Description of neuropsychological battery

Mini-Mental State Examination (MMSE) will be used to assess the global cognition function of MCI patients. It takes about 5 to 10 minutes to finish the 30-point questions which evaluates cognitive functions including orientation, memory, attention, calculation, language and visual-spatial functions[[1](#_ENREF_1)]. The culturally adapted Chinese version of the MMSE will be performed in screen and follow-up[[2](#_ENREF_2), [3](#_ENREF_3)]. The inclusion criterion of MMSE ranges between 24 and 28.

The Chinese version of the Alzheimer's Disease Assessment Scale-Cognitive Subscale (ADAS-cog) is regularly used to assess global cognitive dysfunction in AD clinical trials[[4-6](#_ENREF_4)]. ADAS-cog provides maximum information of all cognitive domains. The test estimates patients’ abilities of memory, naming, executive function, language, configuration, orientation and attention. A higher score means a greater cognition dysfunction. The scale score ranges from 0 to 70, with increasing scores indicating higher severity of global cognitive impairment. ADAS-Cog helps differentiate the cognitive impaired individuals from normal population, as well as contributes to evaluate the extent of cognitive impairment[[7](#_ENREF_7)].

Memory will be assessed using the Rey Auditory Verbal Learning Test-Huashan (Chinese) version (AVLT-H)[[8](#_ENREF_8)]. The patients will be required to memorize 12 unrelated words, with 20-minute interruption by other tests between memory encoding and recall. AVLT is stable of diagnoses and of predicting value of MCI progression. In the Chinese clinical setting, Zhao Q and Guo Q et al. suggested that the "one test" criterion AVLT is optimal in balancing sensitivity and specificity[[9](#_ENREF_9)].

Attention and executive function will be evaluated by Chinese modified version of Trail Making Test (TMT) [[10](#_ENREF_10)] and the Stroop Color-Word Test[[11](#_ENREF_11)]. TMT evaluates functions of rapid visual search, visual spatial ordering and mental flexibility. The difference between time consumed in TMT-B and TMT-A represents the impairment of executive functions. TMT-B is reported to be significantly predictive for the development of dementia in amnestic MCI[[12](#_ENREF_12)]. In the Stroop test, patients will be required to read words of colors (the first trial) , then to read colors (the second trial) and finally name the colors of words (the third trial). The ratio of time consumed in the third trial and the first trial indicates attention/executive function.

Language will be assessed by a modified Chinese-version Boston naming test (30-item)[[13](#_ENREF_13)]. This test requires patients to name 30 pictures with certain sequence. This version had demonstrated good validity for detecting naming impairment in Chinese-speaking patients in Shanghai[[14](#_ENREF_14)].Visual spatial ability and memory will be evaluated by the Rey-Osterrieth complex figure test (CFT). Patients will be required to copy a complicated line drawing and to recall the picture and draw it[[14](#_ENREF_14)].

Activities of daily living (ADL)will be assessed by authorized Chinese version of Alzheimer's Disease Cooperative Study-Activities of Daily Living (ADCS-ADL)[[6](#_ENREF_6)]. Patients’ caregivers will be required to recall and answer 23 questions about ADL of patients in the last 4 weeks. Two major types of living activities involved are basic ADL like eating and dressing, and instrumental ADL like talking and shopping. The existence of depression will be found out by Hamilton Depression Scale (HAMD-17 items)[[15](#_ENREF_15)], which are [self-report](https://en.wikipedia.org/wiki/Self-report_inventory) [assessment](https://en.wikipedia.org/wiki/Psychological_assessment)s with questions about mood and interest in daily activities. The score higher than 7 points indicates existence of depression, and a higher score indicates more severe depression.

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