

# Training Issues for the Future of Muscle Pathology in the USA

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# Training in Neuromuscular Pathology

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**Training in muscle, nerve  
and eye path are  
requirements for  
neuropathology fellowship**

- Resources

“Indexes of usual and unusual cases, course and seminar materials, microscopic slide collections augmented by photographs, and museum specimens sufficient for the study of conditions and diseases not frequently encountered in routine necropsy and surgical specimens should be readily available to the program for educational purposes.”

**Resources (II.D.)**

- Fellows:
  - (1) must demonstrate a satisfactory level of diagnostic competence and the ability to provide appropriate and effective consultation in the context of pathology services;
  - (2) must actively participate in the evaluation of a comprehensive body of pathological lesions of the central nervous system, **peripheral nervous system, and neuromuscular systems**

**Program Requirements – Patient Care (IV.A.5.a). (1 and 2)**

- (3) should have the opportunity to develop competence in morphologic assessment of diseases of muscle and peripheral nerves, including morphometric analysis and teased nerve fiber preparations, and to study neoplasms and related lesions of peripheral nerves and the sympathetic and parasympathetic nervous systems
- (4) must perform at least 200 necropsies that include examination of the nervous system (these may include brains seen in consultation, brains from complete autopsies, or brain only autopsies)

**Program Requirements Patient Care IV.A.5.a). (3 and 4)**

- 5) must examine at least 300 neurosurgical specimens (including consultations) from the brain, spinal cord, pituitary gland, and eyes (including neoplastic, degenerative, infectious, and immune disorders of significance in the treatment and management of pediatric and adult patients; and,
- 6) must perform at least 50 intraoperative neurosurgical consultations

**Program Requirements IV.A.5.a.  
(5 and 6)**

- No specifics on muscle and/or nerve case volumes
- No specifics on what constitutes “education” in these areas
- Vague to allow for all programs to meet the requirements

**Specifics?**

- No additional specificity has been added to the program requirements that have been recently posted for comment regarding neuromuscular pathology beyond removal of the requirement for examination of teased nerve preparations
- Autopsy requirement is being reduced down to 150 from 200

**Changes**

- Variability in number of cases
- Variability in resources
- Variability in testing available
- Variability in participation by neurologists in the training of neuropathologists reading nerve and muscle biopsies
- Competition for these specimens with neurologists
- Joint conferences for NP and Neurology in areas where neuromuscular fellowships exist for neurologists

## Program Education Issues

**Summary of  
Muscle Pathology-related  
Questions  
from two AANP surveys,  
Spring 2010 and Spring 2011**

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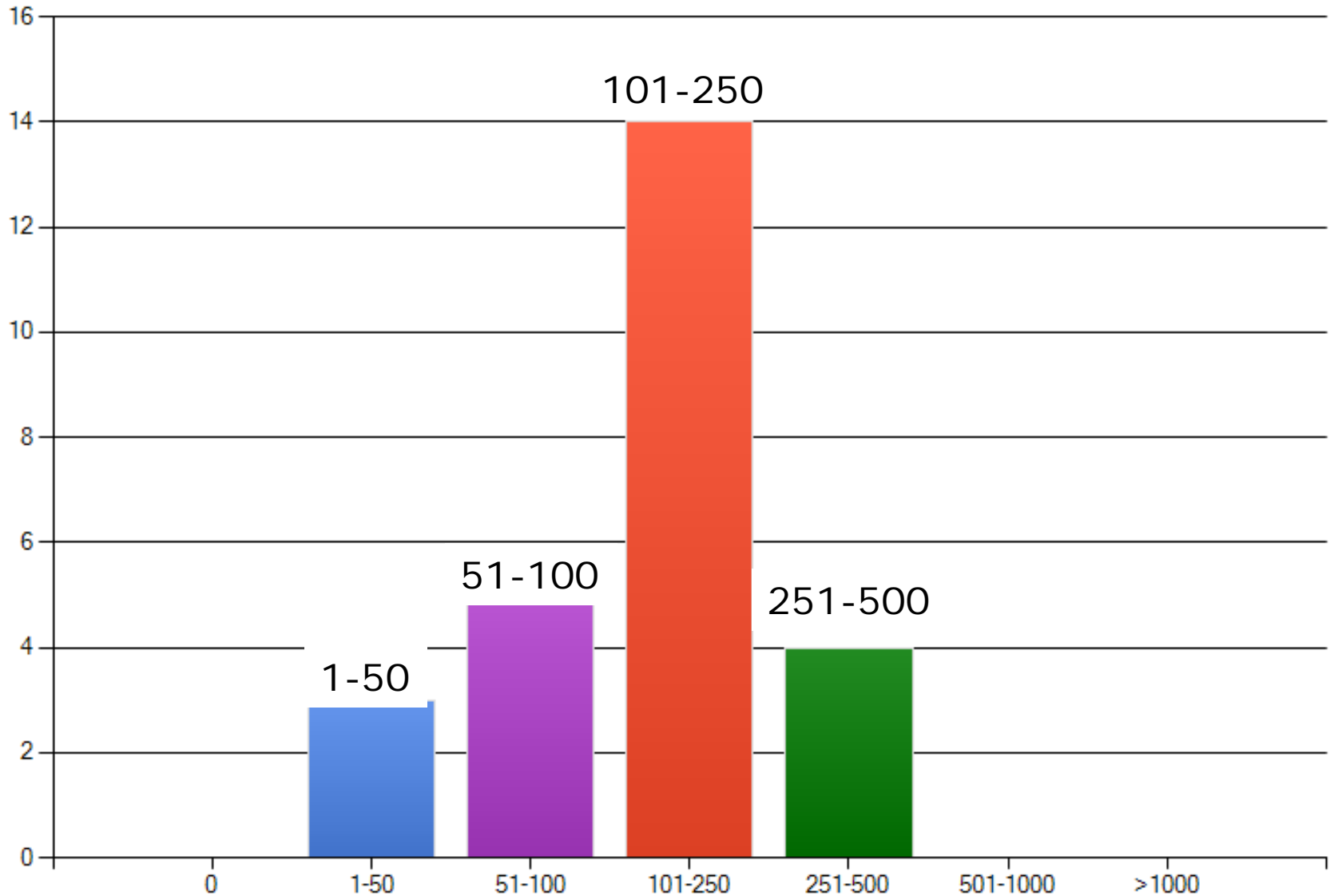
- 61% (140) do not limit practice to specific areas in neuropathology
  - 7.4% (17) limit practice to only muscle or nerve evaluations
- No. of muscle & nerve biopsies range from 0 to 1250/year
  - 0 to 50: 87 (38.2%)
  - 51 to 250: 84 (36.8%)
  - 251 to 1250: 29 (12.8%)
- 69.6%(154) reported muscle & nerve biopsies are evaluated by a neuropathologist
- 56.5% (125) accept muscle biopsy consults
- 32.1% (73) participate in muscle and/or nerve biopsy conferences

## Summary (2010 survey)

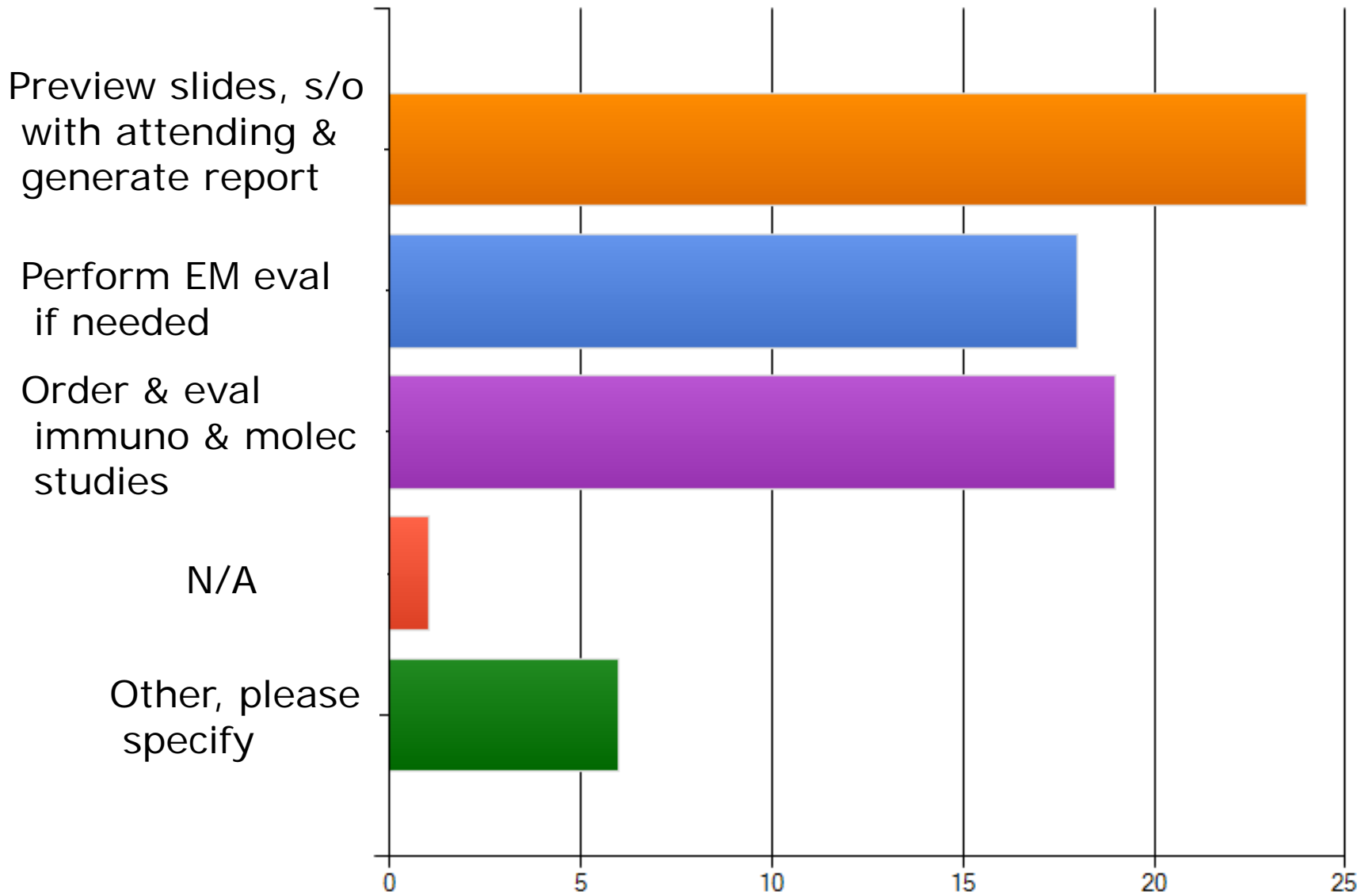
- Sent to NP fellowship directors
- Response: 27/35 = 77%

## **Survey of NP Fellowship Directors on Training in Muscle Pathology (2011)**

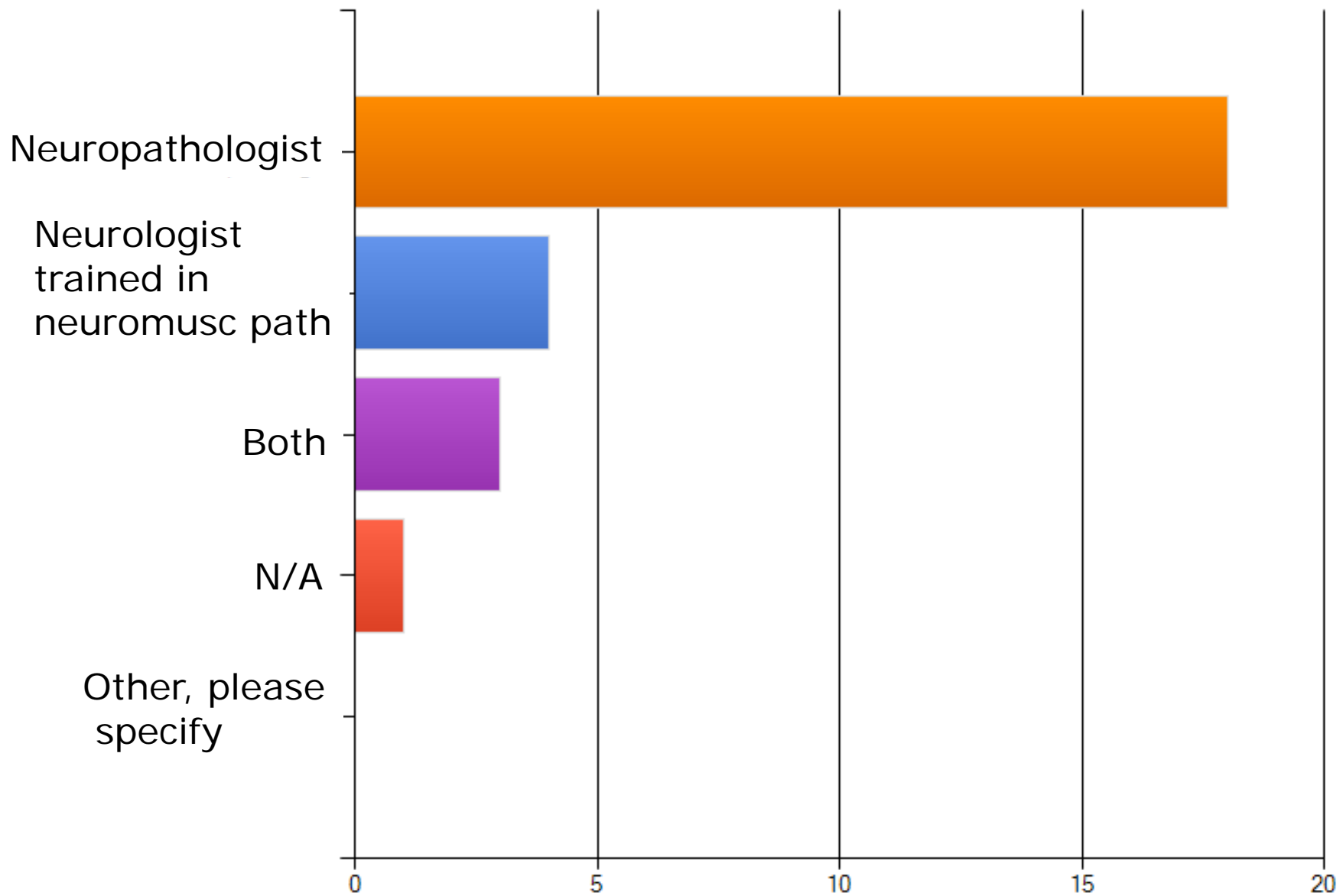
In your department, how many muscle biopsies are evaluated by Neuropathology fellows each year?



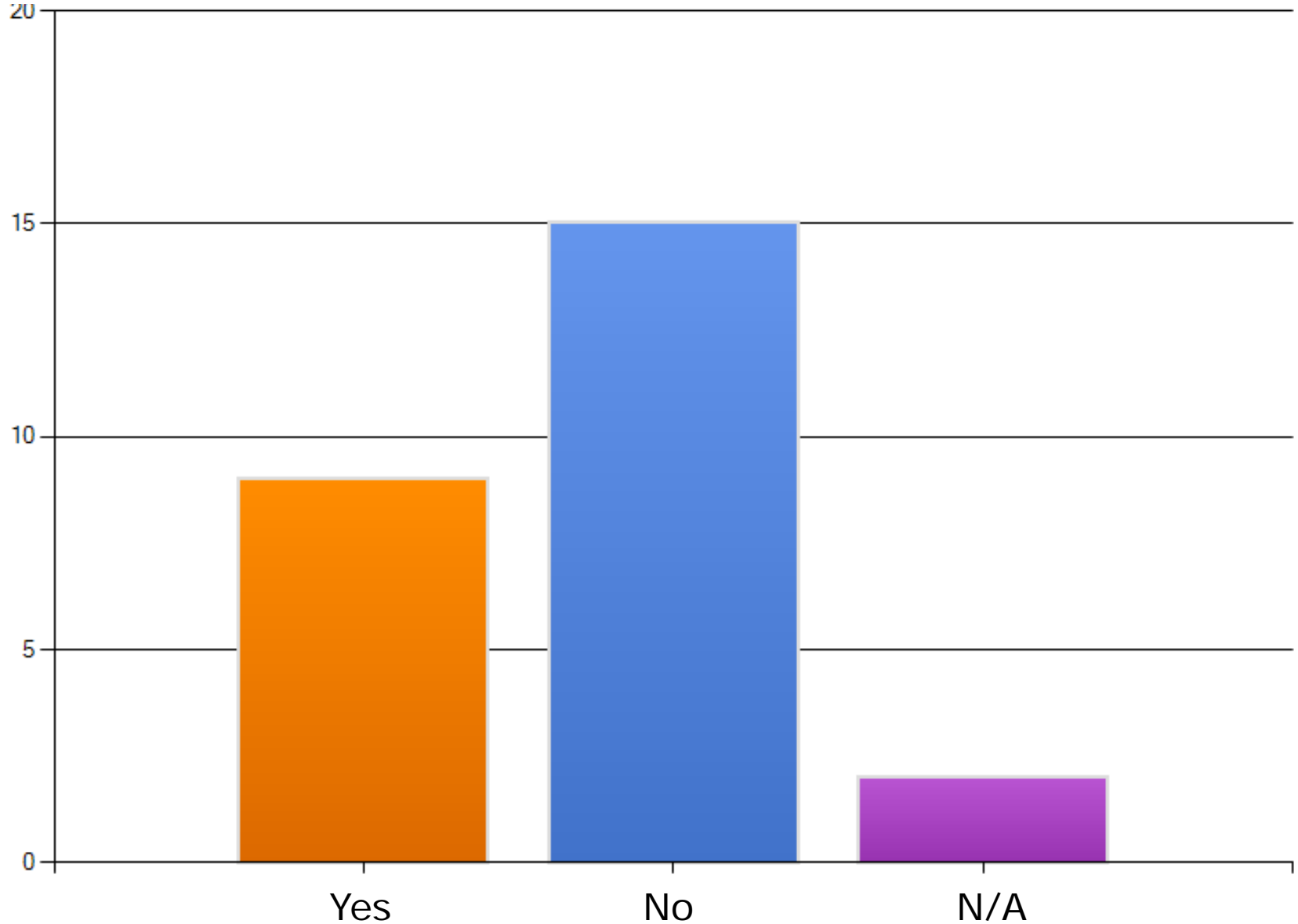
What are the responsibilities of the Neuropathology fellow in the evaluation of the muscle biopsies? Please check all that apply.



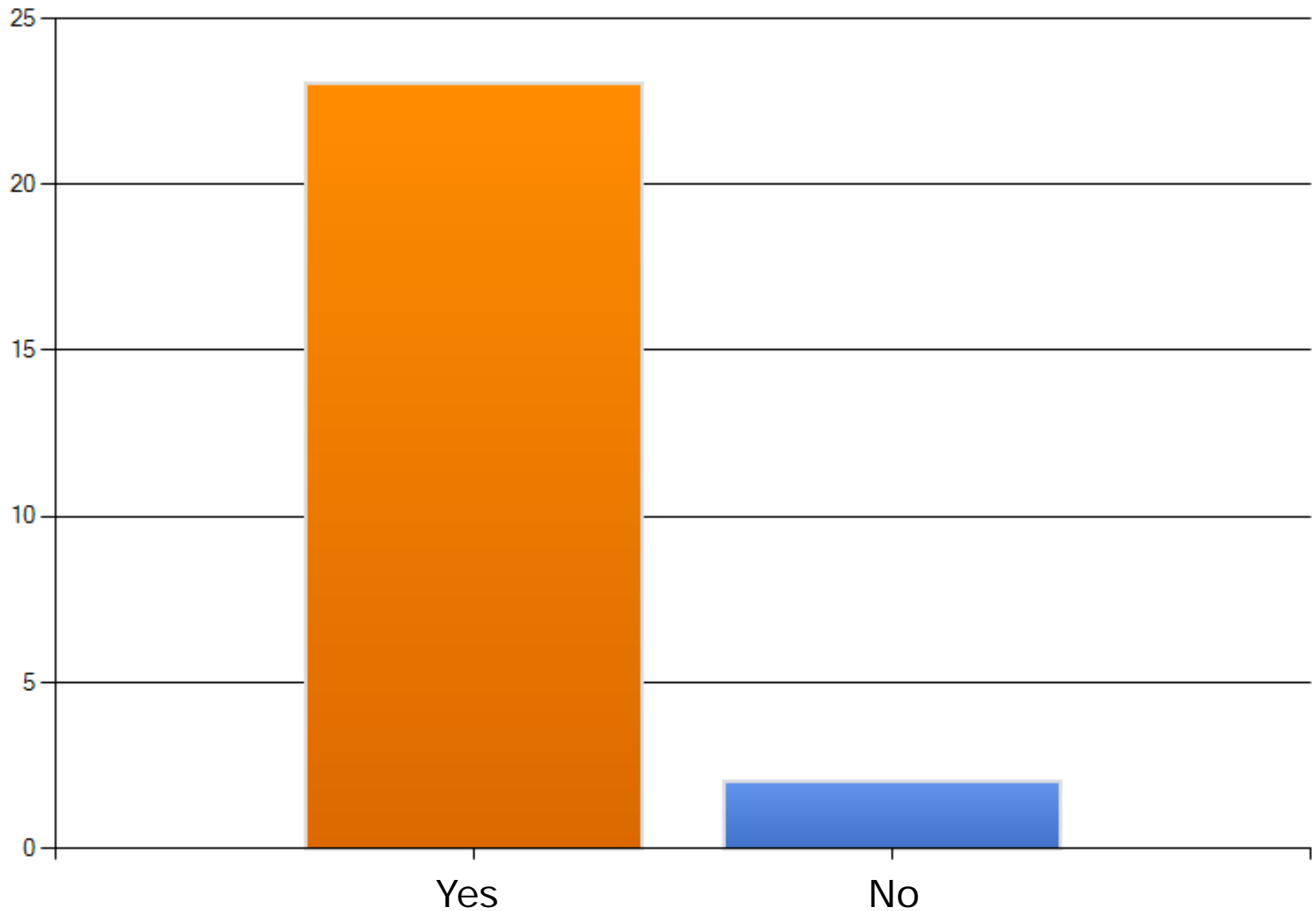
# With whom do the Neuropathology fellows review the muscle biopsies?



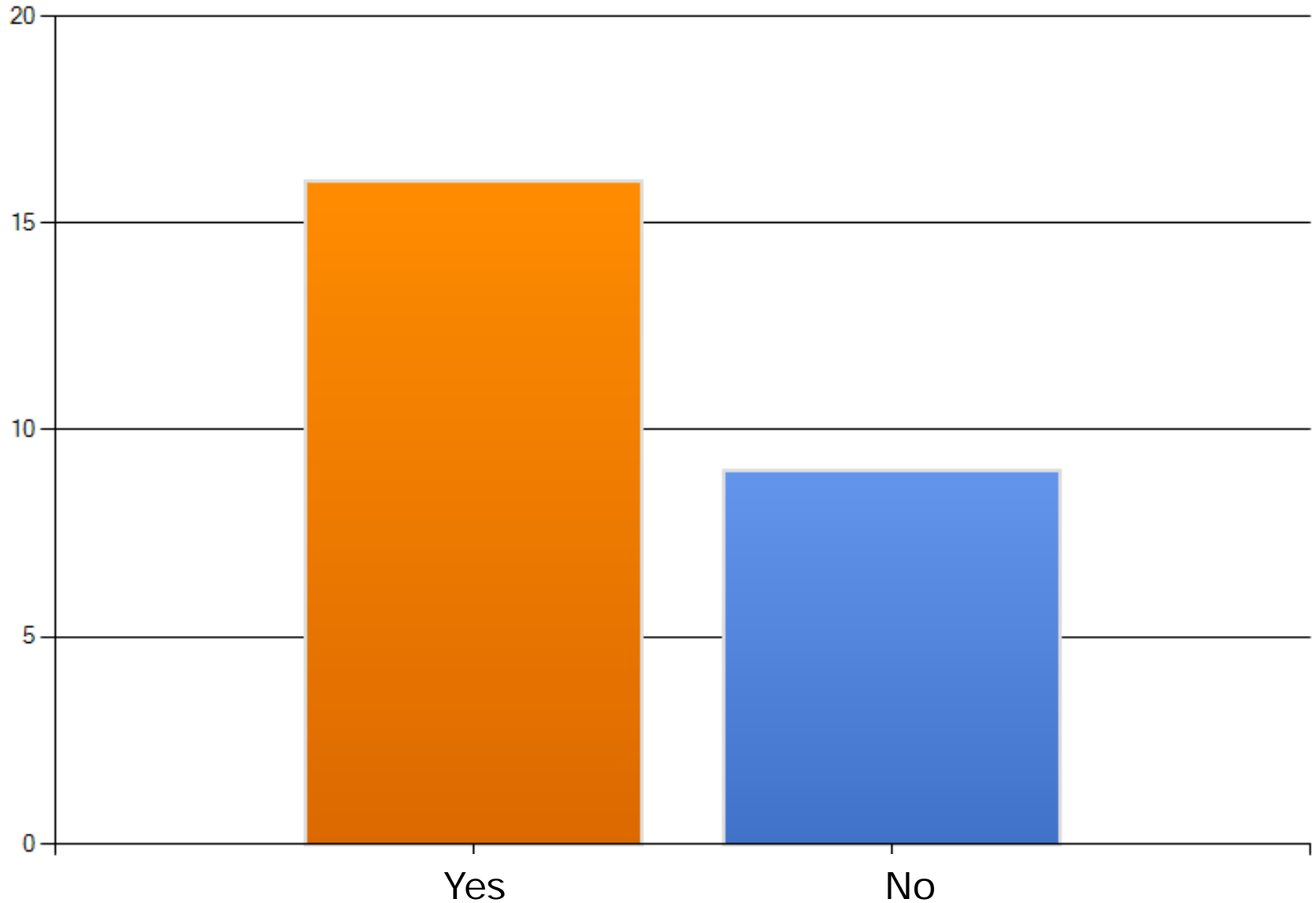
# Do the Neuropathology fellows participate in research activities in muscle pathology?



Do you have adequate training opportunities in muscle pathology for Neuropathology fellows in your institution?



Has the training of Neuropathology fellows in muscle pathology been impacted by Neurology colleagues at your institution?



- Most comments remarked upon the positive impact on fellow training by Neurology colleagues:
  - Better clinical information
  - Clinico-pathological correlations
  - Educational interdisciplinary conferences
  - Frequent positive interactions between trainees & neurologists

**Please explain the impact:**

- I think we will continue to S/O cases.
- Advances in molecular/genetic testing will decrease the need for the current morphological & histochemical studies. These will increasingly be done at specialized academic centers.
- If we are to compete with Neurologists, we have to be available for clinical consultation.
- ....training of NP fellows in neuromuscular pathology seems spotty, based on my difficulty in identifying individuals with adequate training during faculty recruitment efforts.
- The role of neuropathologists in the evaluation of muscle biopsies will likely increase...
- There is still a lack of deep acknowledgement from our community neurologists about the need and/or best practices for muscle biopsy analysis.
- Continued variations in practice patterns between institutions (as some neurologists are trained in reading biopsies).

## What does the future hold?

- Few training programs have the needed facilities for such complex testing on-site. Not every institution can have state-of-art facilities & large numbers of cases.
- ...allowances should be made for rotations or special training at other institutions.
- ...ensure that histology labs in ... institutions are capable of providing a broad range of neuromuscular histology services.
- Consider rotation of fellows on a Neuromuscular clinical service
- Close collaboration with neurology and neurosurgery so that biopsies are done correctly, & adequate clinical information & NCV/EMG results are provided. Weekly conferences with neuromuscular service.
- Continued integration of & emphasis on molecular and genetic studies so we are a resource for neurologists. More exposure of fellows to interpretation of NCV, EMG, etc.
- Ensure exposure of NP fellows to *pediatric* cases.....
- Increased availability of web-based muscle pathology case conferences, didactic courses & focused study sets with clinico-pathologic correlations

## How can we improve training?

- Neuropathology needs to be aggressive in this area. There is a lot of muscle disease around and the biopsies it generates (and will generate in the future despite molecular diagnosis) need to be processed and interpreted properly. NP is in the best position to do this.
- NP fellow training in muscle pathology & in fact in most of neuropathology will have to evolve as next generation sequencing technologies will be replacing many individual genetic tests and eventually will replace/complement many pathology ancillary tests. We all need to prepare for this new reality.
- Muscle pathology performed by Neurologists may provide accurate diagnoses, but they may lack the infrastructure of a path dept. in processing tissues expertly, lack training in greater aspects of surgical pathology that regularly play a role in interpreting muscle biopsies, & represent a potential conflict of interest when they are deciding when a muscle biopsy should be done.

## **Additional Comments:**

1. Are there adequate training opportunities for NP fellows in muscle pathology at primary sites of neuropathology fellowship training?
2. Are there sufficient CME/SAM opportunities in muscle biopsy evaluation for practicing neuropathologists and other interested pathologists?
3. How is the training of neuropathology fellows in muscle pathology impacted by neurology colleagues?
4. How can training in muscle pathology for neuropathology fellows be improved?
5. What does the future hold for the role of neuropathologists in the evaluation of muscle biopsies?

## Questions for Discussion