

AMERICAN ACADEMY OF NEUROLOGY NEUROMUSCULAR FELLOWSHIP CORE CURRICULUM

1. Introduction:

Specialists in Neuromuscular Disorders possess specialized knowledge in the science, clinical evaluation, or clinical management of disorders of anterior horn cell, peripheral nerve, neuromuscular junction, and muscle. This encompasses knowledge of the pathophysiology, pathology, diagnosis, and treatment of these disorders at a level that is significantly beyond the training and knowledge expected of a general neurologist.

2. Goals and objectives:

The goal of fellowship training in neuromuscular disorders is to facilitate the development of neurologists with subspecialty expertise in neuromuscular disorders. These subspecialists will serve to advance the science and understanding of nerve and muscle abnormalities. They will also provide diagnoses and care for patients with nerve and muscle disorders, and will educate other physicians (including internists, family practitioners, neurology residents, general neurologists, and other neuromuscular subspecialists), other healthcare personnel, and the public about these disorders.

All subspecialists in neuromuscular disorders must acquire expertise in the evaluation and management of patients with nerve and/or muscle pathology. This includes skill in the interview and examination of patients with neuromuscular complaints, knowledge of the appropriate laboratory investigations for diagnosis of neuromuscular disorders, knowledge of the differential diagnoses for the various clinical presentations of nerve and muscle problems, and expertise in the management of these conditions. Within the spectrum of neuromuscular disorders, individuals and programs may develop a variety of specialized skills with the above objectives. These skills may include: performance of nerve and/or muscle biopsies; interpretation of nerve and/or muscle biopsies; performance and interpretation of electrodiagnostic studies (including electromyography, nerve conduction studies, autonomic studies, and evoked potentials); performance and interpretation of skin biopsy for intrapidermal fiber density, imaging (ultrasound, computerized tomography, magnetic resonance) of muscle or nerve; methods for investigating the molecular biology, immunology, pharmacology, biochemistry, physiology, or other basic science of neuromuscular disorders.

3. Definitions:

Neuromuscular disorders are a subsection of neurology that includes abnormalities of the anterior horn cells, nerve roots, peripheral nerves, neuromuscular junction, and muscle, including disorders that affect adults and/or children.

4. Content of Subjects to be Taught:

Fellows who are training in neuromuscular disorders must be provided with an advanced and extensive background in neurophysiology, neuroanatomy, and neuropathology of these conditions. They also must be exposed to the clinical presentation, laboratory investigation, and management of a wide-range of neuromuscular disorders.

5. Prerequisites for the Trainee:

The neuromuscular disorders fellow must have completed an accredited residency program in either child neurology or adult neurology.

6. Personnel Needed for the Training:

The Director and teaching staff of the neuromuscular fellowship must include at least one full-time faculty member with expertise in neuromuscular disorders.

7. Qualifications of the Trainers:

The Program Director must have completed at least one year of neuromuscular fellowship training, unless their training took place before such fellowships were offered, and must have at least three years of post-fellowship experience in the evaluation and management of neuromuscular disorders. All members of the faculty should have an appointment in good standing on the medical staff of an institution participating in the fellowship program.

8. Facilities Needed for the Training:

The neuromuscular disorders fellowship must be within a department or division of neurology with an ACGME-approved residency program and have facilities adequate for the educational program. Residents must have ready access to a major medical library. There must be access to an on-site collection of appropriate texts and journals at each institution participating in the fellowship program.

9. Set-Up for the Training:

The fellowship program must include a clinical experience in which the fellow develops expertise in the evaluation and treatment of patients with a variety of neuromuscular disorders. The program design and/or structure must be approved by the sponsoring institution's residency review committee for neurology as part of the regular review process. Participation by any institution providing 2 months or more of training in a program must be approved by the residency review committee for neurology.

The Program Director is responsible for the overall coordination of the program. The Program Director is responsible for the selection of residents for appointment to the program in accordance with institutional and departmental policies and procedures. The Program Director is also responsible for selection and supervision of the teaching staff and personnel

at each institution participating in the program. The Program Director and faculty are responsible for instruction and supervision of the fellows in the program.

10. Methods of Training:

The fellow must have instruction and practical experience sufficient to develop diagnostic and therapeutic skills sufficient to provide care for patients with neuromuscular disorders. The clinical experience must include opportunities to observe, evaluate, and manage patients with a wide variety of disorders of muscle and nerve. Clinical experience must include inpatient care, outpatient care, and must have supporting services in pathology, radiology, and electrodiagnosis. This may include training in the performance and/or interpretation of nerve and/or muscle biopsies, motor and sensory nerve conduction studies, electromyography and single-fiber electromyography, evoked potential studies, testing of autonomic function, imaging of muscle, and basic science laboratory methodology.

The fellowship program will conduct formal lectures and teaching conferences. These conferences must include discussions of neuropathology, neurophysiology, and the clinical diagnosis and management of neuromuscular disorders.

Clinical assignments should include progressively increasing responsibilities for patient care with direct supervision by the appropriate faculty and/or staff. Clinical assignments need not be identical for each resident. Subspecialty experience should accommodate the fellow's individual interest.

The fellow in clinical neuromuscular diseases should take an active role in the teaching and training of neurology residents.

11. Timetable for Training:

The fellowship is for at least 1 year and must include the equivalent of at least 6 months of full-time patient care (including inpatient care, outpatient care, and electrodiagnosis).

12. Methods of Evaluation of the Trainee:

The Program Director, with participation of members of the teaching staff, shall:

- At least semi-annually evaluate the knowledge, skills, and professional growth of the fellows, using appropriate criteria and procedures.
- Communicate each evaluation to the fellow in a timely manner.
- Provide a written final evaluation for each fellow who completes the program. This evaluation should verify that the fellow has demonstrated sufficient professional ability to practice competently and independently. This final evaluation should be part of the fellow's permanent record retained by the institution.

13. Methods of Evaluation of the Training Process:

The educational effectiveness of the neuromuscular fellowship must be evaluated in a systematic manner. The quality of the curriculum and the extent to which the educational goals have been met must be assessed. Regular evaluations by fellows should be utilized in this process.

14. Mechanisms for Feedback:

As noted above, fellows should be given the opportunity to complete evaluations of the faculty and curriculum at least every 3 months during the fellowship. In addition, the Program Director or designated neuromuscular faculty member must be available to meet with each fellow on a weekly basis to discuss any concerns that the fellow(s) have regarding the program. The Program Director should also be available on a weekly basis to discuss concerns that the faculty may have with regard to the conduct of the fellowship.

15. Methods of Constantly Upgrading Knowledge:

The faculty and fellows within the program are expected to participate in continuing education in order to expand their knowledge base and remain up-to-date in their understanding of neuromuscular disorders. Activities to accomplish this goal may include:

- Active participation in clinical discussions, rounds and conferences in a manner that promotes the spirit of inquiry and scholarship.
- Participation in journal clubs and research conferences.
- Active participation in regional or national professional and scientific societies, particularly through presentations at the organizations' meetings and publication in journals.
- Participation in basic science and/or clinical research.

16. List of References/Resources:

- **Neuromuscular Diseases, General**

Brown WF, Bolton CF, Aminoff MJ. Neuromuscular Function and Disease. Philadelphia. W.B. Saunders Co, 2002

Jones HR, DeVivo DC, Darras BT. Neuromuscular Disorders of Infancy, Childhood, and Adolescence. Philadelphia. Butterworth-Heinemann, 2003.

Pourmand R. Neuromuscular Diseases. Expert Clinicians' Views. Boston. Butterworth-Heinemann, 2001

- **Muscle Pathology**

Dubowitz V. Muscle Pathology: A Practical Approach. 2nd Ed. Baillière Tindall, 1985

Carpenter S, Karpati G. Pathology of Skeletal Muscle. 2nd Ed. Oxford University Press, 2001.

Karpait G, Hilton-Jones D, Griggs RC. Disorders of Voluntary Muscle. Cambridge University Press, 2001

- **Nerve Pathology**

Midroni G, Bilbao JM. Biopsy Diagnosis of Peripheral Neuropathy. Butterworth-Heinemann, 1995

Richardson EP Jr., De Girolami U. Pathology of the Peripheral Nerve. WB Saunders Co, 1995

Vital C, Vallat J-M. Ultrastructural Study of the Human Diseased Peripheral Nerve. 2nd Ed. Elsevier, 1987

- **Electrodiagnosis**

Kimura J. Electrodiagnosis in Diseases of Nerve and Muscle. 3rd Ed. Oxford University Press, 2001

Oh, S. Clinical Electromyography. 2nd Ed. Williams & Wilkins, 1993

Preston D, Shapiro B. Electromyography and Neuromuscular Disorders. Butterworth-Heinemann, 1998

Dumitru D, Amato a, Zwarts MJ. Electrodiagnostic Medicine. Philadelphia. Hanley & Belfus, Inc., 2002

- **Disorders of Peripheral Nerve**

Griffin J, Low P, Poduslo J. Peripheral Neuropathy. 3rd Ed. W.B. Saunders Co., 1993

- **Disorders of Muscle**

Engel A, Franzini-Armstrong C. Myology. 2nd Ed. McGraw-Hill, 1994

Griggs R, Mendell J, Miller R. Evaluation and Treatment of Myopathies. Philadelphia: F.A. Davis Co., 1995

Walton J, Karpai G, Hilton-Jones D. Disorders of Voluntary Muscle. 6th Ed. Churchill Livingstone, 1994

17. Continuing Medical Education Needed:

At least 20 hours of category 1 of continuing education in neuromuscular disorders must be completed by the neuromuscular specialist every five years in order to maintain certification.