AdvoCal
Legislative and Administrative Agency Advocacy
Professional Association Management
Established 1983

September 8, 2015

Hon. Edmund G. Brown, Jr., Governor
Governor's Office
State Capitol
Sacramento, California 95814

RE: Assembly Bill 1542 (Mathis and Cooley) – SIGN

Dear Governor Brown:

Our client, the California Society of Industrial Medicine and Surgery (CSIMS), is a co-sponsor with the California Psychological Association of Assembly Bill 1542 by Assembly Members Mathis and Cooley. CSIMS, along with our other clients, the California Society of Physical Medicine and Rehabilitation and the California Neurology Society, urge you to sign AB 1542. This legislation restores the specialty category of Neuropsychologist Qualified Medical Evaluator in California's workers' compensation system.

For more than 22 years, injured workers have had the ability to have their head and spinal cord injuries evaluated by neuropsychologists certified by the State. To our astonishment, the Division of Workers' Compensation (DWC) recently adopted administrative regulations to abolish recognition of neuropsychologists and transfer them into the data pool reserved for general clinical psychologists for the creation of the random QME evaluation panels. This will adversely affect employers, the DWC, and injured workers, whether or not they are represented by an attorney. The outcome will likely be either an incomplete, under-, or over-assessment of the worker's condition and impairment. Regardless, obtaining a proper assessment will take months longer and cost thousands of dollars more than necessary. No one wins.

Workers across the entire employment spectrum suffer traumatic brain and spinal cord injuries, but the most vulnerable occupations are roofers and other construction trades, police officers, firefighters, farm laborers and IHSS caregivers.

When a worker suffers a brain or spinal cord injury, the condition needs to be evaluated by a QME clinical neuropsychologist, not a regular psychologist. There is a vast difference between what psychologists do and what neuropsychologists do. Psychologists in the work comp setting typically evaluate, diagnose, and treat behavior and mental processes. On the other hand, according to the National Academy of Neuropsychology, "[a] clinical neuropsychologist is a professional within the field of psychology with special expertise in the applied science of brain-behavior relationships." In other words, a neuropsychologist has special training to evaluate and help those whose cognitive issues are the result of concussions, strokes, traumatic brain injuries and similar physical head and spinal cord traumas.

1000 Q Street, Suite 200 Sacramento, California 95811-6518
(916) 446.6161 · (800) 446.9121 · F (916) 443.6719 · welobby@advocal.com · www.advocal.com

Now that the DWC has abolished the QME designation for neuropsychologists and folded them into the general category of "psychologist," there is a high probability that the random QME panel of three psychologists will not include any neuropsychologists at all. Whereas brain-injured workers formerly had a 100% chance of receiving a panel of three neuropsychologists, they now have only a 0.4% chance of this occurring.

It is also not a good outcome for employers because the DWC will repeatedly have to create a series of random QME panels until it gets one that includes just neuropsychologists. Since neuropsychologists are no longer separately identified in the DWC's computer database, it will require a cumbersome, manual process to identify qualified evaluators, and this will delay the resolution of the case, causing the employer to pay additional Temporary Disability benefits in many cases. Presently, DWC has no process in place to accomplish this and has no plans to create one. This will delay the entire panel creation process and the extra burden will increase DWC's operational costs which happen to be 100% funded by assessments on California's employers. In addition, without AB 1542, there will be more litigation, consultations and depositions.

The language of AB 1542 was carefully drafted by the sponsors to conform to consensus opinion by the national medical community. At present, board certification is not required to practice clinical neuropsychology anywhere in the United States. The two accrediting bodies identified in the bill – the American Board of Clinical Neuropsychology and the American Board of Professional Neuropsychology – are the only nationally-recognized certifying bodies for neuropsychologists. Since the board certification of neuropsychologists is a relatively new process, AB 1542 also establishes a second track for non-board certified neuropsychologists to operate. That process is the one adopted by the National Academy of Neuropsychology in 2001.

AB 1542 enjoys broad support from the medical community, the Brain Injury Council of California, the California Board of Psychology, the California Applicants' Attorneys Association, the International Association of Machinists and Aerospace Workers, and Voters Injured at Work. It received unanimous support from the Legislature, passing the Assembly (79-0) and the Senate (40-0). Since it was correctly drafted in the first place, it did not need to be amended throughout the entire legislative process.

We would be remiss not to comment on what we feel is the misguided opposition from the Department of Industrial Relations. After we first objected to the abolition of the neuropsychology QME category during the DWC's administrative hearings on May 22, it gave the formal response below. It forms the basis of the letter of opposition sent by DIR Director Christine Baker on July 29, 2015, to Assembly Member Mathis:

> The California Board of Psychology, the licensing board for psychologists, does not recognize subspecialties. The Administrative Director under Labor Code

> section 139.2(a) has the authority to decide which specialties to recognize as part of the QME process; the Administrative Director chose to recognize only those specialty boards recognized by the respective physician licensing boards. The California Board of Psychology has jurisdiction to recognize specialty areas of practice and it does not recognize neuropsychology boards. In the event that a psychologist is unable to perform the necessary evaluation, the psychologist QME can arrange for diagnostic tests with a neuropsychologist. This will give injured workers wider access to a wider geographic area. According to the DWC database, in 2013, of the 120,000 panels requested, only 381 were requested in neuropsychology.

In our opinion, this response reflects DIR's fundamental misunderstanding of the law and the factual situation. First, although the Board of Psychology does not recognize any subspecialties, neither does any other health care licensing board, except for the Board of Chiropractic Examiners. As such, the assertion that "the Administrative Director chose to recognize only those specialty boards recognized by the respective physician licensing boards," is false on its face. Furthermore, the Board of Psychology does recognize the American Psychological Association and the specialty of clinical neuropsychology is recognized by the APA and the Canadian Psychological Association. The fact that the Board of Psychology supports AB 1542 is tacit recognition of the neuropsychology specialty.

Second, we seriously question whether the AD's "authority to decide which specialties to recognize" is as broad as DWC claims. Labor Code Section 139.2(a) reads in its entirety, " The administrative director shall appoint qualified medical evaluators in each of the respective specialties as required for the evaluation of medical-legal issues. The appointments shall be for two-year terms." The section reads "shall." It does not appear to give the AD any discretion to pick and choose specialties. The entire medical community recognizes the importance of neuropsychology. For example, in 1996, the American Academy of Neurology issued a position paper endorsing the role of neuropsychologists in the assessment of traumatic brain injuries. Enclosed is a copy of that paper.

Third, the assertion that the "California Board of Psychology has jurisdiction to recognize specialty areas of practice . . ." is incorrect. All health care licenses in California are generic, not specialty specific. The Board of Psychology has advised us that it does not have jurisdiction to license neuropsychologists separately and it is not interested in having that authority. As noted above, the Board of Psychology supports AB 1542 and that is, at least, an informal recognition of neuropsychology as a specialty.

Fourth, the assertion that "[i]n the event that a psychologist is unable to perform the necessary evaluation, the psychologist QME can arrange for diagnostic tests with a neuropsychologist" manifests a fundamental misunderstanding of the role of the neuropsychologist and a

misunderstanding of the DWC's own administrative regulations. A brain-injured worker needs a comprehensive evaluation by a neuropsychologist. A QME clinical psychologist is neither trained nor qualified to interpret the comprehensive cognitive tests administered by a neuropsychologist. What is needed, at a minimum, would be a neuropsychological consultation, but the revisions to Regulations 31.7 and 32 several years ago preclude that in most instances. Given the recent abolition of the separate neuropsychology QME category, there is only a 15.4% chance that a random consultation panel will contain one neuropsychologist and only a 0.4% chance that it will contain three neuropsychologists. In a meeting with the DWC last Friday, when we questioned the ability to obtain a neuropsychological consultation under current regulations, the DWC representatives were unable to cite any law or regulation authorizing the process.[1] Furthermore, the "solution" proffered by DWC will be time-consuming and forces employers to pay for two, rather than one, forensic reports.

Fifth, the statement that, " [t]his will give injured workers wider access to a wider geographic area" makes no sense whatsoever. We think they were trying to say that the new, combined pool of psychologists and neuropsychologists will give workers more options, but it makes no sense to draw from a pool in which nearly 85% of the physicians are neither trained nor qualified to perform the services. In fact, conventional medical wisdom suggests that neurologists are better qualified to assess traumatic brain injuries than regular clinical psychologists, but even a neurologist would likely need to obtain an additional evaluation from a neuropsychologist.

Sixth, for the first time ever, the DWC raised another issue last Friday when it objected to the grandfather clause in AB 1542, claiming that it permits self-certification without independent verification of competency. We respectfully disagree. Board certification of neuropsychologists is a relatively new process and many highly-qualified and highly-respected neuropsychologists began practicing before certifying boards were even created in their specialty.[2] According to DWC, only 18 neuropsychologist QMEs presently are board certified by the two accrediting

---

[1]DWC's recommended solution may actually violate its own rules. Regulation 32(b) provides that, "Except as provided in subdivision 32(a) above [concerning evaluations by acupuncturists], no QME may obtain a consultation for the purpose of obtaining an opinion regarding permanent disability and apportionment consistent with the requirements of Labor Code sections 4660 through 4664 and the AMA Guides." Regular clinical psychologists use the GAF (Global Assessment of Function) to measure impairment and traumatic brain injuries require evaluation by neuropsychologists using Chapter 13 of the AMA *Guides*. Regular clinical psychologists are not trained in the use of Chapter 13. Labor Code Section 4663 does not cure this defect since it only applies to apportionment and not permanent disability issues.

[2]For example, the American Board of Clinical Neuropsychology was incorporated in1981 under the auspices of the American Board of Professional Psychology. The American Board of Professional Neuropsychology was incorporated in 1982.

boards identified in AB 1542. So as not to create a shortage of neuropsychologist QMEs for California's brain-injured workers, AB 1542 grandfathers in all 70 QMEs who were certified as neuropsychologists on January 1 of this year. There is historical precedent for such language because the Legislature created a similar grandfather clause for medical doctors in 2000.[3] When we asked the DWC representatives whether there had been any complaints about the competency of any of the 70 self-certified neuropsychologists over the past 22 years, they could cite none.

Finally, DWC's assertion that "only 381 [QME panels] were requested in neuropsychology" in 2013 seems to suggest that we shouldn't waste our time and effort on such a small number of injured workers. That in unfortunate. All injured workers matter! Fortunately, there were only 381 workers who apparently needed a neuropsychologist QME in 2013, but those 381 workers were legally entitled to the same honest, fair evaluation of their injuries as all other workers that year. To take their argument to its logical conclusion, perhaps DWC should abolish dermatologist QMEs, acupuncturist QMEs and a couple others because fewer than 381 panels were created in those specialties in 2013, too? (In 2014, there were 633 QME neuropsychology panels.)

Article XIV, Section 4, of the California Constitution gives the Legislature plenary power to define the parameters and policy of the workers' compensation system. AB 1542 is an exercise of that authority. Please consider the unanimous voice of the Legislature.

Governor, this is extremely important legislation for brain-injured workers and it has broad support from the Legislature as well as the medical and legal communities. The only opposition is based on a misunderstanding of the law and facts and should be disregarded.

Please do the right thing and sign this urgency legislation at your earliest opportunity. Thank you very much.

Sincerely,

Carlyle R. Brakensiek
Legislative Advocate

CRB:moi
enc.
cc: Hon. Devon J. Mathis
Hon. Ken Cooley

---

[3]See Labor Code Section 139.2(b)(3)(C), as amended by Assembly Bill 776, Ch. 54, Statutes of 2000.

Special Article

Neurology 1996;47:592-599

Assessment: Neuropsychological testing of adults.

Considerations for neurologists

Report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology

This report considers the use of neuropsychological assessment of adults for neurologists, including the appropriate application and limitations of neuropsychological testing, specific disorders where evaluation is pertinent, and issues surrounding neuropsychological consultation to neurologists. The report excludes neuropsychological testing in developmental disorders. The report was assembled from a review of the pertinent literature, opinions, and information from experts in the fields of Neurology and Neuropsychology and input from the Academy at large.

Diseases of the brain commonly produce changes in behavior, including impairment of cognitive abilities and production of neuropsychiatric symptoms. Knowledge of the presence and characteristics of these behavioral changes can aid in the diagnosis, management, and longitudinal care of patients with neurologic disease. Neuropsychological evaluation is one means of garnering quantitative information about behavioral changes in patients with known neurologic diseases or who are considered to be at risk for brain dysfunction.

Technical issues in neuropsychologic assessment. Neuropsychological evaluation can characterize cognitive and behavioral disturbances and may be helpful to the clinician in the course of diagnostic assessment, rehabilitation planning, or development of a management plan. Like other tests, neuropsychological assessments are of limited usefulness by themselves and must be interpreted in conjunction with other clinical, imaging, and laboratory information. Neuropsychological evaluations have the advantage of being objective, safe, portable, and relevant to the functional integrity of the brain.

Results of neuropsychological assessment must be considered in the context of the patient's age, education, socioeconomic status, and cultural background. These factors can affect test performance and condition the conclusions that can be inferred from the evaluation. In addition, issues involved in test construction such as the reliability, validity, and sensitivity of the assessment procedures have an impact on the conclusions that can be drawn from neuropsychological evaluations.[1]

Neuropsychologic tests and neurologic function. Many widely used psychological tests were constructed before the emergence of much of the currently available information relating altered behavior to brain dysfunction. Commonly used instruments such as the Wechsler Adult Intelligence Scale (WAIS and its revised form WAIS-R)[2] and the Wechsler Memory Scale (WMS and its revised form WMS-R)[3] were constructed without the specific intention of using them as instruments to assess brain function and detect brain disorders, but extensive experience with these instruments provides a basis for interpreting the tests in neurologic terms. The Halstead-Reitan Battery[4] was developed specifically to detect "organic" dysfunction and differentiate between patients with and without brain damage (e.g., to distinguish "organic" from "functional" disorders). Differential diagnosis of neurologic disorders or precise delineation of the underlying neuronal systems affected was not intended. Newer tests designed in concert with evolving information regarding the mediation of behavior by specific structures or circuits provide greater insight into the integrity or disintegration of neurologic function. Most current neuropsychological assessment approaches use several of the traditional tests in combination with newer techniques developed specifically to evaluate neurocognitive activities and provide insight into brain function in different disease states.[5]

Test sensitivity. The ability to identify brain dysfunction varies greatly among tests and is determined both by the fidelity with which the test distinguishes normal from abnormal function and by the specific type of deficit that the patient exhibits. The WAIS-R, for example, has no memory subtests and is necessarily insensitive to memory-related deficits, whereas it has demonstrated sensitivity to disorders affecting visuospatial, calculation, and attentional

Approved by the Therapeutics and Technology Assessment Subcommittee on November 5, 1995; by the Practice Committee on December 7, 1995; by the Executive Board on January 13, 1996.

Received February 15, 1996. Accepted February 16, 1996.

Address correspondence and reprint requests to the American Academy of Neurology, 2221 University Ave, SE, Suite 335, Minneapolis, MN 55414.

abilities. In general, tests that are timed, requiring the patient to complete the test in a specified period, have greater sensitivity to diffuse or multifocal cerebral changes than untimed tests.[1] Availability of normative data and use of standardized administration procedures allow neuropsychological evaluation to be more sensitive than unstructured mental status testing in the detection of mild cognitive disturbances.

Test reliability. Reliability of tests refers to the consistency with which the same information is obtained if the test is given by different examiners (interrater reliability), by the same examiner on more than one occasion (intrarater reliability), or to the same patient on different days (test-retest reliability). Internal consistency and test-retest reliability are very high for the WAIS-R[2] and slightly lower, but still in the acceptable range, for the WMS-R.[3] Test-retest reliability data are available almost exclusively for repeated testing within short periods of time; only a few studies have addressed the long-term reliability of neuropsychological assessments in stable patients.[6] Reliability for memory tests is consistently lower than for other types of neuropsychological tests. Ideally, tests used in neuropsychological assessment should have demonstrated reliability; when reliability information is not available, the clinician must bear in mind that conclusions drawn from the tests may be more variable than is desirable.

Test validity. The validity of tests used in the assessment of cognitive function must also be known. There are several types of validity regarding neuropsychological tests, including construct validity (do memory tests assess memory?), concurrent validity (do new tests come to the same conclusions as established tests?), localization validity (do test results localize focal lesions?), diagnostic validity (do tests accurately diagnose disease?), and ecologic validity (do test results predict real-life performance?). Standardized tests widely used in neuropsychological assessment have demonstrated construct validity. For example, the WMS assesses verbal and nonverbal aspects of memory. Newly introduced tests should be shown to have concurrent validity before data derived from them are accepted. Localization validity has made considerable strides in the recent past, and some types of specific neuropsychological tests have relatively precise anatomic correlates. More basic cognitive processes (e.g., color vision) have better localization correlates than more complex processes (e.g., memory, abstraction), but it is the latter that are usually of more interest to clinicians.[7] Neurologic examination and neuroimaging are intended to provide localizing information and are usually superior to neuropsychological testing for localizing focal brain lesions; the purpose of neuropsychological assessment is to provide information on cognitive deficits and capacities. No neuropsychological tests have been shown to have consistent diagnostic validity. Some tests accurately distinguish between two or three diseases when samples of patients with these diseases are assessed,[8] but no study has shown that neuropsychological tests have positive predictive value when patients with a wide variety of disorders are tested. Even when focal lesions of different types involve similar brain regions, they often produce substantially different manifestations that would impede deriving etiologically specific conclusions from the test data.[9] Neuropsychological tests have been shown to have high validity for distinguishing between abnormal and normal performance but have little capacity for distinguishing among different causes of performance impairment.

There has been limited attention to the relationships between neuropsychological test performance and functional capacity in activities of daily living, occupational competence, or success in returning to school. A few studies have addressed this type of validity. For example, Henderson and colleagues[10] showed that deficits on a clock-drawing task correlated with wandering behavior in patients with Alzheimer's disease. In general, however, there has been inadequate exploration of the ecologic validity of neuropsychological test results, and extrapolation from test findings to disturbances in activities of daily living should be done with restraint. Tentative inferences from the neuropsychological assessment concerning the individual's return to home, work, or school should be based on a formulation that includes other factors affecting prognosis such as the patient's age, premorbid abilities, associated neuropsychiatric conditions, coexisting physical disabilities, and presence of seizures.[1]

Effects of aging on neuropsychological performance. Aging affects several domains of neuropsychological function, including fluid intellectual abilities, complex attentional processes, some aspects of memory, psychomotor speed, accessing word knowledge, visuospatial skills, some forms of abstract reasoning, and complex problem-solving.[11-13] Agestratified norms exist for most widely used instruments, although patients in the extremes of old age (above age 75) are often underrepresented in the normative sample, making interpretation of test results in very old patients more difficult. Interpretation of tests without normative data must be done with caution; patients may inappropriately be considered to be impaired on the basis of normal age-related changes.

Effects of education on neuropsychological performance. Education has a marked effect on neuropsychological test performance. For example, the cutoff for "normal" performance on the Mini-Mental State Examination may vary by as much as eight points depending on the individual's educational level.[14] The clock-drawing test, widely used in clinical screening, is also affected by low education.[15] Education-specific normative data are not available for most tests, and interpretation of test results in individuals with unusually high or low levels of education must be done with caution.

Ethnicity and cultural influences on neuropsychological assessment. Ethnicity and cultural back-

ground are important factors in interpreting test performance.[11] Most tests have been constructed by members of the majority culture and reflect their standards and experience. Minority members may score lower on some tasks due to unfamiliarity with test-taking and dissimilarities in cultural experiences and expectations. When patients are not native English speakers and are tested in English, they are at a disadvantage on tests of verbal skills. Almost none of the standardized instruments have adequate normative data for minority individuals. Culture-fair tests constructed for studies by the World Health Organization may be superior to conventional assessments in evaluating individuals not of the majority culture,[16] but these have not yet had widespread use. These factors must be taken into account when interpreting the results of neuropsychological assessment.

Effects of gender on neuropsychological performance. Gender has consistent but minor effects on neuropsychological assessment. Women tend to perform better on tests of verbal memory than men,[8] and some studies suggest that men evidence more decline than women on most neuropsychological tests in the course of normal aging.[11] Few tests provide normative data stratified by gender to account for these differences. Gender effects are of modest magnitude compared with the influences of age and education on neuropsychological test performance.

Effects of psychiatric disorders on neuropsychological testing. Neuropsychiatric disorders may profoundly affect neuropsychological performance. Anxiety, depression, psychosis, apathy, and irritability all have an impact on the patient's ability to cooperate with testing and may directly affect cognition. Anxiety and depression impair performance on effort-demanding tests and have less effect on tests of overlearned skills. Memory complaints are common manifestations of depressive disorders, and severe depression is commonly accompanied by psychomotor slowing, impaired attention, decreased cognitive flexibility, and poor retrieval memory.[12,17-19] Although groups of demented and depressed patients can be distinguished by neuropsychological tests, the predictive power of test performance for individual patients is modest, with 10 to 30% of depressed patients classified as demented.[20,21] Information from the clinical assessment, historical anamnesis, and response to treatment may all be required to distinguish these two disorders, and, in some cases, both disorders may be present simultaneously.

Effects of substance abuse on neuropsychological performance. Substance abuse also adversely affects cognition and performance on neuropsychological tests. Chronic alcoholism is associated with deterioration in abstraction, visuospatial skills, and problem-solving abilities.[22] A history of excessive substance use must be sought and integrated into the interpretation of neuropsychological test data. This is particularly important in the evaluation of patients with histories of head trauma because trauma is more common among those with substance abuse.[23]

Neuropsychological assessment of specific neurologic disorders. Neurologic disorders of differing etiologies can have markedly different behavioral ramifications, and the role of neuropsychological assessment in evaluating these conditions also varies.

Traumatic brain injury. Neuropsychological assessment is useful in the assessment of patients with traumatic brain injury (TBI) where it can aid in the detection of subtle deficits, provide information on outcome and prognosis, contribute to construction of directed rehabilitation strategies, and facilitate rehabilitation that leads to more functional independence.[24] In patients with severe TBI and those who are in the acute posttraumatic period, brief directed assessments are most useful. When recovery has largely plateaued, more detailed neuropsychological evaluation is appropriate to guide interventions and management. In patients with mild TBI, deficits are common but often recover. A few patients have chronic deficits that may be identified by neuropsychological testing.[25] A subgroup of patients has persistent deficits embedded in a complex clinical syndrome that includes chronic pain, anxiety, and depression. Deficits in these patients have multiple determinants.[26] Neuropsychological assessment in the rehabilitative setting is most useful when it informs the individual's specific rehabilitative program and identifies deficits that can be addressed or capacities that can be used to facilitate functional recovery and it is performed near the time of discharge to aid the physician and family with long-term planning.

Cerebrovascular disease. Neuropsychological assessment has little role in the assessment of patients with acute stroke. Severe deficits indicate a poor prognosis for recovery but are less predictive of outcome than tests of functional capacity. Neuropsychological assessment can be helpful in patients who have largely recovered but may still evidence cognitive impairment. Patients with deficits too subtle for detection on routine bedside testing may be shown to have memory, language, or executive function deficits that are important for vocational recommendations. In patients with more marked deficits, neuropsychological evaluation may guide rehabilitation and assist families in planning home management. In aphasic patients, for example, assessment can provide information on residual deficits and competencies in communication that are important for social and occupational reintegration.

Dementia. Neuropsychological assessment can aid in the assessment of patients with Alzheimer's disease and other dementias. It is particularly valuable in distinguishing between normal aging and mild dementias, such as early Alzheimer's disease.[27-29] Verbal and construction recall tests are consistently superior to other assessments in distinguishing between mild dementia and normal

aging.[30-32] Neuropsychological testing is required for a diagnosis of Alzheimer's disease by the widely used research criteria of the National Institute of Neurological Diseases and Stroke-Alzheimer's Disease and Related Disorders Association,[33] and neuropsychological testing is currently the principal means of assessing the efficacy of drugs used to enhance cognition in dementia patients. Neuropsychological testing can assist in distinguishing among different types of dementia,[34,35] but differential diagnosis requires additional historical and laboratory data and information from the neurologic examination and neuroimaging. Neuropsychological testing by itself, unbuttressed by other clinical information, does not distinguish among the many potential causes of intellectual impairment. In addition, traditional psychological instruments such as the WAIS-R are insensitive to the intellectual consequences of dysfunction of the basal ganglia, frontal lobes, and frontal-subcortical circuits. These structures mediate executive function, and assessment of executive function deficits requires specialized attention to both the patient's test scores and the strategies used to solve the problems posed.[36]

Parkinson's disease. Neuropsychological assessment can be of value in Parkinson's disease when there is a question of subtle cognitive deficits that may be influencing occupational function, medication compliance, or suitability for tasks such as driving. Overt dementia can be established by the clinician, but detection of more subtle cognitive deficits and identification of executive function disturbances may require neuropsychological evaluation.[37]

Human immunodeficiency virus encephalopathy. Neuropsychological testing has been applied extensively in the evaluation of patients who are seropositive for the human immunodeficiency virus (HIV). Neuropsychological deficits are not more common in seropositive asymptomatic individuals than in those who are seronegative, and routine neuropsychological assessment does not need to be performed in persons with HIV.[38] When HIV encephalopathy and cognitive deficits occur in the course of acquired immunodeficiency syndrome, however, there is an increased risk of rapid decline and death.[39] Documentation of suspected deficits thus has prognostic significance and may influence the decision to use zidovudine or other antiviral agents.

Multiple sclerosis. The frequency of cognitive deficits in MS is underestimated on the basis of routine clinical assessment. Peyser et al.[40] demonstrated that approximately half of the patients being followed in an MS clinic were cognitively impaired, and in half of these patients the cognitive deficits were unsuspected. Impaired cognition in MS correlates with reduced occupational success, poorer social engagement, sexual dysfunction, impaired activities of daily living, and psychopathology.[41] Thus, neuropsychological evaluation can provide prognostic information of potential utility in management planning.

Epilepsy. Neuropsychological testing is particularly valuable in the presurgical evaluation of patients with epilepsy who are being considered for temporal lobectomy. Cognitive assessment performed when the hemisphere to be operated on is anesthetized in the course of Wada testing (intracarotid amobarbital) reveals the cognitive integrity of the remaining hemisphere and lateralized representation of specific cognitive capacities.[42] Language testing during the Wada test is used to help plan surgical approaches, guide the extent of the resection, and determine if surgery should be performed under local anesthesia to allow cortical language mapping.[42] Memory impairment after intracarotid amobarbital injection ipsilateral to the planned temporal lobectomy suggests that the patient is at increased risk for significant postoperative memory deficits.[43] Wada test results should not be considered as absolute indicators of brain integrity or dysfunction because some test-retest variability has been demonstrated. Wada testing is indicated in patients as young as 10 years of age and has been used in those as young as 5 years of age.

Neurotoxic exposure. Exposure to neurotoxic substances often results first in complaints of poor concentration, impaired attention, and abnormal memory. Comprehensive assessment of those at risk for neurotoxic disorders (agricultural workers, persons exposed to solvents and other industrial agents, laboratory workers, painters) includes neuropsychological testing with special attention to evaluation of functions relevant to any known domain-specific effects of the suspected agent.[44] Neuropsychological tests are also sensitive to the effects of chronic alcohol use.[22] Neuropsychological assessment may play a useful role in determining the presence and extent of such changes and contribute to planning a comprehensive rehabilitation program.

Chronic pain. Neuropsychological testing is most useful in patients with chronic pain when it assesses personality and mood. Cognitive assessment is necessary only if the patient shows evidence of intellectual disturbances after discontinuation of pain-relieving and psychotropic medications. Personality profiles of the Minnesota Multiphasic Personality Inventory (MMPI) predict treatment response. This has been best documented in patients with low back pain.[45-47] The hysteria, anxiety, and depression subscales of the MMPI may provide useful information, and the validity scale may help identify patients with marked defensiveness or malingering. The MMPI cannot aid in identifying the source or pathophysiology of pain and should not be used by itself to develop an approach to the chronic pain patient. The MMPI-II is more ethnically and culturally unbiased than the original MMPI.

Personality assessment in patients with neurologic disease. Personality tests are often used to augment neuropsychological assessment. Traditional personality assessments such as the MMPI should be interpreted with caution in patients with identi-

fied or suspected brain disorders. They were not constructed with the intent of detecting brain dysfunction, and the normative data were generated with individuals without known cerebral pathology. Patients with neurologic disorders may have unusual sensory or motor experiences that will be interpreted as "schizophrenic" or they may make behavioral adjustments to their diseases that would be labeled "schizoid" or "antisocial" in nondisabled individuals. The behavioral and personality changes that occur in patients with frontal lobe or temporal lobe pathology are not readily characterized by responses to standard personality inventories.[48]

Forensic applications of neuropsychological assessment. Neuropsychological documentation is critical in cases where litigation concerns the presence of cognitive impairment. Standardized procedures should be used whether the case involves plaintiff injury or defendant responsibility. Courts have become increasingly oriented toward expert testimony, and standardized information and neuropsychological data have a distinct advantage in this setting.[49] Neuropsychological information is subject to intensive scrutiny in forensic proceedings and can be successfully challenged if it is overinterpreted, obtained during the acute phase of an injury or when the patient is taking medications that might affect performance, ignores the presence of depression or anxiety when the tests were performed, or fails to take premorbid characteristics, developmental irregularities, and substance abuse into account.

Malingering. Malingering is often considered in patients suing for damages and complaining of intellectual impairment. There is no established neuropsychological profile diagnostic of malingering, but inconsistencies in performance (e.g., failing easy items while succeeding at hard ones), deviations from the performance typical of patients with brain injury (e.g., not exhibiting recency effects on list learning), poorer than expected performance on tests assessing vocabulary or reading that tend to be preserved in neurologic conditions, and the attitude of the patient toward failure may suggest the presence of malingering.

Summary. In general, neuropsychological assessment is most useful in patients with more subtle deficits. It is also useful for detecting deficits in patients with particularly high premorbid intelligence levels[50] in which bedside-type clinical testing may be insensitive to mild alterations. Neuropsychological testing has an important role in patients undergoing epilepsy surgery and can provide useful rehabilitative guidance in patients recovering from TBI and stroke and prognostic information for patients with HIV.

Neuropsychological consultations. Neuropsychological assessment has several potential advantages over bedside mental status testing that make it useful in specific circumstances.[1,51] First, administration and scoring are standardized. Second, reliability and validity have been determined for most neuropsychological tests. Third, normative values are available for most widely used tests. Fourth, knowledge of measurement error facilitates detection of change over time when patients are assessed repeatedly. Fifth, test scores can be meaningfully compared over time and among different patients.

Neuropsychological consultation may be obtained by the clinician when (1) there are only mild or questionable deficits on mental status testing and more precise evaluation is needed to establish the presence of abnormalities or distinguish them from changes that may occur with normal aging; (2) there is a need to quantify the patient's deficits, particularly when the information will be useful in predicting or following the course of a disorder (recovery or decline); (3) when there is a need to characterize the strengths and weaknesses of a patient as part of constructing a management or rehabilitation plan or when making recommendations about returning to school or work; (4) when the neuropsychologist can provide the specific rehabilitation or other therapeutic services required; (5) when neuropsychological data can provide a more comprehensive profile of function that, when buttressed with clinical, laboratory, and imaging data, may assist in diagnosis; (6) when the patient is being considered for epilepsy surgery; and (7) when there is litigation that concerns the patient's cognitive status. Neuropsychological assessment is not intended to provide a diagnosis or to indicate the precise localization of a focal brain lesion.

Neuropsychological evaluations should be commensurate in extent with the question being asked and the state of the patient. Severely demented patients or patients in the acute phases of stroke or trauma, for example, should have brief and targeted assessments. More extensive evaluations may be required for patients with mild deficits; patients about to return home, enter rehabilitation programs, or desiring to re-enter occupations or school; or patients in whom the information is being sought to assist in diagnosis. Detailed testing tends to overidentify cognitive impairments, and referring clinicians should be aware that neuropsychological testing will often provide an exaggerated estimate of the possibility of brain dysfunction.[52] Overall, the pattern of neuropsychological test results and the strategies used by the patient to solve problems are more important than the scores on any particular test in arriving at an interpretation of the patient's cognitive status.

Neuropsychological assessments should flexibly respond to the question being asked by the clinician. The severity of the patient's deficits, the nature of the brain disorder (e.g., stroke, degenerative), the characteristics of the clinical syndrome (e.g., whether an aphasia is present), the age of the patient, associated physical limitations or neuropsychiatric disorders (depression, anxiety), effects of medication, distractibility, motivation, history of developmental disabilities, history of substance abuse, and the planned use of the informa-

Table *Tests commonly used to assess the major domains of neuropsychological function*

Neuropsychological domain	Neuropsychological test
Attention	Digit span
	Letter cancellation
	Trails A test
Language	Boston Naming Test
	Boston Diagnostic Aphasia Examination
	Western Aphasia Battery
	Verbal fluency
Memory	Wechsler Memory Scale
	Rey Auditory Verbal Learning Test
	California Verbal Learning Test
Visuospatial skills	Rey-Osterrieth Complex Figure
	Block design subtest of WAIS-R
Executive function	Wisconsin Card Sort Test
	Stroop Test
	Trails B test
Intelligence	WAIS-R
	Wechsler Intelligence Scale for Children
	New Adult Reading Test
Motor speed	Finger Tapping
	Grooved Pegboard
Educational achievement	Wide Range Achievement Test

Not all tests are used with each patient; a selection of tests is made to best characterize the patient's strengths and weaknesses and answer the referring question.

WAIS-R = Wechsler Adult Intelligence Test-Revised.

tion should all condition the choice of tests to be administered and their interpretation. The table shows tests typically used to assess specific domains of neuropsychological function. Assessment or re-evaluation merely for the sake of charting the course of the illness or recovery is generally unwarranted.

Neuropsychological reports should contain the numerical data (e.g., percentile of performance corrected for age and education) and the neuropsychologist's interpretation of the information. Some clinicians have substantial neuropsychological expertise, and raw data should be made available on request. Brevity in reporting often serves the clinician better than an extended narrative.

Assessment of neuropsychiatric disorders that bear on test performance should be provided by the neuropsychologist as part of a comprehensive assessment. Depression and anxiety are common in patients with neurologic disorders and should be evaluated with rating scales, inventories, or structured interviews. Neuropsychological assessments by themselves are insufficient as a basis for decisions regarding medical therapy and recommendations concerning specific medical tests to be ordered (i.e., CT, EEG) or pharmacologic agents (i.e., antidepressants, anticonvulsants) to be used and should not be expected or provided as part of the neuropsychological assessment.

Clinicians must be cognizant of the fact that there is great variability in the training of individuals providing neuropsychological consultation. Those with training, experience, and demonstrated competence are best qualified. For example, individuals can be certified by the American Board of Clinical Neuropsychology or the American Board of Professional Neuropsychology, hold a doctoral degree in Psychology from an accredited institution, complete postdoctoral training in a neuropsychology training program, or hold a professional license.[53] Direct experience with whether the assessments are useful and well informed provide the basis for judging the individual's competence and usefulness as a consultant. Administration of test batteries that are too long or too short to answer the specified questions, failure to recognize the limitations of neuropsychological tests (especially with regard to localization and diagnosis), administration of inappropriate tests or tests without proper standardization, and preparation of unhelpful reports are indications of inadequate preparation.[51,53] In addition, in some cases, neuropsychological tests are administered by a technician for later interpretation by a neuropsychologist. Technicians may be less likely to identify spurious data or to modify their procedures to optimize information collection, and this may lead to interpretive errors.[1] Clinicians should be aware of whether technicians are in use in the neuropsychological laboratories to which they refer. Finally, the clinician must recognize the limited reliability or unestablished validity of some tests (discussed previously).

Clinicians should perform their own mental status examination on patients before referral to a neuropsychologist, and many clinicians have expertise in the administration of basic questionnaires.[54-56] These screening tests, however have substantial false-negative rates, failing to detect subtle cognitive changes, and cannot substitute for neuropsychological assessment in answering many of the consultation questions discussed above.[57] This initial assessment guides the questions to be asked of the neuropsychologist. The referring clinician should be as specific as possible regarding the questions to be answered.

Executive summary. Most neuropsychological tests have established validity and reliability, and the information garnered from them can be regarded with confidence when the tests are administered using the prescribed method and interpreted by an individual with competence and experience. Neuropsychological evaluation is usually able to distinguish between normal and abnormal but cannot determine the cause of neurologic diseases. Lesion localization should be inferred with caution on the basis of neuropsychological test results. Neuropsychological as-

sessment is particularly valuable in patients with subtle deficits and provides less unique information when used with severely impaired patients. Neuropsychological testing is critical in patients undergoing epilepsy surgery and can be useful in management planning in patients with suspected dementia, MS, Parkinson's disease, TBI, stroke, and HIV encephalopathy. Neuropsychological referrals should be specific and guided by preliminary mental status assessment by the clinician. Neuropsychological consultation should focus on the referring question and should not provide specific medical recommendations.

Rating. *Established.* Neuropsychological assessment is accepted as appropriate by the practicing medical community for the indications and under the conditions described here. There is class II evidence for these specific conditions, and a type A recommendation is made with the restrictions noted above.

Acknowledgments

The Technology and Therapeutics Assessment Subcommittee would like to thank Dr. Jeffrey L. Cummings for his service to the Academy as chief author of this project and the panel members who provided their expert review of the drafts.

Expert Panel Members: Michael Alexander, MD; D. Frank Benson, MD; Dean C. Delis, PhD; Asenath LaRue, PhD; Kim Meador, MD; Marcel O. Ponton, PhD; W. Donald Shields, MD; Donald J. Stuss, PhD; Donna K. Whitney, MD. U.S. Government employees who participated in the development of this technology assessment did so in a private capacity. No official support or endorsement by the U.S. Department of Health and Human Services or the Department of Veterans Affairs is intended or should be inferred.

Therapeutics and Technology Assessment Subcommittee: John H. Ferguson, MD, Chair; Paul Altrocchi, MD; Mitchell Erin, MD; Robert S. Goldman, MD; Michael Goldstein, MD; Douglas S. Goodin, MD; Philip B. Gorelick, MD, Project Facilitator; Daniel F. Hanley, MD; Dale J. Lange, MD; Anne Marie Marini, MD; Marc R. Nuwer, MD, PhD; E. Steven Roach, MD; Stanley van den Noort, MD.

References

1. Levin HS. A guide to clinical neuropsychological testing. Arch Neurol 1994;51:854-859.
2. Wechsler D. WAIS-R manual. New York: Psychological Corporation, 1981.
3. Wechsler D. WMS-R manual. New York: Psychological Corporation, 1987.
4. Reitan RM, Davison LA. Clinical neuropsychology: current status and applications. New York: Winston/Wiley, 1974.
5. Massman PJ, Delis DC, Butters N, et al. The subcortical dysfunction model of memory deficits in depression: neuropsychological validation in a subgroup of patients. J Clin Exp Neuropsychology 1992;14:687-706.
6. Snow WG, Tierney MC, Zoritto ML, et al. WAIS-R test retest reliability in a normal elderly sample. J Clin Exp Neuropsy. chology 1989;11:423-428.
7. Damasio H, Damasio AR. Lesion analysis in neuropsychology New York: Oxford University Press, 1989.
8. Delis DC, Kramer JH, Kaplan E, et al. The California Verbal Learning Test. San Antonio: the Psychological Corporation 1987.
9. Anderson SW, Damasio H, Tranel D. Neuropsychological impairments associated with lesions caused by tumor or stroke. Arch Neurol 1990;47:397-405.
10. Henderson VW, Mack W, Williams BW. Spatial disorientation in Alzheimer's disease. Arch Neurol1989;46:391-394.
11. Ganguli M, Ratcliff G, Huff J, et al. Effects of age, gender, and education on cognitive tests in a rural elderly community sample: norms for the Monongahela Valley Independent Elders Survey. Neuroepidemiology 1991;10:42-52.
12. La Rue A. Aging and neuropsychological assessment. New York: Plenum Press, 1992.
13. Lezak M. Norms for growing older. Dev Neuropsychol1987;3: 1-12.
14. Crum RM, Anthony JC, Bassett SS, et al. Population-based norms for the Mini-Mental State Examination by age and educational level. JAMA 1993;269:2386-3291.
15. Ainslie NK, Murden RA. Effect of education on the clock-drawing dementia screen in non-demented elderly persons.J Am Geriatr Soc 1993;41:249-252.
16. Maj J, D'Elia L, Satz P, et al. Evaluation of two new neuropsychological tests designed to minimize cultural bias in the assessment of HIV-1 seropositive persons: a WHO study. Arch Clin Neuropsychol 1993;8:123-135.
17. Caine ED. The neuropsychology of depression: the pseudodementia syndrome. In: Grant I, Adams KM, eds. Neuropsychological assessment of neuropsychiatric disorders. New York: Oxford University Press, 1986:221-243.
18. Bornstein RA, Kozora E. Content bias of the MMPI Sc scale in neurological patients. Neuropsychiatry Neuropsychol Behav Neurol 1990;3:200-205.
19. Nelson DV, Harper RG, Kotik-Harper D, et al. Briefneuropsychologic differentiation of demented versus depressed elderly patients. Gen Hosp Psychiatry 1993;15:409-416.
20. Lamberty GJ, Bieliauskus LA. Distinguishing between depression and dementia in the elderly: a review of neuropsychological fmdings. Arch Clin Neuropsychol 1993;8:149-170.
21. Harper RB, Chacko RC, Katie-Harper D, et al. Comparison of two cognitive screening measures for efficacy in differentiating dementia from depression in a geriatric inpatient population. J Neuropsychiatry Clin Neurosci 1992;4:178–184.
22. Parsons OA. Neuropsychological consequences of alcohol abuse: many questions— some answers. In: Parsons OA, Butters N, Nathan PE, eds. Neuropsychology of alcoholism: implications for diagnosis and treatment. New York: The Guilford Press, 1987:153-175.
23. Mearns J, Lees-Haley PR. Discriminating neuropsychological sequelae of head injury form alcohol-abuse-induced deficits: a review and analysis. J Clin Psychol1993;49:714-720.
24. Sohlberg MM, Mateer CA, Stuss DT. Contemporary approaches to the management of executive control dysfunction J Head Trauma Rehabil 1993;8:45-58.
25. Hugenholtz H, Stuss DT, Stethem LL, et al. How long does it take to recover from a mild concussion? Neurosurgery 1988; 22:53-58.
26. Schoenhuber R, Genitilini M. Anxicty and depression after mild head injury: a case control study. J Neurol Neurosurg Psychiatry 1988;51:722-724.
27. Flicker C, Ferris SH, Reisberg B. Mild cognitive impairment. in the elderly: predictors of dementia. Neurology 1991;41: 1006-1009.
28. Huff FJ, Becker JT, Belle SH, et al. Cognitive deficits and clinical diagnosis of Alzheimer's disease. Neurology 1987;37: 1119-1124.
29. Welsh K, Butters N, Hughes J, et al. Detection of abnormal memory decline in mild cases of Alzheimer's disease using CERAD neuropsychological measures. Arch Neurol 1991;48: 278-281.

30. Christensen J, Hadzi-Pavlovic D, Jacomb P. The psychometric differentiation of dementia from normal aging: a meta-analysis. Psychol Assess 1991;3:147–155.
31. Eslinger PJ, Damasio AR, Benton AL, et al. Neuropsychologic detection of abnormal mental decline in older persons. JAMA 1985;253:670–674.
32. Storandt M, Botwinick J, Danziger WL, et al. Psychometric differentiation of mild senile dementia of the Alzheimer type. Arch Neurol 1984;41:497–499.
33. McKhann G, Drachman D, Folstein M, et al. Clinical diagnosis of Alzheimer's disease: report of the NINCDS-ADRDA Work Group under the auspices of the Department of Health and Human Services Task Force on Alzheimer's Disease. Neurology 1984;34:939–944.
34. Brandt J, Folstein SE, Folstein MF. Differential cognitive impairment in Alzheimer's disease and Huntington's disease. Ann Neurol 1988;23:555–561.
35. Mendez MF, Ashla-Mendez M. Differences between multi-infarct dementia and Alzheimer's disease on unstructured neuropsychological tasks. J Clin Exp Neuropsychol 1991;13: 923–932.
36. Kaplan E, Fein D, Morris R, et al. WAIS-R as a neuropsychological instrument. New York: The Psychological Corporation, 1991.
37. Lees AJ, Smith E. Cognitive deficits in the early stages of Parkinson's disease. Brain 1983;106:257–270.
38. Miller EN, Selnes OA, McArthur JC, et al. Neuropsychological performance in HIV-1-infected homosexual men: the Multicenter AIDS Cohort Study (MACS). Neurology 1990;40:197–203.
39. Mayeux R, Stern Y, Tang M-X, et al. Mortality risks in gay men with human immunodeficiency virus infection and cognitive impairment. Neurology 1993;43:176–182.
40. Peyser JM, Edwards KR, Poser CM, et al. Cognitive function in patients with multiple sclerosis. Arch Neurol 1980;37:577–579.
41. Rao SM, Leo GJ, Ellington L, et al. Cognitive dysfunction in multiple sclerosis. II. Impact on employment and social functioning. Neurology 1991;41:692–696.
42. Loring DW, Meador KJ, Lee GP, et al. Amobarbital effects and lateralized brain dysfunction: the Wada test. New York: Springer-Verlag, 1992.
43. Rausch R. Role of the neuropsychological evaluation and the intracarotid sodium amobarbital procedure in the surgical treatment of epilepsy. In: Theodore WH, ed. Surgical treatment of epilepsy. New York: Elsevier Science Publishers, 1992:77–86.
44. Hartman DE. Neuropsychological toxicology. New York: Pergamon Press, 1988.
45. Herron L, Turner JA, Weiner P. A comparison of the Millon Clinical Multiaxial Inventory and the Minnesota Multiphasic Personality Inventory as predictors of successful treatment by lumbar laminectomy. Clin Orthop Rel Res 1986;203:232.
46. Oostdam EMM, Duivenvoorden HJ, Pondaag W. Predictive value of some psychological tests on the outcome of surgical intervention in low back pain patients. J Psychosom Res 1981; 25:227.
47. Turner JA, Robinson J, McCreary CP. Chronic low back pain: predicting response to nonsurgical treatment. Arch Phys Med Rehab 1983;64:560.
48. Alfano DP, Paniak CE, Finlayson AJ. The MMPI and closed head injury. A neurocorrective approach. Neuropsychiatry Neuropsychol Behav Neurol 1993;6:111–116.
49. Barth JT, Ryan TV, Hawk GL. Forensic neuropsychology: a reply to the method skeptics. Neuropsychol Rev 1992;2:251–266.
50. Naugle RI, Cullum CM, Bigler ED. Evaluation of intellectual and memory function among dementia patients who were intellectually superior. Clin Neuropsychol 1990;4:355–374.
51. Prigatano GP, Redner JE. Uses and abuses of neuropsychological testing in behavioral neurology. Neurol Clin 1993;11:219–231.
52. Pittman J, Andrews H, Tatemichi T, et al. Diagnosis of dementia in a heterogeneous population. A comparison of paradigm-based and physician's diagnosis. Arch Neurol 1992; 49:461–467.
53. Delis DC. Neuropsychological assessment of memory disorders. In: Oldham JM, Riba MB, Tasman A, eds. American psychiatric press review of psychiatry, Vol. 12. Washington, DC: American Psychiatric Press, 1993.
54. Folstein MF, Folstein SE, McHugh P. The "Mini-Mental State" Exam: a practical method of grading the cognitive state of patients for the clinician. J Psychiatry Res 1975;12:189–198.
55. Kiernan RJ, Mueller J, Langston JW, et al. The Neurobehavior Cognitive Status Examination: a brief but differentiated approach to cognitive assessment. Ann Intern Med 1987;107: 481–485.
56. Morris JC, Heyman A, Mohs RC, et al. The Consortium to Establish a Registry for Alzheimer's Disease (CERAD). Part I. Clinical and neuropsychological assessment of Alzheimer's disease. Neurology 1989;39:1159–1165.
57. Nelson A, Fogel BS, Faust D. Bedside cognitive screening instruments: a critical assessment. J Nerv Ment Dis 1986;174: 73–83.