PROTOCOLS

The majority of the following protocols were developed by Dr. James Albers for the 1983 AAEE Course A: Fundamentals of EMG. The protocols are listed separately here for your practical application in the EMG laboratory. Please read the course material to understand the rationale behind these protocols.

FACIAL PARALYSIS PROTOCOL

A. CONDUCTION STUDIES
   1. Ipsilateral facial nerve (nasalis); stimulate at mastoid.
      a. Repetitive stimulation at low rates, 2 Hz, if neuromuscular junction abnormality possible.
      b. Reorient stimulating electrode if initial positive dip occurs from masseter activation.
   2. Contralateral facial (nasalis); mastoid.
   3. Record other facial muscle if weakness focal.
   4. Bilateral trigeminal (orbicularis oculi); stimulate supraorbital (blink reflex studies).
   5. Limb nerve conduction if two cranial nerves abnormal or generalized disorder suspected.

B. NEEDLE EXAMINATION
   1. Ipsilateral orbicularis oris and oculi, mentalis, frontalis.
   2. If abnormal, check a contralateral muscle, masseter and sternocleidomastoid.

PERIODIC PARALYSIS PROTOCOL
(from Muscle & Nerve: October 1986, McManis, Lambert, Daube)

A. PROCEDURE
   1. Use ulnar motor (hypothenar) recording - easiest.
   2. Establish baseline CMAP at supramaximal stimulation.
   3. Exercise hypothenar muscles using maximum voluntary contraction for 2-5 minutes with 3-4 second rest every 15 seconds.
   4. Record CMAP after each minute of exercise (OPTIONAL).
   5. Record CMAP every 1-2 minutes for 20-30 minutes or until no further decrease in amplitude is noted.
   6. Needle examination may show decreased insertional activity with myopathic changes.

B. INTERPRETATION
   1. Normal increment after exercise: mean = 11% (range: 0-27%).
   2. Normals return to baseline amplitude within 5 minutes (mean = 15% decline).
   3. Positive for Periodic Paralysis
      a. Increment greater than normal: may be as much as 50 - 300%.
      b. Mean decrease greater than or equal to 40% (range: 19-62%).
      c. Mean time to nadir: 38.6 minutes; most demonstrated half the decrease in 10 minutes.
CARPAL TUNNEL PROTOCOL

A. CONDUCTION STUDIES
1. Median sensory wrist
2. Ulnar sensory wrist
3. Mid-palmars if MSW peak latency is 3.3 ms or greater and doesn’t meet criteria
4. Median motor wrist with conduction
5. Ulnar motor wrist with an F-response
6. If positive, check the opposite side (at least median and ulnar sensory).

B. NEEDLE EXAMINATION
1. Examine ipsilateral first dorsal interosseous, abductor pollicis brevis, or opponens pollicis and pronator teres muscle.
2. Examine additional muscles, i.e. biceps brachii, deltoid, triceps, cervical paraspinous muscles if nerve conduction studies are normal.

C. CRITERIA
1. Difference between median sensory wrist and ulnar sensory wrist =/> 0.5 ms
2. Difference between median and ulnar sensory mid-palm =/> 0.5 ms
3. Difference between median and ulnar motor wrist =/> 1.7 ms

UPPER EXTREMITY PAIN PROTOCOL

A. CONDUCTION STUDIES
1. Same as for CTS protocol
2. If ulnar mononeuropathy suspected:
   a. Ulnar across the elbow
3. If radial nerve injury suspected:
   a. Radial sensory and motor
4. If plexopathy suspected:
   a. Do appropriate nerves corresponding to the injury, i.e. Musculocutaneous sensory and/or motor, deltoid, radial, median sensory to the thumb, or third finger. If any abnormalities, look at the other side.

B. NEEDLE EXAMINATION
1. Biceps brachii (musculocutaneous N, C5-6), triceps (radial N, C6-7), deltoid (axillary N, C5-6), pronator teres (median N, C6-7), first dorsal interosseous (ulnar N, C8-T1), infraspinatus (supraclavicular N, C5-6), and cervical paraspinous muscles.
2. If one root is suspected clinically or if any abnormality is seen, examine two or more muscles in distribution of the suspected nerve root (proximal and distal) and demonstrate normal muscles above and below elbow.
LOWER EXTREMITY PAIN PROTOCOL

A. CONDUCTION STUDIES
   1. Sural sensory, peroneal motor with conduction (if peroneal mononeuropathy suspected conduction across the knee), tibial motor with an F-wave.
   2. If proximal pain consider testing femoral nerve.
   3. If any abnormalities compare to the other side.

B. NEEDLE EXAMINATION
   1. Needle examination should include muscles of different peripheral nerve and root innervation A screening should include at least 5 muscles, but not limited to 5

POLYNEUROPATHY PROTOCOL

A. CONDUCTION STUDIES
   1. Test most involved limb first if mild; if severe do least involved limb first.
   2. Test at least 2 limbs, upper and lower, do 3rd limb for symmetry.
   3. Lower extremity do sural sensory, peroneal motor with conduction, tibial motor with an F-wave.
   4. Upper extremity do a sensory either median or ulnar, also a motor either median or ulnar with conduction and an F-wave.

B. NEEDLE EXAMINATION
   1. Test distal muscle, including a foot intrinsic. Find a gradient of the neuropathy if possible. Do at least 3 muscles per extremity.
   2. Any abnormalities should be confirmed by examination of a least one contralateral muscle.

WEAKNESS PROTOCOL

A. CONDUCTION STUDIES
   1. Test 2 extremities upper and lower. In lower extremity do sural sensory and peroneal motor with conduction and an F-wave.
   2. Upper extremity, do ulnar sensory wrist, ulnar motor with conduction, F-wave and a repetitive stimulation. If proximal weakness, do a spinal accessory with repetitive stimulation.

B. NEEDLE EXAMINATION
   1. Test muscles in upper and lower extremity. Check both proximal and distal muscles.
   2. Test at least 3 muscles per extremity.
POLYRADICULOPATHY PROTOCOL

A. CONDUCTION STUDIES
   1. Sural sensory ankle; stimulate 14 cm proximal to recording electrode.
   2. If sural equivocal or technically difficult:
      a. Opposite sural
      b. Median sensory (index); stimulate at wrist and elbow.
   3. Peroneal motor (EDB); stimulate at knee and ankle with F-response latency.
   4. Tibial motor (abductor hallucis brevis); stimulate knee and ankle with F-response latency.
   5. Ulnar motor (hypothenar); stimulate at wrist and elbow with F-response latency.
   6. If clinically indicated, consider:
      a. Median (thenar); stimulate at wrist and elbows with F-response latency.
      b. Musculocutaneous (biceps brachii); stimulate at axilla.
      c. Facial (orbicularis oculi); stimulate at ankle of jaw.
      d. Trigeminal (orbicularis oculi); stimulate supraorbital nerve.

B. NEEDLE EXAMINATION
   1. Anterior tibialis, medial gastrocnemius, vastus lateralis, gluteus medius, lumbar paraspinal, and rectal sphincter muscles.
   2. First dorsal interosseous (hand), biceps, triceps, pronator teres, and cervical paraspinal muscles.
   3. Other muscles as needed for evaluation of focal or questionable abnormalities.