



Commentary

Formation and Growth of the Child Neurology Society

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ABSTRACT

The Child Neurology Society, founded in 1972, has developed into a strong and vibrant voice for professionals who care for children with a wide variety of neurological disorders. In this article, we describe its beginnings, growth, and how the Society has established robust relationships with many professional societies, and most importantly, the National Institute of Neurological Disorders and Stroke, in fostering research, education, and training for those in the field. The Child Neurology Society was also instrumental in helping to establish the Professors of Child Neurology and the Child Neurology Foundation. In addition, the Child Neurology Society, collaborating with key partner organizations such as the American Academy of Neurology and American Academy of Pediatrics, supports legislative efforts to improve the lives of children with neurological disorders and their families.

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Introduction

The year 2021 will mark the fiftieth (“semicentennial”) anniversary of the founding of the Child Neurology Society (CNS). In anticipation, we will highlight how the organization was established and how it evolved to become the major North American society representing medical professionals who care for children with the ever-expanding and complex conditions that encompass the field of child neurology. In part, this also has served as a model for the formation of similar societies in many countries and international organizations such as the International Child Neurology Association (ICNA) and the European Paediatric Neurology Society.¹

Origins of the CNS

Several landmarks precede the formation of the CNS. These include the founding of the first neurological association in the United States (American Neurological Association [ANA], 1874),

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the first national professional American society for pediatric physicians (American Academy of Pediatrics [AAP], 1930), the largest American neurological society (American Academy of Neurology [AAN], 1948), the first specialty board for professionals who care for children (American Board of Pediatrics [ABP], 1933), and finally, the first specialty board devoted to those who care for individuals with neurological and psychiatric disorders (American Board of Psychiatry and Neurology [ABPN], 1934). Another 34 years elapsed before child neurology was recognized as a distinct neurological subspecialty (ABPN with Special Competence in Child Neurology, 1968). Photographs of individuals mentioned in this article are contained in [Supplementary Figure 1](#).

Following this important milestone, Ken Swaiman, having long recognized the uniqueness of child neurology, moved forward. As a group, those individuals practicing child neurology neither had effective means of communicating with one another for professional or personal reasons nor did they have direct connections with the other professional organizations or with many governmental and medical organizations. An afternoon session held at the annual AAN meeting did not meet the needs of the growing number of American and Canadian child neurologists. Clearly, it was time to form a national organization of and for child neurologists. Thus Ken gathered together a small group of senior pediatric neurologists from the Upper Midwest of the United States, who met in La Crosse, Wisconsin, in 1971 and



FIGURE 1. The first meeting of the CNS Executive Committee. This photo was taken on January 26, 1973, in Nashville, Tennessee, and pictured (left to right) are John Menkes (Councillor, West), Isabelle Rapin (Councillor, East), Gerry Fenichel (Vice President), Ken Swaiman (President), Dick Allen (Secretary-Treasurer), Manny Gomez (Councillor, Mid-West), and Jim Schwartz (Councillor, South).

with them, founded the Child Neurology Society in 1972.^{2,3} The first meeting was held on October 5, 1972, at the University of Michigan (in the Towsley Hall for Continuing Medical Education) with approximately 180 members in attendance. Richard Allen served as the meeting's host and introduced Sabine Pelc (Belgium), who spoke of the need for an international child neurology association. Dick then introduced Ken Swaiman, who suggested bylaws for the CNS modified from those used by the AAN. After vigorous discussions, in which a few individuals voiced their opposition to the establishment of a child neurology society, it was decided that the society would be formed with the first officers being Ken Swaiman (President), Gerald Fenichel (Vice President), and Richard Allen (Secretary) (Fig 1). Vanderbilt University in Nashville was chosen as the site for the second meeting.

Ken also had the vision to develop a logo for the CNS. Working with Danae Kasbi, an experienced illustrator from the biomedical graphics unit of the University of Minnesota, and with the help of Dick Allen, a logo and photograph were selected; they continue to adorn the cover and first page of each CNS annual meeting's program booklet (Fig 2). The complete 1972 meeting program booklet, including abstracts of the papers presented, is contained in [Supplementary Figure 2](#).

Incorporation of the Society, development of bylaws, establishment of an Executive Board with succession policies, and hiring of administrative staff to manage the Society's many and ongoing needs, including organization of annual meetings, were the building blocks of a dynamic evolving organization. With the increasing number of individuals interested in academic or private practice careers in child neurology and the expansion of child neurology training programs, the number of Society members has grown to more than 2000 (1972, 223; 1980, 544; 1990, 963;

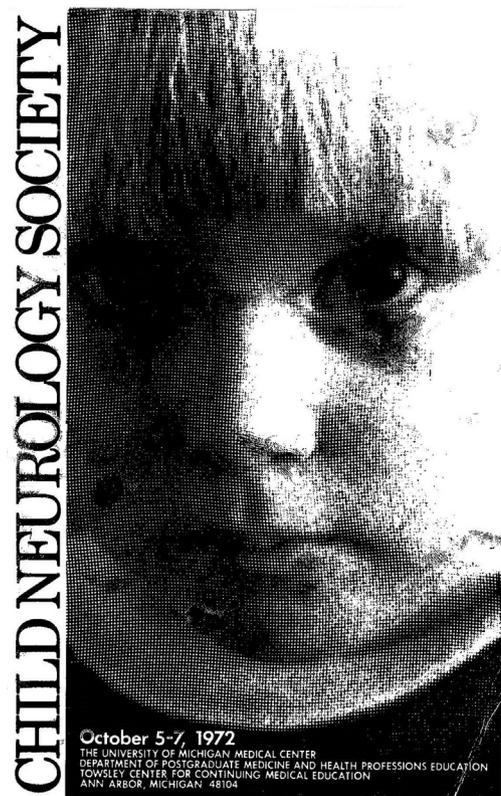


FIGURE 2. The Child Neurology Society cover figure that has been used on the cover of the annual meeting booklet since the first annual meeting in 1972.

TABLE 1.
Child Neurology Society Presidents

| Name | Years |
|----------------------|-----------|
| Kenneth F. Swaiman | 1972–1973 |
| Gerald M. Fenichel | 1973–1974 |
| Manuel R. Gomez | 1974–1975 |
| James H. Schwartz | 1975–1976 |
| Richard J. Allen | 1976–1977 |
| Bruce O. Berg | 1977–1978 |
| N. Paul Rosman | 1978–1979 |
| Arthur L. Prenskey | 1979–1980 |
| Paul R. Dyken | 1980–1981 |
| Mary Anne Guggenheim | 1981–1982 |
| Raymond W.M. Chun | 1982–1983 |
| Robert M. Eiben | 1983–1985 |
| David A. Stumpf | 1985–1987 |
| Marvin A. Fishman | 1987–1989 |
| Darryl C. De Vivo | 1989–1991 |
| Peter H. Berman | 1991–1993 |
| Joseph J. Volpe | 1993–1995 |
| Michael E. Cohen | 1995–1997 |
| Alan K. Percy | 1997–1999 |
| Michael J. Painter | 1999–2001 |
| Stephen Ashwal | 2001–2003 |
| James F. Bale Jr. | 2003–2005 |
| Ann H. Tilton | 2005–2007 |
| John B. Bodensteiner | 2007–2009 |
| Donna M. Ferriero | 2009–2011 |
| E. Steve Roach | 2011–2013 |
| Nina F. Schor | 2013–2015 |
| Kenneth J. Mack | 2015–2017 |
| Jonathan W. Mink | 2017–2019 |
| Phillip L. Pearl | 2019–2021 |

2000, 1235; 2010, 1517; 2018, 2120). This article is one of three that will be published sequentially on the histories of the CNS, Professors of Child Neurology (PCN) and the Child Neurology Foundation (CNF).

Formation of the Executive Board and the committees

From its first meeting to this day, the leadership structure of the CNS was established including the duration for the terms of office and the electoral process. In addition to the President, Vice President, and Secretary-Treasurer, regional councillors (West, South, Midwest, and East) were elected, encouraging a wide range of perspectives and a training ground for future leaders of the Society. Table 1 provides a list of the Presidents of the CNS. The annual meeting booklet contains lists of those who have served in different capacities since the CNS was formed, and Supplementary Figure 3 lists the names of those who have served as CNS officers since its inception. Basic to this process was the development, passage, and periodic update of a series of bylaws to meet the Society's evolving needs (<https://www.childneurologysociety.org/>).

Committees have served critical roles in helping the Society examine numerous aspects of the field of child neurology, the professional needs of its members, and in planning for the current and future needs of the organization. Committee chairs were selected by the President, and these chairs served two-year terms; in many instances, chairs continued their service beyond two years, as did the CNS committee member volunteers who were invaluable contributors. During his tenure, E. Steve Roach (2011–13) implemented a system of staggered three-year committee appointments with periodic member rotations, a practice continued by his successors, hoping to promote continuity and facilitate participation by younger members. As in any organization, the relative importance and size of the committees has varied depending on the organizational needs. In the Winter 2018 CNS *Connections* (the official CNS newsletter; see website), the Society's

strategic goals were described by our current President, Jonathan Mink, along with the different committees that would undertake these goals. They included:

- (1) Provide current and relevant mechanisms for life-long learning among child neurologists—committees: Archives, Awards, Electronic Communication, Ethics, International Affairs, Practice, Research, Scientific Program Planning.
- (2) Establish for the CNS stable and consistent funding sources for specific, longitudinal, and targeted initiatives—committee: Finance.
- (3) Achieve awareness among the public and national policy makers of the importance and cost-effectiveness of a child neurology workforce—committees: Archives, Awards, Electronic Communication, Legislative Affairs.
- (4) Achieve awareness among the public and national policy makers of the general health needs and challenges for individuals with chronic neurological conditions of childhood onset—committees: Electronic Communication, Legislative Affairs.
- (5) Engage and encourage the child neurology workforce of the future—committees: Archives, Awards, Electronic Communication, International Affairs, Membership.
- (6) Provide a robust infrastructure and consistent direction for the CNS—committees: Bylaws, Finance, Long-range Planning, Membership, Nominating, Administrative Liaison.

CNS membership categories

One aspect of the Society's maturation was the establishment of different membership categories. Initially there were two categories—Active Members who had completed training in child neurology (but who were not necessarily Board certified) and whose practice included clinical service or research in child neurology, and Junior Members, who were persons training in child neurology. These criteria were later modified so that both Active and Junior membership required completion or current enrollment in an ACGME-approved program leading to ABPN Board Certification in Neurology with Special Competence in Child Neurology (later changed to Special Qualification in Child Neurology, as it was believed the ABPN examination could not determine if a candidate was truly “competent” to practice child neurology). A third membership category, Emeritus Members, introduced in the late 1970s, provided for retired child neurologists (practicing less than 50% time) who had been Active Members of the CNS for more than 10 years. Active Members on the Basis of Meritorious Contributions was a fourth category, created for non-child neurologists. Few individuals were considered for this membership category and in 2014 it was dropped as a special category and folded into the Active Members category, to include individuals who were not Board certified/eligible child neurologists but who were active in areas important to child neurology (including, but not limited to: [1] nurses, nurse practitioners, and physician assistants and [2] developmental pediatricians, neuropsychologists, geneticists, neuroophthalmologists, and neurorehabilitation specialists). This membership category was deemed important as it was evident that comprehensive care of children with neurological disorders was and remains multidisciplinary. A fifth category, Medical Student Members, has been added to attract medical students to the field. This category, created in 2014, presently includes ~44 medical student members.

The CNS national office

It is an interesting sidelight that, at one point, the three major American neurological societies all had their executive offices in

the Twin Cities of Minneapolis and St. Paul. The AAN (<https://www.aan.com/AAN-Resources/Details/about-the-aan/history/>) offices have always been located in the Twin Cities as one of its founding members (A. B. Baker) was Chairman of Neurology at the University of Minnesota. The ANA had its first meeting in Philadelphia, later moved to Minneapolis, but more recently has relocated its national office to New Jersey (<https://myana.org/historical-overview>). By contrast, the CNS offices first utilized space and shared administrative staff with the Division of Pediatric Neurology (directed by Ken Swaiman) at the University of Minnesota. The CNS Executive Board later had the opportunity to acquire independent office space and a full time administrative staff. This change was necessitated in part because of membership growth from 223 members in 1972 to 935 members in 1989, with further growth anticipated, requiring more space and support. The CNS moved to their new offices in St. Paul in July 1989. The transition was remarkably smooth because of the efforts of Mary Currey (Executive Director, 1972-2012) and Roger Larson (Associate Director, 1988-2012; Executive Director, 2012-present). At present, there are four CNS administrative staff members, including Roger Larson (Executive Director), Sue Hussman (Associate Director), Kathy Pavel (Administrator), and Emily McConnell (Professional Development Manager) (see CNS website). It is an understatement to say that the CNS owes much to the passion and commitment that these individuals consistently bring to “work” every day.

The annual meeting

October 5 (Thursday) to October 7 (Saturday), 1972, mark the dates for the first CNS meeting. The published meeting booklet lists 133 participants (but there were actually 180 CNS member attendees), a Thursday morning session for registration and a business meeting, two afternoon plenary sessions chaired by Paul Dyken and Ray Chun, and an evening reception and dinner ([Supplementary Figure 2](#)). A similar schedule was followed on Friday, with the afternoon plenary sessions chaired by Manuel Gomez and Frank Wright. The final meeting (Saturday) was a business meeting that ended at 11:30 am. A typical plenary session lasted one hour and 25 minutes, including five 10-minute platform presentations covering a wide range of subjects, with between-sessions coffee breaks providing essential community-forming networking opportunities. The meeting booklet included the program, the complete abstracts, and contact information for all participants. There was no corporate sponsorship and, of course, no awards. There was, however, as in all subsequent meetings, a sense of identity, accomplishment, camaraderie, and anticipation about what the future would hold.

Fast forward to the forty-seventh annual CNS meeting (2018) held in Chicago ([Supplementary Figure 3](#)). It garnered the highest attendance to date, with 1350 attendees and another 300+ individuals representing 78 different exhibitors occupying more than 100 booths. The scientific program included six breakfast seminars, six scientific symposia, three concurrent platform sessions (21 presentations), three poster review sessions (200 posters), three CME-accredited Meet the Expert sessions organized by Special Interest Groups (SIGs), a writer's workshop for junior faculty, three Junior Member seminars, as well as eight committee meetings and eight to 10 SIG meetings. In addition, a Child Neurology Career Development Program retreat and the Pellock Seminar on Epilepsy were both on the front end of the meeting.

Organization of the meeting has changed as each newly elected President has tweaked the program depending on what is perceived as the needs of the membership and the President's personal interests and vision. These changes have been guided

(to some degree) by the surveys completed by the membership about the meeting's content (symposia, platform and poster presentations, special speakers and events, etc.). Two examples are the introduction of poster sessions during the tenure of the Society's seventh president (Paul Rosman, 1978-79) and the introduction of presidential symposia during the tenure of the thirteenth president (David Stumpf, 1985-87), with both now being major features of each CNS annual meeting.

Another important component that has evolved is the role of corporate sponsorship. The average annual meeting expenses in the past several years has been approximately \$1.2 to \$1.5 million, with attendee registration fees clearly insufficient to cover these costs. The CNS has been fortunate that many pharmaceutical, device, and educational companies have been willing to contribute to the meeting. Six exhibit booths were set up for the 1989 CNS annual meeting; the 2018 annual meeting featured more than 100. This provides the corporate sponsors a means to meet and interact with the Society's members and to showcase their products. In recent years, companies also have provided well-attended educational satellite symposia that have augmented the scientific content of the meetings.

Two other aspects bear mentioning. When the CNS was founded, it was thought to be important to have equitable geographic membership representation. The first was that the CNS Executive Board divided the United States and Canada into four regions (East, South, Midwest, and West). The states or Canadian provinces for these regions are listed on the CNS website, and a councillor was elected from each region to serve a two-year term on the Board. The second aspect was the importance to rotate the meetings geographically. The year 2021 marks the fiftieth year of the CNS. The Society has held to its pledge, with 43 meetings held in one of the four regions of the United States, and seven in different provinces across Canada.

Special interest groups

As child neurology diversified into many subspecialties, it became apparent that the national meeting could serve as a place for individuals with common interests to meet. One outgrowth of these efforts was the development of SIGs during the presidency of Stephen Ashwal (2001-2003). There now are approximately 12 to 18 SIGs that meet at the annual meeting encompassing the fields of demyelinating disease, education, epilepsy, ethics, headache, movement disorders, neonatal neurology, neurocritical care, neuropalliative care, neurogenetics and neurodevelopmental disabilities, neurohospitalists, quality improvement, neuroimmune disorders, neuromuscular disorders, sleep disorders, stroke, and traumatic brain injury. They provide a chance to meet colleagues with similar interests, develop research and data collection collaborations, and to present informally research and ideas for future programs to be incorporated into the annual meeting. Perhaps the most prominent example of the impact that such groups have is seen in the International Pediatric Stroke Study group spearheaded by Gabrielle deVeber, which was developed at the same time as the Stroke SIG—with the International Pediatric Stroke Study being a larger and international version of the Stroke SIG.

Awards presented at the annual CNS meeting

Every professional society honors its members and others in allied fields with awards to recognize special achievements and important milestones, as well as grants to support research activities. The Awards Committee, chaired by Nigel Bamford, is responsible for balanced and comprehensive deliberations needed in choosing the awardees who are to be recognized at the annual

TABLE 2.
Awards Presented at the Annual CNS Meeting

| |
|---|
| Hower Award (1974) |
| Philip R. Dodge Young Investigator Award (1983) |
| Bernard Sachs Award (1987) |
| Bernard D'Souza International Fellowship Award (1989) |
| Outstanding Junior Member Award (1996) |
| CNS Bhuwan Garg High School Neuroscience Award (1998) |
| International Visiting Professor Award (2003) |
| Roger and Mary Brumback Memorial Lifetime Achievement Awards (2004) |
| Arnold P. Gold Foundation Humanism in Medicine Award (2010) |
| M. Richard Koenigsberger Scholarship (2013) |
| AAP Section on Neurology Travel Scholarship Award (2015) |
| Child Neurology Foundation: the PERF Grant (2013) and the Shields Research Grant (2013) |
| CNS/PCN Blue Bird Circle Training Director Award (2013) |
| ACNN Claire Chee Award for Excellence (2000) |
| ACNN Nurse Practitioner Excellence Award (2015) |

Additional information about these awards is given in the CNS Newsletters on the CNS website. The Lifetime Achievement Award was named for the Brumbacks and first given at the 2017 CNS meeting. The years that the other awards were first given are in parentheses.

CNS meetings. Over time, the process of selection has changed and the number of awards has increased. The awards and the year they were initiated are summarized in [Table 2](#) and in [Supplementary Figure 3](#). The interested reader is referred to an article by Dean Timmons on the Hower Award (the first award created by the CNS) and to an interesting introduction to the history of the founding of child neurology in America by David Stumpf, describing the importance of Bernard Sachs in whose honor the Society's third award was introduced.^{4,5} Recipients of the Hower and Sachs awards are recognized at each annual meeting of the CNS, where six to eight Junior Member awards are also given annually, along with the Bhuwan Garg High School Neuroscience Award, so renamed in 2012 in recognition of Dr. Garg's many years of fostering this program in collaboration with the AAN. The year 2018 also marks the thirtieth year in which the Bernard D'Souza International Fellowship Award is being given. The recipient of this award is an "early career" international child neurologist who is invited to attend the annual CNS meeting (without personal cost), followed by a one-week visiting rotation at a host program and medical center.

One of the most prestigious awards, the second award established by the CNS (and given since 1983), is the Young Investigator Award. In 2004, it was renamed the "Philip R. Dodge Young Investigator Award," to recognize Dr. Dodge's contributions to child neurology; after a heroic campaign started by Darryl De Vivo in 2009 and completed in 2014, over \$1,000,000 was raised for its full endowment, with more than 350 CNS members and several large institutions contributing.

Development of relationships with other organizations

Each president and executive board has dealt with the challenges associated with finding a path to developing meaningful relationships with other neurological and pediatric professional societies as well as with numerous other allied organizations. Under the leadership of Paul Rosman (1978-1979), solid, beneficial, and long-standing relations were developed with the Association of University Professors of Neurology, the National Institute of Neurological and Communicative Disorders and Stroke, and the ABPN. The AAN had served as a template for developing the structure, bylaws, and mission of many of the CNS committees, and over time, many CNS members began to play important roles in various AAN committees. The ANA also played a pivotal role in the development of the CNS, and the two organizations now cosponsor monthly publication of the *Annals of Neurology*, the neurology journal with one of the highest scientific impact factors worldwide.

Eventually we were perceived to be on equal footing with these other two major national neurological organizations. The CNS also became one of the sponsoring organizations of the National Committee for Research in Neurological and Communicative Disorders. In addition, new liaison relationships were formalized with the American Academy of Child Psychiatry and the Canadian Association for Child Neurology. Likewise, ties with other professional societies, including the AAP and the ICNA, developed within the first two decades of the founding of the CNS. Further agreement was obtained from the ABPN that there would always be at least one child neurologist on their Board, and that there also could be more than one. The CNS was asked to rewrite the section in the American Medical Association Green Book, outlining recommended content of Pediatric Neurology training programs. For recertification in Child Neurology, it was anticipated that there would be two tracks to recertification, one in neurology and the other in child neurology. A major concern of the CNS was that the number of physicians pursuing post-doctoral medical research training had declined precipitously in the United States. This is a concern in many fields of medicine, not just child neurology. The need for a concerted effort to reverse this trend was cited as a major priority of the CNS.

By 1989, the CNS had matured as a professional organization, just as the period of the Decade of the Brain began in 1990. The CNS Executive Committee continued to engage other professions including the ANA, AAN, National Institutes of Health (NIH), the Association of University Professors of Neurology, and ABPN, requesting full professional recognition and partnership in important ongoing affairs of mutual interest and importance, and to corporations and other funding agencies to support the expanding financial needs of a growing neurological society. One example of the increasing recognition of the CNS was that our members have been given the sole responsibility for developing the well-attended child neurology courses at the AAN's annual meeting. The future looked bright as we entered the Decade of the Brain. As part of these efforts, the CNS research committee, under the leadership of Michael Johnston, assembled a guidebook entitled *Research Opportunities in Child Neurology*. This publication would prove helpful in planning strategies over the next two decades to obtain new funding to foster increased research in our discipline.

Another important liaison was established between the CNS and the Pediatric Academic Societies when, over a decade ago, the CNS became an affiliate member with the Pediatric Academic Societies through the American Pediatric Society and the Society for Pediatric Research. This alliance allowed the CNS to sponsor symposia and abstract sessions to enhance the visibility of child neurology at these major scientific meetings. Donna Ferriero was a major catalyst in this effort. Likewise, Eileen Ouellette served as President of the AAP (2005–2006), and before, during, and after her presidency, she worked to develop closer relations between the AAP and the CNS. Members of the CNS have also served on the executive boards of the AAN and AAP.

During the presidency of David Stumpf (1985-1987), the CNS opened communications with leaders in Europe and Asia. The Hower Award, for the first time, was given to an international recipient, Jean Aicardi, who was instrumental in organizing the European Federation of Child Neurology Societies. The then President of the ICNA, Yukio Fukuyama, began his long relationship with the CNS. This focus on international engagement laid the foundation for the CNS to host a memorable 1994 joint CNS-ICNA meeting in San Francisco during Joseph Volpe's tenure as president (1993-1995), with David Stumpf as chair of the organizing committee. Planning for this conjoint meeting had begun in 1985 and was approved by the executive committees of the CNS and ICNA in 1987. Organization of the spectacular scientific program was

spearheaded by Alan Percy, with considerable input from Michael Johnston and Darryl De Vivo. More than 1100 registrants were present, and Hugo Moser delivered a memorable lecture as the Hower Award recipient. Under the presidential leadership of Kenneth Mack (2015–2017), Jon Mink (2017–2019), and Phillip Pearl (2019–2021) plans have progressed toward having a joint 2020 CNS-ICNA meeting in San Diego.

Another important organization that works closely with the CNS is the Association of Child Neurology Nurses ([ACNN] <https://www.childneurologysociety.org/acnn/home>). The ACNN is an international association of nurses and other health care professionals caring for children with neurological conditions. Its mission is to promote excellence in child neurology nursing practice through the development and support of nurses caring for children with neurological conditions. The ACNN was formed in 2002 and currently has 254 members. This group holds a three-day conference, in conjunction with the CNS, focusing on educational opportunities, fostering research and facilitating international collaboration. They also have annual awards for Innovation in Clinical Practice, the Claire Chee Award for Excellence in Child Neurology Nursing, and the Nurse Practitioner Excellence Award in Child Neurology Nursing.

The CNS and the National Institute of Neurological Disorders and Stroke

The CNS developed many partnerships with the National Institute of Neurological Disorders and Stroke (NINDS) that reflected mutual interest in enhancing the workforce, tools, and translational approaches needed to bring cutting-edge science to improve the health and well-being of children and families with neurological disorders. Collaboration continues to be particularly robust around training and career development mechanisms for junior members of the child neurology community, with educational and networking opportunities for members at all points in their career.

In 1992, during the Decade of the Brain, the NINDS, under the direction of Dr. Murray Goldstein, launched a request for applications for K12 Institutional Career Development Awards, for newly trained child neurologists and other clinicians who have made a commitment to independent research careers, to facilitate their transition to more advanced support mechanisms. In parallel with the K12 award was the Neurological Sciences Academic Development Award (NSADA), a grant that provided up to three years of salary support at the applicant institution for junior child neurology faculty members who were committed to pursuing research-intensive careers in child neurology. In 2013, at the urging of the Research Committee of the CNS, the first NSADA symposium was held as an integral part of the CNS annual meeting. This symposium allowed NINDS K12 and NSADA awardees from around the United States to present their work in a forum aimed at mentoring and networking. In addition, it allowed the investigators of these mentored career development grants to network and exchange ideas and strategies. Largely as a result of the collective brainstorming of these individuals and their interaction with Stephen Korn, PhD, at NINDS, the K12 and NSADA programs are now a single national program, newly named the Child Neurologist Career Development Program (CNCDP), to which any institution's junior faculty can apply; its symposia continue to encourage, mentor, and inspire. The CNCDP staged its third annual retreat in conjunction with the 2018 annual CNS meeting, with nearly 50 young physician-scientists presenting their research and/or interviewing for available positions in future years.

The CNS also has long been a contributor, both fiscally and through the mentoring efforts of its members, to the Combining Clinical and Research Careers annual conference for MD-PhD

students. This two-day-long conference brings students from around the United States interested in research-intensive careers in child neurology, adult neurology, neurosurgery, psychiatry, or neuropathology to Washington, DC, to hear from career neuroscience physician-scientists at every level and to gain mentoring and advice from academicians and NINDS scientists and administrators early in their careers. The 2018 Combining Clinical and Research Careers conference was held at the NIH campus, affording participants a first-hand view of the training and careers at NINDS.

Another aspect of the synergistic relationship between the CNS and the NINDS was formed in 2001, with additional support from the Office of Rare Diseases. These organizations have funded an annual symposium, held at the beginning of the CNS meeting, entitled the Neurobiology of Disease in Children (NDC), focusing on neurological disorders that are often challenging to treat. These symposia are currently funded through 2020. These annual conferences have been very successful in presenting state-of-the-art aspects of different neurological conditions of childhood. The NDC's success is attributable to Dr. Bernie Maria's skill in selecting topics to be discussed and speakers for each program, with thoughtful juxtaposition of the most accomplished investigators in different fields. Attendees include a large group of child neurologists, with many new investigators, as well as representative lay organizations, with important input from the NIH in identifying future directions and research priorities. In 2018, the NDC Symposium focused on Tourette syndrome and drew over 300 attendees. Significantly, CNS members such as Deborah Hirtz (now succeeded by Adam Hartman) have spent their child neurology careers at the NINDS to foster funding of research and developing collaborative networks. Notably, former CNS president Nina Schor recently became the Deputy Director of the NINDS.

Annals of Neurology

The history of its development by Fred Plum and others was recently published and is an interesting story.⁶ To ensure its viability, the CNS, which had formed only five years before the first issue of the *Annals of Neurology* was published, was approached to be the cosponsoring professional society with the ANA of its flagship journal the *Annals of Neurology*. There were approximately 600 initial subscribers, equally divided between the two organizations. The first issue appeared in January 1977, and it rapidly became one of the preeminent clinical neuroscience journals worldwide. Initially, the number of published articles related to child neurology was small, explained in part by there being fewer child neurologists, with a relatively smaller number of quality manuscripts being submitted by child neurologists than by adult neurologists. Manuscript selection was doubtlessly also affected by priorities set down by the journal's editorial staff. The CNS was appreciative of being cosponsors as there was much prestige attached to the *Annals* and it was believed that over time there would be a greater representation of child neurology content. When the journal was first published there were 14 editors, four of whom were clinical child neurologists (Charles Barlow, Paul Dyken, Gerald Golden, and Ken Swaiman). The profits generated by the journal were initially divided as 75% for the ANA and 25% for the CNS, a situation that was considered unjustified by the CNS Executive Board as there were an equal number of subscribers from the two societies. The CNS explored the possibility of switching their affiliation to *Neurology*, the journal of the AAN. The AAN organization was quite receptive, but in subsequent meetings, it was decided to remain with the *Annals* (and the ANA), with whom Michael Painter, Alan Percy, and David Stumpf were able to renegotiate a slightly more favorable financial split (ANA, 70%; CNS, 30%). The *Annals* remains the journal of the CNS, which

continues to be a significant source of income for the society, and more importantly, is a repository for very-high-quality research in many areas of pediatric neurology.

The Legislative Affairs Committee

Fifteen years ago, the CNS Legislative Affairs Committee (LAC) was organized to complement the legislative activities of the AAN. Roy Elterman served as the first chair, and subsequently, Bennett Lavenstein assumed this role and continues to serve as the LAC's chair. Bennett works in Fairfax, Virginia, and is on the faculty of the Children's National Health System, so he has unique access to provide direct representation of the CNS on the Hill in Congressional affairs concerning matters related to child neurology. The law firm of Powers Pyles Sutter and Verville, which formerly represented the AAN, was enlisted to represent the CNS, and one of the firm's partners (Judi Buckalew) oversaw the CNS interests. Peggy Tighe currently represents the CNS on behalf of Powers Pyles Sutter and Verville. During this period, there were lobbying efforts to support programs, including Universal Newborn Screening, Children's Health Insurance Program reauthorization, Disability Programs for Children, NIH funding, and the recently (2018) re-introduced bill for Loan Forgiveness for Pediatric Subspecialists. To advance these efforts, Bennett Lavenstein frequently partners with the AAN and the AAP and encourages members of the CNS to contact their congressional representatives and senators; additionally, Bennett personally goes to the Hill to meet with Congressional staffers. These combined efforts have resulted in recognition of child neurologists and their work by members of Congress.

The Practice Committee

Over the past four decades the CNS practice committee has been chaired by Stephen Ashwal, Deborah Hirtz, Roy Elterman, Carmella Tardo, Bruce Cohen, and Jeff Buchhalter and earlier by several other CNS members. The Practice Committee initially focused on developing practice guidelines, but in the past two decades, issues related to coding and practice management became its principal focus. At the time that Bruce Cohen served on this committee (1990s and later), he was invited to join a similarly focused AAN committee, the Medical Economics and Management (MEM) subcommittee, after first serving on the AAN Practice committee. These combined efforts have bridged communication between the two organizations and have accelerated dissemination of educational programs related to Current Procedural Terminology coding and business management of hospital-based and private child neurology practices.

CNS and its role in membership workforce, training, education issues

Workforce issues

During the 1990s Decade of the Brain, there were increasing concerns about whether enough child neurologists were being trained in the United States to meet the needs of our children, as there were estimates of between 10 and 15 million children with neurological disorders, but only about 1500 child neurologists available to see them. In addition, the population of child neurologists was aging, and it was calculated that about 75% would be retiring over the subsequent decade. With this in mind and over the course of three presidencies (Mike Painter, 1999–2001; Steve Ashwal, 2001–2003; and Jim Bale, 2003–2005), the CNS Executive Board hired Daniel Polsky, from the Wharton School, University of Pennsylvania, who also served as an economist in the

Department of Medicine at the University of Pennsylvania. Daniel surveyed the CNS membership to characterize the US child neurology workforce and to determine factors that influenced decisions to enter the field of child neurology. As detailed in a series of publications,^{7–10} it was clear that although child neurologists were quite happy with their careers, there was a serious shortage. These efforts would later lead to a Health Resources and Services Administration grant that enabled the CNS to study pediatrician satisfaction with US child neurologists and patient access to child neurological services. During this period, the CNS leadership worked closely with the leadership of the PCN and the CNF to determine the most effective means to advance our discipline. Career development became a major focus, as exemplified by the CNS Young Investigator Award, which later became the Philip R. Dodge Young Investigator Award, recognizing the lifetime contributions of this premier educator and mentor, as well as working with the NINDS with the establishment of the CNCDP.

Training and certification

Before 1957, people were largely self-taught in pediatric neurology. Some had trained in pediatrics (e.g., Randolph Byers), others had trained in neurology (Sidney Carter and Philip Dodge), and occasionally, some had trained in both pediatrics and neurology (David Clark). In 1957, Drs. Carter, Dodge, and Clark met with the NINDS leadership and convinced them to provide support for pediatric neurology training programs. As noted earlier, it was not until 1968 that Board certification in Neurology with Special Competence in Child Neurology was established (34 years after adult neurology!), with the first examination in this "new" subspecialty in 1969. At the time of the founding of the CNS, there were several small training programs, the core curriculum was quite variable, pediatric neurology was housed with almost equal frequencies in departments of pediatrics or neurology, and the number of pediatric neurology faculty was quite limited and very busy. Several recent publications have discussed how training programs evolved, the past and current issues faced by programs and trainees, and the potential solutions regarding redesigning training and pediatric neurology certification, topics that are beyond the scope of this review.^{11–16} Because of the complexity of these issues, and with efforts made by Ken Swaiman with the considerable help of then CNS President Bruce Berg (1977–78), a separate organization was formed, the Professors of Child Neurology (PCN), which held its first meeting during the 1978 CNS meeting. A future publication will describe the PCN's evolution, challenges, and accomplishments.

A few barriers that the CNS has had to resolve over the past three decades are worth mentioning. One issue related to the growing interest in neurodevelopmental disabilities (NDD) and the need for child neurology residents to have more training in this area. In the late 1970s and the early 1980s, individuals, particularly Isabelle Rapin and Ron David, began to advocate for child neurologists to advance the field of child neurology from its traditional base in classical adult neurology and become involved in clinical care and research in NDD.¹⁷ This culminated in a simple printed booklet (that was never published) for the attendees at the 1981 CNS meeting¹⁸ that identified 11 disorders with neurological and neurodevelopmental underpinnings (e.g., disorders of attention/activity, mood and affect, autism, general cognition, speech and language, reading, coordination, and others).

A similar interest in formalizing training in NDD led to the establishment of the Society for Developmental Pediatrics (SDP) in 1978. The SDP's first president was Arnold Capute, MD, at the Kennedy Krieger Institute at Johns Hopkins. In the 1970s, training in developmental pediatrics varied substantially, and in recognition of a

need for uniform training standards, Dr. Capute led the effort for certification in developmental pediatrics.^{19–21} Dr. Capute and his colleagues at the Kennedy Krieger Institute also recognized a need for closer ties with child neurology, underscored by the biological basis for NDD, including cerebral palsy, intellectual disabilities, and a range of communication disorders, including learning disabilities and autism. Those problems of development that did not have an apparent “neuropathological substratum” were considered to be in the purview of general pediatrics.

This interest in NDD served as a stimulus for an evolving relationship between the CNS and the SDP. Both the CNS and the SDP recognized the unique deficiencies in their respective training (NDD in child neurology; neurology and neurosciences in developmental pediatrics), enabling this process to move forward. The SDP and the CNS thus came to recognize the value of a jointly sponsored six-year “integrated” training program at a joint meeting of the CNS and the SDP in 1991. In the mid-1990s, it was the early work of Drs. Ira Lott, Michael Painter, and Michael Cohen working with their counterparts in the SDP that was crucial in spearheading credentialing in NDD. The results were that the six-year residency training program would be housed in neurology and would consist of two years of pediatrics, followed by a year of adult of neurology, 18 months of integrated child neurology and developmental pediatrics, and 18 months of neurosciences and research. Both the ABP and the ABPN collaborated on the eventual establishment of board certification in neurodevelopmental disabilities in 1999, with the first certifying examination administered by the ABPN in 2001.

As interests of the CNS and SDP overlapped and as members of both societies frequently collaborated and competed, a number of SDP leaders (Bruce Shapiro, Arnold Capute, Brian Rogers, Pat Accardo) met with CNS representatives when Michael Cohen was CNS President (1995–1997) and Michael Painter was PCN President (1994–1996). These meetings had several important outcomes. They created an agreement allowing SDP members full access to the CNS with all rights and privileges. At the time, the SDP consisted of about 150 to 200 members. Following a vote from the SDP membership, it was decided to integrate the SDP totally into the CNS, and a “grandfathering” period followed, in which all SDP members were reviewed for membership in the CNS. The SDP had a Foundation Account, which after five years was transferred to the CNS. The purpose of this account was to further the field of NDD. Initially the SDP proposed that a “section” for NDD be created within the CNS. This was not approved, but two years later, an NDD SIG within the CNS was formed. Max Wiznitzer (CNS) and Brian Rogers (SDP) served as co-directors of the first CNS NDD SIG for the following eight years.

A third issue requiring action by the CNS was related to funding for residency training. In the late 1990s, the Health Care Financing Administration (HCFA) was evaluating existing funding for residency training, including reimbursing the last year of Child Neurology training at only half the usual direct Graduate Medical Education rate due the sponsoring institution. Because child neurology had two years of pediatric training incorporated into child neurology residency, it was deemed that we were eligible for only two but not three additional years of support. This decision would have placed a number of child neurology training programs at risk. The CNS, primarily through the LAC, chaired at that time by Roy Elterman, and with the assistance of Bennett Lavenstein (the CNS’s stalwart LAC Washington-based child neurologist) worked closely with the respective LACs of the AAN and the AAP to secure funding for all five years of child neurology training. Alan Percy, Roy Elterman, Michael Painter, Bennett Lavenstein, and Sheldon Gross met with Senator Kay Bailey Hutchinson (R-Texas), Senator Ted Kennedy’s (D-Massachusetts) chief of staff and a member of the HCFA; Ann Tilton also was involved, seeking the help of the Louisiana delegation. Senator Kennedy was very supportive of these

efforts and an amendment to HCFA’s regulation, to include full reimbursement for all 5 years of residency training was introduced and passed by the House of Representatives.

A fourth issue to mention briefly (that will be covered in the PCN publication), related to earnest CNS discussions regarding the advantages and disadvantages of having a matching process for child neurology training. Through the efforts of Harvey Singer (President of the PCN, 2002–2004), the CNS chose to affiliate with the San Francisco Match Service, an organization which at that time administered the match in neurosurgery. The match demystified the process by which medical students and pediatric residents entered postgraduate training in child neurology and led to greater visibility of careers in child neurology, directly increasing the numbers of applicants to US child neurology training programs. Later, the CNS would affiliate with the National Residency Matching Program. To date, the match appears to be successful as more individuals are training in child neurology. The 2018 National Resident Matching Program reported that 68 child neurology residency programs participated and that 96.3% of the 129 offered positions were filled (<http://www.nrmp.org/main-residency-match-data/>).

Finally, the fifth issue that remains actively and heatedly discussed relates to the controversies surrounding how child neurology training programs should be constituted. These discussions have focused on the controversies surrounding the balances between child neurology’s historical roots in adult neurology and pediatrics and the need to modernize training to account for the enormous advances in genetics, neuroimaging, and in many of the other neurosciences.^{22,23} On June 11, 2016, the ACME approved recategorization of child neurology from a dependent subspecialty to a core specialty that was distinct from adult neurology and consistent with the ABPN designation of child neurology. This likely will stimulate significant changes in the training of child neurologists and will be reviewed in more depth in a future article on the PCN.

Relation between the CNS and the CNF

Ken Swaiman had been asking the CNS to consider forming a foundation for several years, recognizing the Society’s need for a platform to interact more formally with patients, their parents, and industry. During the presidential term of Michael Cohen (1995–97), discussions began about establishing the CNF, and it was during the subsequent presidential term of Alan Percy (1997–1999) that this was accomplished, with Ken Swaiman as the founding President. A major point of discussion was how much control the CNS would exert over the Foundation. Several times, votes to authorize formation of the Foundation fell short. When it was proposed and agreed upon that the Foundation bylaws, selection of all members of the Foundation’s board of directors, and all decisions regarding the Foundation’s major initiatives would need to be approved by the CNS executive committee, the CNS executive committee approved formation of the CNF in October 2001. The CNS provided \$300,000 in startup funds once the CNF bylaws were approved. At that time, Roy Elterman raised a remarkable \$1.4 million from industry groups, which allowed the Foundation to establish research awards immediately. The CNF continued to work with corporate sponsors for these purposes using an approach that was similar to that of the AAN.

From the beginning, the two organizations (CNS and CNF) found it difficult to define their separate missions clearly, to ensure that their relationship would be synergistic. During the CNS presidencies of Donna Ferriero (2009–2011), Steve Roach (2011–2013), and Nina Schor (2013–2015), working with CNF president Don Shields (2012–2015), substantial progress was made in defining the separate but mutual goals of the two organizations: to improve the lives

of children with neurological disorders, with the CNS reassuming from the CNF responsibility for supporting many of the different awards that had been established (e.g., the Dodge Young Investigator Award), and with the CNF committed to working with its corporate advisory board to provide support for programming focused on the needs of patients and their families, with the CNF serving as a “nodal point” for multistakeholder collaborations. The hiring in 2015 of Amy Miller, as Executive Director of the CNF, has launched the CNF into a new era of dedication to the needs of children with neurological disorders.

The Founders of Child Neurology

During the successive presidential tenures of Marvin Fishman (1987–1989) and Darryl De Vivo (1989–1991), the CNS Executive Board supported the publication of the first book on the history of child neurology. Entitled *The Founders of Child Neurology*, edited by Steve Ashwal, and 935 pages in length, it was published jointly in 1990 by Norman Publishing and the CNS.²⁴ It was the first comprehensive review of important contributors to the field of child neurology. The book, consisting of 124 biographical sketches written by over 100 physicians specializing in neurology, child neurology, pediatrics and obstetrics, was organized chronologically into four sections, beginning before 1800 and continuing to the 1940s, tracing the emergence of child neurology as a separate specialty from its roots in pediatrics and neurology. For the interested reader, there are additional useful publications to explore.^{13,24}

Guidelines development

The CNS organized a multisociety effort to write the first guideline on brain death in children. Participants represented the CNS, the AAP, the AAN, the ANA, and the American Bar Association. The guideline, first published in 1987, was the standard of care for criteria for childhood brain death for the next 24 years. Since then, the CNS has worked with the AAN to publish a series of evidenced-based guidelines on common childhood neurological disorders²⁵ and in the past decade, because of its vastly greater resources, the AAN has taken on the challenge of inclusiveness, with support of many guidelines of value to child neurologists. Stephen Ashwal and Deborah Hirtz represented the CNS on the AAN guidelines committees for many years, and in the past several years, additional members of the CNS (Diane Donley, Yolanda Holler-Managan) as well as several Canadian child neurologists (Maryam Oskoui, Lori Billingham) have been active participants in child neurology guideline development (see AAN website). Other CNS members and their colleagues have been very actively involved with other organizations, such as the Tuberous Sclerosis Alliance (e.g., E. Steve Roach, Darcy Krueger, et al.) and the American Heart and Stroke Association (E. Steve Roach, Donna Ferriero, et al.) in preparing targeted guidelines related to specific conditions that can affect children.^{26–29}

Conclusion

The growth of the Child Neurology Society since its inception in 1972 has been remarkable, and the celebration of its semi-centennial anniversary in 2021 will be a major landmark for the Society. The recent 2018 annual CNS meeting confirmed that the energy, enthusiasm, creativity, and passion for taking caring for children with neurological diseases have obviously been transmitted to the next generation of child neurologists. This new

generation brings to the field very sophisticated backgrounds and access to incredible tools to make possible major advances in understanding and treating disorders of the developing nervous system. This will translate in to continued improvement in function and quality of life for our patients and their families.

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Supplementary data

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