# AANFM **Position Statement**American Association of Neuromuscular & Electrodiagnostic Medicine

## **Neuromuscular Ultrasound Qualifications**

#### **Introduction and Definitions**

Neuromuscular ultrasound is a growing diagnostic subspecialty field. Neuromuscular ultrasound focuses on primary diseases of nerve and muscle. It is distinct from musculoskeletal ultrasound, which focuses on traumatic and degenerative changes of tendons and synovial joints. High resolution ultrasound allows physicians to study peripheral nerves to evaluate neuromuscular diseases. Traditionally, electrodiagnostic testing was used to diagnose these diseases; however neuromuscular ultrasound can now complement the electrodiagnostic findings. It is the position of the AANEM that neuromuscular ultrasound is within the scope of practice of specialists in neurology and physical medicine and rehabilitation who have demonstrated the prerequisites for the performance and interpretation outlined below. It is the position of AANEM that the interpretation of neuromuscular ultrasound is the practice of medicine.

#### **Evolution of Neuromuscular Ultrasound**

The first report of the utility of neuromuscular ultrasound was in 1980 with the elucidation of distinct imaging dystrophy.<sup>1</sup> of muscular characteristics High resolution/high frequency ultrasound transducers have since made it possible to routinely study peripheral nerves. It is now clear that anatomic changes are frequently associated with inflammatory and compressive neuropathies and that these changes are of diagnostic significance. The ability to sensitively evaluate muscle disease has also improved to the point that now it is possible to image fasciculations of muscle and, most recently, fibrillations. Atrophy and hypertrophy are readily measured as are changes in quantitative muscle echointensity. Reference standards for neuromuscular ultrasound have been published.

Interventional applications of neuromuscular ultrasound have quickly advanced. Neuromuscular ultrasound is now routinely used to guide local anesthetic administration for proximal nerve and brachial plexus blocks. Ultrasound decreases the risk of inadvertent intraneural or intravascular injection and enhances nerve localization which lowers drug doses needed and improves safety margins. The technique has also been used to guide therapeutic injections of botulinum toxin in muscle and salivary glands, steroids into the carpal tunnel, and biopsies of nerve and muscle. Ultrasound guided EMG needle placement can also be used to more safely study high risk muscles such as the diaphragm, or to assist

with direct needle stimulation of deep nerves at sites inaccessible to percutaneous stimulation.

#### **Clinical Indications for Neuromuscular Ultrasound**

Studies to date have suggested that neuromuscular ultrasound may be useful in diagnosing focal neuropathies including: carpal tunnel syndrome, ulnar neuropathy at the elbow, and peroneal (fibular) neuropathy at the fibular head, hereditary neuropathies, nerve transection, as well as the detection of nerve tumors and neuromas. Additional evidence suggests a role for ultrasound in the diagnosis of multifocal motor neuropathy and other inflammatory neuropathies, and in the evaluation of a variety of primary muscle diseases including muscular dystrophy, inflammatory myopathies, and neurogenic muscle atrophy.

Ultrasound technology is rapidly evolving and the variety of neuromuscular diseases is expanding. The use of neuromuscular ultrasound, a painless, noninvasive and cost-effective technique, is likely to further increase in the future. Since 1953, the AANEM has overseen the development, growth, and clinical applications of clinical neurophysiology in neuromuscular diseases and is well suited to take a lead role in the development, growth, and clinical applications of neuromuscular ultrasound.

### **Prerequisites for the Performance and Interpretation** of Neuromuscular Ultrasound

Proficiency in neuromuscular ultrasound requires:

- 1. An understanding of peripheral nerve and muscle anatomy, including normal variants which can mimic diseases.
- 2. An understanding of the distribution patterns of myopathic and neurogenic diseases.
- 3. An understanding of the risks and benefits of surgical and medical treatment of nerve and muscle disease.
- 4. The ability to correlate ultrasound imaging with clinical findings, including genetic, serological, histopathologic, radiographic, and electrodiagnostic tests.
- 5. The ability to understand and recommend appropriate correlative studies.
- 6. The ability to modify the examination based on realtime findings.
- 7. An understanding of ultrasound equipment and basic principles upon which ultrasound operates.
- 8. An understanding of ultrasound technique and common artifacts.

9. An understanding of imaging characteristics of abnormal and healthy muscles and nerves.

These prerequisites are distinct from those needed for musculoskeletal ultrasound. Because items 1-6 are required for proficiency in electrodiagnostic medicine, many physiatrists and neurologists already possess these skills. Physicians certified by the American Board of Electrodiagnostic Medicine (ABEM) have already demonstrated competence in these six items. The ABEM Neuromuscular Medicine Ultrasound Certificate of Added Qualification is highly recommended for those who are eligible. Since patients with neuromuscular disorders are routinely referred for electrodiagnostic testing, the EMG laboratory is an ideal setting for physicians to acquire, refine and apply skills in neuromuscular ultrasound.

#### The Role of Neuromuscular Ultrasound Technologists

The focused physical examination is directed by the individual patient's particular symptoms and clinical history. Based on the history and physical examination, the physician determines the differential diagnosis, and identifies the nerves and muscles to be studied by neuromuscular ultrasound. Thereafter, an appropriately trained technologist may perform the scanning for the specific neuromuscular ultrasound studies selected by the physician. It is the position of the AANEM that direct supervision by a physician, meaning that the physician is on-site and immediately available, as defined by Medicare, is the minimum standard recommended for all neuromuscular ultrasound studies done by a trained neuromuscular ultrasound technologist.

It is the responsibility of the supervising physician to the technologist performing that ensure the neuromuscular ultrasound is fully qualified and competent in the specific procedures assigned. Before permitting a technologist to conduct any scans, the physician must assess the technologist's training, skills, and experience to ensure they align with the complexity of the specific studies to be performed. The physician should only assign tasks that are within the technologist's verified scope of competence. This ensures that all neuromuscular ultrasound studies are performed at the highest standard of quality and safety, reflecting the physician's commitment to patient care and adherence to regulatory requirements.

The imaging results of the initial neuromuscular ultrasound studies are reviewed by the physician on-site to determine whether additional images are needed. Neuromuscular ultrasound imaging results should be reviewed in real time as they are obtained, and the patient should remain in the examination room until the supervising physician has reviewed such results.

## **Professional Development**

The AANEM is prepared to provide continuing medical education to physicians and technologists who wish to acquire prerequisite skills in the clinical, laboratory, and electrodiagnostic evaluation of patients with neuromuscular disease. The AANEM is also willing to partner with other interested medical organizations to improve education and research in the growing field of neuromuscular ultrasound.

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#### **References**

1. Heckmatt JZ, Dubowitz V, Leeman S. Detection of pathological change in dystrophic muscle with B-scan ultrasound imaging. Lancet. 1980 Jun 28;1(8183):1389-90.