The Addenbrooke’s Cognitive Examination (ACE) in the Differential Diagnosis of Early Dementias Versus Affective Disorder

Robert B. Dudas, M.D., M.Phil.
German E. Berrios, M.D., D.M., FRCPsych
John R. Hodges, M.D., FRCP

Objective: The authors describe the profile of performance of patients whose cognitive complaint is due to dementia, affective disorder, or combinations thereof on the Addenbrooke’s Cognitive Examination (ACE) test battery. Methods: Authors tested 90 subjects with dementia (63 Alzheimer disease [AD]; 27 fronto-temporal dementia [FTD]), 60 subjects with “pure” affective disorder (23 major depression [MDD], 37 whose affective symptoms did not meet criteria for major depression [Affective]); 22 patients with symptoms of affective disorder and organic dementia (Mixed); and 127 healthy volunteers (NC). Results: The total ACE scores for the AD, FTD, and Mixed groups were significantly lower than for the NC group. Likewise, on total score, the AD and FTD groups scored significantly lower than either of the “pure” affective-disorder groups. Within the dementia group, the AD group scored significantly lower than the fronto-temporal group. Conclusions: The profile of performance on the ACE of patients with dementia is different from that of patients suffering from affective illness. Mild impairment in the total ACE score, along with a low score on the memory domain tasks and letter fluency (in contrast to normal category fluency), are strongly indicative of an affective, as opposed to organic, pathology. A total score of <.88 in suspected dementia patients with affective symptoms appears strongly predictive of an underlying organic disorder. (Am J Geriatr Psychiatry 2005; 13:218–226)

The Addenbrooke’s Cognitive Examination is a brief, 15–20-minute test battery originally designed to detect and classify different kinds of dementia, particularly Alzheimer disease (AD) and fronto-temporal dementia (FTD), without the use of specialized test equipment. It incorporates the Mini-Mental State Exam (MMSE), with additional memory, language, and visuospatial components. The maximum score is 100, weighed as follows: orientation (10), attention (8), memory (35), verbal fluency (14), language (28), and visuospatial ability (5). The ACE was validated on 115 dementia (AD, FTD, and vascular dementia), and 24 non-dementia patients, and 127 NC subjects. Of note is the fact that patients
with affective pathology were excluded from this study. When the lower cut-off score of 83 was used, the sensitivity of the ACE to detect dementia was 79%, one-third more than the MMSE using the conventional cut-off score of 24. The ACE appeared to be especially sensitive in FTD, where it nearly doubled the rate of detection, compared with the MMSE. At a cut-off score of 88, in a memory clinic with a dementia prevalence rate of 40%, a high proportion (68%) of those who screen positive will have dementia, and 94% of those above the cut-off score will not. Age, number of years of education, or gender did not influence predictive outcome during the initial validation.

Patients presenting with combinations of cognitive, affective, and behavioral problems pose a clinical conundrum. In some cases, it is difficult to establish whether the cognitive impairment is secondary to an affective disorder, or a more sinister, organic dementing process—most often AD. Depressive symptoms are common in the elderly population without dementia.3,4 A small proportion of depressed individuals present with very significant cognitive under-functioning, formerly known as depressive pseudodementia, also termed “functional (as opposed to organic) dementia,” “memory disorder in the context of depressive illness,” or “the dementia syndrome of depression.” In clinical practice, this group remains difficult to identify. Approximately 10% of the patients with depression are misdiagnosed as having dementia,5,6 leading to a misdiagnosis of depression rather than early dementia. One of the major confounding factors is that many patients with organic dementia also have affective symptoms. Patients with AD often contact their general practitioner or the memory clinic with complaints of depressive symptoms.

Several screening and diagnostic tests for dementia (such as the CAMDEX7 or the Mattis Dementia Rating Scale8) are available, but their complexity and need for specialized test equipment put them beyond routine bedside use.9

The aim of this study was to investigate the ability of the ACE to discriminate between cognitive deficits resulting from dementia versus those from affective disorder. Correlations were sought between the cognitive deficits (reflected by the cognitive domain scores of ACE) and affective symptoms (as captured by the Hamilton Rating Scale for Depression [Ham-D] and other standard instruments for affective change). We were particularly interested in the ability of the ACE to detect progressive degenerative dementias in patients presenting with difficult, mixed symptoms.

METHODS

Subjects

A total of 299 patients participated: major depressive disorder (MDD; N = 23), Affective (N = 37), AD (N = 63), FTD (N = 27), mixed: possible progressive degenerative dementing disorder with an affective component (N = 22), and healthy volunteers (NC; N = 127). The research protocol was approved by the Local Research Ethics Committee. Data for the patients with dementia were collected from the Cambridge Memory Clinic, and for those with MDD from the Medical Research Council Link Study between June 1996 and April 2001. Patients were excluded if they had 1) any concurrent psychiatric illness other than those on the affective spectrum (excluding bipolar disorder according to ICD-10), such as schizophrenia, or obsessive-compulsive disorder, or 2) causes of cognitive impairment other than primary degenerative or affective pathology (e.g., vascular dementia, closed head injury, or alcoholism). The healthy volunteers for the NC group were ascertained from a previous study.1 Exclusion criteria were history of head injury, drug abuse, alcoholism, and cognitive complaints of neurological or psychiatric origin.

The diagnosis of AD was in accordance with the National Institute of Neurological and Communicative Disorders and Stroke–AD and Related Disorders Association (NINCDS-ADA) criteria.10 The diagnosis of FTD was used in all cases with focal lobar degeneration, including patients with the core feature of personality and behavioral changes (frontal-variant FTD), non-fluent spontaneous speech (progressive non-fluent aphasia), and fluent empty spontaneous speech with semantic breakdown (semantic dementia).11,12 The severity of dementia was assessed with the Clinical Dementia Rating scale.13,14 Patients with MDD met the DSM-IV criteria for major depression. Patients in the affective group (Affective) had significant memory complaints and depressive symptom-
Dementia Versus Depression

atology (e.g., low mood, anhedonia, lack of motivation, lack of energy, etc., alone or in combination) of various degrees, but did not meet the DSM-IV criteria for MDD. Importantly, they were also not felt to suffer from a progressive degenerative dementing condition. In contrast, the Mixed group consisted of patients with a mixture of cognitive and affective symptoms; and, in this group, it was difficult to arrive at a formal diagnosis with high certainty and to establish whether or not the cognitive impairment was due to a degenerative disease, and, if so, to what extent. A large proportion of these patients developed frank progressive degenerative dementia over an average follow-up period of 2 years. The NC consisted of 127 age- and education-matched neuropsychiatrically healthy volunteers who were attendees at an orthopedic (N = 36) or gynecologic (N = 28) clinic, spouses of the before-mentioned (N = 26), or members of the Medical Research Council subject panel (N = 37).

All patients were assessed by a senior neurologist (JRH) and psychiatrist (GEB), using standardized assessments described elsewhere. In brief, a caregiver/relative is also always interviewed. Patients undergo a neuropsychological evaluation, including the Wechsler Memory Scale–Revised, the Rey Complex Figure Test, the Rey Auditory Verbal Learning, Wechsler Adult Intelligence Scale (WAIS), the Trail-Making Test, Stroop Test, Verbal Fluency, the Wisconsin Card-Sorting Test, Graded Naming Test, the National Adult Reading Test, Visual Object and Space Perception battery, and the Warrington Recognition Memory Test. The team met at the end of the day, and reviewed evidence from all clinical and test results. All patients have structural brain scans (CT or MRI), and are followed up in the clinic after 6 months. Those with progressive degenerative dementias or ambiguous diagnoses are followed thereafter at 6–12-month intervals.

Procedures

The ACE was completed in the memory clinic as part of the routine assessment. The orientation and attention components of the ACE are identical to the ones in the MMSE. The memory component evaluates episodic and semantic memory. In addition to the recall of three items from the MMSE, there is a “name and address learning and delayed recall test,” which appears to be a remarkably sensitive measure in the detection of early AD. The language component comprises naming 12 line-drawings of medium and low familiarity, comprehension of sentences, repeating words and phrases, reading regular and irregular words, and writing a sentence. Naming has been found to be dependent upon concept frequency and age of acquisition. Alterations made to the non-semantic aspects of language evaluation in the ACE are intended for the early detection of FTD, especially the progressive aphasial variants. Frontal executive function is tested by verbal fluency in two tasks: letter fluency (generating words beginning with the letter P in 1 minute), and category fluency (generating names of animals in 1 minute). Letter fluency relies upon phonologic processing, and category fluency on semantic memory in addition to other executive processes. The former is a particularly sensitive indicator of FTD, whereas the latter is a marker of semantic memory impairment. Visuospatial testing includes copying overlapping pentagons (from the MMSE) and a wire cube, and drawing a clock face. Adding the three-dimensional wire cube copying and the clock face-drawing test provide a greater scope for detecting impaired constructional abilities. Raw scores are used for each item except the two fluency tasks, where scaled scoring systems derived from the Gaussian distributions of the raw scores from NC subjects are used instead. The calculated six domain scores add up to the composite score on the ACE.

We chose the 17-question version of the Hamilton Rating Scale for Depression (Ham-D) as an observer-rated instrument to assess the actual affective status of our patients. The statistical analysis was carried out with the SPSS for Windows package. One-way ANOVAs and suitable post-hoc multiple comparisons (Scheffé test when equal variances were assumed and Games-Howell test when the Levene test was significant) were carried out to compare the relevant group means. As in our original sample, ascertained through the natural occurrence and presentation of patients in the memory clinic, the groups presenting with diagnoses other than a progressive degenerative dementia tended to be younger than those with a progressive degenerative process, we carried out analyses of covariance for age with confidence-interval adjustment, using the Bonferroni method for each variable. As a check, but not reported, the appropriate nonparametric tests were also carried out, and
they were consistent in each case. Logistic-regression analysis was used to predict group membership, and we applied a receiver operating characteristic curve (ROC) analysis to examine the sensitivity and specificity of our measures.

**RESULTS**

Clinical and demographic characteristics of the patient and NC groups are summarized in Table 1. Comparison of the age of the subject groups revealed an overall significant difference (one-way ANOVA: $F_{[5, 291]} = 14.31; p = 0.0000$). The AD patients, although not significantly different from the subjects in the NC and patients in the Mixed group, were older than those in the other groups, and, at the other extreme, the Affective group was significantly younger than all the other groups except the MDD and the FTD. The NC group matched each patient group for age, except the Affective group who were younger. There were no significant differences in education level between the groups (one-way ANOVA: $F_{[5, 242]} = 1.79; p = 0.115$).

The MMSE scores reflected the fact that the AD group (mean score: 20.4; standard deviation [SD]: 5.6) consisted of mild cases, and patients in the FTD group had very mild overall cognitive impairment (mean score: 26.0; SD: 3.7). The Clinical Dementia Rating Scale (CDR)\textsuperscript{26} scores, likewise, indicated relatively mild disease.

As expected from the entry criteria, the MDD group scored high on the Ham-D (mean: 24.7; [SD: 4.7]), and had significantly more signs and symptoms of depression than any other group (one-way ANOVA: $F_{[4, 133]} = 134.28; p = 0.0000$). The Affective and the Mixed groups (Ham-D scores: 10; [SD: 4.4] versus 9.4; [SD: 5.0]) had equivalent levels of depression, and, although significantly less depressed than the MDD group (Games-Howell $p = 0.0000$), they were still significantly more depressed than either of the progressive-degenerative dementia groups ($p = 0.0000$ and $p = 0.0003$, respectively, for AD and FTD). The Ham-D mean scores indicated minimal affective symptoms in the AD (1.8; SD: 2.0) and FTD (2.8; [3.7]) groups. In an ANCOVA, age was not a significant covariate of the Ham-D score.

**ACE Scores**

The mean scores on the ACE of the various groups are shown in Table 2. An ANCOVA showed a significant between-group difference ($F_{[5, 290]} = 73.73; p = 0.0000$). It is of note that there was a lack of correlation between age and the ACE total score. To explore this further, we carried out post-hoc pairwise comparisons. The AD, FTD, and Mixed groups showed significant impairment relative to the NC group (Bonferroni; $p = 0.0000$), and, importantly, they were also more impaired than any of the affective groups ($p = 0.0000$). Also, the AD group scored significantly lower than the FTD group ($p = 0.0004$). The Mixed group was indistinguishable from either of the progressive-degenerative dementia groups. Compared with the NC group, the small decrements in the overall performance of the MDD and Affective groups failed to reach significance. In view of the relatively low number of cases in the MDD and Affective groups, we repeated the analysis with a single affective (MDD + Affective) group. Again, an ANCOVA demonstrated a significant difference between the progressive-degenerative dementia groups and the Mixed group versus the collapsed affective group, but it could not distinguish the collapsed affective group from the NC group.
To examine further the usefulness of the ACE total score as a quick guide to assist the clinician in the detection of progressive-degenerative dementias in a patient population with cognitive deficits of various etiologies, we carried out a logistic-regression analysis with only two target variables: progressive-degenerative dementia patients (AD and FTD) versus subjects with no progressive-degenerative dementia (MDD, Affective, and NC). The patients originally classified into the Mixed group for whom we had follow-up diagnoses were allocated into the appropriate group according to their follow-up diagnoses; that is, those who developed a progressive-degenerative dementia were put into the “progressive degenerative” group; those who still suffered from an affective illness without significant cognitive deterioration, into the “no organic dementia” group; and those with still mixed affective + cognitive symptomatology or no follow-up information were excluded from this analysis. The total ACE score correctly classified 88.5% of the cases. The trade-off between sensitivity (true positive rate) and 1-specificity (false positive rate) of the ACE in diagnosing progressive dementia in a patient population with and without a later confirmed progressive-degenerative pathology is shown in the ROC curve in Figure 1. The area under the ROC curve is 0.95, which suggests that the ACE has a high specificity for a large range of sensitivities. At 88, the previously recommended cut-off score for clinical use in the detection of dementia, the ACE showed a sensitivity of 93%, and a specificity of 82% for progressive-degenerative pathology in our study.

A scatterplot showing the individual scores of our subjects on the ACE is displayed in Figure 2, and the proportions of MDD, Affective, AD, FTD, Mixed, and NC subjects scoring less than 83 and 88 (the recommended cut-off scores on the ACE for research and for screening, respectively) are shown in Table 3. These proportions indicated a need for further indices in the domain scores to enable us to better separate the affective patients from those with progressive-degenerative dementia, especially MDD/Affective patients from FTD patients, on an individual basis.

A series of ANCOVAs revealed significant mean differences (p = 0.0000) between the groups for all domain scores (Table 2). Age only seemed to correlate

---

**TABLE 2. Addenbrooke’s Cognitive Examination (ACE) Cognitive Domain and Total Scores**

<table>
<thead>
<tr>
<th></th>
<th>MDD (n=27)</th>
<th>Affective (n=27)</th>
<th>AD (n=26)</th>
<th>FTD (n=26)</th>
<th>Mixed (n=26)</th>
<th>NC (n=26)</th>
<th>ANCOVA: F[5]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation (max: 10)</td>
<td>9.7 (0.6)</td>
<td>9.7 (0.8)</td>
<td>6.7 (2.6)</td>
<td>9.4 (0.9)</td>
<td>8.6 (1.7)</td>
<td>9.9 (0.4)</td>
<td>46.62</td>
</tr>
<tr>
<td>Attention (max: 8)</td>
<td>6.9 (1.4)</td>
<td>7.5 (1.4)</td>
<td>5.6 (2.2)</td>
<td>7.3 (1.2)</td>
<td>6.2 (1.9)</td>
<td>7.9 (0.4)</td>
<td>46.27</td>
</tr>
<tr>
<td>Memory (max: 35)</td>
<td>30.4 (5.0)</td>
<td>29.1 (5.9)</td>
<td>15.7 (8.3)</td>
<td>24.4 (7.9)</td>
<td>20.0 (8.7)</td>
<td>32.7 (2.0)</td>
<td>79.99</td>
</tr>
<tr>
<td>Verbal fluency (max: 14)</td>
<td>9.8 (2.7)</td>
<td>9.9 (3.5)</td>
<td>6.6 (3.1)</td>
<td>6.0 (3.4)</td>
<td>7.3 (3.1)</td>
<td>11.0 (2.2)</td>
<td>30.15</td>
</tr>
<tr>
<td>Naming (max: 12)</td>
<td>12.0 (0.0)</td>
<td>11.9 (0.3)</td>
<td>10.3 (2.6)</td>
<td>9.2 (3.8)</td>
<td>11.0 (1.8)</td>
<td>12.0 (0.3)</td>
<td>16.72</td>
</tr>
<tr>
<td>Language (max: 16)</td>
<td>15.4 (0.7)</td>
<td>15.1 (2.2)</td>
<td>14.1 (2.5)</td>
<td>13.8 (2.1)</td>
<td>14.7 (1.9)</td>
<td>15.9 (0.4)</td>
<td>13.64</td>
</tr>
<tr>
<td>Visuospatial (max: 5)</td>
<td>4.5 (0.5)</td>
<td>4.6 (0.9)</td>
<td>2.9 (1.8)</td>
<td>4.0 (1.3)</td>
<td>3.8 (1.5)</td>
<td>4.6 (0.6)</td>
<td>20.58</td>
</tr>
<tr>
<td>ACE Total (max: 100)</td>
<td>89.2 (9.2)</td>
<td>89.0 (9.2)</td>
<td>61.9 (18.3)</td>
<td>74.2 (15.4)</td>
<td>71.0 (16.6)</td>
<td>93.9 (3.5)</td>
<td>73.73*</td>
</tr>
</tbody>
</table>

**Note:** Values are mean (standard deviation). MDD: major depression; AD: Alzheimer disease; FTD: frontotemporal dementia; NC: normal-control subjects.

*p = 0.0000; AD, FTD, and Mixed groups showed significant impairment relative to the NC group (Bonferroni; p = 0.0000), and were also more impaired than any of the affective groups (p = 0.0000). Also, the AD group scored significantly lower than the FTD group (p = 0.0004).
with verbal fluency but none of the other domain scores. The Bonferroni test was used for pairwise comparisons. As would be predicted, the AD group showed significant deficits in all domains, relative to the NC group. In contrast, the FTD group was not impaired in the orientation, attention, and visuospatial domains, but showed deficits in all the other domains \((p = 0.0000)\). The MDD and Affective groups were again found to be statistically indistinguishable on the basis of the domain scores. Compared with the MDD group, the AD group was impaired on all measures except language, and the FTD group on memory, verbal fluency, naming, and language. Compared with the Affective group, the AD group was, again, impaired in each domain except language, and the FTD group was impaired on verbal fluency, and naming. In summary, the AD group performed more poorly in all domains (except language) than either of the affective disorder groups, and, not surprisingly, it was the lower verbal fluency and naming scores that could clearly differentiate the FTD group from both affective disorders groups. From the non-progressive-degenerative groups, only the Affective group was impaired in memory relative to the NCs \((p = 0.0033)\). The combined Affective + MDD group, again, showed significant impairment in memory and verbal fluency \((p = 0.0062, p = 0.0377, \text{ respectively})\) relative to the NC group.

The Mixed group was not as impaired as the AD group in the orientation \((p = 0.0000)\) and visuospatial domains \((p = 0.0421)\), and, relative to the FTD group, performed better on the naming \((p = 0.0097)\), and slightly worse on the attention \((p = 0.0429)\) tasks.

In view of our findings with the verbal fluency scores and previous reports of selective impairment of category fluency in AD, we analyzed the performance of the groups on the two measures of fluency: initial letter (P) and category (animals; see Figure 3).
Dementia Versus Depression

ANCOVAs indicated significant mean differences between the groups on both scores, and age covaried with category (p = 0.0017), but not with letter fluency; for letter fluency, F[5,290] = 14.68; p = 0.0000; for category fluency, F[5,290] = 37.28; p = 0.0000. Pairwise comparisons revealed that both the AD group and the FTD group were impaired on both category and letter fluency, compared with the NC group (p = 0.0000). Relative to the MDD and Affective groups, they were also similarly impaired on category fluency (p = 0.0000), whereas on letter fluency only the FTD group showed a statistically demonstrable difference. Of note was the finding that neither the MDD nor the Affective group was statistically different from the AD group on the letter fluency task.

The performance of the Mixed group was also significantly poorer on both the letter and category fluency tasks compared with the NC group (p = 0.0001 and p = 0.0000, respectively), and was not distinguishable from that of the AD and FTD groups on either measure.

A logistic-regression analysis using the domain scores of the ACE again to predict membership in the target groups with and without a progressive-degenerative dementia indicated a satisfactorily high proportion, 89.5%, of the observed cases correctly predicted, and the naming, orientation, attention, category fluency, memory, and attention scores being the discriminating variables in this order of size of effect; and age had a negligible effect.

**Follow-Up of the Mixed Group**

The most interesting group, from the point of differential diagnosis, was the Mixed group. At presentation, 8 out of a total of 22 patients in this group were suspected to have a progressive-degenerative dementia with concomitant affective disorder, and the other 14 were diagnosed as suffering primarily from an affective disorder with a probable progressive-degenerative component. After an average 2 years of follow-up, there was a marked shift to organic diagnoses: of the 18 subjects for whom data were available, 15 had clinically confirmed progressive-degenerative dementias (8 still with concomitant affective symptoms). The organic etiologies were the following: AD: 10; FTD: 2; Lewy-body dementia: 1; vascular dementia: 1; and dementia of other origin: 1. Three patients suffered from affective disorder only. Of particular note is the fact that all the subjects who eventually developed a progressive-degenerative dementia scored below the recommended cut-off point (88) for screening on the ACE (except one who scored just at the cut-off point), and 15 out of the 16 patients scoring lower than 88 had a confirmed progressive-degenerative dementia diagnosis within 2 years.

**DISCUSSION**

The earlier study by Mathuranath et al. established that the Addenbrooke’s Cognitive Examination is sensitive to both AD and FTD, and is able to distinguish between these two disorders. We have extended this work by showing that patients with affective disorders are clearly separable from those with a progressive degenerative dementia whether considered as a combined Affective-MDD group or as separate subgroups. There was a small difference between the affective groups and the normal-comparison group that failed to reach statistical signifi-
cance. Overall, therefore, the affective groups showed very little impairment in the total ACE score, and this could be attributed almost entirely to mild deficits in memory and verbal fluency.

Considering first memory, it was surprising that the memory impairment (as reflected by the ACE Memory Domain score) reached statistical significance in the Affective (but not the MDD) group. Nevertheless, it is of note that this impairment was also demonstrable in the combined Affective-MDD group. This finding was unexpected for two reasons: First, the memory deficit in depression has long been described in the literature,\(^\text{27}\) but we found a significant deficit in the generally less depressed Affective group only. Second, our sample consisted of depressed patients with significant complaints of poor memory. Other researchers reported a lack of relationship between the severity of memory complaints and memory performance\(^\text{28}\) and alternatively that the linkage between depression and memory impairment was present only in a subset of the depressed subjects, rather than in all depressed individuals.\(^\text{29}\) It should also be borne in mind that the complaint of “poor memory” is a general catch-phrase used by subjects in a folk-psychology sense to describe a broad range of cognitive deficits, including poor attention, working, episodic, or semantic memory (see Berrios and Hodges\(^\text{15}\)). The memory complaints in patients with affective disorders are likely to reflect, therefore, defective attentional processing.

Moving to the verbal fluency findings, although the total Verbal Fluency Domain scores were not significantly impaired in either of the groups without a progressive degenerative dementia diagnosis relative to the normal-comparison group, a finer-grained analysis of the two components uncovered some interesting findings. Whereas the MDD and Affective group showed unimpaired category fluency, their performance on letter fluency was the same as that of the AD group. In comparison to the huge literature of letter- and category-based fluency in the dementias,\(^\text{30-33}\) relatively little attention has been paid to verbal fluency in affective disorders. Some researchers have found no significant difference between depressed and normal-comparison subjects,\(^\text{31}\) whereas others have reported impairment.\(^\text{32,33}\) A more recent study, in accordance with our findings, reported impaired letter but unimpaired semantic fluency in mildly depressed elderly subjects.\(^\text{34}\) Impaired verbal fluency in severely depressed patients has also been found to normalize after successful treatment of depression.\(^\text{35}\) A previous study also found impairment on letter fluency in patients with AD and depression, and a trend toward poorer performance than in patients with AD with no depression.\(^\text{36}\) More recently, however, Berger et al.\(^\text{37}\) found that AD and “AD-with-depression” patients were indistinguishable on category and letter fluency tasks. Our finding of a correlation between age and category but not letter fluency is consistent with the findings of others.\(^\text{37}\)

The Mixed group, in whom we suspected underlying dementia but were unable to reach a clear diagnosis at presentation because of the prominence of mood-related symptoms, represents a clinically important but neglected group. Of the 18 patients for whom follow-up data were available, 15 developed a clear-cut dementia within 2 years (seven pure progressive-degenerative [four AD, one FTD, one Lewy-body dementia, and one vascular dementia], and eight still mixed, but clearly diagnosed progressive degenerative dementia). On the ACE, the Mixed group was not separable from the AD and FTD groups in terms of total scores. Our finding was consistent with that of Lopez et al.\(^\text{38}\) in patients with AD and concomitant depression. The ACE appears to be particularly valuable in this challenging group. Patients scoring above 88 on the ACE are unlikely to develop a progressive degenerative dementia, whereas, for those scoring below 88, the likelihood is very high.

References

Dementia Versus Depression