

## COMPUTER FOR COGNITIVE REHABILITATION IN DEMENTIA

Dementia looks as a 'worldwide rising tide', affecting 25 million people today<sup>1,2</sup>. Besides prevention, there is growing interest for cognitive rehabilitation of cognitively impaired older persons<sup>3</sup>, as also stated in the European Silver Paper<sup>4</sup>.

Gerontechnology may prove useful by computer-based intervention programs for persons affected by cognitive impairment of different severity. In 'mild cognitive impairment' (MCI) patients, memory can benefit either at an 'ecological' level<sup>5</sup> or in visual-motor mnemonic performance; depressed mood, anxiety and physical performance may improve as well<sup>6</sup>. Mild Alzheimer's patients improve in Mini Mental Status Examination (MMSE) scores, verbal fluency, and executive functions<sup>5</sup>, also when compared to kinesis therapy<sup>6</sup>.

In mildly impaired Alzheimer's patients, cognitive rehabilitation by interactive computer games involving memory, concentration, and problem-solving skills, together with symptomatic mainstream pharmacologic therapy including cholinesterase inhibitors [ChEI], resulted in improved memory and mood<sup>7</sup>. Patients, (n=46) receiving three weekly, 20-minute sessions of multimedia internet-based systems (IMIS), in addition to 8 hours per day of integrated psycho-stimulation program (IPP) and ChEI, had improved cognitive scores, which were maintained through 24 weeks of follow-up, above and beyond that seen with IPP and ChEI alone. While the absolute mean increase in cognitive score was marginal, the same scores worsened in control groups<sup>8</sup>.

On the basis of MMSE scores, 50 patients with mild (30 %) to moderate (40 %) to severe (30 %) AD followed informal and formal Reality Orientation Therapy [ROT], with individual cognitive support through computerised training. Computer programs were used to make 30 tasks tapping

different functional areas at various levels of difficulty: trained attention, concentration, verbal, spatial, and numerical abilities, memory and psychomotor speed. Tasks were attractively designed with an adaptive level of difficulty. Of the 50 patients, 35 were also taking ChEI. Subjects were predominantly males, aged about 76 years, had low levels of comorbidity, mobility impairments, and formal education. After 4 weeks in the ward, the comprehensive treatment program led to significant cognitive and functional improvements. Most important, effects were highly significant on psychological and behavioural disturbances, especially apathy, agitation, hallucination, and delusions. In AD, apathy is the commonest amongst BPSD. Environmental stimulation and cognitive-behavioural rehabilitation may help to reduce at least the 'exogenous' component of apathy and its consequences for patients and caregivers, likely also by positive group feelings, and socialization<sup>9</sup>. Beyond computers, an electronic memory aid may improve prospective memory in persons with mild to moderate probable AD, while written lists and free recall appear not useful<sup>10</sup>

In conclusion, gerontechnology may enhance the quality of life of people with dementia<sup>11</sup>; we still have to pay suitable attention to ethical issues<sup>12</sup>.

## References

1. Larson EB, Langa KM. The rising tide of dementia worldwide. *Lancet* 2008;372(9637):430-432
2. Ferri CP, Prince M, Brayne C, Brodaty H, Fratiglioni L, Ganguli M, Hall K, Hasegawa K, Hendrie H, Huang Y, Jorm A, Mathers C, Menezes PR, Rimmer E, Scazufca M. Alzheimer's Disease International. Global prevalence of dementia: a Delphi consensus study. *Lancet* 2005;366(9503):2112-2117
3. Cotelli M, Calabria M, Zanetti O. Cognitive rehabilitation in Alzheimer's Disease. *Aging Clinical Experimental Research* 2006;18(2):141-143
4. Cruz-Jentoft AJ, Franco A, Sommer P, Baeyens JP, Jankowska E, Maggi E, Ponikowski P, Ryś A, Szczerbińska

K, Milewicz A. European silver paper on the future of health promotion and preventive actions, basic research, and clinical aspects of age-related disease. *Gerontechnology* 2008;7(4):331-339; doi:10.4017/gt.2008.07.04.001.00

5. Cipriani G, Bianchetti A, Trabucchi M. Outcomes of a computer-based cognitive rehabilitation program on Alzheimer's disease patients compared with those on patients affected by mild cognitive impairment. *Archives of Gerontology and Geriatrics* 2006;43(3):327-335
6. Talassi E, Guerreschi M, Feriani M, Fedi V, Bianchetti A, Trabucchi M. Effectiveness of a cognitive rehabilitation program in mild dementia (MD) and mild cognitive impairment (MCI): a case control study. *Archives of Gerontology and Geriatrics* 2007;44(Suppl. 1):391-399
7. Loewenstein DA, Acevedo A, Czaja SJ, Duara R. Cognitive rehabilitation of mildly impaired Alzheimer disease patients on cholinesterase inhibitors. *American Journal of Geriatric Psychiatry* 2004;12(4):395-402
8. Tárraga L, Boada M, Modinos G, Espinosa A, Diego S, Morera A, Guitart M, Balcells J, López OL, Becker JT. A randomised pilot study to assess the efficacy of an interactive, multimedia tool of cognitive stimulation in Alzheimer's disease. *Journal of Neurology, Neurosurgery and Psychiatry* 2006;77(10):1116-1121
9. Raggi A, Iannaccone S, Marcone A, Ginex V, Orтели P, Nonis A, Giusti MC, Cappa SF. The effects of a comprehensive rehabilitation program of Alzheimer's Disease in a hospital setting. *Behavioural Neurology* 2007;18(1):1-6
10. Oriani M, Moniz-Cook E, Binetti G, Zanieri G, Frisoni GB, Geroldi C, De Vreese LP, Zanetti O. An electronic memory aid to support prospective memory in patients in the early stages of Alzheimer's disease: a pilot study. *Aging & Mental Health* 2003;7(1):22-27
11. Sixsmith AJ, Gibson G, Orpwood RD, Torrington JM. Developing a technology "wish-list" to enhance the quality of life of people with dementia. *Gerontechnology* 2007;6(1):2-19; doi:10.4017/gt.2007.06.01.002.00
12. Bjørneby S, Topo P, Holthe T, editors. *Technology, Ethics and Dementia*. Sem: Norwegian Centre for Dementia Research; 1999

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## MENTAL COMPENSATION STRATEGIES AND GERONTECHNOLOGY

Computerized cognitive stimulation (CCS) is a promising intervention for training cognitive functions as recommended in the European Silver Paper<sup>1</sup>. CCS assumes that both cognitive competencies and psychosocial factors contribute to personal accomplishment. Cognition includes attention, perception, episodic and semantic memory, visuo-spatial abilities, executive function, and verbal fluency. Psychosocial factors relate to self-confidence, self-esteem, motivation, affective state, and social involvement. When aware of their memory deficits, persons suffer from anxiety and depressive mood with negative effects on their cognitive and functional abilities. Even a subtle enhancement of cognitive function will be perceived by the subject as an affirmation of competence and therefore augment self-esteem

and improve affective status, a good indicator of quality of life and correlating significantly with everyday functioning.

CS-intervention has yielded significant benefits both for people with normal ageing and those with mild cognitive impairment(MCI)<sup>2</sup> or Alzheimer's disease<sup>2-4</sup>. CS programmes are now computerized for older populations and provided through Internet or CD-ROM. These include cognitive exercises gathered in sessions (for instance, 30 minutes) several times a week. A training period of 3 - 6 months is needed to obtain significant cognitive and psycho-social benefits. Increasingly, CCS programmes, such as Mindfit<sup>5</sup> and HAPPYneuron<sup>6</sup> become available as primary prevention for healthy older people, to prevent or delay cognitive impairment. A theoretical part explains cognitive functioning and includes practical exercises