Feeling the need … the need for speed (of processing training) in Parkinson disease

Kelvin L. Chou, MD
Alice Cronin-Golomb, PhD

Correspondence to Dr. Chou: klchou@med.umich.edu

Neurology® 2013;81:1278–1279

Cognitive impairment is common in patients with Parkinson disease (PD) without dementia, and may be present even at diagnosis.[1,2] Although a wide range of cognitive domains may be affected in patients with PD without dementia, early cognitive deficits usually occur in the domains of attention and executive function (planning, sequencing, processing speed, and working memory).[3] While cholinesterase inhibitors improve cognition in PD dementia, only a limited number of trials have investigated pharmacologic agents for mild cognitive impairment in PD, and none has been proven to be effective.[1] There is limited evidence for nonpharmacologic cognitive interventions in PD; existing studies have focused on physical exercise[1] or enhancing sensory-perceptual function, thereby improving stimulus quality to enable better cognitive processing.[4,5]

In this issue of *Neurology*®, Edwards et al.[6] report the first randomized trial of cognitive speed of processing training (SOPT) in PD. In healthy older adults, SOPT has substantial beneficial effects on neuropsychological test performance, health-related quality of life, depression, self-rated health, and driving safety.[7,8] Edwards et al.[6] enrolled 87 persons with mild to moderate PD without dementia and randomized them to a self-administered cognitive SOPT arm or a no-contact control condition. At baseline, Mini-Mental State Examination scores ranged from 24 to 30, with only 3 participants scoring below 26. For the SOPT arm, the investigators recommended that participants complete at least 20 hours of training and encouraged working on the SOPT program for 1 hour 3 times a week. At the 3-month follow-up evaluation, the SOPT group experienced greater improvements on the Useful Field of View (UFOV) Test than the control group. SOPT did not alter secondary outcomes in this trial, which included measures of cognitive self-perception and depression.

The study by Edwards et al.[6] demonstrates the effectiveness of a nonpharmacologic cognitive intervention (SOPT) on a measure of visual attention and processing speed (UFOV) in a population prone to problems with cognitive speed of processing (PD). Slower processing speed theoretically affects cognitive performance because there is either not enough time to process all stimuli or enough availability of previous information for further processing.[9] Accordingly, interventions to improve processing speed could lead to improved cognitive ability. As no cognitive tasks other than the UFOV were administered in this study, we cannot conclude that SOPT leads to improved cognition in PD. Because there was no alternative training or active placebo condition to contrast with SOPT, it is also possible that the observed benefit was due to some nonspecific effect of study participation. However, other studies assessing the effects of SOPT in healthy adults aged 50 and older have shown that this training improves performance on several neuropsychological measures, including Trails A and B, the Symbol Digit Modalities Test, and the Stroop Word Test.[8] UFOV performance is also a predictor of driving ability in PD,[10] so SOPT may potentially prevent loss of driving in this population. Future studies will need to focus on these issues.

The SOPT software used in this study is commercially available, can be run on any computer, and appears to be easy to install and use. There are no adverse effects as would be experienced with pharmacologic interventions. But SOPT requires a substantial time commitment, so it is difficult to know whether patients will embrace it. Clinical trial participants are generally more motivated than the general population, and there still was a 27% attrition rate from randomization to the 3-month assessment in the SOPT group, with the most common reason for dropping out being "too busy." Furthermore, while UFOV performance was improved in this trial, cognitive self-perceptions were unchanged, which may further discourage patients from continuing with SOPT. Overall, participants randomized to the SOPT group completed an average of 21.4 hours of training, and 69% of the participants completed at least 20 hours of training over the 3 months,[6] suggesting that in principle, patients with PD can commit to a self-administered SOPT program. It is unclear how much SOPT training is necessary in order to see a benefit. If improvement can be seen with less intense training, it may promote participation.

Other questions need to be answered. How long does the effect from SOPT last once participants stop?

See page 1284

From the Departments of Neurology and Neurosurgery (K.L.C.), University of Michigan, Ann Arbor; and the Department of Psychology (A.C.-G.), Boston University, MA.

Go to Neurology.org for full disclosures. Funding information and disclosures deemed relevant by the authors, if any, are provided at the end of the editorial.

May there be even more improvements in the UFOV with longer training times? This trial did not enroll PD participants with marked cognitive decline. Would cognitive SOPT offer more benefit in those with greater cognitive impairment? Younger age at diagnosis of PD and longer disease duration in this trial were the characteristics associated with larger training gains. These 2 groups also tended to have worse baseline performance on the UFOV, implying that those with greater impairment may show the greatest improvement. Despite the new questions raised by this trial, there is a clear need for nonpharmacologic interventions in the treatment of cognitive dysfunction in PD, and SOPT looks like a promising option.

STUDY FUNDING

No targeted funding reported.

DISCLOSURE

K.L. Chou reports no disclosures relevant to the manuscript. A. Cronin-Golomb is a "Contributing Scientist" by Posit Science, the company producing InSight, the software program discussed in the article. Go to Neurology.org for full disclosures.

REFERENCES

1. Barone P, Aarsland D, Burn D, Emre M, Kulisevsky J, Weintraub D. Cognitive impairment in nondemented Parkinson's disease. Mov Disord 2011;26:2483–2495.
2. Uc EY, McDermott MP, Marder KS, et al. Incidence of and risk factors for cognitive impairment in an early Parkinson disease clinical trial cohort. Neurology 2009;73:1469–1477.
3. Miller IN, Neargarder S, Risi MM, Cronin-Golomb A. Frontal and posterior subtypes of neuropsychological deficit in Parkinson's disease. Behav Neurosci 2013;127:175–183.
4. Amick MM, Cronin-Golomb A, Gilmore GC. Visual processing of rapidly presented stimuli is normalized in Parkinson's disease when proximal stimulus strength is enhanced. Vision Res 2003;43:2827–2835.
5. Toner CK, Reese BE, Neargarder S, Riedel TM, Gilmore GC, Cronin-Golomb A. Vision-fair neuropsychological assessment in normal aging, Parkinson's disease and Alzheimer's disease. Psychol Aging 2012;27:785–790.
6. Edwards JD, Hauser RA, O'Connor ML, Valdés EG, Zesiewicz TA, Uc EY. Randomized trial of cognitive speed of processing training in Parkinson disease. Neurology 2013;81:1284–1290.
7. Ball K, Edwards JD, Ross LA, McGwin G Jr. Cognitive training decreases motor vehicle collision involvement of older drivers. J Am Geriatr Soc 2010;58:2107–2113.
8. Wolinsky FD, Vander Weg MW, Howren MB, Jones MP, Dotson MM. A randomized controlled trial of cognitive training using a visual speed of processing intervention in middle aged and older adults. PLoS One 2013;8:e61624.
9. Clay OJ, Edwards JD, Ross LA, et al. Visual function and cognitive speed of processing mediate age-related decline in memory span and fluid intelligence. J Aging Health 2009;21:547–566.
10. Crizzle AM, Classen S, Uc EY. Parkinson disease and driving: an evidence-based review. Neurology 2012;79:2067–2074.