 1992	Dr. John R.W. Kestle
May 1–August 15, 1992	Dr. Paul D. Chumas
July 1, 1991–June 30, 1993	Dr. Abraham Cohen
July 1, 1992–June 30, 1993	Dr. John A. Duncan III
September 1, 1992–June 30, 1993	Dr. Marcia da Silva
September 1, 1992–October 31, 1993	Dr. Mehdi Abdolazadeh
July 1, 1993–June 30, 1994	Dr. Andre Turmel
July 1, 1993–June 30, 1994	Dr. Daniela Stritt
July 1, 1993–October 31, 1994	Dr. Hanoch Elran
July 1, 1994–June 30, 1995	Dr. Mark Souweidane
November 23, 1994–August 15, 1995	Dr. Young Shin Ra
July 1, 1995–February 15, 1996	Dr. Maria Varela-Stavrinou
July 1, 1995–June 30, 1997	Dr. Essam Al-Shail
October 15, 1995–June 30, 1997	Dr. Kahil Salame
July 1, 1996–June 30, 1997	Dr. John Myseros
February 1–May 31, 1997	Dr. Franck-Emmauel Roux
May 1, 1997–June 30, 1998	Dr. Awni Musharbash
July 1, 1997–June 30, 1998	Dr. Nalin Gupta
September 1, 1997–February 28, 1998	Dr. Anantha Kishan
July 1, 1998–June 30, 1999	Dr. Mark Iantosca
July 1, 1998–December 18, 1999	Dr. Lynn Myles
February 1, 1999–January 31, 2000	Dr. Teresa K. Withers
July 1, 1999–June 30, 2000	Dr. Jeffrey P. Blount
July 1, 1999–April 3, 2000	Dr. Dwight Webster
February 1, 2000–January 31, 2001	Dr. Patrick Lo
July 1, 2000–June 30, 2001	Dr. Walter Hader
July 1, 2000–June 30, 2001	Dr. Hussam Kutub
January 1–June 30, 2001	Dr. Wilson Hu
February 1–December 31, 2001	Dr. Torben Hansen
July 1–December 31, 2001	Dr. Carl Bruce
July 1, 2001–June 30, 2002	Dr. Stephen Santorenos
July 1, 2001–June 30, 2002	Dr. Patrick McDonald
January 1–June 30, 2002	Dr. Mamoud Rashidi
November 1, 2001–February 28, 2003	Dr. Hisashi Hatano
July 1, 2002–June 30, 2003	Dr. William Whitehead
July 1, 2002–June 30, 2003	Dr. Michael Carter
July 1, 2002–June 30, 2003	Dr. Aurelia Peraud
July 1, 2002–June 30, 2003	Dr. Raafat Yahya
July 1, 2003–June 30, 2004	Dr. John Jane, Jr.
March 1, 2003–December 31, 2004	Dr. Takashi Araki
July 1, 2003–June 30, 2004	Dr. Jayaratnam Jayamohan
September 1, 2003–September 30, 2004	Dr. Francesco Sala
June 1–November 30, 2004	Dr. Amit Ray
January 1–June 30, 2005	Dr. Takashi Araki
July 1, 2004–June 30, 2005	Dr. Sami Khoshyomn
July 1, 2004–June 30, 2006	Dr. Mony Benifla
July 1–October 15, 2005	Dr. Neermala Dasi
July 1, 2005–June 30, 2006	Dr. Jay Riva-Cambrin
July 1, 2005–June 30, 2006	Dr. Richard Edwards
August 30, 2005–January 3, 2006	Dr. Bart Depreitere
January 1–December 30, 2006	Dr. Zulma Tovar-Spinoza
July 1, 2006–June 30, 2007	Dr. Andrew Jea
July 1, 2006–June 30, 2007	Dr. Sandrine de Ribaupierre

APPENDIX 2. Selected residents rotated through the Hospital for Sick Children in pediatric neurosurgery

Residency term	Residents
July 1–December 31, 1970	Dr. William Shucart
July 1–December 31, 1971	Dr. Paul Chapman
July 1, 1972–June 30, 1973	Dr. Marion L. Walker
January 1–June 30, 1975	Dr. Anthony D. Hockley
July 1–December 31, 1975	Dr. W. Jerry Oakes
July 1–December 31, 1976	Dr. Haring Nauta
July 1–December 31, 1976	Dr. Guy Sava
January 1–June 30, 1977	Dr. Kotoo Meguro
July 1–December 31, 1978	Dr. Warwick J. Peacock
January 1–June 30, 1979	Dr. Michael Besser
July 1–December 31, 1980	Dr. Bruce B. Storrs
January 1–June 30, 1981	Dr. Harold P. Smith
July 1–December 31, 1982	Dr. Patricia A. Aronin
July 1, 1982–December 31, 1983	Dr. Jonathon Punt
October 1–December 31, 1982	Dr. Kamel Muakkassa
January 1–June 30, 1984	Dr. Nasri J. S. Khoury
January 1–June 30, 1984	Dr. Bruce Tranmer
January 1–June 30, 1985	Dr. Beverly C. Walters
July 1–December 31, 1985	Dr. Kerry R. Crone
July 1–December 31, 1985	Dr. Kim H. Manwaring
January 1–June 30, 1986	Dr. Fred A. Lenz
July 1, 1986–June 30, 1987	Dr. Joseph H. Piatt
August 1–September 30, 1987	Dr. Frederick A. Boop
January 1–June 30, 1989	Dr. Douglas Kondziolka
July 1–September 30, 1989	Dr. Allan Levi
July 1–December 31, 1994	Dr. Hal Meltzer
April 1–May 31, 2000	Dr. David Sandberg

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COMMENTS

The esteemed reputation of Sick Kids is shadowed only by the personnel that have passed through her doors, most notably those who have spent their careers enriching our understanding of the field of pediatric neurosurgery. This treatise documenting the historical and contemporary era of that venerated hospital is long overdue and greatly appreciated. I have dedicated my career to caring for children with ailments of the central nervous system, and seldom does a day go by when I do not incorporate some “trick of the trade” inherited from Drs. Hoffman, Humphreys, Drake, or Rutka. Although the technical merit is the most immediate benefit acquired during my year at Sick Kids, I must recount two anecdotes that furthers the characterization of two individuals who manned the helm at various times.

The first of these accounts took place 1 month after my arrival in Toronto. I was invited to dine with Dr. Bruce Hendrick, a person I knew by name only, but nevertheless respected. His purpose was simple, to introduce himself, recount the history of Sick Kids, and engender a philosophical perspective on the profession that I chose to pursue. Before departing that afternoon, he generously presented a token of remembrance. He joyfully handed me a sculptured stone facsimile of the Country’s national bird, a loon, which continues to rest on a bookcase in my office. Generous, thoughtful, and nostalgic were my first and lasting impressions of Dr. Hendrick.

The second narrative describes an event that left me with an eternal impression of the personal nature of Harold J. Hoffman. After 10 or so months that elapsed in my year-long adventure at Sick Kids, I was kindly invited to the home of Robin Humphreys for a backyard barbecue. I had shared many occasions with Dr. Hoffman and was well aware of the deserved respect that he held in the hallways and operating room theaters of the Hospital. On this wonderful spring evening,

while listening to one of Dr. Humphrey’s expertly presented tales in his backyard, Dr. Hoffman entered through the front door, thus requiring a long walk through the living room and across the back porch. It was not his normal gallant manner of walking that immediately furthered my admiration for him; instead it was the fact that he was carrying his wife, JoAnn, in his arms because of her incapacity stemming from a disabling ailment. From that time forward, I was never to listen or recount a story of Dr. Hoffman without interjecting some element of his enormous humanity and caring.

I will bookmark this article with many of my other favorites that define the practice and character of pediatric neurosurgery. This history offers the reader who has never visited Sick Kids a great insight into a remarkable place and provides the person familiar with the hospital a stimulus for sentimental memories. My many thanks to Jea et al. for their splendid contribution.

Mark M. Souweidane
Toronto, Canada

I can write this publication comment on a purely objective basis and without a single prejudice. I unabashedly admit that I have never trained at The Hospital of Sick Children in Toronto, nor have I had the opportunity to visit this renowned institution. However, its influence has made a significant impact on me. I dare say the neurosurgical advances which have emanated from Sick Kids have reached nearly every neurosurgeon who has operated upon a child. So what is the magic of this place? It appears it is a very simple concoction of the following principals: altruism, fortitude, dedication, talent, wise resource management, effective regionalization, internationalism, and formidable but benevolent leadership. More specifically, a group of altruistic women in Toronto had the vision and fortitude to set up a Children’s Hospital to serve the children of Canada at a time when none existed. They found ambitious, talented faculty to move their respective practices and dedicate their lives to this vision. The effective political and medical leaders wisely decided to regionalize pediatric care and preserve their precious resources, thus creating a unique regional referral system that attracted the brightest and most gifted surgeons to serve an enormous population of children in need. This atmosphere made the chances for discovery and innovation that much more likely. International colleagues and ideas were imported and generously welcomed to ensure that there was a steady export of ideas, good will, and Sick Kids’ selfless culture. The institution retained the native, creative, and colorful surgeons by wisely providing them with cutting edge resources and robust leadership that was renewed from a deep pool of rising stars every 10 years. The authors are to be congratulated for recounting a compelling model of neurosurgical success that has benefited patients worldwide, and is worthy of emulation.

Richard G. Ellenbogen
Seattle, Washington

Einstein said, “If I have seen a little farther than others it is because I have stood on the shoulders of giants.” Pediatric neurosurgery is a recent enough specialty that many of us now in practice have had the privilege of knowing and learning from the founding giants of our field. Bruce Hendricks, Harold Hoffman, and Robin Humphreys of the “3 H” era are among these. Although they have moved from the scene, they live on in what they have passed on to others. The great medical institutions such as Toronto Sick Kids have encouraged and fostered the creativity of such individuals.

Leslie N. Sutton
Philadelphia, Pennsylvania

Writing the history of the Department of Pediatric Neurosurgery at the Sick Children's Hospital in Toronto is somehow writing the history of pediatric neurosurgery. After the pioneering years of Dr. Keith, the impressive influence that Bruce Hendricks had over his generation of colleagues is still remembered today. I first met Harold Hoffman at the International Society for Pediatric Neurosurgery meeting in Rome in 1988, during my second year of residency. It was my first international meeting of neurosurgery, and I remained fascinated by the continuous, vivid, and endless discussions between Drs. Hoffman, Epstein, Schut, Hirsch, and Lapras during the sessions. It was impossible not to note Harold Hoffman, always in the first or second row, apparently not paying too much attention to the speaker but ready to stare at him and let the eyeglass fall whenever he heard something he disagreed with, filling his comments with humor and intelligence. He was part of a generation of neurosurgeons who had to struggle to find a place and identity for pediatric neurosurgery in the larger and more powerful world of general neurosurgery, and he did this very well with personality and intelligence, and even fighting when necessary.

The staff at Sick Kids is a tremendous blend of gentlemen, scientists, and surgeons, each one well aware of the high reputation of the institution and of the scientific group they represent. They are all committed

to excellence in order to produce scientific work that will be considered a scientific standard in that specific field around the world. The Shunt Design Trial, designed and completed in the 1990s was a very important turning point for both Sick Kids and the whole community of pediatric neurosurgeons and was a wonderful and enriching experience for all participants. That work has set the standard for much future clinical research, not only in the field of pediatric hydrocephalus but for all of pediatric neurosurgery.

The long tradition and the recent work on hydrocephalus, epilepsy surgery, brain tumor biology, and outcome evaluation are there to witness the commitment of a very productive and dedicated group. For all those who had the pleasure of meeting the staff of Sick Kids, the quality appreciated most remains their ease and kindness in any circumstance, as well as the value they place on friendship and personal relationships, which they keep precious separated from the scientific and academic process. This article reflects this style very nicely and is certainly very useful for future generations as an example of how an academic, surgical, and scientific group should be.

Giuseppe Cinalli
Naples, Italy

INTERNATIONAL TRAVELING FELLOWSHIP IN PEDIATRIC NEUROSURGERY

The Joint Pediatric Neurosurgery Section of the *American Association of Neurological Surgeons* and the *Congress of Neurological Surgeons* has established an international traveling fellowship for neurosurgeons who at the time of their application are either training in a residency program outside the United States and Canada, or who have completed residency training outside the United States and Canada within the past five years. The fellowship will cover the traveling and living expenses for a three month period to be spent observing the activities of an established Pediatric Neurosurgical service in the United States or Canada. The fellowship can be spent in any activity on such a service which broadens the individual's exposure to Pediatric Neurosurgery, and can include observation at a clinical or research center, or any other relevant activity which the committee finds acceptable. One fellowship per year will be awarded on the basis of the recommendation of a committee of the Pediatric Section. The maximum fellowship stipend is \$5000.

The application must include:

- 1) A statement defining the purpose of the proposed fellowship and an estimate of expenses for the period of the fellowship.
- 2) A letter of recommendation from the applicant's current Neurosurgical program director.
- 3) A letter of acceptance from the institution where the applicant will seek the fellowship confirming the description of the fellow's activities during the period of the award.
- 4) The applicant's current Curriculum Vitae.

The completed application should be sent to:

R. Michael Scott, M.D.
Department of Neurosurgery, The Children's Hospital
300 Longwood Avenue, Bader 319
Boston, Massachusetts 02115

or via e-mail to:

michael.scott@childrens.harvard.edu

THE ABSOLUTE DEADLINE FOR APPLICATION SUBMISSION IS NOVEMBER 15, 2007