Chapter 16
Brain Reserve and Cognitive Training in the Elderly

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Given the precipitous forecast for dementia prevalence over the coming years, effective preventive strategies are of great importance.

Recent evidence linking mental activity and dementia risk invokes "brain reserve" as the mediating agent. 10–40 % of persons who satisfy post-mortem criteria for AD show no signs of cognitive impairment ante-mortem. Does brain reserve protect against amyloid load? Brain reserve has acquired several interpretations. The so-called hard version emphasizes a genetically based phenomenon, for example increased brain size or neural density. Another concept uses a "soft" analogy which is a flexible brain reserve compensating for neural dysfunction by motivating a great number of potential neural pathways. The latter, being the most reliable one, focuses on behavioural level by assessing frequency and range of participation in complex mental activities. Consequently, persons who have developed a wide spectrum of cognitive strategies for coping with complex problems perform very well in psychometric tests.

Many recent international cohort studies show an overall dementia risk reduction for high mental activity levels compared to low ones. Interestingly the effects of education, occupational complexity and cognitively active lifestyle are equally significant. However the question remains whether active lifestyle is a protective factor for dementia or low activity levels in fact represent an early symptom of insidious dementia.

There is a long history of studies investigating the effects of cognitive training in late life. Exercising on a specific cognitive task does improve performance in that task. But there is the issue of effect transfer and the challenge of effect durability. In recent years there are clinical trials indicating that advanced mental programmes

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can slow the decline not only in the trained mental domain but also in more general indices relevant to dementia.

Use of computer-based multi-component cognitive training allows for measurable and effective interventions for healthy and mild cognitively impaired elderly. Our team has developed such a computerized programme, SOCIABLE, which proved effective in improving and maintaining the cognitive abilities in three groups of elderly (cognitively intact, suffering from mild cognitive impairment and with mild Alzheimer's disease).