# The Written and Oral Administration of the Symbol Digit Modality Test in Huntington Disease

Octavian R. Adam, M.D., Sharon Halton, L.C.S.W., Giovanni Mostile, M.D., Joseph Jankovic, M.D.

Parkinson's Disease Center and Movement Disorders Clinic,
Department of Neurology, Baylor College of Medicine, Houston, Texas

## INTRODUCTION

The Symbol Digit Modality Test (SDMT) assesses divided attention, visual scanning and motor speed [1]. After being presented with a coding key, the responder is required to pair the number with the corresponding symbol as rapidly as possible [2]. SDMT is a sensitive test for cognitive decline in Huntington disease (HD)[3] but the concomitant oral (oSDMT) and written (wSDMT) administration of SDMT in HD has not been previously compared.
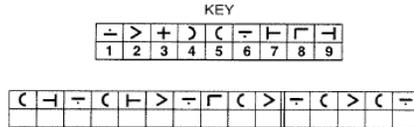


## METHODS

Ten patients (5 males) with HD, mean age 48 ± 15 years, disease duration 61.6 ± 49.6 months (no data for 3 patients), completed the SDMT in both written and oral format. The complete Unified Huntington Disease Rating Scale (UHDRS) and Mini mental Status Examination (MMSE) were also recorded. The UHDRS ocular motor score, subscore of the motor UHDRS, was calculated as the sum of scores for horizontal and vertical ocular pursuit, saccade initiation and velocity items.

## RESULTS

Mean SDMT, motor UHDRS, MMSE and Stroop test (ST) are summarized in Table 1. There was a significant difference among SDMT written task (p<0.001) and oral tasks (p=0.002) between the HD population (N=10) and controls (N=19) from published normative data [4]. In our HD patients, both scores correlated with the motor UHDRS, MMSE and Stroop test (Table 2). Only the wSDMT correlated significantly with the UHDRS ocular motor score.

## DISCUSSION

The SDMT has been used as a test for divided attention, but requires complex visual scanning and tracking, perceptual speed, motor speed, and memory. The administration in both oSDMT and wSDMT provides a comparison between verbal and visuomotor responses [5].The oral and written administrations of the SDMT are highly correlated in normal controls. In HD, both the oral and written administrations of the SDMT correlate with UHDRS, MMSE and Stroop test. The mean scores between the two forms differ. The general tendency to produce higher scores on the oral administration may be explained by impaired motor function in HD, the wSDMT inversely correlating with the motor ocular function.

## CONCLUSIONS

Both the oral and written administrations of the SDMT in HD patients correlate with UHDRS, MMSE and ST. The difference in performance demonstrated by the oSDMT compared to the wSDMT suggests that the latter may be more likely to be influenced by motor dysfunction in HD.

**Table.1: Population study: descriptive analysis**

| N=10 | Mean ± S.D. | Range |
|---|---|---|
| Age | 48 ± 15 | [26 - 68] |
| Education (years) | 4 ± 2 | [1 - 6] |
| **UHDRS - Motor Assessment** | | |
| UHDRS - Motor Total Score | 21.2 ± 17.8 | [2 - 50] |
| UHDRS - Ocular Motor Score | 4.6 ± 3.6 | [1 - 12] |
| **UHDRS - Cognitive Assessment** | | |
| *Verbal Fluency Test [a]* | 29.8 ± 17.1 | [7-49] |
| *Symbol Digit Modalities Test* | | |
| Oral SDMT [a] | 41.9 ± 20.04 | [19 - 71] |
| Written SDMT [a] | 31.4 ± 15.1 | [15 - 57] |
| Oral SDMT (%) | 38.1 ± 18.2 | [17.3 - 65.5] |
| Written SDMT (%) | 28.5 ± 13.7 | [13.6 - 51.8] |
| *Stroop Test [a]* | 176.2 ± 65.3 | [99 - 268] |
| *MMSE Score* | 27.6 ± 2.2 | [23 - 30] |

Notes:
a) Number of correct responses

**Table.2: Correlation analysis**

| Symbol Digit Modalities Test | UHDRS Motor | UHDRS Ocular Motor | MMSE | Stroop Test |
|---|---|---|---|---|
| *Oral SDMT (%)* | r = -0.785 (*p=0.007) | r = -0.539 (p=0.108) | r = 0.689 (*p=0.028) | r = 0.966 (*p<0.001) |
| *Written SDMT (%)* | r = -0.833 (*p=0.003) | r = -0.635 (*p=0.048) | r = 0.692 (*p=0.027) | r = 0.976 (*p<0.001) |

## REFERENCES

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