THURSDAY MORNING, JULY 11, 2013

Invited Address: Cognitive Reserve

Presenter: Ian Robertson

8:45–9:45 a.m.

I. ROBERTSON, Cognitive Reserve.

The gap between symptoms and pathology in many brain disorders has been explained by ‘cognitive reserve’ – a set of variables including education level which putatively allow the brain to adapt to damage by maintaining cognitive function. I propose here a hypothesis that repeated stimulation of the noradrenergic system over a lifetime mediates the effects of cognitive reserve on cognitive function. Noradrenaline has a key role in mediating the neuroprotective and neuroplasticity-affording effects of environmental enrichment on the brain and recent longitudinal evidence in aging strongly supports this hypothesis.

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Symposium 4: Retraining of Cognitive Functions after Acquired Brain Injury: Old Wine in New Bottles?

Chair: Caroline Van Heugten

10:00–11:30 a.m.


Symposium Description: Cognitive rehabilitation after brain injury can be defined as any intervention strategy or technique to enable patients and their families to reduce, compensate, live with, pass by, manage or accept the cognitive deficits due to brain injury (Wilson, 1997).

In the seventies and eighties of the last century cognitive rehabilitation studies were directed at investigating the effects of cognitive retraining aimed at restoring the lost cognitive function. In most studies forms of cognitive retraining were computer-based tasks related to cognitive functions. These studies showed that the performance on trained tasks and untrained tasks related to the training material improved. Unfortunately these studies led to disappointing results in terms of improving the level of daily life functioning, societal participation and quality of life.

In the first review on the effectiveness of cognitive rehabilitation it was stated that ‘sole reliance on repeated exposure and practice on computer-based tasks without extensive involvement and intervention by a therapist is NOT recommended’ (Cicerone et al., 2000). A shift was seen towards the compensatory approach instead of the restorative approach. The past few decades the notion of brain plasticity appeared and the common belief now is that the brain shows some degree of self-repair and spontaneous recovery; in addition, structural and functional brain changes have been shown after (intensive) training. These new insights have led to a second wave of studies investigating the effects of cognitive retraining after brain damage, especially in the areas of working memory and selective attention. The question is whether these studies indeed explore new boundaries and new life can be breathed into the restorative approach or whether these studies merely represent old wine in new bottles. In this symposium an overview of new evidence on cognitive retraining will be given and a debate will be held in order to answer this question.

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C. VAN HEUGTEN, Cognitive Retraining for Patients with Brain Injury.

Objective: The fast few years studies investigating the effectiveness of (computerized) brain training after brain injury have been performed. These studies are mostly aimed at the cognitive domains of attention and working memory. In this presentation, an overview of these rehabilitation programs and evaluation studies will be given.

Results: In the domain of attention the most well known treatment program is the Attention Process Training which has been evaluated in some small, non-randomized evaluation studies in TBI and a large post-stroke randomized clinical trial. In addition, there is a version for mild deficits (APT-II) and it has been tested in children treated with radiation after cancer. In the domain of working memory Cogmed is currently the most widely used studies and treatment program. Cogmed training has been evaluated in a non-randomized pilot study on stroke patients and a randomized cross-over study on a mixed sample of patients with acquired brain injury. In addition, the effects of Cogmed training on daily life functioning have been investigated.

Conclusions: Although these studies seem promising, generalization to daily life functioning is still limited.

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J. MURRE, Online Brain Training and Testing of Older Adults and Patients with Cognitive Impairments.

Objective: Online brain training in various forms is currently popular by elderly computer users. A recent review of the literature by our group, however, indicates that effects of brain training on cognition are neither robust nor consistent, and that transfer and sustained effects appear limited. We also found that there were a number of successful studies, which had the following characteristics: (i) they included flexibility and novelty as features of the training and (iii) they tailored the training adaptively to the level and progress of the individual. In this presentation, I will briefly review this literature and then present the results of one of our ongoing research projects with online brain training and testing using a version of a commercial web site that has been made suitable for elderly participants and CVA patients who have milder cognitive impairments. The training capitalizes on characteristics (i) and (ii) to increase the chances of success. The research design also includes covariance-based MRI methods in linking structural and functional changes in the brain to individual differences in neurocognitive efficiency and trainability in order to help uncover the underlying mechanisms.

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A. RAZ, Brain Training.

Objective: Train-the-brain program are in vogue. Putatively safe and effective for improving cognitive performance in both health and disease, products purported to train the brain appeal to consumers and healthcare practitioners. In an increasingly health-centered society, these applications constitute a burgeoning commercial market. And yet, sparse evidence leaves many claims concerning the impact and duration of such brain training largely unsubstantiated. On the other hand, at least some scientific findings seem to support the effectiveness and sustainability of training for higher brain functions such as attention and working memory. My presentation will highlight cognitive training approaches. Specifically, I will sketch the relative merits and shortcomings of these programs, which often appeal to parents who must choose between side-effect-laden medication and less conventional options. Whether brain training can be a stand-alone treatment or an adjunct to pharmacotherapy will guide the crux of my talk as I outline promising future prospects and describe what training outcomes are plausible in line with available data. The main issue centres on an overarching question I will address: Is brain training likely to realize its potential and revolutionize education and rehabilitation or is it more likely to remain shrouded in controversy?

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