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EMG Medical Advisory Board

## TEMPERATURE IN NERVE CONDUCTION STUDIES

There is an old saying my grandmother taught me - "cold hands mean a warm heart." But cold hands do not predict high quality nerve conduction studies and can be a serious problem in EMG labs. A recent patient referred to me for a repeat study illustrates this problem.

The patient was a 55-year-old woman who worked in a chemical factory. Lately, she had begun to complain of pain and tingling in her hands and feet. She was diabetic, so her physicians were concerned about peripheral neuropathy and carpal tunnel syndrome. An outside EMG, which she brought with her, showed slowed conduction in the distal nerves in virtually all extremities. The neurologist diagnosed peripheral neuropathy and carpal tunnel syndrome. He suggested a major evaluation including nerve biopsy and also suggested bilateral carpal tunnel surgery. He also suggested the worker find another job. There was no mention on the report of temperature testing or warming the limbs.

When we saw her, her hands were quite cold and physical examination was otherwise normal. As is our practice, we warmed her well by soaking her hands and feet in hot water and repeated the nerve conduction studies with careful temperature control. The studies were entirely normal. It turned out, after further workup, that she was hypothyroid and this was the cause of her symptoms.

EMGs are technically demanding and sensitive tests. The nerves are greatly affected by temperature and this must be controlled carefully during the study.

**Cool temperatures slow nerve conduction and interfere with the size of responses. Not only that, they can affect nerves in an asymmetrical fashion, sometimes mimicking individual nerve injuries.** Unfortunately, many busy EMG physician offices do not want to take the extra 10 minutes or so to warm the limbs and therefore get inaccurate results. A study conducted by One Call Medical showed that on application to OCM's network in 2000, only 14% of physicians checked temperature and warmed the patient. With education by OCM, that rate rose to 58% in its largest volume state in 2002 and has continued to increase with current temperature monitoring at 93%.

Thus, my grandmother was only partially right. Cold hands do not predict good results in the EMG lab.

### JOHN J. KELLY, JR., M.D. INTRODUCTION

Dr. Kelly graduated Cum Laude from Brown University and went on to receive his Medical Degree from Yale Medical School, New Haven, Connecticut. He obtained his postdoctoral Neurology residency training at the Mayo Clinic in Rochester, MN, where he received the Henry Woltman Award as the outstanding graduate resident.

Dr. Kelly transferred to Tufts-NE Medical Center where he became a Professor of Neurology and Senior Neurologist while heading the Neuromuscular Division. For the last 12 years, Dr. Kelly has been a Professor and Chairman of the Department of Neurology at George Washington University Medical Center in Washington, DC. He has written over 100 scientific articles and books in his field and contributed significantly to improvement in the field of Electrodiagnostic Medicine. He has been selected to Best Doctors in America and Who's Who in America.

Dr. Kelly is a long standing member of the American Academy of Neurology and the American Association of Electrodiagnostic Medicine.

Ask the  
Medical Advisors

**Q: How are Carpal Tunnel & neck/spine problems differentiated from one another?**

**A:** Carpal Tunnel abnormalities are noted on nerve conduction when one studies the median nerve at the wrist. Neck/spine problems are documented by the needle portion of the examination when one investigates muscles supplied by different nerve roots using the needle EMG. There is no confusion between the two diagnoses on EMG and nerve conduction.

*Clinical Services  
Message Centers FAQs*

**Q:** Can the EMG show if pain is due to Diabetic Neuropathy?

**A:** No. The EMG and Nerve conduction can tell if the patient has a diabetic neuropathy, however, the subjective complaint of pain cannot be measured through any conventional testing.

# TO PAY OR NOT TO PAY??:

## The Importance of Amplitudes in Nerve Conduction Studies



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There are a number of companies in the United States currently offering nerve conduction services to doctors' offices using hand-held low-cost devices. It is nearly universal that this equipment is able to measure only latency and not the recording of amplitude. There are also doctors who simply report the amplitude as either normal or low without documenting a numerical measurement of the amplitude. **Neither is acceptable.**

### What are the components of a good Nerve Conduction Study?

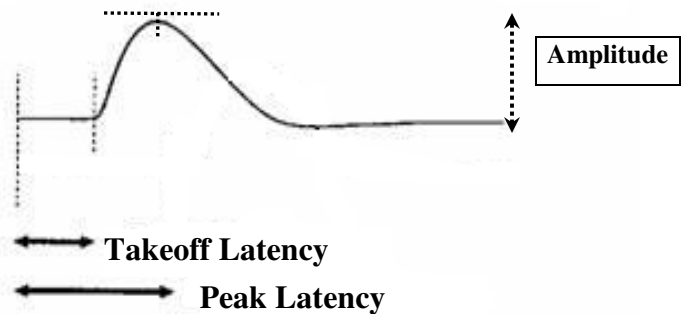
The nerve conduction study consists of the examination of a number of motor and sensory nerves which then reports the measured values for amplitude, latency and for motor nerves and some sensory nerves conduction velocity. Payment for motor and sensory nerves for all providers requires reporting of the distal latency and amplitude. A report form that is missing either the amplitude or latency is incomplete and, therefore, not eligible for payment. The parameter most often **omitted** is the amplitude.

The latency and conduction velocity report the speed of electrical transmission along nerve or across nerve segments. **The amplitude measures** the size of the response. (see diagram)

**When the** term "nerve damage" is used, we are describing a diminution (reduction in size) of the amplitude. Following a nerve injury, measurement of the amplitude on follow-up studies permits assessment of regeneration and recovery. On occasion, an absolute value for the amplitude is not reported in studies. This is unacceptable, as it does not provide a point of comparison for future studies or an absolute assessment of the current state of the patient.

Therefore, a numerical measurement of the amplitude must be documented in the report to be considered a valid study eligible for payment consideration.

If you have any questions regarding this article or would like further information, please call the Clinical Services Message Center at Ext. 3431 and your call will be answered within 48-72 business hours.



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