

CORRESPONDENCE

Use of screening nerve conduction studies for predicting future carpal tunnel syndrome

Editor—Werner *et al*¹ consider a question critical to the interpretation of nerve conduction studies used as a screening tool to identify workers at risk of hand and finger disorders associated with repetitive motion. They conclude that an abnormal median sensory nerve conduction in asymptomatic active workers is not predictive of development of hand and finger symptoms in the future.

The results do not discuss the possibility of selection bias in choosing asymptomatic workers employed for years in manufacturing jobs with a range of repetitive hand movements. Active workers with abnormal nerve conduction studies who perform repetitive tasks for years and remain asymptomatic may be the ones that have attributes, yet to be determined, that prevent the attainment of a symptom threshold. The lack of follow up nerve conduction studies did not allow the authors to answer their question regarding the predictive value of abnormal median sensory nerve conduction. Without these data it is not known whether the active workers and controls who developed symptoms had a progression in their nerve conduction studies; whereas the nerve conduction studies in those with no symptoms at follow up remained unchanged or improved. It was only determined that at one point in time 77 active workers had abnormal nerve conduction studies not accompanied by symptoms. As the reliability of abnormal nerve conduction studies in this setting is not established, it may be premature to use nerve conduction studies as a biomarker to predict risk. For example, it is not known if the nerve conduction studies of the 77 asymptomatic workers would remain abnormal at follow up one to two years later.

Median mononeuropathy associated with carpal tunnel syndrome has numerous underlying pathological processes from ischaemia secondary to altered blood flow, direct axonal compression, and chronic degenerative changes. Therefore it is not surprising that various combinations occur when screening workers with quantitative nerve studies and a symptom questionnaire. Those who commonly examine cases of median mononeuropathy (carpal tunnel syndrome) often find a low correlation between symptoms, physical findings, and nerve conduction studies. This is not unexpected as carpal tunnel syndrome is a multifactorial problem in which the time line for change and the underlying pathology may differ.

Before discarding nerve conduction studies as a screening tool, another approach that may yield results more predictive of risk is the examination of median nerve function in workers at pre-employment with follow up studies to identify change and the association with ergonomic stressors. Also electrodiagnostic measures known to better identify abnormalities in the carpal canal portion of the median nerve such as the midpalmar latency have increased sensitivity.²

Abnormal nerve conduction studies as an isolated finding should not be treated or used to screen out workers but rather should be followed up to establish, if it exists, the natural history of median nerve function and hand symptoms. The sound practice of medicine dictates treatment of the patient, not the abnormal laboratory value. Nerve conduction studies must use norms based on a healthy population without known exposures. If a shift in median nerve function is found more often in workers involved in repetitive activities, this cannot be accepted as a worker norm in the absence of prospective studies to determine the long term consequences. An oft quoted saying by Carl Sagan fits the study's conclusion of median sensory nerve conduction not predicting hand symptoms, "Absence of evidence is not evidence of absence."

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- 1 Werner RA, Franzblau A, Albers JA, Buchele H, Armstrong TJ. Use of screening nerve conduction studies for predicting future carpal tunnel syndrome. *Occup Environ Med* 1997;54:96-100.
- 2 AAEM Quality Assurance Committee. Literature review of the usefulness of nerve conduction studies and electromyography for the evaluation of patients with carpal tunnel syndrome. *Muscle Nerve* 1993;16:1392-414.

Authors' reply—We appreciate the comments from Bleecker regarding our recent article on the predictive value of nerve conduction studies in predicting future symptoms consistent with carpal tunnel syndrome (CTS).¹ The issues raised are appropriate and will hopefully encourage more research in this area. The concerns about a possible selection bias are real as our study was based upon active workers and did not represent an inception cohort of workers. We agree that this type of study needs to be duplicated with an inception cohort to show the natural history of median nerve conduction across the wrist over time, with a close correlation of hand and finger symptoms. Our sample was randomly chosen and did have a high participation rate. The duration of employment at their present job did not influence the reporting of symptoms in our study; this argues against a selection bias of survivors but does not rule out the possibility.

The issue of whether or not the latency of the median nerve evoked response changes over time in active workers was not considered in our study and may provide some additional insight into the natural history of median mononeuropathy at the wrist but it does not assess the risk for CTS. Our study supports the conclusion that an active asymptomatic worker, with a documented median mononeuropathy, is not at increased risk for developing CTS (even though this contradicts our original hypothesis). Knowing the change in latency at follow up would not change this conclusion.

We are in agreement with Bleecker that you treat the patient and not the test. Unfortunately, many clinicians think that a prolonged median latency is the equivalent of carpal tunnel syndrome. This is because of the high sensitivity reported for nerve conduction studies in relation to CTS.^{2,3} We raise the issue that the high sensitivity noted in a clinical

setting with symptomatic patients is not found in the cross sectional screening in the workplace.^{4,5} Also, the specificity is lower than previously thought.^{1,4,5}

This study questions the value of a screening nerve conduction study but also raises issues with their value as a diagnostic test. We think that the current criteria for determining a threshold for a prolongation of the median nerve evoked response across the wrist in the active worker needs to be re-evaluated. Our normative data, from our asymptomatic workers, suggest that a relative difference of 0.8 ms be used instead of 0.5 ms that is used in many laboratories.^{2,3} The data from Stetson *et al*⁶ supports the assumption that active industrial workers represent a shift in the population with more prolongation of the median nerve present among active workers. A longitudinal study will be necessary to find whether the active worker with a prolonged median nerve evoked response across the wrist develops any significant problems in the future. Our study showed that within a mean of 17 months of follow up that asymptomatic workers with a median mononeuropathy were not at greater risk of developing symptoms consistent with CTS. This argues against using nerve conduction testing as a screening procedure but a definitive study remains to be done.

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- 1 Werner RA, Franzblau A, Albers JW, Buchele H, Armstrong TJ. Use of screening nerve conduction studies for predicting future carpal tunnel syndrome. *Occup Environ Med* 1997;54:96-100.
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- 3 Redmond MD, Rivner MH. False positive electrodiagnostic tests in carpal tunnel syndrome. *Muscle Nerve* 1988;11:511-8.
- 4 Franzblau A, Werner RA, Valle J, Johnston E. Workplace surveillance for carpal tunnel syndrome: a comparison of methods. *Journal of Occupational Rehabilitation* 1993;3:1-14.
- 5 Franzblau A, Werner RA, Albers JW, Olinski D, Johnston E. Workplace surveillance for carpal tunnel syndrome using hand diagrams. *Journal of Occupational Rehabilitation* 1994;4:185-98.
- 6 Stetson DS, Silverstein BA, Keyserling W, Wolfe RA, Albers JW. Median sensory distal amplitude and latency: comparisons between non-exposed managerial/professional employees and industrial workers. *Am J Ind Med* 1993;24:175-89.

The sex ratios of offspring of people exposed to non-ionising radiation

Editor—In recent years there has been increasing concern that exposures to non-ionising electromagnetic fields have adverse reproductive effects.^{1,2} It is well established that in men, many forms of non-endocrine disease are associated with low testosterone, or high gonadotrophin concentrations, or both.³ There is very substantial evidence that