

UNITED COUNCIL  
FOR  
NEUROLOGIC  
SUBSPECIALTIES



**Clinical Neuromuscular Pathology  
Program Requirements**

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## Clinical Neuromuscular Pathology Program Requirements

[The common program requirements are standards required of accredited programs in all UCNS subspecialties. They are shown in **bold** typeface below. Requirements in regular typeface have been set by the Clinical Neuromuscular Pathology subspecialty and approved by the UCNS Board of Directors.]

### I. Introduction

A. Clinical neuromuscular pathology is a subspecialty area of neurology defined by special competence in the interpretation of muscle and nerve pathology. It differs from neuropathology because it is highly integrated with the clinical management of neuromuscular disease. All UCNS training programs in clinical neuromuscular pathology must incorporate the evaluation of muscle and nerve in the context of clinical patient care.

### II. Institutional Support

There are three types of institutions that may comprise a program: 1) the sponsoring institution, which assumes ultimate responsibility for the program and is required of all programs, 2) the primary institution, which is the primary clinical training site and may or may not be the sponsoring institution, and 3) the participating institution, which provides required experience that cannot be obtained at the primary or sponsoring institutions.

#### A. Sponsoring Institution

1. **The sponsoring institution must be accredited by the Accreditation Council for Graduate Medical Education (ACGME), and meet the current ACGME Institutional Requirements. This responsibility extends to fellow assignments at all participating institutions. The sponsoring institution must be appropriately organized for the conduct of graduate medical education (GME) in a scholarly environment and must be committed to excellence in both medical education and patient care.**
2. **A letter demonstrating the sponsoring institution's responsibility for the program must be submitted. Such a letter must:**
  - a) **confirm sponsorship of the training program,**
  - b) **state the sponsoring institution's commitment to training and education, and**
  - c) **be signed by the designated institution official of the institution as defined by ACGME.**

#### B. Primary Institution

1. **Assignments at the primary institution must be of sufficient duration to ensure a quality educational experience and must provide sufficient opportunity for continuity of care. The primary institution must demonstrate the ability to promote the overall program goals and support educational and peer activities.**
2. **A letter from the appropriate department chair(s) at the primary institution must be submitted. Such a letter must:**
  - a) **confirm the relationship of the primary institution to the program,**
  - b) **state the primary institution's commitment to training and education, and**
  - c) **list specific activities that will be undertaken, supported, and supervised at the primary institution.**

#### C. Participating Institutions

1. **Assignments to participating institutions must be based on a clear educational rationale, must have clearly stated learning objectives and activities, and should provide resources not otherwise available to the program. When multiple**

participating institutions are used, there should be assurance of the continuity of the educational experience.

2. Assignments at participating institutions must be of sufficient duration to ensure a quality educational experience and should provide sufficient opportunity for continuity of care. All participating institutions must demonstrate the ability to promote the overall program goals and support educational and peer activities.
3. If a participating institution is used, a participating institution letter must be submitted. Such a letter must:
  - a) confirm the relationship of the participating institution to the program,
  - b) state the participating institution's commitment to training and education,
  - c) list specific activities that will be undertaken, supported, and supervised at the participating institution, and
  - d) be signed by the department chair of the participating institution.
4. The training must take place in facilities that have been approved under the Clinical Laboratory Improvement Act (CLIA) and that are supervised by physicians who meet all state licensing requirements.
5. If more than one facility is used in the program, there must be a clear educational rationale for the use of each participating institution.

### **III. Facilities and Resources**

#### **A. Each program must demonstrate that it possesses the facilities and resources necessary to support a quality educational experience.**

1. The core neurology program must be a part of, or affiliated with, clinical care facilities that have a full range of patient services.
2. There must be adequate equipment, laboratory space, office facilities, meeting rooms, classrooms, and research space to support service, teaching, and educational responsibilities.
3. The Clinical Neuromuscular Pathology program should be integrated into a full-service clinical program providing evaluation of the patient.
4. The Clinical Neuromuscular Pathology program must provide the fellow a sufficient variety and volume of pathological material. This shall be comprised of at least 100 new biopsy cases of nerve and muscle acquired in the course of the training period, including a minimum of 30 specimens of nerve and 30 specimens of muscle.
5. Fellows must have access to computers.

### **IV. Faculty**

**The faculty of accredited programs consists of: 1) the program director, 2) core faculty, and 3) other faculty. Core faculty are physicians who oversee clinical training in the subspecialty. The program director is considered a core faculty member for the purpose of determining the fellow complement. Other faculty are physicians and other professionals determined by the Subspecialty to be necessary in order to deliver the program curriculum. The program director and faculty are responsible for the general administration of the program and for the establishment and maintenance of a stable educational environment. Adequate durations of appointments for the program director and core faculty members are essential for maintaining such an environment. The duration of appointment for the program director must provide for continuity of leadership.**

#### **A. Program Director Qualifications**

1. **There must be a single program director responsible for the program. The person designated with this authority is accountable for the operation of the program and he or she should be a member of the faculty or medical staff of the primary institution. At institutions where the nerve and muscle biopsies are handled**

in two different laboratories under two different directors, directors of the two laboratories can be co-directors of the program. However, there must be a single administrative program director designated responsible for the program and communication with UCNS.

2. **The program director must:**
  - a. **possess requisite specialty expertise as well as documented educational and administrative abilities and experience in his or her field,**
  - b. **be certified in a primary ABMS or RCPSC specialty** including neurology, child neurology, or other neurologic area,
  - c. **possess a current, valid, unrestricted, and unqualified license to practice medicine in the state or province of the program, and**
  - d. **be certified, and maintain certification, in Clinical Neuromuscular Pathology by the UCNS<sup>1</sup>.**
3. The program director should be an experienced, active clinician, and must devote sufficient time to the program to ensure achievement of the educational goals and objectives.

## **B. Program Director Responsibilities**

1. **The program director must:**
  - a. **oversee and organize the activities of the educational program in all institutions participating in the program including selecting and supervising the faculty and other program personnel at each participating institution, and monitoring appropriate fellow supervision and evaluation at all participating institutions,**
  - b. **prepare an accurate statistical and narrative description of the program as requested by the UCNS as well as update the program and fellow records annually,**
  - c. **ensure the implementation of fair policies and procedures, as established by the sponsoring institution, to address fellow grievances and due process in compliance with the institutional requirements,**
  - d. **monitor fellow stress, including mental or emotional conditions inhibiting performance or learning, and drug- or alcohol-related dysfunction, and**
  - e. **obtain prior approval of the UCNS for changes in the program that may significantly alter the educational experience of the fellows. Upon review of a proposal for a program change, the UCNS may determine that additional oversight or a site visit is necessary. Examples of changes that must be reported include:**
    - 1) **change in the program director,**
    - 2) **the addition or deletion of sponsoring, primary, or participating institution(s),**
    - 3) **change in the number of approved fellows, and**
    - 4) **change in the format of the educational program**
  - f. Supervise the recruitment and appointment process for applicants, including compliance with appropriate credentialing policies and procedures.
  - g. Ensure and document proper, direct, supervision of all fellows at all times by appropriately qualified faculty. Such supervision must be appropriate to the level and experience of the fellow.
  - h. Monitor the progress of each Clinical Neuromuscular Pathology fellow, including the maintenance of a training record that documents completion of all required components of the program, as well as the evaluations of performance by supervisors and teachers.

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<sup>1</sup> This requirement will not be imposed until after the expiration of the subspecialty's practice track.

- i. Monitor the quality of didactic and clinical experiences, including the collection and review of periodic written evaluations by the trainee of all such supervision and experiences.
- j. Maintain all training records, including those related to appointment, departmental processes regarding due process, sickness and other leaves, call responsibilities and vacation time.
- k. Place a statement in the training record of each fellow upon the completion of the program that documents the satisfactory completion of all program requirements.

#### C. Core Faculty Qualifications

##### 1. Each core faculty member must:

- a. **possess requisite specialty expertise as well as documented educational and administrative abilities and experience in his or her field,**
- b. **be currently certified in a primary ABMS or RCPSC specialty including neurology or child neurology,**
- c. **possess a current, valid, unrestricted, and unqualified license to practice medicine in the state or province of the program, and**
- d. **be appointed in good standing to the faculty of an institution participating in the program.**

##### 2. The core faculty must include at least one neurologist. The neurologist may also be the program director.

#### D. Core Faculty Responsibilities

##### 1. There must be a sufficient number of core faculty members with documented qualifications at each institution participating in the program to instruct and adequately supervise all fellows in the program.

##### 2. Core Faculty members must:

- a. **devote sufficient time to the educational program to fulfill their supervisory and teaching responsibilities,**
- b. **evaluate the fellows whom they supervise in a timely manner,**
- c. **demonstrate a strong interest in the education of fellows, demonstrate competence in both clinical care and teaching abilities, support the goals and objectives of the educational program, and demonstrate commitment to their own continuing medical education by participating in scholarly activities, and**
- d. devote sufficient time of their current schedule to the educational program in clinical neuromuscular pathology to assure fulfillment of its goals and objectives.

#### E. Other Faculty

The program must provide additional professional, technical, and clerical personnel as needed to support the administration and educational conduct of the program.

1. The laboratory must be directed by qualified physicians who are licensed to practice medicine and are members in good standing of the institution medical staff.
2. There must be a sufficient number (at least one) of qualified histotechnologists as well as clinical and other staff to support laboratory work and the educational program.

## **V. Fellow Appointment**

### **A. Duration of Training**

1. The training period in clinical neuromuscular pathology must be at least 12 months of education subsequent to satisfactory completion of an Accreditation Council for Graduate Medical Education (ACGME) or Royal College of Physicians and Surgeons of Canada (RCPSC) accredited residency in neurology.
2. Training in clinical neuromuscular pathology that occurred during general neurology residency training will not be counted toward meeting this requirement.
3. While clinical neuromuscular pathology training is a minimum of 12 months of defined training, if integrated with a research program or further pathological training in nerve or muscle, the clinical neuromuscular pathology training program should not exceed 24 months. However, accreditation is only applied to the 12 months of clinical training.

### **B. Eligibility Criteria**

1. **The fellow must possess a current valid and unrestricted license to practice medicine in the United States or Canada or its territories.**
2. **The fellow must be a graduate of a residency program in neurology accredited by the ACGME or the Royal College of Physicians and Surgeons of Canada (RCPSC).**
3. **The fellow must be board certified or eligible for certification in a primary ABMS or RCPSC specialty.**

### **C. Minimum Number of Fellows and Fellow Complement**

1. **The minimum number of fellows to be trained is one.**
2. **The fellow complement is the number of fellows allowed to be enrolled in the program. There must be at least 1 core faculty member(s) for every 2 fellow(s).**

## **VI. Educational Program**

### **A. Role of the Program Director and Faculty**

2. **The program director, with assistance of the faculty, is responsible for developing and implementing the academic and clinical program of fellow education by:**
  - a. **preparing a written statement to be distributed to fellows and faculty and reviewed with fellows prior to assignment, which outlines the educational goals and objectives of the program with respect to the knowledge, skills, and other attributes to be demonstrated by fellows for the entire fellowship and on each major assignment and each level of the program,**
  - b. **preparing and implementing a comprehensive, well-organized, and effective curriculum, both academic and clinical, which includes the presentation of core specialty knowledge supplemented by the addition of current information, and**
  - c. **providing fellows with direct experience in progressive responsibility for patient management.**

### **B. Competencies**

1. **A fellowship program must require that its fellows obtain competence in the AGCME Competencies to the level expected of a new practitioner in the subspecialty. Programs must define the specific and unique learning objectives in the area including the knowledge, skills, behaviors, and attitudes required**

and provide educational experiences as needed in order for their fellows to demonstrate the following:

- a. *patient care* that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health,
- b. *medical knowledge* about established and evolving biomedical, clinical, and basic sciences, as well as the application of this knowledge to patient care,
- c. *practice-based learning and improvement* that involves investigation and evaluation of their own patient care, appraisal and assimilation of scientific evidence, and improvements in patient care,
- d. *interpersonal and communication skills* that result in effective information exchange and collaboration with patients, their families, and other health professionals,
- e. *professionalism*, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population, and
- f. *systems-based practice*, as manifested by actions that demonstrate an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value.

#### C. Didactic Components

1. The program must provide the fellow with instruction and experience in the techniques of obtaining, processing, and evaluating tissue to ensure that quality specimens suitable for evaluation are obtained.
2. The program must provide a lecture series, selected readings or other clearly identified mechanism for addressing core content (See *Clinical Muscular Pathology Core Curriculum*).
3. Fellows should present a minimum of two clinical conferences each year and participate in subspecialty conferences and journal clubs.

#### D. Clinical Components

1. **Approximately 80% of the fellow's time must be spent in supervised activities related to Clinical Neuromuscular Pathology. Clinical experiences may include all training relevant to Clinical Neuromuscular Pathology, including lectures and individual didactic experiences and journal clubs emphasizing clinical matters. Programs with flexible fellowship terms must assure that equivalent time is spent in clinical training.**
2. Fellows will work in neuromuscular clinics and interact with clinicians caring for patients.
3. Each Clinical Neuromuscular Pathology fellow should independently examine and generate a written report on a minimum of 100 biopsy specimens of which a minimum of 30 must be of muscle and 30 must be of nerve. The reports must accurately describe the findings and indicate the diagnosis or diagnoses on each case which must subsequently be evaluated and countersigned by faculty. The required new case material must be obtained during the course training period, which includes clinical evaluation, determination, and need for biopsy. That is, the clinical evaluation, determination of need for biopsy, site and specific procedure, preparation of biopsy material for histopathological examination, interpretation of the slides, and subsequent management of the patient based on the pathological diagnosis must occur during the term of the fellowship. The fellow must participate in all or most steps.
4. Fellows are required to participate and present in available clinical pathological conferences or case reviews with clinicians as part of their training.

## 5. Nerve Laboratory

Within the nerve laboratory, the fellow should become familiar with and competent in the following areas:

- a. Rapidly frozen, unfixed segments of nerve appropriately sectioned and stained applying to these nerve sections a battery of stains directed at establishing the diagnosis.
- b. Standard set of stains used for nerve pathology including H&E, trichrome, Congo red, and cresyl violet.
- c. Immunostaining nerve slides using selected antibodies addressing the clinical problem undergoing evaluation.
- d. Formalin-fixed segments of nerve embedded in paraffin, appropriately sectioned, and stained applying to these nerve sections a battery of stains addressing the clinical problem at hand.
- e. Glutaraldehyde-fixed segments of nerve, post-fixed in osmium tetroxide and embedded in epoxy resin, sectioned and stained using basic aniline dye resin, sectioned and stained using basic aniline dye and/or araphenylenediamine for light microscope evaluation.
- f. Electron microscopic evaluation of nerve biopsies
- g. Teased nerve fiber preparations from segments of nerve fixed in glutaraldehyde and post-fixed in osmium tetroxide placed on slides for evaluation by the trainee.
- h. Methods of nerve fiber teasing.
- i. Development of frequency-distribution histograms of myelinated and unmyelinated nerve fibers.

## 6. Muscle Laboratory

Within the muscle laboratory, the fellow should become familiar with and competent in the following areas:

- a. Competent services for preparation, transportation, sectioning and staining of muscle biopsy specimens.
- b. Rapidly frozen, unfixed segments of muscle appropriately sectioned and stained using a battery of stains directed at establishing the diagnosis.
- c. Stains that include: hematoxylin and eosin, modified trichrome, NADH dehydrogenase, succinate dehydrogenase, cytochrome c oxidase, ATPase reactions at pH 4.3, 4.6, and 9.4, acid phosphatase, periodic-acid Schiff, oil red O, nonspecific esterase, and Congo red.
- d. The principles of immunostaining using selected antibodies addressing the clinical problem undergoing evaluation.
- e. Ultrastructural reactions of skeletal muscle and the neuromuscular junction, and should be able to assess pathologic changes revealed by electron micrographs of muscle and the neuromuscular junction.
- f. Familiarity with morphometric analysis.

## E. Scholarly Activities

1. **The responsibility for establishing and maintaining an environment of inquiry and scholarship rests with the faculty. Both faculty and fellows must participate actively in some form of scholarly activity. Scholarship is defined as activities unrelated to the specific care of patients, which includes scholarship pertaining to research, writing review papers, giving research-based lectures and participating in research-oriented journal clubs.**
2. **There must be adequate resources for scholarly activities for faculty and fellows, e.g., sufficient laboratory space, equipment, computer services for data analysis, and statistical consultation services.**

**F. Duty Hours, Working Environment, and On-Call Activities**

Providing fellows with a sound academic and clinical education must be carefully planned and balanced with concerns for patient safety and fellow well-being. Each program must ensure that the learning objectives of the program are not compromised by excessive reliance on fellows to fulfill service obligations. Didactic and clinical education defined by the program requirements must have priority in the allotment of a fellow's time and energy.

**1. Supervision of Fellows**

- a. All patient care required by the program requirements must be supervised by qualified faculty. The program director must ensure, direct, and document adequate supervision of fellows at all times. Fellows must be provided with rapid, reliable systems for communicating with supervising faculty.
  - b. Faculty schedules must be structured to provide fellows with continuous supervision and consultation.
  - c. Faculty and fellows must be educated to recognize the signs of fatigue and adopt and apply policies to prevent and counteract the potential negative effects.
- 2. Duty hours assignments must recognize that the faculty and fellows collectively have responsibility for the safety and welfare of patients. Fellow duty hours and work environment must comply with the current ACGME program requirements.**
- 3. The objective of on-call activities is to provide fellows with continuity of patient care experiences throughout a 24-hour period. *In-house call* is defined as those duty hours beyond the normal work day when fellows are required to be immediately available in the assigned institution. Fellow on-call activities must be consistent with the current ACGME program requirements.**

**VII. Evaluation**

**A. Fellow Evaluation**

1. Fellow evaluation by faculty must:
  - a. take place at least semi-annually and areas of weakness and strength must be communicated to the fellow,
  - b. records must be maintained documenting fellow experience and performance, and
  - c. include the fellow's demonstration of learning objectives and mastery of the core competencies (see VI.B).
2. The summary and final evaluation of the fellow must be prepared by the program director and should reflect the input of faculty. A permanent record of evaluation must be maintained and be accessible to the fellow and other authorized personnel.

**B. Faculty Evaluation**

1. The performance of faculty must be evaluated by the program director on an annual basis.
2. The evaluations must include a review of their teaching abilities, commitment to the educational program, clinical knowledge, and scholarly activities.
3. These evaluations must include annual written evaluations by fellows. A permanent record of evaluation must be maintained and be accessible to the fellow and other authorized personnel.

**C. Program Evaluation**

- 1. The effectiveness of a program must be evaluated in a systematic manner. In particular, the quality of the curriculum and the extent to which the educational goals have been met must be assessed.**
- 2. Confidential written evaluations by fellows must be utilized in this process.**
- 3. Performance by fellows on the UCNS certification exam may also be used to measure the quality of the training program.**