EARLY DETECTION OF COGNITIVE IMPAIRMENT IN PARKINSON’S DISEASE WITH USE OF THE WISCONSIN CARD SORTING TEST

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Introduction

Impairment of cognitive function is one of the most common and important features of Parkinson’s disease (PD), and often appears in the early stage of PD. There are several ways to assess cognition in the clinical or research setting. The Montreal Cognitive Assessment (MoCA) is a promising tool, and its sensitivity and specificity for detecting mild cognitive impairments in PD are 90% and 87%, respectively.

On the other hand, the Wisconsin Card Sorting Test (WCST) is a “set-shifting” neuropsychological test that evaluates the ability to display flexibility in the face of changing schedules of reinforcement, and is an indicator of several frontal lobe functions. In order to ascertain whether WCST is a useful test for detecting early changes of cognitive function in PD, we performed MoCA and WCST simultaneously and compared the results. In addition, as the majority of PD patients have an impaired sense of smell at an early stage, we conducted a smell test at the same time as the psychological tests.

Results

In PD patients, CA was 2.1 ± 1.9, PEN was 7.1 ± 6.1, and DMS was 2.4 ± 2.1, and all were significantly worse than those of age-matched normal subjects. MoCA scores tended to correlate with the WCST sub-scores (CA: r=0.27, p=0.075, PEN: r=0.30, p<0.05 and DMS: r=0.30, P=0.055). Smell test scores were significantly correlated with MoCA scores (r=0.47, p<0.001) and also showed a weak correlation with CA (r=0.28, p=0.074) (Figure 2).

Conclusions

PD patients exhibited impaired set-shifting ability, and the WCST sub-scores tended to correlate with MoCA score and smell test score. As both MoCA and the smell test reportedly show high sensitivity and specificity for detecting mild cognitive impairments in PD, WCST may also become a useful tool for diagnosing early and mild cognitive impairments in PD.

Methods

Subjects were 50 PD patients (20 males and 30 females, age: 67 ± 9 years). Hohen & Yahr stage was 2.5 ± 0.9, and mean duration was 3.6 ± 2.8 years. Diagnosis of PD was based on the UK PD Brain Bank Criteria, and other possible causes of cognitive impairment were excluded. MoCA was performed using MoCA-J (Japanese version), which was revised for Japanese patients after verifying validity across language and culture. MoCA-J scores range between 0 and 30.

In WCST, several stimulus cards are presented (Figure 1) and the patients are asked match the cards. For evaluation, we used sub-scores for categories achieved (CA), perseverative errors of Nelson type (PEN), and difficulties of maintaining set (DMS).

The smell test was performed using OSIT-J (Odor Stick Identification Test for Japanese). The OSIT-J includes 13 kinds of odor items familiar to Japanese people.

References


Figure 1. Cards for WCST

Figure 2. The Correlations between two variables (the Spearman’s rank correlation coefficient)