

**American Academy of Neurology  
Clinical Neurophysiology (CNP) Section  
Resident Core Curriculum**

9/7/01

Definition of the Subspecialty of Clinical Neurophysiology

The subspecialty of Clinical Neurophysiology involves the assessment of function of the central and peripheral nervous system for the purpose of diagnosing and treatment of neurologic disorders. The CNP procedures commonly used include EEG, EMG, evoked potentials, polysomnography, epilepsy monitoring, intraoperative monitoring, evaluation of movement disorders, and autonomic nervous system testing. The use of CNP procedures requires an understanding of neurophysiology, clinical neurology, and the findings that can occur in various neurologic disorders.

The following are the recommended CORE curriculum for residents re CNP.

Basic Neurophysiology: Membrane properties of nerve and muscle potentials (resting, action, synaptic, generator), ion channels, synaptic transmission, physiologic basis of EEG, EMG, evoked potentials, sleep mechanisms, autonomic disorders, epilepsy, neuromuscular diseases, and movement disorders

Anatomic Substrates of EEG, EMG, evoked potentials, sleep and autonomic activity

Indications: Know the indications for and the interpretation of the various CNP tests in the context of the clinical problem.

EEG:

1. Recognize normal EEG patterns of infants, children, and adults
2. Recognize abnormal EEG patterns and their clinical significance, including epileptiform patterns, coma patterns, periodic patterns, and the EEG patterns seen with various focal and diffuse neurologic and systemic disorders.
3. Know the EEG criteria for recording in suspected brain death

EMG:

1. Know the normal parameters of nerve conduction studies and needle exam of infants, children, and adults
2. Know the abnormal patterns of nerve conduction studies and needle exam and the clinical correlates with various diseases that affect the neuromuscular and peripheral nervous system

Evoked Potential Studies

1. Know the principles and recording of evoked potential studies, including pattern reversal visual evoked responses, brainstem auditory evoked responses and somatosensory evoked potential studies.

2. Know the generators and names of waveforms and normal values of evoked potential studies.
3. Know the clinical significance of normal and abnormal findings of evoked potential studies.

Sleep recordings: Be familiar with the basic principles of tests, including polysomnography, and multiple sleep latency tests, and evaluation of various sleep disorders.

Autonomic Function Tests: Be familiar with the various tests used to evaluate disorders of the autonomic nervous system, including the quantitative sweat axonal reflex test (QSART), the thermoregulatory sweat test, heart rate, and blood pressure changes.

Special Recordings: Be familiar with the indications for doing prolonged EEG monitoring studies, recording EEG, EMG, evoked potential studies in the ICU, intraoperative intracranial and spinal cord recording, and recording various movement disorders.

Instrumentation: Be familiar with basic electronics, analog/digital recording, electrodes for recording EEG, EMG, and EPs, stimulators and stimulus parameters, amplifiers, and filters.

Principles and Techniques of Recording: Know the techniques for localization, polarity, stimulus parameters, and montages for the various CNP Studies.

Laboratory and Electrical Safety: Know the principles and guidelines for electrical safety of doing recordings in the lab, ICU, and operating room.

## Recommended Educational References and Resources

### General

American EEG Society Guidelines in EEG, Evoked Potentials, and Polysomnography. *J Clin Neurophysiol* 11:1, 1994.

American Association of Electrodiagnostic Medicine. Guidelines for Ethical Behavior Relating to Clinical Practice Issues in Electrodiagnostic Medicine. Rochester, MN: American Association of Electrodiagnostic Medicine, 1997.

Aminoff M. Electrodiagnosis. *Neurologic Clinics*, Vol 3, No 3. W.B. Saunders, 1985.

Aminoff M. Electrodiagnosis in Clinical Neurology, 4<sup>th</sup> edition. Churchill Livingstone, New York, 1999.

Daube JR, editor. Clinical neurophysiology. Contemporary Neurology Series, No 46. Philadelphia: FA Davis, 1996. (A new edition is expected to be published in 2001.)

Daube JR, editor. AAN Continuum Issue on Clinical Neurophysiology, Vol 4, #5, Lippincott Williams and Wilkins, 1998.

Levin KH, Luders HO. Comprehensive clinical neurophysiology. Philadelphia: WB Saunders, 2000.

Misulis KE. Essentials of Clinical Neurophysiology, second edition, Butterworth-Heinemann, 1997.

S.A. Schneck. Clinical Neurophysiology Education in Residency. *Annals of Neurology* 33:658-659, 1993.

### EEG

Blume WT et al. Atlas of Adult Electroencephalography. Raven Press, New York, 1995.

Blume WT, Kaibara M. Atlas of Pediatric Electroencephalography, second edition. Lippincott-Raven, 1999.

Daly DD, Pedley TA (editors). Current Practice of Clinical EEG, second edition. Raven Press, 1990.

Fisch B. Spehlmann's EEG Primer, Basic Principles of Digital and Analog EEG. Elsevier/North Holland, third edition, 1999.

Morris HH (ed). EEG Rhythms. *J Clin Neurophysiol* 7:2:155, 1990.

Niedermeyer E, Lopes da Silva F. Electroencephalography, fourth edition. Williams and Wilkins, 1999.

## **EMG**

American Association of Electrodiagnostic Medicine Monographs.

Aminoff MJ. Electromyography in clinical practice: clinical and electrodiagnostic aspects of neuromuscular disease, 3<sup>rd</sup> edition. New York: Churchill Livingstone, 1997.

Jones HR, Bolton CF, Harper CM. Pediatric clinical electromyography. New York: Lippincott Williams & Wilkins, 1996.

Kimura J. Electrodiagnosis in diseases of nerve and muscle: principles and practice, 3<sup>rd</sup> edition. New York: Oxford University Press, 2001.

## **Evoked Potentials**

Chiappa K. Evoked Potentials in Clinical Medicine, third edition. Raven Press, 1997.

Misulis KE. Spehlmann's evoked potential primer: visual, auditory and somatosensory evoked potentials in clinical diagnosis, 2<sup>nd</sup> edition. Boston: Butterworth-Heinemann, 1994.

## **Sleep**

Kryger MH, Roth T, Dement WC. Principles and Practice of Sleep Medicine, third edition. W.B. Saunders Company, 2000.

## **Other**

Robertson D, Low PA, Polinsky RJ. Primer on the Autonomic Nervous System. Academic Press, 1996.

## **Physiology**

Kandel ER, Schwartz JH, Jessel TM. Principles of Neural Science, fourth edition. McGraw Hill, 2000.

## **Anatomy**

Delagi EF, Perotto A. Anatomic Guide for the Electromyographer, second edition. Charles C. Thomas, Springfield, 1980.

Geiringer SR. Anatomic localization for needle electromyography, 2<sup>nd</sup> edition. Philadelphia: Hanley & Belfus, 1999.

Goodgold J. Anatomical correlates of clinical electromyography, 2<sup>nd</sup> edition. Baltimore; Lippincott Williams & Wilkins, 1985.

Perotto A. Anatomical guide for the electromyographer: the limbs and trunk, 3<sup>rd</sup> edition. Springfield: Charles C Thomas, 1994.

**CNP Articles in the Following Journals**

1. Archives of Neurology.
2. Clinical Neurophysiology.
3. Electroencephalography and Clinical Neurophysiology
4. Electromyography and Clinical Neurophysiology
5. Journal of Clinical Neurophysiology
6. Muscle and Nerve
7. Neurology.
8. Pediatric Neurology.

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