Supplemental materials

**Neuropsychiatric symptoms are associated with exacerbated cognitive impairment**

**in covert cerebral small vessel disease**

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**Supplemental table 1.** Cognitive raw scores in 134 subjects with available NPI-Q data

|  |  |  |
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| **Cognitive domain** | **Neuropsychological test** | **Mean (SD)** |
| Processing speed | WAIS-IV Coding1 | 47.3 (12.8) |
|  | Stroop test (colour-congruent)2, correct responses in 45 seconds | 54.7 (11.2) |
|  | FAT Numbers3 (similar to Trail Making A4), time (s) | 50.1 (19.9) |
| Executive functions | Stroop test (colour-incongruent)2, correct responses in 45 seconds | 30.1 (10.1) |
|  | Verbal fluency5, total correct responses for animals and two letters | 53.7 (14.8) |
|  | Hayling Sentence Completion Test6, error score | 8.4 (10.0) |
|  | Brixton Spatial Anticipation Test6, error score | 19.8 (7.3) |
|  | FAT Number-Letter3 (similar to Trail Making B4), time (s) / number of correct responses | 4.3 (2.0) |
| Memory | WMS-III Word List7, total immediate recall | 26.5 (6.4) |
|  | WMS-III Word List7, delayed recall | 5.2 (2.7) |
|  | WMS-III Logical memory7, immediate recall | 13.6 (4.2) |
|  | WMS-III Logical memory7, delayed recall | 11.5 (4.5) |
|  | Rey Complex Figure Test5, delayed recall | 13.0 (6.7) |
| Working memory | WMS-III Letter-Number Sequencing7 | 8.2 (2.2) |
|  | WMS-III Digit Span7 | 14.1 (2.7) |
|  | FAT Visuospatial Span3,8forwardbackward | 4.5 (1.4)4.2 (1.4) |
| Visuospatial perception | WAIS-IV Block Design1 | 32.2 (11.1) |
|  | Rey Complex Figure Test5, copy | 29.8 (5.7) |
| Verbal reasoning | WAIS-IV Similarities1 | 26.4 (4.1) |

FAT, Flexible Attention Test (computerised modification of the Trail making test and the Corsi block-tapping test); NPI-Q, Neuropsychiatric Inventory Questionnaire; WAIS-IV, Wechsler Adult Intelligence Scale IV; WMS-III, Wechsler Memory Scale III

**References**

1. Wechsler D. Wechsler Adult Intelligence Scale (WAIS-IV). 4th ed. San Antonio, TX: Pearson, 2008.
2. Golden CJ. Stroop Color and Word Test: A manual for clinical and experimental uses. Chicago, IL: Stoelting Co., 1978.
3. Järnefelt H, Härmä M, Lapveteläinen N, Leivategija T, Martimo K-P, Paajanen T, Sallinen M, Velin R, Virkkala J, Hublin C. Vuorotyöntekijöiden unen ja vireyden tukeminen työterveyshuollossa [In Finnish]. Helsinki: Finnish Institute of Occupational Health, 2018.
4. Reitan RM. Validity of the Trail Making test as an indicator of organic brain damage. Percept Mot Skills 1958;8:271–276.
5. Lezak MD, Howieson DB, Bigler ED, Tranel D. Neuropsychological assessment. 5th ed. New York: Oxford University Press, 2012.
6. Burgess P, Shallice T. The Hayling and Brixton Tests. Test manual. Bury St. Edmunds, UK: Thames Valley Test Company, 1997.
7. Wechsler D. Wechsler Memory Scale (WMS-III). 3rd ed. San Antonio, TX: Psychological Corporation, 1997.
8. Kessels RP, van Zandvoort MJ, Postma A, Kappelle LJ, de Haan EH. The Corsi Block-Tapping Task: standardization and normative data. Applied Neuropsychology 2000;7:252-258.

**Supplemental table 2.** Cognitive, functional and neuropsychiatric scores in groups based on WMH severity (Fazekas score none/mild vs. moderate/severe) in 134 subjects with available NPI-Q data

|  |  |
| --- | --- |
| **Score, mean (SD)** | **Fazekas group** |
| **None/mild** | **Moderate/Severe** |
| Global cognition composite score | 0.1 (0.6) | -0.2 (0.6) |
| Processing speed composite score | 0.2 (0.8) | -0.2 (0.9) |
| Executive functions composite score  | 0.1 (0.7) | -0.2 (0.6) |
| Memory composite score | 0.1 (0.8) | -0.2 (0.8) |
| MoCA score | 23.9 (3.0) | 22.9 (3.7) |
| A-IADL score | 67.7 (3.2) | 65.4 (6.0) |
| NPI-Q number of symptoms | 0.6 (1.0) | 1.2 (1.9) |

A-IADL, Amsterdam Instrumental Activities of Daily Living; MoCA, Montreal Cognitive Assessment; NPI-Q, Neuropsychiatric Inventory Questionnaire; WMH, white matter hyperintensity