

# The MCI Sentinel Program™

## Improving the Diagnostic Approach to MCI in the Primary Care Setting



Created and developed by

THEBIOCONTINUUMGROUP

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## Disclaimer

The responsibility for medical care rests with the individual healthcare provider. The information presented in this monograph is not meant to serve as a guideline for patient management, but should be used as a reference for a plan of care that incorporates consultation with evidence-based practice guidelines, published clinical trials, and the physician's professional experience.

# Evaluation of Mild Cognitive Impairment in the Primary Care Setting

Mary Jones\* arrives at your office for her scheduled check-up, this time accompanied by her daughter. You remember Mary, a 71-year-old homemaker, widowed at an early age. She worked hard to put her two children—both now adults—through college, maintained their home, and still found time to participate in social gatherings with friends. She always arrives to her appointments on time, dressed well with her hair neatly done, and is outgoing and friendly to the office staff.

Today, though, Mary seems vaguely uncomfortable. She is quiet, less cheerful than usual, and you sense that she and her daughter are worried about something. You begin with a general check-up, and you report that Mary appears to be in good health. But, you sense mother and daughter's hesitation, so you ask, "Is there anything on your mind that you would like to discuss today?"

At this point, Mary's daughter speaks up and explains that her mother has been recently forgetful. She has misplaced her keys several times in the last few months, has confused a few appointments, and sometimes has forgotten to return her daughter's phone calls. Mary's own mother developed dementia at the age of 70, and Mary is concerned that she might be developing dementia, too. After her daughter's explanation, Mary appears slightly embarrassed. She tells you she is not sure if the mild forgetfulness she is experiencing is normal for a person her age, and she says shyly that she knows she is probably overreacting, but she wanted to be on the safe side and ask you what you thought.

Mild cognitive impairment (MCI) can be defined as cognitive impairment without major impairment in basic activities of daily living (ADLs; eg, bathing) or instrumental activities of daily living (eg, finances). MCI is frequently encountered by primary care physicians (PCPs) during the routine office visit.<sup>1</sup> In fact, it has been estimated that

>80% of professional medical care for cognitive impairment occurs in primary care, including doctors' offices, hospitals, and nursing homes. Nevertheless, MCI may often be underrecognized in these settings, possibly because of the mild nature of the symptoms and the fast pace of most medical practices.

Estimates of MCI prevalence vary depending on the definition of MCI used and the age of the population studied. The prevalence of MCI is probably 9% to 42% among people older than age 75,<sup>2,3</sup> and rises with age.<sup>4-7</sup> Results from the Cardiovascular Health Study (CHS), which included 3608 participants who underwent comprehensive evaluation to identify the presence of MCI or dementia, indicated that the prevalence of MCI in the entire cohort was 19% among those under age 75 and 29% in those >85 years of age. Among 927 participants evaluated at one center, the prevalence of all subtypes of MCI, MCI with multiple cognitive deficits, and amnesic MCI was 22%, 17%, and 6%, respectively.<sup>8</sup>

MCI may be attributable to one of various treatable medical conditions such as vitamin B<sub>12</sub> deficiency, it may be due to one of a number of neurodegenerative brain disorders, or it may represent nonspecific and/or age-associated cognitive impairment that may not lead to major functional losses over time. Commonly, though, MCI is a prodrome of Alzheimer's disease (AD). This is especially true in the case of amnesic MCI, which "converts" to AD at a higher rate than does nonamnesic MCI.<sup>9-11</sup>

Older people with amnesic MCI convert to AD at a rate of 10% to 15% per year, versus 1% to 2% in age-matched peers with normal cognitive functioning.<sup>9</sup> In one study, the rate of conversion from amnesic MCI to AD was 48.7% (confidence interval [CI], 32.4-65.2) over a period of 2.5 years, which corresponded to an approximate annual conversion rate of 19%.<sup>10</sup> Estimates of the

rate of conversion from MCI to dementia over a period of several years range from approximately 25% to more than 40%.<sup>3,10,12</sup> Larrieu and associates estimated conversion to AD in patients with MCI to occur at an annual rate of 8.3%.<sup>13</sup> The risk for conversion to AD over 1 year of follow-up was estimated to be much higher (22%) in a small sample of 37 subjects followed by Mosconi and colleagues.<sup>14</sup> The aging of the general population suggests that the overall prevalence of MCI will only increase in coming decades.

## Benefits of Diagnosis

There are benefits to early diagnosis of MCI. First, patients want to know their cognitive status, and they desire treatment when available.<sup>15</sup> Diagnosis of MCI may prompt appropriate laboratory investigations, consultations with other specialists, and clinical monitoring for conversion to dementia. For patients in whom MCI is a precursor to AD, early detection ensures that a treatment plan can be put into place as soon as possible after conversion, to avoid delaying any potential benefits that might be gained from therapeutic interventions (eg, acetylcholinesterase inhibitors). Early diagnosis empowers patients to make plans for their estates and provisions for their families, and to take measures to maintain a satisfying level of function and quality of life for as long as possible, as well as to seek resources such as support groups, if desired.<sup>16</sup>

## Examination of Patients With Cognitive Impairment

Recently there has been increasing interest in the development of practical tools that can be used to rapidly screen for cognitive impairment. Some of these tools require just 5 or 10 minutes to administer and can be translated to the primary care office setting with minimal effort. When incorporated into the routine primary care visit, these tools can help PCPs diagnose MCI,

especially in patients in whom the symptoms are very mild and therefore more difficult to characterize. On our recent review, the Montreal Cognitive Assessment (MoCA) appeared to be the only screening test that has demonstrated a high enough sensitivity for MCI to be used reliably for diagnosis in the primary care setting. The Mini-Cog as well as a battery that consists of letter fluency, six-item orientation, and a memory subtest from the MoCA are also promising options. These three tools are presented in the next section.

## Screening Tools for MCI

Screening tests are designed to identify the possibility that disease might be present and to prompt further evaluation in those who screen positive in order to establish a definitive diagnosis. A screening test should therefore be regarded as only the first stage of the diagnostic sequence. Useful screening tests should be easy to administer rapidly and should require little training of staff; they should be highly acceptable, sensitive, specific, and low in cost; and they should help guide the diagnosis and treatment of the condition.<sup>17,18</sup>

The American Academy of Neurology, American Geriatrics Society, and other organizations recommend routine screening of patients for MCI.<sup>19-21</sup> There is no single algorithm for successful incorporation of MCI screening into a primary care practice; it is very likely that inclusion of screening tools will at least slightly increase the time and cost of patient visits. However, there is evidence that early diagnosis and treatment of MCI decreases the overall cost of patient management.<sup>22</sup> Because patients and families are understandably concerned about loss of cognition, these symptoms often lead to prolonged office visits and phone calls. Having a systematic approach to diagnosis and tracking of cognitive symptoms may actually increase the speed and efficiency of patient care. Therefore, time saved may translate into a cost savings for some providers.

## Montreal Cognitive Assessment

The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It evaluates multiple cognitive domains, including attention and concentration, executive function, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. The time needed to administer the MoCA is approximately 10 minutes. A laminated blank MoCA test form is enclosed at the back of this publication.

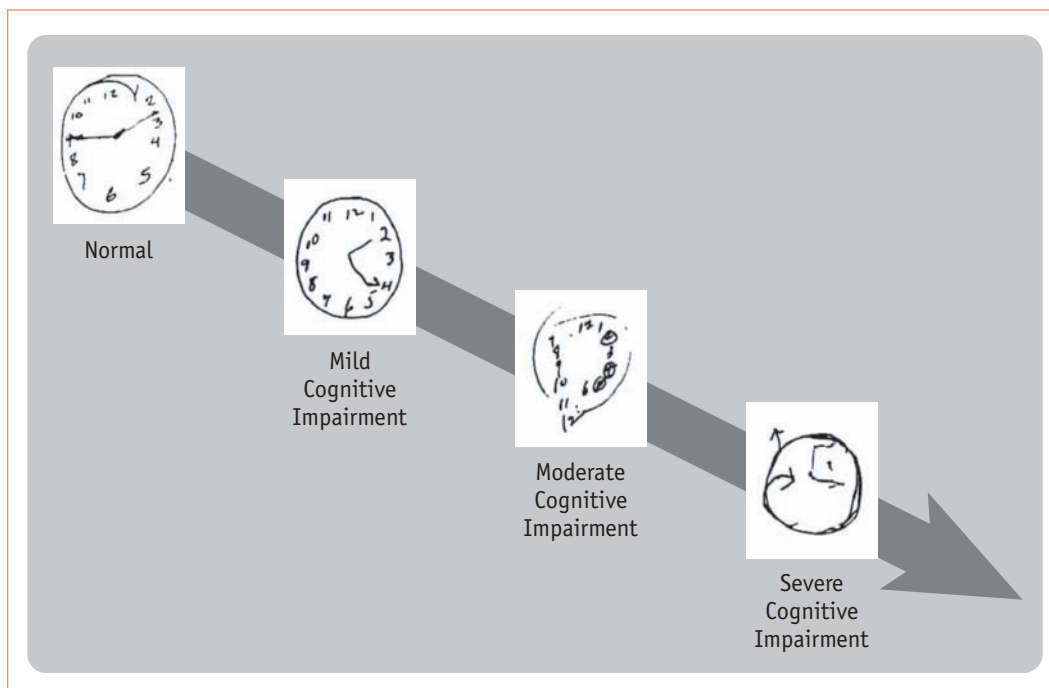
Detailed instructions for administration of the MoCA are presented in the next section.

Test-retest reliability of the MoCA is high. The internal consistency of the MoCA is also good, with a Cronbach's alpha on the standardized items of 0.83.<sup>23</sup> Nasreddine and colleagues compared the MoCA and the Mini-Mental State Examination (MMSE) in 93 patients with mild AD (MMSE score, 17), 94 patients with MCI as determined by neurologists or geriatricians, and 90 healthy controls. The MoCA and MMSE were administered to all participants, and sensitivity and specificity of both measures were assessed for detection of MCI and mild AD. Using a cutoff score of 26, the MMSE had a sensitivity of 18% to detect MCI. The sensitivity of the MoCA using

the same cutoff score was 90%. The mean MoCA scores for normal controls, subjects with MCI, and those with mild AD were 27.4, 22.1, and 16.2, respectively. The sensitivity of the MMSE for detection of mild AD was 78% versus 100% for the MoCA. The specificity of the MoCA was 87% compared with 100% for the MMSE. The positive and negative predictive values for MCI with the MoCA were 89% and 91%, respectively. The values for AD were 89% and 100%, respectively.<sup>23,24</sup>

## Mini-Cog

The Mini-Cog is a tool that shows promise for cognitive screening in the primary care setting and requires about 3 minutes to administer. The test consists of a three-item recall and a clock drawing test. The patient is first asked to repeat three unrelated words and then to draw a clock. The patient is then asked to recall the three words. If the patient is unable to recall any of the three words he or she is categorized as probably having dementia. If the patient can recall all three words he or she is categorized as probably not having dementia. Individuals who can recall one or two words are categorized based on the results of their clock drawing test (Figure 1).



**Figure 1. Results From the Mini-Cog Clock-Drawing Test**

Reprinted with permission from Sunderland T, Hill JL, Mellow AM, et al. *J Am Geriatr Soc.* 1989;37:725-729.

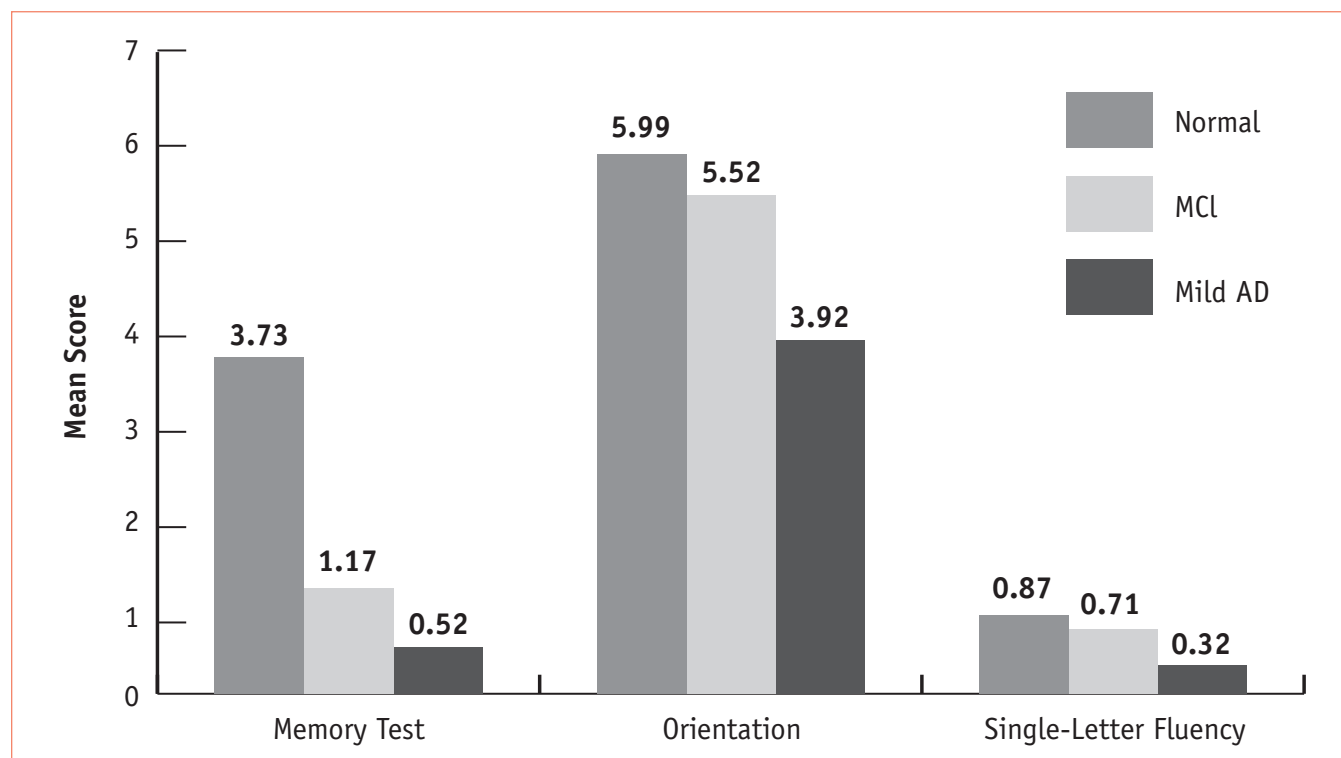
Results for the Mini-Cog are unaffected by education or language, and it can be scored by untrained personnel with minimal loss of sensitivity and specificity. The Mini-Cog incorporates the two strongest elements of the MMSE—testing of memory for new events and visuospatial representation—and adds assessment of executive function.<sup>21</sup> Instructions for administration and scoring of the Mini-Cog are located in the next section.

Borson and colleagues assessed the sensitivity and specificity of the Mini-Cog in 129 patients with a diagnosis of probable dementia and 120 subjects with no history of dementia. The Mini-Cog was found to have a sensitivity and specificity of 99% and 93%, respectively, for detection of dementia.<sup>25</sup> Other important advantages of the Mini-Cog are the lack of requirement for a test form and the minimal training required for administration.<sup>25</sup> However, for detection of MCI the Mini-Cog has been

found to be insufficiently sensitive, which may be a result of its relative simplicity. In a more recent study, Borson and colleagues found the sensitivity of the Mini-Cog for the detection of MCI (defined as CDR = 0.5) to be only 58%.<sup>26</sup>

### Letter Fluency, Six-Item Orientation, and Memory Subtest From the MoCA

The National Institute of Neurological Disorders and Stroke-Canadian Stroke Network have selected three items from the MoCA for assessing cognitive function in stroke patients: the five-word immediate and delayed memory test, the six-item orientation task, and the one-letter phonemic fluency test (the letter F).<sup>27</sup> Whereas the sensitivity and specificity for detection of MCI of these three tests when delivered as a battery has not been determined, Nasreddine and colleagues have provided normative data for each of the tests in normal subjects, individuals with MCI, and those with mild AD (Figure 2).<sup>24</sup>



**Figure 2. Normative Results for Three MoCA Items\***

\*Used in the National Institute of Neurological Disorders and Stroke-Canadian Stroke Network battery for assessing cognitive function in stroke patients.

Data from Montreal Cognitive Assessment Normative Data. Available at: [www.mocatest.org/validation\\_study.html](http://www.mocatest.org/validation_study.html). Accessed January 31, 2007. Copyright © 2004 Ziad Nasreddine, MD.

## Assessment of Function

In the diagnosis of MCI and/or dementia, it is important to determine whether there has been a loss of social and/or occupational function. Many scales, such as the Functional Activities Questionnaire (FAQ), have been devised to assess function and/or ADLs. These measurements of function are beyond the scope of this monograph. In general, if the examining physician suspects a diagnosis of dementia, it is important to discuss this with an informant such as a spouse, child, or close friend of the patient to obtain reliable information. Questions should be asked about the patient's ability to manage his or her own financial affairs. Have the bills or operation of a business been turned over to a spouse or to one of the children? Have there been a lot of voided checks in the past year, reflecting potential financial errors? If the patient is employed, has job performance decreased? Is the patient less able to express himself/herself in conversation? Collecting information about function from family members and close friends allows the PCP to diagnose dementia more accurately and follow patients with dementia in a systematic fashion.

## Conclusion

Older patients want to know about their cognitive status, and want to take preventive measures to preserve cognition for as long as possible.<sup>15</sup> Among 149 healthy adults aged 35 and older, 98% said they would be willing to be screened for MCI if a family member suggested they had memory problems; 99% would be willing to take a drug if it would halve their risk of progressing from MCI to AD; and 92% would take a medication to delay onset of AD by 1 year.<sup>15</sup> The existence of accurate, easy-to-administer tools for the routine screening of cognitive function in older patients provides the PCP with a method of detecting impairments early in their progression. Early diagnosis of MCI informs decisions regarding follow-up, lifestyle changes, and plans for the patient and his or her family. Formal assessment of cognition may also increase the likelihood that treatments will be prescribed at the earliest appropriate stage of illness,

which is likely to result in the greatest benefit for patients who are found to have cognitive impairment of a progressive nature.

## References

1. Borson S. Should older adults be screened for cognitive impairment? *MedGenMed*. 2004;6:30.
2. Petersen RC. Aging, mild cognitive impairment, and Alzheimer's disease. *Neural Clin*. 2000;18:789-805.
3. Busse A, Hensel A, Guhne U, Angermeyer MC, Riedel-Heller SG. Mild cognitive impairment: Long-term course of four clinical subtypes. *Neurology*. 2006;67:2176-2185.
4. Boeve B, McCormick J, Smith G, et al. Mild cognitive impairment in the oldest old. *Neurology*. 2003;60:477-480.
5. Busse A, Bischof J, Riedel-Heller SG, Angermeyer MC. Mild cognitive impairment: prevalence and incidence according to different diagnostic criteria. Results of the Leipzig Longitudinal Study of the Aged (LEILA75+). *Br J Psychiatry*. 2003;182:449-454.
6. Fisk JD, Merry HR, Rockwood K. Variations in case definition affect prevalence but not outcomes of mild cognitive impairment. *Neurology*. 2003;61:1179-1184.
7. Ritchie K, Artero S, Touchon J. Classification criteria for mild cognitive impairment: a population-based validation study. *Neurology*. 2001;56:37-42.
8. Lopez OL, Jagust WJ, Dulberg C, et al. Risk factors for mild cognitive impairment in the Cardiovascular Health Study Cognition Study: part 2. *Arch Neurol*. 2003;60:1394-1399.
9. Petersen RC, Smith GE, Waring SC, Ivnik RJ, Tangalos EG, Kokmen E. Mild cognitive impairment: clinical characterization and outcome. *Arch Neurol*. 1999;56:303-308.
10. Fischer P, Jungwirth S, Zehetmayer S, et al. Conversion from subtypes of mild cognitive impairment to Alzheimer dementia. *Neurology*. 2007;68:288-291.
11. Bruscoli M, Lovestone S. Is MCI really just early dementia? A systematic review of conversion studies. *Int Psychogeriatr*. 2004;16:129-140.
12. Visser PJ, Kester A, Jolles J, Verhey F. Ten-year risk of dementia in subjects with mild cognitive impairment. *Neurology*. 2006;67:1201-1207.
13. Larrieu S, Letenneur L, Orgogozo JM, et al. Incidence and outcome of mild cognitive impairment in a population-based prospective cohort. *Neurology*. 2002;59:1594-1599.
14. Mosconi L, Perani D, Sorbi S, et al. MCI conversion to dementia and the APOE genotype: a prediction study with FDG-PET. *Neurology*. 2004;63:2332-2340.
15. Dale W, Hougham GW, Hill EK, Sachs GA. High interest in screening and treatment for mild cognitive impairment in older adults: a pilot study. *J Am Geriatr Soc*. 2006;54:1388-1394.
16. Birrer RB, Kumar DN, Caruso R. Alzheimer's disease: a primary care approach. *Clin Geriatr*. 1999;7:205-212.
17. Warner J. Clinicians' guide to evaluating diagnostic and screening tests in psychiatry. *Adv Psychiatric Treat*. 2004;10:446-454.
18. Medical Care Corporation. Screening large populations to detect early stages of Alzheimer's and related disorders: comparison of available screening tests with the MCI screen. 2004. Available at: [www.mccare.com/pdf/MCIScreenComparison.pdf](http://www.mccare.com/pdf/MCIScreenComparison.pdf). Accessed January 31, 2007.
19. National Association of Community Health Centers. Clinical issues and facility considerations for senior care services. 2002. Available at: [www.nachc.com/pubmgr/Files/SpecPop1.pdf](http://www.nachc.com/pubmgr/Files/SpecPop1.pdf). Accessed January 31, 2007.
20. American Academy of Neurology. Detection, diagnosis and management of dementia. 2006. Available at: [www.aan.com/professionals/practice/pdfs/dementia\\_guideline.pdf](http://www.aan.com/professionals/practice/pdfs/dementia_guideline.pdf). Accessed January 31, 2007.
21. American Association for Geriatric Psychiatry. Designing brief Alzheimer's screening tests for use in general medical practice. 2003. Available at: [www.cmecorner.com/macmcm/AAGP/aagp2003\\_07.htm](http://www.cmecorner.com/macmcm/AAGP/aagp2003_07.htm). Accessed January 31, 2007.
22. Wimo A, Winblad B. Pharmacoeconomics of mild cognitive impairment. *Acta Neurol Scand Suppl*. 2003;179:94-99.
23. Nasreddine ZS, Phillips NA, Bedirian V, et al. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *J Am Geriatr Soc*. 2005;53:695-699.
24. Montreal Cognitive Assessment. Administration and scoring instructions. 2006. Available at: [www.mocatest.org/pdf\\_files/MoCA-Instructions-English.pdf](http://www.mocatest.org/pdf_files/MoCA-Instructions-English.pdf). Accessed January 31, 2007.
25. Borson S, Scanlan J, Brush M, Vitaliano P, Dokmak A. The Mini-Cog: a cognitive vital signs measure for dementia screening in multi-lingual elderly. *Int J Geriatr Psychiatry*. 2000;15:1021-1027.
26. Borson S, Scanlan JM, Watanabe J, Tu SP, Lessig M. Improving identification of cognitive impairment in primary care. *Int J Geriatr Psychiatry*. 2006;21:349-355.
27. Hachinski V, Iadecola C, Petersen RC, et al. National Institute of Neurological Disorders and Stroke-Canadian Stroke Network vascular cognitive impairment harmonization standards. *Stroke*. 2006;37:2220-2241.

# Screening Test Administration and Scoring Instructions

## MONTREAL COGNITIVE ASSESSMENT (MoCA)

The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

### 1. Alternating Trail Making

**Administration:** The examiner instructs the subject: *“Please draw a line, going from a number to a letter in ascending order. Begin here [point to (1)] and draw a line from 1 then to A then to 2 and so on. End here [point to (E)].”*

**Scoring:** Allocate one point if the subject successfully draws the following pattern: 1 -A- 2- B- 3- C- 4- D- 5- E, without drawing any lines that cross. Any error that is not immediately self-corrected earns a score of 0.

### 2. Visuoconstructional Skills (Cube)

**Administration:** The examiner gives the following instructions, pointing to the **cube**: *“Copy this drawing as accurately as you can, in the space below.”*

**Scoring:** One point is allocated for a correctly executed drawing.

- Drawing must be three-dimensional
- All lines are drawn
- No line is added
- Lines are relatively parallel and their length is similar (rectangular prisms are accepted)

A point is not assigned if any of the above-criteria are not met.

### 3. Visuoconstructional Skills (Clock)

**Administration:** Indicate the right third of the space and give the following instructions: *“Draw a clock. Put in all the numbers and set the time to 10 after 11.”*

**Scoring:** One point is allocated for each of the following three criteria:

- Contour (1 pt.): the clock face must be a circle with only minor distortion acceptable (eg, slight imperfection on closing the circle);
- Numbers (1 pt.): all clock numbers must be present with no additional numbers; numbers must be in the correct order and placed in the approximate quadrants on the clock face; Roman numerals are acceptable; numbers can be placed outside the circle contour;
- Hands (1 pt.): there must be two hands jointly indicating the correct time; the hour hand must be clearly shorter than the minute hand; hands must be centered within the clock face with their junction close to the clock center.

A point is not assigned for a given element if any of the above criteria are not met.

### 4. Naming

**Administration:** Beginning on the left, point to each figure and say: *“Tell me the name of this animal.”*

**Scoring:** One point each is given for the following responses: (1) camel or dromedary, (2) lion, (3) rhinoceros or rhino.

## 5. Memory

**Administration:** The examiner reads a list of 5 words at a rate of one per second, giving the following instructions: *“This is a memory test. I am going to read a list of words that you will have to remember now and later on. Listen carefully. When I am through, tell me as many words as you can remember. It doesn’t matter in what order you say them.”* Mark a check in the allocated space for each word the subject produces on this first trial. When the subject indicates that (s)he has finished (has recalled all words), or can recall no more words, read the list a second time with the following instructions: *“I am going to read the same list for a second time. Try to remember and tell me as many words as you can, including words you said the first time.”* Put a check in the allocated space for each word the subject recalls after the second trial.

At the end of the second trial, inform the subject that (s)he will be asked to recall these words again by saying, *“I will ask you to recall those words again at the end of the test.”*

**Scoring:** No points are given for Trials One and Two.

## 6. Attention

**Forward Digit Span:** Administration: Give the following instruction: *“I am going to say some numbers and when I am through, repeat them to me exactly as I said them.”* Read the five number sequence at a rate of one digit per second.

**Backward Digit Span:** Administration: Give the following instruction: *“Now I am going to say some more numbers, but when I am through you must repeat them to me in the backwards order.”* Read the three number sequence at a rate of one digit per second.

**Scoring:** Allocate one point for each sequence correctly repeated, (N.B.: the correct response for the backwards trial is 2-4-7).

**Vigilance: Administration:** The examiner reads the list of letters at a rate of one per second, after giving the following instruction: *“I am going to read a sequence of letters. Every time I*

*say the letter A, tap your hand once. If I say a different letter, do not tap your hand.”*

**Scoring:** Give one point if there is zero to one errors (an error is a tap on a wrong letter or a failure to tap on letter A).

**Serial 7s: Administration:** The examiner gives the following instruction: *“Now, I will ask you to count by subtracting seven from 100, and then, keep subtracting seven from your answer until I tell you to stop.”* Give this instruction twice if necessary.

**Scoring:** This item is scored out of 3 points. Give no (0) points for no correct subtractions, 1 point for one correction subtraction, 2 points for two-to-three correct subtractions, and 3 points if the participant successfully makes four or five correct subtractions. Count each correct subtraction of 7 beginning at 100. Each subtraction is evaluated independently; that is, if the participant responds with an incorrect number but continues to correctly subtract 7 from it, give a point for each correct subtraction. For example, a participant may respond “92 - 85 - 78 - 71 - 64” where the “92” is incorrect, but all subsequent numbers are subtracted correctly. This is one error and the item would be given a score of 3.

## 7. Sentence repetition

**Administration:** The examiner gives the following instructions: *“I am going to read you a sentence. Repeat it after me, exactly as I say it [pause]: **I only know that John is the one to help today.**”* Following the response, say: *“Now I am going to read you another sentence. Repeat it after me, exactly as I say it [pause]: **The cat always hid under the couch when dogs were in the room.**”*

**Scoring:** Allocate 1 point for each sentence correctly repeated. Repetition must be exact. Be alert for errors that are omissions (eg, omitting “only,” “always”) and substitutions/additions (eg, “John is the one who helped today”; substituting “hides” for “hid,” altering plurals, etc).

## 8. Verbal fluency

**Administration:** The examiner gives the following instruction: *“Tell me as many words as you can think of that begin with a certain letter of the alphabet that I will tell you in a moment. You can say any kind of word you want, except for proper nouns (like Bob or Boston), numbers, or words that begin with the same sound but have a different suffix, for example, love, lover, loving. I will tell you to stop after one minute. Are you ready? [Pause] Now, tell me as many words as you can think of that begin with the letter F. [time for 60 sec]. Stop.”*

**Scoring:** Allocate one point if the subject generates 11 words or more in 60 sec. Record the subject’s response in the bottom or side margins.

## 9. Abstraction

**Administration:** The examiner asks the subject to explain what each pair of words has in common, starting with the example: *“Tell me how an orange and a banana are alike.”* If the subject answers in a concrete manner, then say only one additional time: *“Tell me another way in which those items are alike.”* If the subject does not give the appropriate response (fruit), say, *“Yes, and they are also both fruit.”* Do not give any additional instructions or clarification.

After the practice trial, say: *“Now, tell me how a train and a bicycle are alike.”* Following the response, administer the second trial, saying: *“Now tell me how a ruler and a watch are alike.”* Do not give any additional instructions or prompts.

**Scoring:** Only the last two item pairs are scored. Give 1 point to each item pair correctly answered. The following responses are acceptable:

Train-bicycle = means of transportation, means of travelling, you take trips in both;

Ruler-watch = measuring instruments, used to measure.

The following responses are not acceptable:  
Train-bicycle = they have wheels; Ruler-watch = they have numbers.

## 10. Delayed recall

**Administration:** The examiner gives the following instruction: *“I read some words to you earlier, which I asked you to remember. Tell me as many of those words as you can remember.”* Make a check mark (✓) for each of the words correctly recalled spontaneously without any cues, in the allocated space.

**Scoring:** Allocate 1 point for each word recalled freely without any cues.

## 11. Orientation

**Administration:** The examiner gives the following instructions: *“Tell me the date today.”* If the subject does not give a complete answer, then prompt accordingly by saying: *“Tell me the [year, month, exact date, and day of the week].”* Then say: *“Now, tell me the name of this place, and which city it is in.”*

**Scoring:** Give one point for each item correctly answered. The subject must tell the exact date and the exact place (name of hospital, clinic, office). No points are allocated if subject makes an error of one day for the day and date.

**Total Score:** Sum all subscores listed on the right-hand side. Add one point for an individual who has 12 years or fewer of formal education, for a possible maximum of 30 points. A final total score of 26 and above is considered normal.

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## MINI-COG

### Administration

1. Instruct the patient to listen carefully to and remember three unrelated words and then to repeat the words.
2. Instruct the patient to draw the face of a clock, either on a blank sheet of paper, or on a sheet with the clock circle already drawn on the page:

After the patient puts the numbers on the clock face, ask him or her to draw the hands of the clock to read a specific time, such as 11:20.

These instructions can be repeated, but no additional instructions should be given. Give the patient as much time as needed to complete the task.

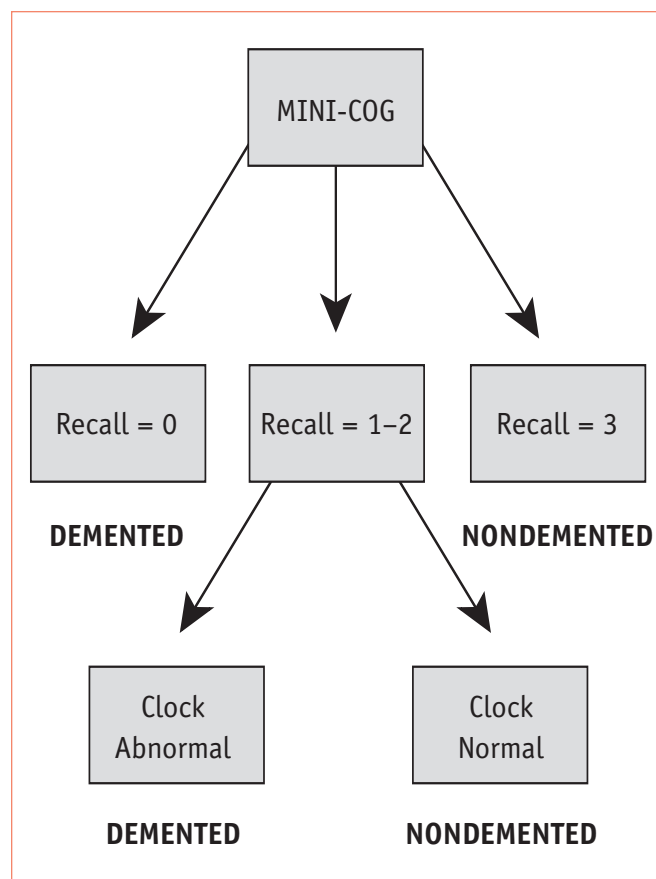
The clock-drawing task serves as the recall distracter.

3. Ask the patient to repeat the 3 previously presented words.

### Scoring

Give 1 point for each recalled word after the clock drawing test (CDT) distracter. Score 1-3. A score of 0 indicates positive screen for dementia. A score of 1 or 2 with an abnormal CDT indicates positive screen for dementia. A score of 1 or 2 with a normal CDT indicates negative screen for dementia. A score of 3 indicates negative screen for dementia (Figure 3).

Adapted with permission from Society for Hospital Medicine. The Mini-Cog assessment for dementia. 2004. Available at: [www.hospitalmedicine.org/geriresource/toolbox/pdfs/clock\\_drawing\\_test.pdf](http://www.hospitalmedicine.org/geriresource/toolbox/pdfs/clock_drawing_test.pdf). Accessed January 31, 2007.



**Figure 3. Scoring Algorithm for the Mini-Cog**

Reprinted with permission from the American Association for Geriatric Psychiatry. Available at: [www.cmecorner.com/macmcm/AAGP/aagp2003\\_07.htm](http://www.cmecorner.com/macmcm/AAGP/aagp2003_07.htm). Accessed March 13, 2007.

# Dementia vs Mild Cognitive Impairment: An Overview

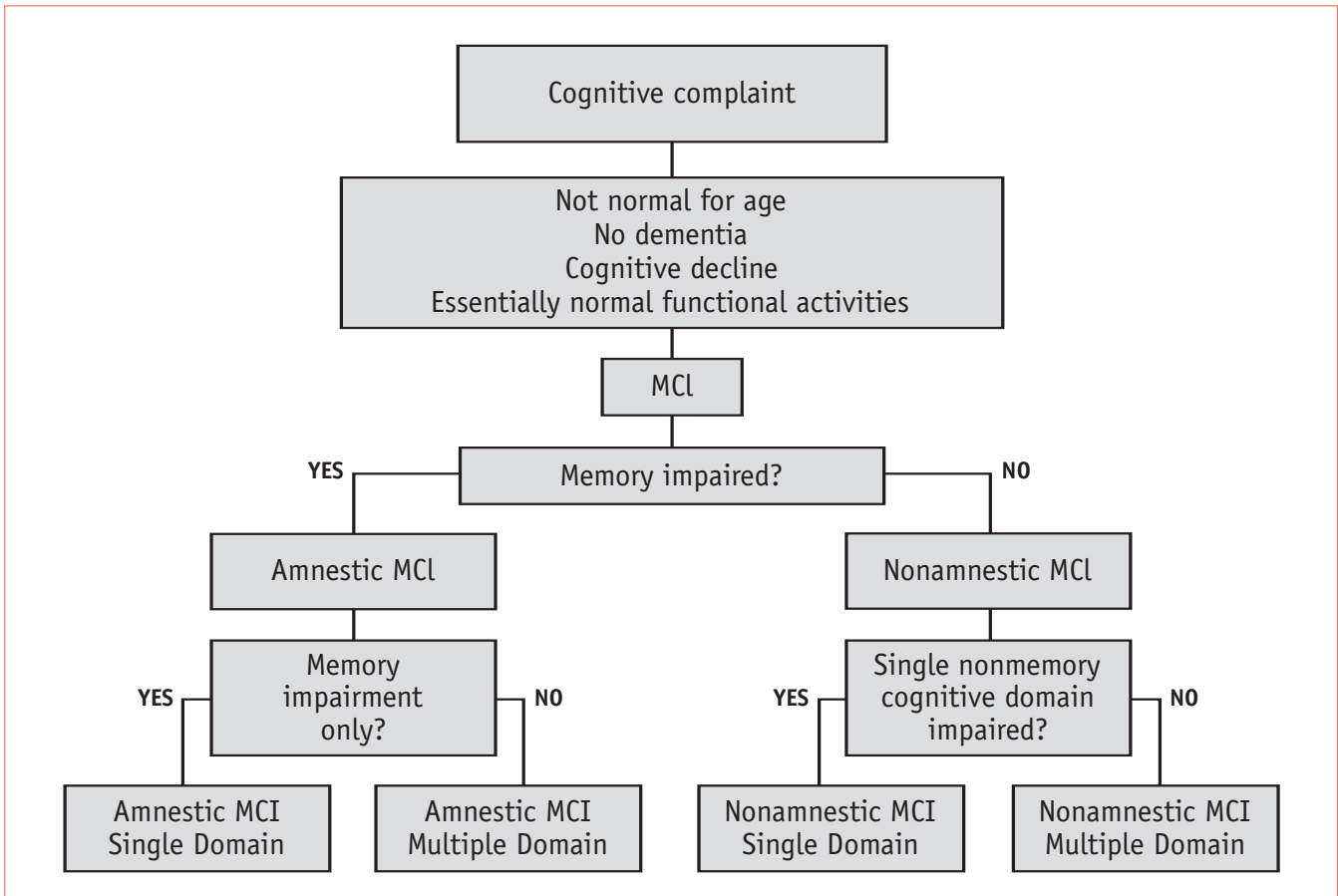
## What Is Dementia?

Dementia may be defined as a departure from previous cognitive function that involves multiple cognitive domains and is severe enough to affect social or occupational function and/or activities of daily living (ADLs). The diagnosis of dementia should not be made if the signs and symptoms are attributable to an acute confusional state and/or delirium. In the United States, the most common cause of dementia is Alzheimer’s disease (AD). Multi-infarct dementia and diffuse Lewy body disease / Parkinson’s dementia are also common. Additional causes of cognitive impairment include those of a metabolic, endocrinologic, infectious, toxic, neoplastic, and hypoxic-ischemic nature.<sup>1</sup> Individuals with dementia may

present with depression, changes in personality, delusions, or hallucinations. Although memory loss is a common symptom of and often part of the definition of dementia, memory loss alone does not signify that a person has dementia.<sup>1</sup>

## What Is MCI?

A spectrum of cognitive changes occurs with aging.<sup>2,3</sup> Even when demonstrable brain disease is excluded, older people score lower on cognitive tests than do younger individuals.<sup>4</sup> Mild cognitive impairment (MCI) is a concept developed to identify individuals at an elevated risk of dementia. MCI is operationally defined by the presence of measurable cognitive impairment



**Figure 4. Definitional Scheme for Mild Cognitive Impairment**

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(usually 1 to 2 standard deviations away from norms), but absence of substantial impairment in ADLs. Many investigators view MCI as a transitional state between normal cognitive function and dementia including AD (Figure 4). The initial phase of AD is marked by a progressive loss of memory for new events. When this process advances, impairment spreads to other domains of cognition, such as executive function, language, or visuospatial ability.<sup>4</sup> Generally, MCI is recognized as a heterogeneous collection of disorders that includes patients with prodromal AD, those with prodromal vascular or other non-AD dementias, those with subtle memory loss who will not experience further pathologic decline, and those with mild cognitive deficits resulting from underlying medical or psychiatric condition(s).<sup>5-10</sup>

Whereas several definitions of MCI have been proposed, the most widely used recognizes three subtypes: amnesic MCI, which is associated with memory loss, multiple-domain MCI, and MCI with impairment in a single nonmemory domain.<sup>11-13</sup>

## Prognosis of MCI

Behavioral and/or psychiatric symptoms are common among patients with MCI. A recent evaluation of 1010 patients with MCI indicated that 59% had neuropsychiatric symptoms (eg, agitation, anxiety, sleep disturbances, or depression).<sup>14</sup> The incidence of depression in patients with MCI is 11.7% versus 6.7% in older adults with normal cognition.<sup>15</sup> Patients with MCI are also likely to have a decreased capacity to carry out instrumental activities of daily living, or IADLs, which can include shopping, cooking, cleaning, transportation, managing medicines or finances, or using the telephone, as some examples.<sup>16</sup>

MCI carries a high risk for conversion to AD and other forms of dementia.<sup>12</sup> An observational study of patients with amnesic MCI indicated that 27% developed dementia (23% AD) over 10 years of follow-up. Over each 2-year interval, individuals with amnesic MCI showed increased risk for progression to dementia.<sup>17</sup> Thus, MCI can be considered a generally progressive condition with a high probability of conversion to dementia.

## How Do I Manage Patients With MCI?

Although there is no FDA-approved treatment for MCI, clinical trials have suggested efficacy and safety of acetylcholinesterase inhibitors for patients with this condition. These drugs can be administered in the primary care setting and have been shown to improve symptoms and delay progression to AD in patients with MCI.<sup>18-20</sup> One of the main goals in management of the patient with MCI should be follow-up of cognitive function to ensure that dementia is diagnosed early.

There is evidence that delay in the use of acetylcholinesterase inhibitors in patients with AD has an adverse impact on clinical course, with patients who are started later on acetylcholinesterase inhibitors never catching up to peers who were started earlier. The efficacy of the centrally-active acetylcholinesterase inhibitor rivastigmine tartrate in patients with mild to moderately severe AD was evaluated in a 26-week open-label extension of a 26-week, double-blind, placebo-controlled study. By 52 weeks, patients originally treated with 6 to 12 mg/day of rivastigmine had significantly better cognitive function than patients originally treated with placebo.<sup>21</sup>

## Referral to Specialists

Although PCPs should expect to play a key role in the diagnosis and management of MCI, there are situations in which consultation with a specialist is warranted.<sup>22</sup> This may be the case when presentation or history is atypical or complex, onset occurs before age 60, or when there is uncertainty regarding the diagnosis. Specialists can provide significant assistance in managing a patient with MCI. Geriatric specialists are competent to manage patients with MCI and dementia, including behavioral management, particularly in patients with agitation, psychosis, or combativeness. A neurologist can be helpful for patients with marked fluctuations in function or behavior, stepwise decline in function, history of stroke or transient ischemic attack, gait and balance impairment,

Parkinsonism, focal neurologic signs, rapid progression, atypical presentations, or abnormal neuroimaging findings. Neuropsychologic testing may clarify diagnostically complex cases and identify cognitive strengths to help compensate for cognitive weaknesses, and neuropsychologists may provide therapy for patients and their caregivers.

## References

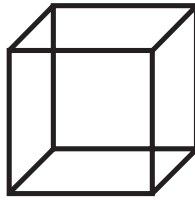
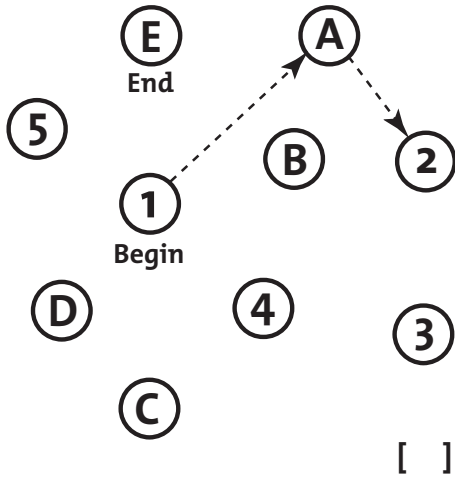
1. NINDS. Dementia. 2006. Available at: [www.ninds.nih.gov/disorders/dementias/dementias/detail\\_dementia.htm?css=print](http://www.ninds.nih.gov/disorders/dementias/dementias/detail_dementia.htm?css=print). Accessed January 31, 2007.
2. Petersen RC. Aging, mild cognitive impairment, and Alzheimer's disease. *Neurol Clin*. 2000;18:789-805.
3. Burns A, Zaudig M. Mild cognitive impairment in older people. *Lancet*. 2002;360:1963-1965.
4. Lindeboom J, Weinstein H. Neuropsychology of cognitive ageing, minimal cognitive impairment, Alzheimer's disease, and vascular cognitive impairment. *Eur J Pharmacol*. 2004;490:83-86.
5. Dubois B, Albert ML. Amnesic MCI or prodromal Alzheimer's disease? *Lancet Neurol*. 2004;3:246-248.
6. Davis HS, Rockwood K. Conceptualization of mild cognitive impairment: a review. *Int J Geriatr Psychiatry*. 2004;19:313-319.
7. Grundman M, Petersen RC, Ferris SH, et al. Mild cognitive impairment can be distinguished from Alzheimer disease and normal aging for clinical trials. *Arch Neurol*. 2004;61:59-66.
8. Winblad B, Palmer K, Kivipelto M, et al. Mild cognitive impairment-beyond controversies, towards a consensus: report of the International Working Group on Mild Cognitive Impairment. *J Intern Med*. 2004;256:240-246.
9. Knopman DS, Boeve BF, Petersen RC. Essentials of the proper diagnoses of mild cognitive impairment, dementia, and major subtypes of dementia. *Mayo Clin Proc*. 2003;78:1290-1308.
10. de Mendonca A, Guerreiro M, Ribeiro F, Mendes T, Garcia C. Mild cognitive impairment: focus on diagnosis. *J Mol Neurosci*. 2004;23:143-147.
11. Petersen RC, Smith GE, Waring SC, Ivnik RJ, Tangalos EG, Kokmen E. Mild cognitive impairment: clinical characterization and outcome. *Arch Neurol*. 1999;56:303-308.
12. Petersen RC, Doody R, Kurz A, et al. Current concepts in mild cognitive impairment. *Arch Neurol*. 2001;58:1985-1992.
13. Petersen RC. Mild cognitive impairment as a diagnostic entity. *J Intern Med*. 2004;256:183-194.
14. Feldman H, Scheltens P, Scarpini E, et al. Behavioral symptoms in mild cognitive impairment. *Neurology*. 2004;62:1199-1201.
15. Li Y-S, Meyer JS, Thornby J. Longitudinal follow-up of depressive symptoms among normal versus cognitively impaired elderly. *Int J Geriatr Psychiatry*. 2001;16:718-727.
16. Artero S, Touchon J, Ritchie K. Disability and mild cognitive impairment: a longitudinal population-based study. *Int J Geriatr Psychiatry*. 2001;16:1092-1097.
17. Ganguli M, Dodge HH, Shen C, DeKosky ST. Mild cognitive impairment, amnesic type: an epidemiologic study. *Neurology*. 2004;63:115-121.
18. Koontz J, Baskys A. Effects of galantamine on working memory and global functioning in patients with mild cognitive impairment: a double-blind placebo-controlled study. *Am J Alzheimers Dis Other Dement*. 2005;20:295-302.
19. Petersen RC, Thomas RG, Grundman M, et al. Vitamin E and donepezil for the treatment of mild cognitive impairment. *N Engl J Med*. 2005;352:2379-2388.
20. Salloway S, Ferris S, Kluger A, et al. Efficacy of donepezil in mild cognitive impairment: a randomized placebo-controlled trial. *Neurology*. 2004;63:651-657.
21. Farlow M, Anand R, Messina J Jr, Hartman R, Veach J. A 52-week study of the efficacy of rivastigmine in patients with mild to moderately severe Alzheimer's disease. *Eur Neurol*. 2000;44:236-241.
22. Barton C, Small GW, Yaffe K. Dementia. 2006. Available at: [http://geriatricsreviewsyllabus.org/content/agscontent/demen6\\_m.htm](http://geriatricsreviewsyllabus.org/content/agscontent/demen6_m.htm). Accessed January 31, 2007.

# MONTREAL COGNITIVE ASSESSMENT (MOCA)

NAME :  
Education :  
Sex :

Date of birth :  
DATE :

## VISUOSPATIAL / EXECUTIVE



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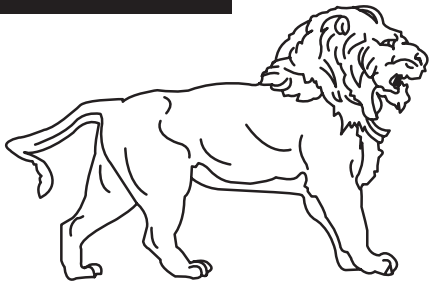
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POINTS

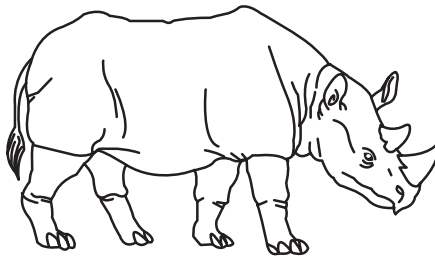
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Contour Numbers Hands

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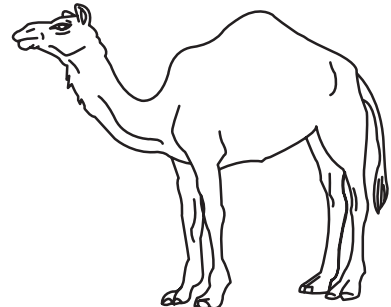
## NAMING



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## MEMORY

Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

## ATTENTION

Read list of digits (1 digit/ sec.). Subject has to repeat them in the forward order [ ] 2 1 8 5 4

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THEBIOCONTINUUMGROUP

This program has been supported through an unrestricted educational grant from Pfizer Inc

