IMPAIRMENT AND DECLINE ON THE COGSTATE BRIEF BATTERY IS RELATED TO AMYLOID AND HIPPOCAMPAL VOLUME IN VERY MILD DEMENTIA

aibl
The Australian Imaging, Biomarkers and Lifestyle Flagship Study of Ageing

COGSTATE

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Introduction

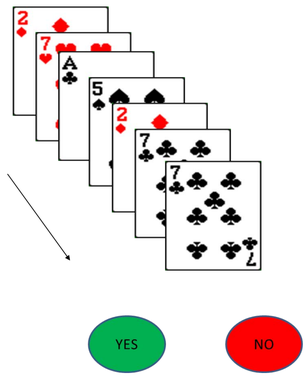
The study followed prospectively changes in cognition and hippocampal volume over 72 months in Aβ- and Aβ+ adults with a CDR score of 0.5. We proposed that at baseline, Aβ- older adults, CDR 0.5 Aβ+ older adults would show large impairments in memory and working memory, and that this would be accompanied by smaller hippocampal volumes. The second hypothesis was that CDR 0.5 Aβ+ older adults would show faster decline in memory and working memory over 72-months and that this would also be accompanied by increased loss of hippocampal volume. The third hypothesis was that any cognitive decline observed in CDR 0.5 Aβ- older adults would be less than that observed in CDR 0.5 Aβ+ older adults.

Methods

Sample: Subjects were recruited as part of the Australian Imaging Biomarkers and Lifestyle (AIBL) study and assessed every 18 months using the Cogstate battery (Fig 1). Aβ levels were measured using PET and hippocampal volume (HV) corrected total intracranial volume .

Table 1: Demographic characteristics of CN older adults

	CDR 0 Aβ- (n=253)	CDR 0.5 Aβ- (n=32)	CDR 0.5 Aβ+ (n=52)	p
Sex N (%) Female	146 (57.7%)	12 (37.5%)	26 (50.0%)	.074
Age	68.27 (5.78)	73.78 (9.22)	78.31 (7.02)	.000
Premorbid IQ	108.65 (6.85)	105.13 (9.78)	108.29 (8.27)	.041
GDS	0.87 (1.27)	2.74 (2.20)	1.70 (1.32)	.000
CDR sum of boxes	0.00 (0.03)	0.77 (0.47)	0.94 (0.66)	.000
MMSE	29.08 (1.10)	27.66 (1.93)	26.94 (2.26)	.000



CogState task	Main cognitive domain assessed
Detection task	Psychomotor function
Identification task	attention
One Back Task	Working memory
One Card Learning Task	Learning

Figure 1 Cogstate Brief Battery (CBB) design

Methods (continued)

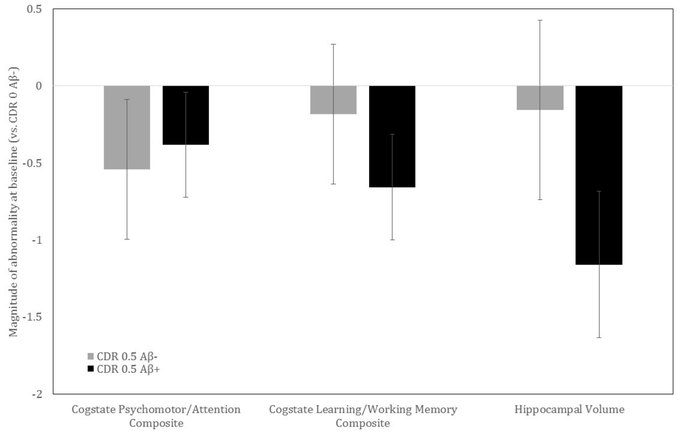


Fig 2: Magnitude of impairment (d +/-95%) on each cognitive composite at baseline for each Aβ group.

At baseline when compared to the CDR 0 Aβ – group, CDR 0.5 Aβ+ group showed impairment on the CBB psychomotor function/attention score and the CBB learning/working memory score and smaller HV. The CDR 0.5 Aβ- group showed impairment only for the CBB psychomotor/attention score (Fig 2).

Slopes of change in performance over the 72month time for the CDR 0 Aβ – group, CDR 0.5 Aβ+ group and CDR 0.5 Aβ+ group estimated from linear mixed model analyses are shown on Figure 2.

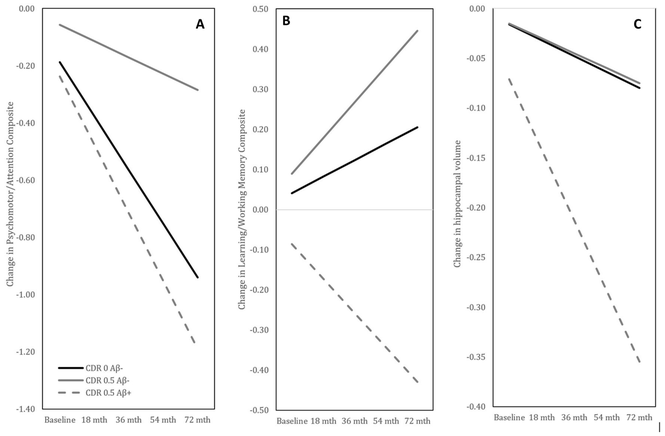


Fig 3: Change over 72-months on the (A) Cogstate Psychomotor /Attention composite (B) Cogstate Learning/Working Memory composite and (C) hippocampal volume, for each Aβ group

Results

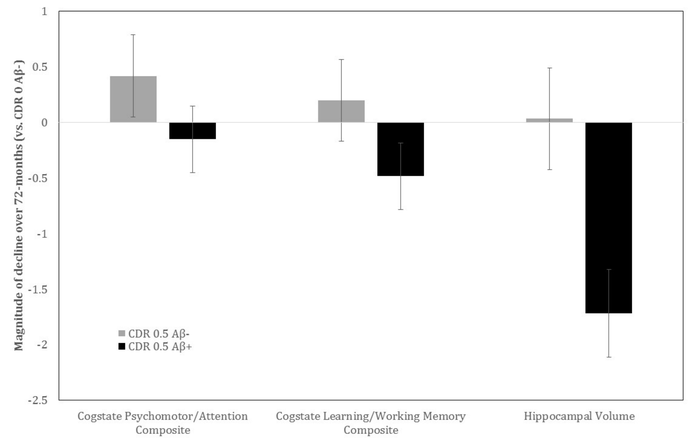


Fig 3: Magnitude of impairment (d +/-95%CI) on each cognitive composite at baseline for each Aβ group.

Figure 4 summarises the magnitudes of the differences in slope between each CDR 0.5 group and the CDR 0 group. Compared to change over time in the CDR 0 Aβ – group, the CDR 0.05 Aβ+ group showed significantly greater decline over 72 months in the CBB psychomotor function/attention score and the CBB learning/working memory score and in HV. However change over time in the CDR 0.5 Aβ- group was significantly different to the CDR 0 Aβ – group only for the CBB psychomotor/attention scores (Fig 3).

Conclusion

In individuals who have been classified clinically as being in the very early stages of AD (CDR 0.5) and who have biomarker confirmation of Aβ, changes in cognitive function manifest primarily as deterioration in memory processing. Further, the gradual loss of hippocampal volume observed in this study is also consistent with neurobiological studies showing the predilection of early AD pathological processes for medial temporal lobe structures. Finally, this study provides additional evidence that the combination of AD biomarkers and sensitive cognitive assessments are important in the identification of individuals in the very early stage of AD who may be appropriate targets of clinical trials of anti-amyloid therapies seeking to modify or alter the course of cognitive deterioration in AD and also for assisting with expectations about the extent to which amyloid related changes in cognition should occur in such patients.