# Webinar Summary Report - Authors' interview

## The Montreal Cognitive Assessment (MoCA) Scale
## Clinical implications of cognitive assessments in early Alzheimer's Disease

Alzheimer's disease (AD) is the most common form of dementia, a condition characterized by the deterioration of memory, thinking, behaviour and the ability to perform everyday activities. It has a life-changing impact on the people who suffer from it and also on their caregivers, families and society at large. Although there is no cure for dementia, early diagnosis facilitates the management of the condition.[1]
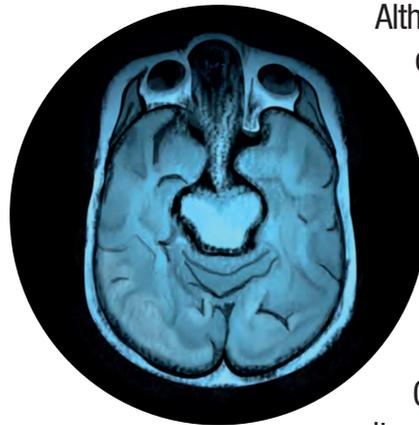
The Montreal Cognitive Assessment Test (MoCA) was created in 1996 as a multi-domain cognitive screening test to detect Mild Cognitive Impairment (MCI). It has been described as the most suitable instrument for the detection of MCI and AD in a population-based cohort or in a memory clinic setting.[2]

As part of its educational webinar series which remains a priority for Managing Director Sonia Bothorel, Mapi Research Trust (MRT) hosted a session on the MoCA on 23 June 2021. The 77-participant webinar featured the developer, neurologist Dr Ziad Nasreddine and Carter Cassedy of MRT. It addressed the context in which the MoCA was developed, its components and psychometric performance, how it compares to other instruments, what derivatives there are as well as their areas of application. It further discussed how to get information on the MoCA and its licensing permission and what to do when you want to develop translations.

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# About the speakers

### *Dr. Ziad Nasreddine MD FRCP(C)*
### *Neurologist and founder of the MoCA*

Ziad Nasreddine graduated from Medical School and Neurology from the University of Sherbrooke. He is certified by the Medical Board of California, and by the American Board of Psychiatry and Neurology.
He completed a post-doctorate fellowship in Neurobehavior at UCLA. He is the recipient of the Arista Sunlife Award of Excellence in the category: Young Quebec Professional. He is actively involved in clinical research in Alzheimer's disease and has created and developed the Montreal Cognitive Assessment Assessment, the MoCA test. The test was recently selected by the White House to assess the cognitive functions of President Donald Trump.

Dr. Nasreddine is affiliated with Charles LeMoyne Hospital.
He is Assistant Clinical Professor in Neurology at the University of Sherbrooke, and is the founder and Director of the MoCA Clinic and Institute.

### *Carter Cassedy,*
### *Sr. Client Services Assoc.,*
### *Author Collaboration Unit,*
### *Mapi Research Trust*

Carter Cassedy is a Senior Client Services Associate with Mapi Research Trust's Author Collaboration Unit. Prior to his work with the ACU, he was a project manager in ICON Language Services' Linguistic Validation team. As a member of that team he published several posters on linguistic validation methodology in outcomes-related conferences.
He is a certified Localization Project Manager.
He graduated from University of London, School of Oriental and African Studies with an MA in Linguistics.

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**MRT: Many thanks to both of you for your presentations. Ziad, we understand that a lot of measures exist to screen for dementia. What made you decide to develop your own? What makes the MoCA unique?**

**ZN:** There are indeed a lot of measures to screen for dementia, such as the Mini Mental State Examination (MMSE)[3] and the Mini-Cog[4]. However, these existing measures lacked sensitivity to capture MCI, the first stage of dementia. They were also not comprehensive enough, as they did not assess all cognitive domains. I wanted to create a cognitive scan that looks at different neuro-anatomical areas involved in cognition.

**MRT: So, what are the components of the MoCA?**

**ZN:** It is a simple 10 minute paper and pencil test that assesses multiple cognitive domains including memory, language, executive functions, visuospatial skills, calculation, abstraction, attention, concentration, and orientation[5] and is scored out of 30 points. Each cognitive domain is related to a specific neuro-anatomical brain area. For example, short term memory is supported by the Papez Circuit which comprises the Hippocampus, Fornix, Mammillary body, and Thalamus. Executive functions are supported by the frontal lobe and the fronto-sub-cortical circuits.

**MRT: In the validation study of your measure the MoCA and the MMSE were administered to 3 groups**

of respondents: (a) patients with MCI, (b) patients with mild AD and (c) normal controls (NC)[6]. Could you summarize the sensitivity and specificity of both tools to pick up MCI and mild AD and explain the cut-off score of 26 you used to distinguish between a healthy and pathological score?*

**ZN:** With a similar cut-off of 26/30, MoCA has a sensitivity of 90% to detect MCI and picks up 100% of mild AD subjects, compared to the MMSE which picks up 18% of MCI and 78% of mild AD patients. It also correctly classifies the NCs (specificity of 87% for the MoCA, 100% for MMSE). This means that the MoCA is very sensitive for the detection of MCI at the slight expense of a few false positives (13%). But since it is a screening tool, we prefer not to have false negatives.

**MRT: Although your validation study advocates a cut-off score at 26, another study suggests using 2 distinct cut-offs combined with scores in an indecisive area to enhance the accuracy of cognitive screening. What is the reason for this and what do you do with the responders that lie between the 2 points?[7]**

**ZN:** A grey zone exists between the 24 and 26 cut-off scores. Patients scoring in this range should be followed more closely and be reassessed after 3 to 6 months to determine their progression trajectory.

**MRT: You have also developed the "Montreal Cognitive Assessment Memory Index Score" (MoCA-MIS) to predict the conversion from MCI to AD.[5] How was this index score developed and how is it used?**

**ZN:** Qualitative cueing for missed words for the "delayed recall" section was part of the original test. Quantifying it was meant to help clinicians predict with more precision the conversion risk from MCI to AD. MCI subjects with a combined total score of less than 20/30 and an MIS score of less than 7/15, had a 90% risk of conversion to dementia in the following 18 months. These subjects should be monitored more closely, and may be good candidates for clinical trials since they have a high risk of progression.

**MRT: The MoCA has been cited in some 14 000 peer-reviewed articles and is not only used as a screening tool in clinical practice. What are the different applications of the instrument?**

**ZN:** The MoCA is used in over 20 medical conditions to assess cognition in which it was shown to be superior to other existing cognitive screening tools. It was developed initially to detect cognitive impairment related to early AD, and then Stroke, Parkinson, Multiple Sclerosis, Substance abuse, Sleep Apnea, COPD, Heart failure, Kidney failure, Traumatic Brain Injury, and more recently COVID-19.

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**MRT: So, the MoCA can be used across conditions and settings. Are there any elements that can influence its scores and should be taken into consideration in the interpretation, such as age and gender of the respondents, their literacy and level of education?**

**ZN:** Age and sex have little effect on the MoCA's performance. Education level requires adjustment. One point should be added to the total score of adults with 12 years of schooling or less as they may perform less well. We also developed the MoCA Basic version for illiterate subjects or respondents with 5 years of education or less.

**MRT: Can the repeated use of the tool with the same patient influence the score? Is there a learning effect?**

**ZN:** There is almost no learning effect when repeating the MoCA. The test re-test performance at one month remains the same in our validation study[6]. Alternate ver- sions were developed to mitigate that theoretical effect.[8]

**MRT: Since the development of the initial MoCA you have developed a number of variations of the tool for application in distinct settings. Which forms exist, and where can they be used?**

**ZN:** "MoCA Full" is the first version. The iPad version uses the full version and helps standardize test adminis- tration, provides automatic scoring for most items, and assesses processing speed. "MoCA Blind" is useful to assess patients with visual impairment. "MoCA Deaf" is now available to test patients with hearing impairment. The "Mini" is a short 5-minute test that can be admi- nistered over the phone or in person. It is not posted on our website yet as we are waiting for the publication of the validation study. The "telehealth version" has a few adaptations to facilitate the administration of the full version over a Zoom-like platform. "MoCA Drive" which is still in development, will help clinicians deter- mine which patients may be at risk of impaired driving.

**MRT: The MoCA is not only used in a variety of settings and for different conditions, but also across a large number of countries and cultures. How many language versions are there and what translation methodology was used?**

**ZN:** The test was translated using experts in the cognitive field that live in the country where the language is spoken. An independent back transla- tion was performed to reconcile any differences with the original. The "MoCA full" is now available in 100 languages and dialects and is used in 200 countries.

**MRT: That is a substantial number of translations. Is there a cultural impact on the scores, and if so, how are they addressed? During the translation process?**

**ZN:** Yes, each culture adapts certain elements: the ani- mals to be named, the 5 word memory items, the sen- tences to be repeated, the abstraction and letter fluen- cy tasks to maintain the same levels of complexity and frequency of use as the French and English originals.

**MRT: And all these translations can of course be found on the official MoCA website. More recently they can also be accessed through Mapi Research Trust. Carter, could you explain the process you need to follow to obtain the MoCA ?**

**CC:** Requests for information and licensing can be submitted through MRT's ePROVIDE platform. Our team will put in place the appropriate license and provide the requested language versions.

**MRT: Are there any fees involved?**

**CC:** Academics and individual clinicians can access the MoCA free of charge, regardless of whether or not they receive external funding. Commercial and for-profit health- care organizations are required to pay licensing fees.

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**MRT: And what if a specific language version is not available?**

**CC:** Then MRT will provide academics and individual clinicians with guidance on the required translation process. For commercial users MRT will coordinate the production of new translations through MRT's linguistic validation partner, ICON Language Services.

**MRT: And when you want to use the MoCA in a clinical setting, I believe it is necessary to go through an interviewer training course. If so, is the training material part of the license ?**

**ZN:** To ensure standardised administration and scoring you have to be trained and certified before using the MoCA. Once the license agreement is in place the user is directed to the MoCA website to receive the training there.
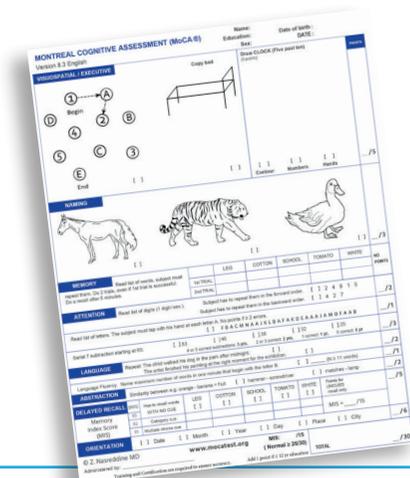
**MRT: Thank you, Ziad for your clarifications. To sum up a final message for potential users of the MoCA, what are the tool's current limitations, what its advantages and futures perspectives you can share with us?**

**ZN:** The MoCA is a time-efficient, sensitive, and comprehensive cognitive screening tool. Training and certification ensures reliability with standardised administration and scoring. MoCA detects early cognitive impairment, helping clinicians to better manage their patients, and researchers to identify appropriate subjects for clinical trials. More advanced electronic versions are in development to help improve the tool's performance as well as the rater/patient experience.

**MRT: Thank you once again, Ziad and Carter for your presentations and time.**

***Interview by Katrin Conway, MRT Board Member***

For anyone wishing to listen to the webinar, click
https://xtalks.com/webinars/montreal-cognitive-assessment-moca-clinical-implications-in-early-alzheimers-disease/
and follow the instructions.

If you have a scientific question, you can contact Dr Ziad Nasreddine at
info@mocatest.org

For any questions on the distribution and translations of the MoCA you can access the official website
https://www.mocatest.org
or submit a question to MRT through the e-PROVIDE platform
https://eprovide.mapi-trust.org

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