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## **Effects of Cognitive Stimulation Therapy: Malaysian version (CST-M) for older people with mild dementia**

**Akehsan Dahlan <sup>1</sup>, Ungku Ahmad Ameen Ungku Mohd Zam <sup>2</sup>, Thinakaran Kandayah <sup>3</sup>, Ninik Nurhidayah <sup>4</sup>**

<sup>1</sup> Faculty of Health Sciences, Universiti Teknologi MARA, Selangor Campus, 42300 Bandar Puncak Alam, Selangor, Malaysia

<sup>2</sup> Geriatric Specialist, Tengku Ampuan Rahimah Hospital, 41200 Klang, Selangor, Malaysia

<sup>3</sup> Medical Officer, Kuala Langat District Health Office 42700 Banting, Selangor, Malaysia

<sup>4</sup> Department of Occupational Therapy, School of Health Polytechnics, Surakarta, Indonesia.

[akehsan@uitm.edu.my](mailto:akehsan@uitm.edu.my), [drumeen@gmail.com](mailto:drumeen@gmail.com), [karan\\_raj1985@yahoo.co.uk](mailto:karan_raj1985@yahoo.co.uk), [niniknurhidayah@gmail.com](mailto:niniknurhidayah@gmail.com)  
Tel: +603-32584387

### **Abstract**

Older people with dementia often deteriorate cognitive functions, which may lead to difficulty performing daily activities. One of the best non-pharmacological treatments for dementia is Cognitive Stimulation Therapy (CST), developed in the United Kingdom. The study aims to determine the effect of the Cognitive Stimulation Therapy – Malaysian version (CST-M) on cognitive functions. The results of this randomised controlled trial indicate a significant difference in cognitive functions among participants in the experimental group. CST-M should be encouraged as a standard treatment for older people with dementia in Malaysia.

**Keywords:** Cognitive Stimulation Therapy; Older people; Mild dementia

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### **1.0 Introduction**

Malaysia will become an ageing country by 2030, in which 16% of the total population consists of older people and will rise to 22% by the year 2050 (United Nations, 2013). Ageing is often associated with deterioration of physical, psychological, psychosocial and cognitive functions. One of the most common causes of the deterioration of cognitive functions is dementia. Deterioration in cognitive functions occurs in stages and initially starts with a minimal change that develops to mild cognitive impairment (MCI) and subsequently results in dementia if no proper intervention is given. MCI is a transitional cognitive impairment stage between normal ageing and early Alzheimer's disease (Mallo et al., 2020). About 37.7% of patients with MCI become dementia, and 71.5% of patients with mild behaviour impairment become dementia (Taragano et al., 2018). The Royal College of Physicians defines dementia as acquired global impairment of higher cortical function, including memory, the capacity to solve the problem of day-to-day living, the performance of learning, perceptuo-motor skills, the correct use of social skills, all aspects of language and communication and the control of the emotional reaction. The progression of dementia is inevitable, and a person suffering from dementia will manifest cognitive deficits that involve memory impairment or one or

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more cognitive disturbances such as aphasia, apraxia, agnosia or disturbance in executive functioning and according to a systematic review, the prevalence of an older people with probable dementia in Malaysia was 14.3% (Anuar et al., 2022).

Treatment for dementia is divided into pharmacological and non-pharmacological intervention (NPI). However, the pharmacological intervention has been less encouraging, and the medications often cause side effects and unpleasant interactions with the patients existing medications (Cummings, Morstorf, & Zhong, 2014). However, NPI can provide a useful complementary therapy, carry fewer risks and adverse effects, and use versatile approaches to improve outcomes for people with dementia (Chalfont et al., 2020). Cognitive Stimulation Therapy (CST) is a non-pharmacological treatment that is clinically effective and more cost-effective than usual treatment for people with dementia (Comas-Herrera & Knapp, 2016). CST is divided into a) group CST, b) individual, and c) maintenance CST and was developed in the United Kingdom. CST consist of structured activities designed to stimulate cognitive functions, tapping into the cognitive reserve and enhancing social interactions between the participants. Group CST was culturally adapted and conducted successfully in Australia, New Zealand, Indonesia, Taiwan, Japan, Italy, Thailand, Hong Kong, Singapore, India, Tanzania and Nigeria. ("International Cognitive Stimulation", 2022) Hence, this study aims to identify the effects of Cognitive Stimulation Therapy in Malaysian version on cognitive functions among older people with mild dementia in the institution

## 2.0 Literature Review

Previous studies show that older people who live in the institution live in a sedentary lifestyle, lack of stimulations and seldom engage in meaningful and valued types of activities (Dahlan & Ibrahim, 2014; Dahlan & Azri, 2020) and often experiencing a poor sleep quality (Azri et al., 2016). In addition, there is a gap in activity among older people between the activity that they do and the activity that they want to do (Haidhir & Dahlan, 2022). Furthermore, the relationship between residents in institutions is seldom a meaningful type of relationship, often for adjustment and interdependence (Makthar et al., 2016). The lack of stimulation and deterioration in the social relationship may influence the deterioration of cognitive functions (Cheng et al., 2019). Hence, many current NPI focus on stimulation to improve cognitive functions among older people.

Previous randomised controlled studies and meta-analysis of randomised controlled studies indicate that the CST improve cognitive functions (Woods et al., 2012; Aguirre et al., 2013; Lin et al., 2018; Sarageh et al., 2022), Mood (Yamanaka et al., 2013) and quality of life (Yamanaka et al., 2013; Lin et al., 2018) and the effect can be maintained after three months (Lin et al., 2018). In addition, CST could reduce depression among older people with dementia (Sarageh et al., 2022; Alvares-Pereira et al., 2020; Capotosto et al., 2017; Juárez-Cedillo et al., 2020). Furthermore, data from qualitative studies indicate that the group CST improve social interaction, interconnection, happiness, sense of togetherness and enrichment (Lauritzen et al., 2022; Morrish et al., 2022). CST was developed based on the Cochrane systematic review of reality orientation (RO), reminiscence therapy and multi-sensory stimulations through engagement in many stimulating cognitive types of activities, leisure, daily and recreational activities. Similarly, these types of activities were the foundation of many successful programmes that are conducted by occupational therapists that aim to improve cognition and quality of life among older people with dementia, such as the Lively Later Life Programme (3LP) (Dahlan & Ibrahim, 2015) and occupational base intervention (Ibrahim et al., 2021). Engagement in meaningful and valued activities is one of the constructs of life satisfaction, purpose in life and quality of life among older people in institutions (Dahlan et al., 2010; Ibrahim & Dahlan, 2015)

## 3.0 Methodology

### 3.1 Study Design

Pre-Test-Post-Test parallel groups Randomized Controlled Trial (RCT) design was used to determine the effect of Cognitive Stimulation Therapy- Malaysian Version (CST-M) compared to the control group.

### 3.2 Study Setting and Participants

The study was conducted at a governmental-funded older people institution. All of the residents were screened, and forty-eight participants were recruited for this study. The inclusion criteria for this study are (i) older people age 60 and above; (ii) lived in the institution for at least three months; (iii) scores 91 - 100 in the Modified Barthel Index, which indicates slight independence in the performance of the activity of daily living; (iv) Mild dementia (Scores 1 for mild dementia in Clinical Dementia Rating Scale); and (v) scores less than 5 in Geriatric Depression Scale (Malay version) which indicates no depression.

### 3.3 Sampling and Randomisation

Based on a prior method of G\*Power calculation analysis, a sample size of forty-eight is needed to test the hypothesis at a 0.05 level (2-tailed) which will give a power equivalent of 80% in detecting a population with an effect size of 0.83. Forty-eight participants met the inclusion criteria, and they were randomly assigned following the simple random sampling strategy to allocate the participants into two groups, i.e. experimental group (EG) or control group (CG), using a computer-generated list of random numbers - Random Allocation Software (Saghaei, 2004). Each participant who met the inclusion criteria was given a random number by an independent research assistant from numbers 01 to 48, and their names were erased from the original list. Subsequently, there were 24 participants in the EG and the CG.

To ensure the study's blinding and to prevent threats to the validity of criterion contamination, the following strategies have been used (i) not allowing participants in the control group to participate in the group CST-M. (ii) the participants in the experimental group are brief



about the importance of not disclosing or discuss any activities conducted in the CST-M. (iii) the pre and post-study measures were conducted by two independent occupational therapists who were not part of the research team. Therefore, the study will be protected from interpretation bias.

### 3.4 Intervention Protocol

The CST was culturally validated and adapted to the CST-M using the Formative Method for Adapting Psychotherapy (FMAP) model aligned with the recommended process for adapting the CST to other cultures, as highlighted by Aguirre, Spector & Orrell (2014). The permission to adapt and validate was obtained from the principal author of the CST. FMAP model comprises five phases which are; Phase 1: Generating knowledge and collaborating with stakeholders, Phase 2: Integrating generated information with theory and empirical and clinical knowledge, Phase 3: Reviewing the initial culturally adapted intervention with stakeholders and revising the culturally adapted intervention, Phase 4: Testing the culturally adapted intervention and Phase 5: Finalising the culturally adapted intervention.

The CST-M was conducted in a group session. Each group consist of 8 participants and two research assistants. The CST-M consists of 14 sessions, 60 minutes/session, twice weekly for seven weeks. Each session has specific interrelated themes, as shown in Table 1. There is a bridge between sessions, consistency in time, place, participants and facilitators. The session is presented in a fun and stimulating way. In addition, each session is divided into three parts, i.e. the introductions part (20 minutes), the main activity part (30 minutes) and the closing part (10 minutes). In the introduction session, the participants need to sing the theme song of the group and discuss topics related to temporal orientations (using an orientation board) and the issues related to current affairs. In the main activity part, the participants engage in the activities related to the theme planned, and in the closing part, the participants sing the team song, reflect on the activity conducted and reminders re the next session and the content for the next session. The 18 fundamental principles of conducting the CST, such as multi-sensory stimulations, new ideas, thought and association, opinions rather than facts, using reminiscence, implicit learning, providing triggers, fun activities etc., are practised throughout the session of the CST-M. The CST-M was conducted using the standardised CST-M manual and kit by the research team trained to conduct the CST-M.

The intervention group (EG) received the CST-M programme and the usual standard occupational therapy (UOT) intervention for people with dementia. Whilst the control group (CG) received only the UOT intervention. The standard intervention was conducted by the occupational therapist in the institution. The standard interventions aimed to improve cognitions include reality orientation therapy, reminiscence therapy, cognitive training and physical activity.

Table 1. Occupation-Based Intervention for Experimental Group

Session	Theme	Session	Theme
1	Physical games	8	Creativity
2	Sound	9	Categorising objects
3	Childhood	10	Orientation
4	Food	11	Using money
5	Current affairs	12	Number games
6	Faces/scenes	13	Word games
7	Word association	14	Team quiz

### 3.5 Research Instruments

The Lowerstein Occupational Therapy Cognitive Assessment–Geriatric Version (LOTCA–G) was used to evaluate the cognitive functions among participants in this study. The LOTCA–G is an Occupational Therapy assessment that evaluates basic cognitive functions required for everyday life. It consists of 23 subtests in seven cognitive areas: Orientation, Perception, visuomotor organisation, thinking operations, memory, praxis, attention and concentration (Elzar et al., 1996). The LOTCA–G was validated in Bahasa Malaysia in 2015, and the results indicated high convergence validity between the English version and the Malay version of LOTCA–G (ranging from 0.83 – 0.96 in the seven cognitive areas) (Natar et al., 2015).

### 3.6 Data Analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) Version 21. The normality test was conducted on all continuous dependent variables using the Shapiro-Wilk test for normality, and it was found that the data was not normally distributed. Therefore, the Mann-Whitney U test was used in accepting or rejecting the null hypothesis. An alpha level of 0.05 was used to determine any significant difference between the pre and post-values. Acceptance or rejection of the hypothesis is based on a 95% confidence interval (CI) ( $p < 0.05$ ).

### 3.7 Ethical consideration

Prior to the commencement of the study, the researcher has obtained ethical approval from the ethics committee of the UiTM (Ref. No: 600-IRMI (5/1/6); REC/154/18) and approval from the Department of Social Welfare Malaysia (Ref. No. JKMM 100/12/5/2:2018/239).

## 4.0 Findings

### 4.1 Demographic characteristics

The socio-demographic characteristics of participants are shown in Table 2. There are two age groups in both experimental and control groups, and both groups have an equal number of participants ( $n=24$ ). The participants are mainly aged between 60 to 74 years old,



predominantly female and of Malay race in both experimental and control groups. The length of stay in the institution ranges from 3 months to 96 months. No statistically significant differences were found between the experimental and control groups on demographic variables, confirming homogeneity between both groups.

Table 2. Socio-demographic characteristics of participants

Demographics	Experimental Group (n/%)	Control Group (n/%)
Age		
60 to 74 years old	16 (66.67)	17 (70.83)
Above 75 years old	8 (33.33)	7 (29.17)
Total	24 (100)	24 (100)
Gender		
Male	10 (41.67)	11 (45.83)
Female	14 (58.33)	15 (54.17)
Total	24 (100)	24 (100)
Race		
Malay	15 (62.50)	16 (66.67)
Chinese	5 (20.83)	4 (16.67)
Indian	4 (16.67)	2 (8.33)
Others	-	2 (8.33)
Total	24 (100)	24 (100)
Length of Stay in Institution		
3 to 24 months	11 (45.83)	12 (50.00)
25 to 48 months	7 (29.17)	6 (25.00)
49 to 72 months	4 (16.67)	5 (20.83)
73 to 96 months	2 (8.33)	1 (4.17)
Total	24 (100)	24 (100)

n = number of participants

#### 4.2 Pre and Post Intervention

Statistical analysis was conducted to determine the baseline for both groups for demographic profile and the cognitive components in the LOTCA-G. The results indicate no statistical differences between both groups prior to the intervention ( $p > 0.05$ ). These results suggest that both groups are comparable.

After seven weeks of intervention, all 48 participants from both groups completed the intervention program. The post-test results indicated that there is a significant difference for the participants in the experimental group in five domains of cognitive functions as measured by LOTCA-G such as orientation (orientation for time), perception (overlapping figures and objects constancy), visuomotor organisation (pegboard constructions, block design, reproduction of puzzle and drawing a clock), thinking operations (categorisation and picture sequence), all component in memory (famous personality, personal possession and everyday objects), and attention and concentration; compared to the control group ( $p < 0.05$ ) with effect sizes ranging from medium to large as shown in Table 3.

Table 3. Differences in the score for LOTCA-G

Domains and components in LOTCA-G	Groups	Pre Median (IQR)	Post Median (IQR)	n	u	z	p	r
<b>1 Orientation</b>								
Orientation for Place	EG	6.00 (5.25 – 6.75)	6.00 (6.00 – 7.00)	24	121.000	- 1.49	0.04*	0.45
	CG	6.00 (5.25 – 6.75)	6.00 (6.75 – 7.00)	24				
Orientation for Time	EG	4.00 (3.00 – 4.00)	4.00 (4.00 – 5.00)	24	68.500	- 3.62	0.02*	0.46
	CG	4.00 (3.00 – 4.00)	4.00 (3.00 – 4.75)	24				
<b>2 Perception</b>								
Visual Identification of Objects	EG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24	118.000	-0.52	1.00	
	CG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24				
Visual Identification of Shapes	EG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24	190.000	- 0.69	0.55	
	CG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24				
Overlapping Figures	EG	3.00 (3.00 – 4.00)	3.50 (3.00 – 4.00)	24	112.500	- 0.85	0.04*	0.32
	CG	3.00 (3.00 – 4.00)	3.50 (3.00 – 4.00)	24				
Object Constancy	EG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24	72.500	- 2.42	0.02*	0.43
	CG	4.00 (3.00 – 4.00)	5.00 (3.00 – 4.75)	24				
<b>3 Spatial Perception</b>								
Directions on Body	EG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24	113.000	0.00	1.00	
	CG	4.00 (4.00 – 4.00)	4.00 (4.00 – 4.00)	24				
Direction in Front	EG	4.00 (3.00 – 4.00)	4.00 (3.00 – 4.00)	24	112.500	- 0.95	0.33	
	CG	3.50 (3.00 – 4.00)	3.50 (3.00 – 4.00)	24				
Spatial Relations	EG	3.00 (2.00 – 4.00)	3.00 (2.00 – 4.00)	24	108.000	- 0.53	0.55	
	CG	4.00 (2.25 – 4.00)	3.50 (2.00 – 4.00)	24				
<b>4 Praxis</b>								
Motor Imitation	EG	3.00 (2.00 – 3.00)	3.00 (2.00 – 3.00)	24	121.500	- 0.269	0.79	
	CG	3.00 (2.25 – 3.00)	3.00 (2.00 – 3.00)	24				
Utilisation of Objects	EG	4.00 (3.00 – 4.00)	4.00 (3.25 – 4.00)	24	116.000	- 0.575	0.57	



	Symbolic Actions	CG	4.00 (4.00 – 4.00)	4.00 (3.00 – 4.00)	24	125.000	- 0.139	0.90
		EG	4.00 (4.00 – 4.00)	4.00 (3.00 – 4.00)	24			
		CG	4.00 (3.25 – 4.00)	4.00 (3.00 – 4.00)	24			
4	Visuomotor Organization	CG	4.00 (4.00 – 4.00)	4.00 (3.00 – 4.00)	24	110.00	- 0.32	0.73
		EG	3.00 (3.00 – 4.00)	3.50 (3.00 – 4.00)	24			
	Copy Geometric Forms	CG	3.00 (3.00 – 4.00)	4.00 (3.00 – 4.00)	24	127.00	- 0.02	0.97
		EG	3.00 (2.00 – 4.00)	3.00 (2.00 – 4.00)	24			
	Two Dimensional Model	CG	3.00 (2.25 – 4.00)	3.00 (2.25 – 4.00)	24	102.000	- 0.65	0.03*
		EG	4.00 (3.00 – 4.00)	4.00 (3.00 – 4.00)	24			
	Pegboard Construction	CG	4.00 (3.00 – 4.00)	4.00 (3.25 – 4.00)	24	79.000	- 1.82	0.05*
		EG	3.00 (3.00 – 4.00)	3.50 (3.00 – 4.00)	24			
	Block Design	CG	3.00 (3.00 – 3.00)	3.00 (3.00 – 3.00)	24	118.00	- 0.18	0.05*
		EG	3.00 (2.25 – 3.00)	3.00 (2.25 – 3.75)	24			
5	Reproduction of a Puzzle	CG	3.00 (3.00 – 4.00)	3.00 (2.25 – 3.00)	24	77.00	- 2.12	0.04*
		EG	3.00 (2.00 – 3.75)	3.00 (3.00 – 4.00)	24			
	Drawing a Clock	CG	3.00 (2.00 – 3.75)	2.50 (2.00 – 3.00)	24	68.50	- 2.22	0.02*
		EG	2.00 (2.00 – 3.00)	3.00 (2.00 – 3.00)	24			
	Categorisation	CG	2.00 (2.00 – 3.00)	2.00 (2.00 – 2.00)	24	102.50	- 1.438	0.05*
		EG	3.00 (3.00 – 3.00)	3.00 (3.00 – 3.75)	24			
	Pictorial Sequence	CG	3.00 (3.00 – 3.00)	3.00 (3.00 – 3.00)	24	110.50	- 1.08	0.02*
		EG	3.00 (2.00 – 3.00)	3.00 (3.00 – 3.00)	24			
	A Famous Personality	CG	3.00 (2.00 – 3.00)	3.00 (3.00 – 3.00)	24	96.000	- 1.24	0.02*
		EG	3.00 (2.00 – 3.00)	3.00 (2.00 – 3.00)	24			
6	A Personal Possession	CG	3.00 (2.00 – 3.75)	3.00 (3.00 – 4.00)	24	76.500	- 2.30	0.05*
		EG	3.00 (2.00 – 3.75)	2.50 (2.00 – 3.00)	24			
	Everyday Objects	CG	3.00 (3.00 – 3.00)	3.00 (3.00 – 4.00)	24	36.500	- 3.45	0.05*
		EG	3.00 (3.00 – 3.00)	3.00 (2.00 – 3.00)	24			
	Attention and Concentration	CG	3.50 (3.00 – 4.00)	4.00 (4.00 – 4.00)	24	36.500	- 3.45	0.05*
		EG	3.00 (2.00 – 4.00)	3.00 (2.00 – 3.00)	24			

## 5.0 Discussion

The present study investigates the effects of CST-M on the cognitive functions of older people with mild dementia living in an institution. Findings from the study suggested that the CST-M programme improved most components in the domain of cognitive functions, especially orientations, thinking operation, visuomotor organisation and memory among older people with mild dementia in the institution. The improvement in cognitive functions are aligned with the findings from previous literature regarding the effect of CST on improving cognitive functions among older people (Woods et al., 2012; Aguirre et al., 2013; Lin et al., 2018; Sarageh et al., 2022). It is postulated that the changes in cognitions are results of the enriched environment and sensory stimulations in the activity that may induce hippocampal neurogenesis, an increase in synaptic plasticity and density, an increase in the alpha wave in addition to the decrease of cortisol during engagement in the activities as suggested in the previous study (Carrion et al., 2018; Chalfont et al., 2020). However, some of the components of cognitive functions measured by LOTCA-G, e.g. two components in praxis and visuomotor organisation, were found not improved in this present study. This is probably because the participants in this study are all categorised in the early stage of dementia. In the aspect of social relationships, this CST-M positively affects the social relationship among older people with mild dementia in the institution. This is because the activities in the program were carried out in a group session where older people will have the opportunity to know each other and complete every session of the program. Other variables include the nature of the activity, where they need to work in pairs, work in a group, and share and exchange their ideas. This will help break the barriers between them before enrollment in the intervention program, providing self-efficacy and confidence and eventually facilitating success during engagement in activity (Shin et al., 2009).

The activity and the principles of this CST-M could mediate significant changes in the cognitions. This result is aligned with the findings from previous studies regarding the effect of CST-M on improving cognitive functions among older people (Woods et al., 2012; Aguirre et al., 2013; Lin et al., 2018; Sarageh et al., 2022). The program provides meaningful and person-centred activities for the participants. The selection of meaningful activities in the CST-M involves values, benefits, motivation and readiness to engage. It could be past activities, activities related to previous life roles, or a new activity that they want to engage with where it was found to facilitate wellbeing (Harmer & Orrell, 2008). Person-centred activity in this intervention context focuses on the participants' strengths (rather than focusing on dementia and its associated impairments) by reflecting on lifetime experience, a skill gained, interests, preferences and abilities throughout their lifetime. In addition, the CST-M also has been designed to be delivered in a fun and delightful way which will fulfil the objectives and focus on opinion rather than facts. These activities including stimulation to cognitions, simple and enjoyable delivery; active involvement and inclusion from all participants in the group, multi-choice of activities reflecting the past and present, and always providing prompt, guidance and encouragement throughout the session. The activities conducted may induce hippocampal neurogenesis, increase synaptic plasticity and density, increase alpha wave, and decrease cortisol during engagement, as suggested in the previous studies (Carrion et al., 2018; Chalfont et al., 2020). Hence, it is recommended that the CST-M is conducted as a standard NPI for older people with mild cognitive impairment in Malaysia.

The limitation of this study is that the participants are older people with mild dementia who live in one elderly institution, while those with moderate and severe dementia were excluded. Further studies should enrol participants from any stages of dementia and also should be conducted on the older people in the community to provide more substantial and conclusive evidence regarding the effects of the CST-



M. Another limitation is that the recruitment of the participants did not consider whether the participant was taking or not taking any medication for dementia. In addition, the limitation is related to the living arrangement in the institution. Participants in this study are living in a communal environment. This may raise an issue and threat to internal validity through contamination, and it was addressed as above. However, Galbraith (2007) stressed that researchers should be less concerned about bias from contamination if differences in study measures were found between groups that provide evidence to reject the null hypothesis.

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## Paper Contribution to Related Field of Study

This paper contributes to the field of Medicine and Health Sciences, especially in the field of Alzheimer's research.

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