

## Career Resources

# So you want to be a neurosurgeon: a career resource guide for successful navigation

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### KEYWORDS:

Neurosurgery;  
Neurologic surgery;  
Residency programs;  
Fellowship training;  
Career resource

**Abstract.** Neurosurgery is not just about head injuries and brain tumors. It is a specialty that currently stands at the forefront of biomedical and technological developments. Modern neurosurgery requires not only creativity and perseverance on behalf of your patients but also clinical acumen, surgical judgment, and technical expertise. This career resource guides the reader through the pathway to a practice in neurosurgery.

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## Historical perspective

History lives in words and memory, but it also lives in objects. That is why people collect original art and books, even when there are reproductions that appear and feel identical to the original. This is no less true for the history of neurologic surgery. One of the earliest surgical procedures of which we have evidence is said to be perforating the skull to let out demons or to release insanities resulting from head wounds. With the advent of written history, the techniques used and the tools used to make holes in the skull have been described in great detail. In the 20th century, neurosurgery was developed by the meticulous procedures of Harvey Cushing and the technical genius of Walter Dandy.<sup>1</sup>

## Introduction

Neurologic surgery is a discipline of medicine and the specialty of surgery that provides the operative and nonoperative management of disorders of the central, peripheral,

and autonomic nervous systems. There are broad general categories of neurosurgical diseases that are commonly managed by neurosurgeons: cerebrovascular (hemorrhage and aneurysms), traumatic head injury, degeneration diseases of the spine, tumors in the central nervous system, and functional neurosurgery.

This career resource guides the interested medical student and physician through the pathway to a practice in neurosurgery. The information presented here is available elsewhere; however, this reading was assembled to make your search easier. [Table 1](#) contains the contact information for several professional entities pertinent to neurosurgery.

## Training requirements

### Medical students

Most people think that all neurosurgeons dreamed of doing brain surgery from an early age. However, the truth is that most are first introduced to the field of neurosurgery in medical school, where they subsequently develop their interest. If a student is interested in neurosurgery, he or she should try to identify a mentor early. Mentors periodically meet with their mentees to provide guidance and even

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Manuscript received March 11, 2011; revised manuscript March 28, 2011

**Table 1** Contact information for professional medical and neurosurgical bodies

Organization	Address	Telephone	Fax	Web Site	E-Mail
Accreditation Council for Graduate Medical Education	515 N State Street, Suite 2000, Chicago, IL 60610	(312) 755-5000	(312) 755-7498	<a href="http://www.acgme.org">www.acgme.org</a>	
American Board of Neurological Surgery	6550 Fannin Street, Suite 2139, Houston, TX 77030	(713) 441-6015	(713) 794-0207	<a href="http://www.abns.org">www.abns.org</a>	<a href="mailto:abns@tmhs.org">abns@tmhs.org</a>
American Association of Neurological Surgeons	5550 Meadowbrook Drive, Rolling Meadows, IL 60008-3852	(847) 378-0500	(847) 378-0600	<a href="http://www.aans.org">www.aans.org</a>	<a href="mailto:info@aans.org">info@aans.org</a>
Congress of Neurological Surgeons	10 North Martingale Road, Suite 190, Schaumburg, IL 60173	(847) 240-2500	(847) 240-0804	<a href="http://www.cns.org">www.cns.org</a>	<a href="mailto:info@1cns.org">info@1cns.org</a>

discuss potential research projects. Doing a surgical clerkship in the junior or senior year is strongly encouraged to gain appreciation for the discipline and to become acquainted with a specific program and its members. High United States Medical Licensing Examination scores, high grades in medical school (including in Alpha Omega Alpha), strong letters of recommendation from other neurosurgeons, and research activity are generally helpful. Given its increasingly competitive nature, only very rarely do spots go unmatched in the National Resident Matching Program for neurosurgery programs.

## Residency

Approximately 100 programs currently provide neurosurgery residency training in the United States. Accreditation of residency training programs is an established process through the Accreditation Council for Graduate Medical Education and its specialty residency review committees. Status regarding accreditation, as well as links to individual programs, may be found on the Web site for the Accreditation Council for Graduate Medical Education. Details of each program can be found in the FREIDA Online database at <http://www.ama-assn.org/ama/pub/education-careers/graduate-medical-education/freida-online.shtml>. Information and applications for the National Resident Matching Program can be found at <http://www.nrmp.org>.

## Residency requirements

Curricular requirements for neurosurgical residency programs are determined by the residency review committee and published by the Accreditation Council for Graduate Medical Education. Neurosurgical training is a minimum of 72 months in length, of which 42 months are on clinical neurosurgical rotations, a 3-month block rotation on neurology, 12 months as chief resident, and up to 24 months devoted to specialized areas of study, including basic sciences, neuroradiology, neuropathology, and research. As of July 1, 2009, the training program in neurologic surgery no longer requires 1 year of surgery internship. Postgraduate year 1 includes a minimum of 3 months of fundamental clinical skills training (critical care, trauma, and other rotations, as determined by the program director), and may include up to 6 months of neurosurgery, which will count toward the 42 months required. Although the minimum training is 72 months (6 years), many programs are 7 years in length to include an additional 12 months devoted to research or advanced training.

## Board certification

Board certification of neurosurgeons is maintained by the American Board of Neurological Surgery (ABNS). The certification process is composed of 2 examinations: a written primary examination that is taken during residency and

an oral examination. The primary examination is an important step in the process toward certification. It is carefully designed to evaluate candidates' knowledge and provide direction for continued learning. It is prepared by the ABNS under the purview of the National Board of Medical Examiners. Each applicant for oral examination must first successfully pass the primary examination for credit toward certification. Oral examination is scheduled within 5 years of completing residency training. Recertification is required every 10 years after passing the oral examination.

Certification (by the ABNS) constitutes an affirmation that the specialist has completed an approved educational training program and an evaluation process, including written and oral examinations, designed to assess the knowledge, skills, and experience necessary to provide quality patient care in neurologic surgery. Information regarding board certification may be found at the ABNS Web site.

## Fellowships

The neurosurgery fellowship match was established in 1993. Its goal is to coordinate fellowship appointments, thus relieving the pressure of uncoordinated appointments and forced early choices. There are many fellowships available in subspecialized fields of neurosurgery. Some fellowships in pediatric neurosurgery, spinal neurosurgery, peripheral nerve surgery, and cerebrovascular surgery are accredited through the Committee on Accreditation of Subspecialty Training. Program information, requirements, and applications may be found at [http://www.societyns.org/fellowships/sns-cast\\_accredit\\_fellowships.html](http://www.societyns.org/fellowships/sns-cast_accredit_fellowships.html). Many other fellowships in other areas of subspecialized training are also available outside of the match, for example, skull base surgery, epilepsy and functional neurosurgery, and neurointerventional surgery.

## Extramural funding (research and travel fellowships and grants)

### Medical students

**American Association of Neurological Surgeons (AANS) Medical Student Summer Research Fellowship.** The AANS through the Neurosurgery Research and Education Foundation offers the AANS Medical Student Summer Research Fellowship program. The fellowship is open to medical students in the United States and Canada who have completed 1 or 2 years of medical school and wish to spend a summer working in a neurosurgical laboratory, mentored by neurosurgical investigators who are member of the AANS and will sponsor the students. Further information about this fellowship program may be found at <http://www.aans.org>.

Many medical schools offer summer research fellowships to preclinical students. The best way for medical

students to find research opportunities is through their schools.

## Residents and faculty members

Numerous clinical and research fellowships are available for both residents and neurosurgery faculty members. There are awards sponsored by the AANS and the Congress of Neurological Surgeons (CNS), as well as awards sponsored by private organizations or in conjunction with private organizations. Some of the prestigious awards, such as the Neurosurgery Research and Education Foundation Research Fellowship and Young Clinician Investigator Award, the William P. Van Wagenen Fellowship, and so on, are designed to support residents and young neurosurgeons for scientific enrichment. Many additional awards are available from joint section specialties. Information on most of these awards can be found at <http://www.neurosurgery.org>.

## Membership in neurosurgical societies

Neurosurgical societies are available at the local, state, regional, and national levels. Participation is encouraged for both residents and faculty. The 2 most prominent national organizations are the AANS and the CNS.

### The AANS

The AANS was founded in 1931 as the Harvey Cushing Society, with the purpose of advancing the specialty of neurologic surgery to provide the highest quality of neurosurgical care to the public. Today, the AANS has a worldwide membership of 6,500. Resident membership is encouraged. Applicants for active membership must be board certified by the ABNS. Further information regarding membership application can be found at the AANS Web site.

### The CNS

The purpose of the CNS is to promote the public welfare through the advancement of neurosurgery, by a commitment to excellence in education, and by dedication to research and scientific knowledge. The 1st annual meeting of the CNS was held in 1951, in Memphis, Tennessee, with an initial membership of 121. Today there are >5,000 members worldwide. This organization also accepts resident and medical student members. Further information is available at the CNS Web site (<http://www.cns.org>).

## Subspecialty organizations

Many national subspecialty organizations also exist. Some are jointly sponsored by the CNS and the AANS. Additionally, there are national organizations with specialized interests that may extend to several medical specialties

(the Stroke Council, North American Spine, etc). Information regarding membership to joint sections of the CNS and AANS is available at <http://www.neurosurgery.org>.

## Conclusions

In a nutshell, neurosurgery is a very demanding but extremely rewarding specialty. It is well suited to those individuals who have a strong interest in the human nervous

system and the various disorders that can affect it. The technological advances that continue to evolve will help keep neurosurgery a fresh and exciting field for decades to come.

## Reference

1. Greenblatt SH, ed. A history of neurosurgery in its scientific and professional contexts. Rolling Meadows, IL: American Association of Neurological Surgeons; 1997.