

ACRM 2018 Symposium

Brain Gaming for Improving Cognitive Function: From Evidence to Action

Presenters

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Abstract

This interdisciplinary symposium is organized jointly by the Neurodegenerative Diseases Networking Group and Geriatric Rehabilitation Networking Group. There is growing interest in the effectiveness of brain gaming, for both healthy older people and those with cognitive impairments. Rehabilitation scientists are actively debating the evidence for benefits of brain gaming (Simons et al., 2016), thus there is a clear need to continue evaluating the peer-reviewed published literature. Presenters will provide an interpretation of the strengths and limitations of brain gaming for improving cognition, recommendations for the use of brain gaming in clinical practice and highlight improvements in study design for future research on brain gaming. Sandra Kletzel, PhD is chair of the Measurement Networking Group (Geriatric Applied Cognition Taskforce. This taskforce is conducting a systematic review and meta-analysis (registered in PROSPERO) on the effects of brain gaming on cognitive function in older adults with mild cognitive impairment and dementia. Dr. Kletzel will present the findings from the review. Greg Burdea, PhD will focus on technology and games as they relate to Virtual Rehabilitation (Burdea et al, 2003). Therapeutic games for brain training differ from off-the-shelf games in several key aspects. One is the control of game avatars which may be uni-manual or bi-manual, using game controllers or hand gestures. Bimanual avatar control engages motor centers in both lobes, and allows training of task sequencing and dual tasking (something problematic for the elderly). Interaction mediated by controllers tends to increase cost and (depending on complexity) may pose problems for spastic hands or weak arms. Alternatively, controller-less tracking can be less precise. Manual control requires baseline for arm reach and finger flexion, so games can be won by motor-impaired individuals. While motor baseline is not necessary for off-the-shelf games, common "shoot-them-up" games incorporate explosions and bursts of light. These features may induce seizures in vulnerable populations such as Cerebral palsy and Parkinson's disease and should thus be avoided. Another important aspect of brain gaming is session composition. Critically, games need to induce neural rewiring as a lasting way to treat cognitive (and motor) disorders. To do so, high number of repetitions and patient attendance to task is key. To maintain interest, a variety of games is needed, however, to reach therapeutic goals, specific games must be played, whether preferred by the patient or not. We will show how these seemingly opposite criteria in game session design can be reconciled. Protocol design (number, duration, difficulty of sessions) is another important aspect, with game difficulty and session duration increasing week after week. Dr. Grampurohit will present data on cognitive and functional outcomes from a recent study where teams of individuals with chronic stroke competed in a tournament between two nursing homes. Co-operative games played by the residents improved their morale and enhanced functional outcomes. The evidence from these findings are discussed in the context of long-term maintenance therapy for nursing home residents, challenges encountered in the clinical setting, and implications for future trials (House et al. , 2016).