Emerging Subspecialties in Neurology: Pain medicine

Nathaniel M. Schuster, MD, and Jacob R. Hascalovici, MD, PhD

Neurology® 2018;91:1025-1028. doi:10.1212/WNL.0000000000006580

Correspondence

Dr. Schuster
nmschuster@ucsd.edu

Pain medicine is a multidisciplinary field specializing in the diagnosis and treatment of chronic pain anywhere in the body. Neurologists have a long history of contributions to the field of pain medicine, and in our experience, today's generation of aspiring pain neurologists are finding ample opportunities for pain medicine fellowship positions as well as academic and non-academic pain medicine career opportunities upon graduation. Pain medicine is a rapidly evolving subspecialty that challenges practitioners' cognitive, procedural, psychomotor, and interpersonal skills and offers a desirable work-life balance. Herein the authors provide a general overview of pain medicine as a neurologic subspecialty.

A brief history

In the United States, there are approximately 400 neurologists double board-certified in neurology and pain medicine. There is a notable history of neurologists as leaders in academic pain medicine and in industry. Silas Weir Mitchell, considered a father of American neurology, first described causalgia, now called complex regional pain syndrome type 2, in Union veterans following the US Civil War.^{1,2} Neurologists have been chiefs and former chiefs of academic pain medicine divisions, including David Borsook at Harvard's Massachusetts General Hospital, R. Norman Harden at Northwestern's Rehabilitation Institute of Chicago, Shaheen Lakhan at Virginia Tech Carilion, Charles Argoff at Albany Medical College, and Charles Brock at University of South Florida; the last 2 are based in neurology departments. In addition to the above individuals, other neurologists with notable contributions to the pain medicine literature have included Miroslav Backonja, Zahid Bajwa, Nathaniel Katz, Alyssa LeBel, John Markman, Anne Louise Oaklander, Michael Rowbotham, and many others not listed. Pain fellowship-trained neurologists are in high demand and currently employed at many academic medical centers including Massachusetts General Hospital, Boston Children's Hospital, Brigham and Women's Hospital, Boston University, Albert Einstein College of Medicine, Albany Medical College, University of Rochester, Virginia Tech Carilion, University of South Florida, Mayo Clinic in Rochester, University of Washington, Stanford University, University of California, San Francisco, University of California, Los Angeles, and University of California, San Diego. A list of pain fellowship-trained neurologists that we are aware of (likely an incomplete list) on faculty at academic medical centers as of July 2018 can be found in table 1.

Practice parameters and the scope of pain neurology

Pain neurologists treat highly prevalent and disabling disorders. Lower back and neck pain has been the leading cause of disability in every Global Burden of Disease Study (GBD) from 1990 to 2015. In 2015, the GBD ranked other musculoskeletal disorders the 8th leading cause of disability, while migraine ranked 7th, and medication overuse headache 20th.³

Pain medicine practice is primarily outpatient-based with regular weekday hours and a mix of clinic and procedural time. An average week as a pain medicine physician will include clinic visits with patients with axial and radicular neck and lower back pain, musculoskeletal pain, neuropathic pain, and headache, and performing diagnostic and therapeutic fluoroscopic and ultrasound-guided procedures including epidural steroid injections, joint and bursa injections,

From the Center for Pain Medicine (N.M.S.), Department of Anesthesiology, University of California, San Diego, La Jolla; and Multidisciplinary Pain Center (J.R.H.), Montefiore Medical Center, Albert Einstein College of Medicine, Bronx, NY.

Table 1 A selection of pain fellowship-trained neurologists at academic medical centers (as of July 2018)

Institution	Faculty members
Harvard University (Boston Children's Hospital, Brigham and Women's Hospital, Massachusetts General Hospital)	David Borsook, MD, PhD; Pradeep Dinakar, MBBS; Alyssa LeBel, MD; Anne Louise Oaklander, MD, PhD; Brian Wainger, MD, PhD; Victor Wang, MD, PhD
Louisiana State University	Harry J. Gould, MD, PhD
Boston University	Michael Perloff, MD, PhD
Albert Einstein College of Medicine	Jacob Hascalovici, MD, PhD
Albany Medical College	Charles Argoff, MD
University of Rochester	John Markman, MD
University of South Florida	Charles Brock, MD
Mayo Clinic Rochester	Narayan Kissoon, MD; James Watson, MD
University of Washington	Miroslav Backonja, MD
Stanford University	Meredith Barad, MD
University of California, San Francisco	Cindy Chai, MD; Prasad Shirvalkar, MD, PhD
University of California, Los Angeles	Chelsea Hesterman, MD; Mollie Johnston, MD
University of California, San Diego	Immanuel Lerman, MD, MS; Nathaniel Schuster, MD
Virginia Tech	Shaheen Lakhan, MD, PhD

diagnostic facet or medial branch blocks and radiofrequency ablations, sympathetic blocks, as well as non-image-guided procedures including chemodenervation for chronic migraine, occipital and trigeminal nerve blocks, and trigger point injections. Many pain physicians are also trained in advanced percutaneous interventional therapeutics for chronic pain including neuromodulation (such as spinal cord stimulation, dorsal root ganglion stimulation, and peripheral nerve stimulation), intrathecal pump placement and management, and vertebral augmentation procedures. Depending on the position, there may be inpatient consultations as part of the job responsibilities, but these are usually nonemergent consultations. Emergencies in pain medicine are rare but may include cancer pain crises, pediatric pain crises, and intrathecal pump malfunction.

While pain medicine is most often associated with performing interventional spine, muscle, nerve and joint procedures, pain medicine practice also includes oral and topical pharmacotherapy and referrals to colleagues for treatments including physical therapy, multimodal functional restoration programs, acupuncture, pain psychology, pain psychiatry, biofeedback, mindfulness meditation training, and osteopathic manipulation. Also, with the ongoing opioid epidemic, pain medicine physicians are called upon to help primary care doctors wean patient's opioids through the use of multimodal care.

Neurology training: A key asset to pain medicine

Neurology residency graduates have a lot to offer pain medicine fellowship programs and pain management practices.

Residency prepares neurologists for outpatient clinic life with regards to obtaining an expert history and physical examination, critically evaluating results from diagnostic testing, and providing a thoughtful assessment and plan. Pain neurologists also serve a valuable function in academia teaching about neurologic disorders (especially headache, peripheral neuropathies, and sympathetically mediated pain syndromes), neurologic examination, and reading and interpreting neuraxial imaging studies. In the case of possible postprocedural complications (including nonphysiologic adverse events), colleagues may call on the pain neurologist to provide an expert neurologic examination and assessment. In most pain medicine groups, a trained neurologist is a rare commodity and pain fellows who are trained in neurology bring valuable knowledge and skills to their pain medicine faculty and cofellows.

Furthermore, since headache is so highly prevalent in the overall population but headache specialists are in short supply, pain neurologists often serve as de facto headache and facial pain specialists in their institutions.

Pain medicine fellowship

There are 102 Accreditation Council for Graduate Medical Education (ACGME)-accredited pain medicine fellowships in the United States, as well as numerous unaccredited fellowships. Of these 102 fellowship programs, 98 programs participated in the national resident match program in 2017 to fill 335 positions. Match rates from 2017 are listed: 231 of 287 (80.5%) US medical school graduates and 335 of 438 (76.5%) total applicants successfully matched. Most applicants match

to one of their top choices, as 45.2% matched to their top choice, 11.2% to their second choice, 7.3% to their third choice, and 11.2% to greater than third choice. Twenty-four percent of applicants did not match.⁴ The authors are unaware of publicly available data regarding pain medicine fellowship match rates stratified by background residency training (i.e., neurology, anesthesiology, physiatry, psychiatry).

Neurologists are matching to pain fellowships with the highest academic profiles disproportionate to neurologists' prevalence in the overall applicant pool. For example, during the 2016–2017 academic year, neurologists represented 1 out of the 7 pain fellows at Massachusetts General Hospital, 1 out of the 9 pain fellows at Brigham and Women's Hospital, and 1 out of the 5 pain fellows at UCSF, while neurologists were likely about 1%–2% of the total pain fellow applicant pool that year. While the data are not available, neurologists may outperform the overall pain fellowship applicant pool because applications from neurologists stand out due to their scarcity. The programs with the highest academic profiles appear to seek neurologists to build well-rounded fellowship classes.

A sample application timeline for neurology resident application preparation is provided in table 2.

Although neurologists, via the American Board of Psychiatry and Neurology (ABPN), belong to one of the 6 boards that cosponsor the pain medicine board certification (the others being anesthesiology, physiatry, psychiatry, emergency medicine, and family medicine), the vast majority of pain medicine fellowship applicants in the United States are anesthesiologists and physiatrists. According to data obtained from 3 program directors of large ACGME-accredited pain fellowship programs, during the 2018 application cycle, the 3 programs combined received a total of 780 applications, of which only 10, or 1.2%, were from neurologists; the authors acknowledge the limitation of likely duplicates in the applicant pools (personal communication, Gary Brenner, MD, PhD; Timothy Furnish, MD; and Sayed Emal Wahezi, MD). Pain fellowships are mostly based within anesthesiology or physical medicine and rehabilitation departments, but the pain medicine departments at both the Albany Medical College and the

University of South Florida are based in neurology departments. More important than the home department is the philosophy of the department. A growing number of anesthesiology- or physiatry-based pain fellowships have trained neurologists in the past and have one or more pain-trained neurologists on faculty. With the ongoing opioid epidemic in the United States, today many pain medicine fellowship programs emphasize non-opioid-based pharmacologic treatments for chronic pain, as well as education in opioid tapering and cessation. Inpatient consultations for acute pain are a core requirement of all ACGME-accredited pain medicine fellowships, although this is usually much lighter than the inpatient consultation requirements of a general neurology resident.

Regardless of whether the fellowship is based in an anesthesiology, physiatry, or neurology department, the pain medicine boards are administered annually in September, and neurologists sign up for the pain medicine boards via the ABPN.

Research opportunities

Like neurology and neurosciences in general, the field of pain medicine is continuously evolving. The opioid epidemic is adding to the urgency of better understanding chronic pain and advancing new nonopioid pain treatments. For neurologists interested in research, there are opportunities in basic science and clinical and translational research. Functional neuroimaging, headache and facial pain, central pain syndromes, and neuromodulation are several lines of clinical research that may be especially well-suited to neurologists given their knowledge of neuroanatomy and neurophysiology, comfort level in diagnosing and treating neurologic disorders, and experience reviewing and interpreting neuroimaging studies.

Pain medicine is an exciting hands-on subspecialty available to neurology residents. While neurology residents may feel that opportunities in pain medicine for neurologists are scarce, the authors have found the opposite is true: neurologists interested in pain medicine are a rare commodity that is in high demand for both fellowship positions and pain faculty

Table 2 Timeline for applying for ACGME-accredited pain fellowships

Timing	Procedure
July of PGY-3 year (or 2 years before one hopes to begin fellowship)	Ask faculty for at least 4 letters of recommendation. Consider obtaining from at least one pain physician and one headache specialist.
December 1 of PGY-3 year	Applications open via ERAS
May of PGY-3 through August of PGY-4 year	Interviews
Late September or early October of PGY-4 year	Rank list deadline via NRMP
Mid-October of PGY-4 year	Match day

Abbreviations: ACGME = Accreditation Council for Graduate Medical Education; ERAS = Electronic Residency Application Service; NRMP = National Resident Matching Program; PGY = postgraduate year.

positions. Understanding factors involved in neurology residents' awareness of and barriers to pursuing pain medicine fellowships is deserving of future research.

References

1. Harden RN, Oaklander AL, Burton AW, et al. Complex regional pain syndrome: practical diagnostic and treatment guidelines, 4th edition. *Pain Med* 2013;14:180–229.
2. Lalani I. Emerging subspecialties in neurology: pain medicine. *Neurology* 2006;67:1522–1523.
3. Vos T, Allen C, Arora M, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 2016;388:1545–1602.
4. National Resident Matching Program. Results and data: specialties matching service: 2018 appointment year. 2018. Available at: nrmp.org/wp-content/uploads/2018/02/Results-and-Data-SMS-2018.pdf. Accessed July 26, 2018.

Neurology® Online CME Program

Earn CME while reading *Neurology*. This program is available only to online *Neurology* subscribers. Read the articles marked CME, go to Neurology.org, and click on CME. This will provide all of the information necessary to get started. The American Academy of Neurology (AAN) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians. *Neurology* is planned and produced in accordance with the ACCME Essentials. For more information, contact AAN Member Services at 800-879-1960.

The AAN Has Your Back!

Every day, the AAN is fighting for you. From actively lobbying members of Congress for common sense legislation, to meeting with regulators to demonstrate the value of neurology and reduce regulatory hassles, the Academy is forcefully countering any threats to your profession and patient access to care. Learn more at AAN.com/policy-and-guidelines/advocacy, read the bimonthly Capitol Hill Report and monthly *AANnews*® member magazine, and respond to Advocacy Action Alert emails when we invite you to share your voice with Congress.

Get into the conversation at #AANAdvocacy.

Visit the *Neurology*® Website at Neurology.org/N

- More article-based content on home pages
- Streamlined menus and navigation
- Enhanced blog sections for specialty areas
- Same experience on desktop, tablet, and mobile devices
- Audio summaries of current issues
- Improved article reading experience; links more evident (pdf, analytics, social media)
- *Neurology*® Clinical Practice initiative “Practice Current” global surveys will be accessible across sites

Find *Neurology*® on Facebook: <http://tinyurl.com/neurologyfan>

Follow *Neurology*® on Twitter: <https://twitter.com/GreenJournal>

Neurology®

Emerging Subspecialties in Neurology: Pain medicine

Nathaniel M. Schuster and Jacob R. Hascalovici

Neurology 2018;91;1025-1028

DOI 10.1212/WNL.0000000000006580

This information is current as of November 26, 2018

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/91/22/1025.full
References	This article cites 3 articles, 1 of which you can access for free at: http://n.neurology.org/content/91/22/1025.full#ref-list-1
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): All Clinical Neurology http://n.neurology.org/cgi/collection/all_clinical_neurology All Education http://n.neurology.org/cgi/collection/all_education All Pain http://n.neurology.org/cgi/collection/all_pain
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/about/about_the_journal#permissions
Reprints	Information about ordering reprints can be found online: http://n.neurology.org/subscribers/advertise

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2018 American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.