

## 研究成果の刊行に関する一覧表レイアウト (参考)

## 書籍

著者氏名	論文タイトル名	書籍全体の編集者名	書籍名	出版社名	出版地	出版年	ページ
池田 学	前頭側頭型認知症	日本老年精神医学会編	改訂・老年精神医学講座；各論	ワールドプランニング	東京	2009	69-88
池田 学	前頭側頭葉変性症	認知症学会編	認知症テキストブック	中外医学社	東京	2008	300-309
池田 学	アルツハイマー型変性認知症	山口徹, 北原光夫, 福井次矢総編	今日の治療指針2009年版ー私はこう治療している	医学書院	東京	2009	717-718
谷向 知	前頭側頭型認知症の治療とマネジメント	大内尉義	老年医学の基礎と臨床II	ワールドプランニング	東京	2009	<i>in press</i>
谷向 知	認知症の方への介入	田宮菜奈子	根拠に基づいた高齢者施設ケア,	金芳堂	京都	2009	<i>in press</i>

## 雑誌

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Miyamoto M, Kodama C, Kinoshita T, Yamashita F, Hidaka S, Mizukami K, Kakuma T, Asada T.	Dementia and mild cognitive impairment among non-responders to a community survey.	J Clin Neurosci	16	270-276	2009
Okumura Y, Tanimukai S, Asada T.	Effects of short-term reminiscence therapy on elderly with dementia: A comparison with everyday conversation approaches.	Psychogeriatrics	8(3)	124-133	2008

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Sasaki M, Kodama C, Hidaka S, Yamashita F, Kinoshita T, Nemoto K, Ikejima C, Asada T.	Prevalence of four subtypes of mild cognitive impairment and APOE in a Japanese Community.	Int J Geriatr Psychiatry			(in press)
Ikejima C, Yasuno F, Mizukami K, Sasaki M, Tanimukai S, Asada T.	Prevalence and causes of early-onset dementia in Japan: A population-based study.	Stroke			(in press)
朝田 隆	若年性認知症という残された課題	精神神経学雑誌	110(1)	13-21	2008
Sato S, Mizukami K, Asada T.	A preliminary open-label study of 5-HT1A partial agonist tandospirone for behavioural and psychological symptoms associated with dementia.	Int J Neuropsychopharmacol	Jul 3	1-3 [Epub]	2006
Hirao K, Ohnishi T, Matsuda H, Nemoto K, Hirata Y, Yamashita F, Asada T, Iwamoto T.	Functional interactions between entorhinal cortex and posterior cingulate cortex at the very early stage of Alzheimer's disease using brain perfusion single-photon emission computed tomography.	Nuclear Medicine Communications	27	151-156	2006
Mizukami K, Tanaka Y, Asada T.	Efficacy of milnacipran on the depressive state in patients with Alzheimer's disease.	Prog Neuropsychopharmacol Biol Psychiatry	30	1342-1346	2006

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Sato S, Mizukami K, Moro K, Tanaka Y, <u>Asada T.</u>	Efficacy of perospirone in the management of aggressive behavior associated with dementia.	Prog Neuropsychol Biol Psychiatry	30	679-683	2006
Nakano S, <u>Asada T.</u> , Yamashita F, Kitamura N, Matsuda H, Hirai S, Yamada T.	Relationship between antisocial behavior and regional cerebral blood flow in frontotemporal dementia.	Neuroimage	32	301-306	2006
Ota M, Obata T, Akine Y, Ito H, Ikehira H, <u>Asada T.</u> , Suhara T.	Age-related degeneration of corpus callosum measured with diffusion tensor imaging.	Neuroimage	31	1445-1452	2006
Ota M, Sato N, Ohya Y, Aoki Y, Mizukami K, Mori T, <u>Asada T.</u>	Relationship between diffusion tensor imaging and brain morphology in patients with myotonic dystrophy.	Neurosci Lett.	407	234-239	2006
Shinagawa S, Toyota Y, Ishikawa T, Fukuhara R, Hokoishi K, Komori K, Tanimukai S, <u>Ikeda M</u>	Cognitive function and psychiatric symptoms in early- and late-onset frontotemporal dementia	Dement Geriatr Cogn Disord	25	439-444	2008
Yokota O, Tsuchiya K, Terada S, Ishizu H, Uchikado H, <u>Ikeda M.</u> Oyanagi K, Nakano I, Murayama S, Kuroda S, Akiyama H	Basophilic inclusion body disease and neuronal intermediate filament inclusion disease: a comparative clinicopathological study	Acta Neuropathol	115	561-575	2008

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
石川智久, 中川賀嗣, 小森憲治郎, 池田学, 田辺敬貴	右側優位の側頭葉萎縮をともなった相貌認知障害の一症例	高次脳機能研究	28	1-10	2008
繁信和恵, 博野信次, 田伏 薫, 池田学	日本語版 NPI-NH の妥当性と信頼性の検討	Brain and Nerve	60	1463-1469	2008
池田学	前頭側頭型認知症の症候学	臨床神経学	48(11)	1002-1004	2008
本田和揮, 橋本衛, 池田学	アルツハイマー病とピック病の鑑別	診断と治療	96(11)	2314-2320	2008
池田学	記憶障害の臨床	神経心理学	24(2)	109-114	2008
Ishikawa T, Ikeda M	Mild cognitive impairment in a population-based epidemiology	PSYCHOGERIA TRICS	7	104-108	2007
Shinagawa S, Ikeda M, Toyota Y, Matsumoto T, Matsumoto N, Mori T, Ishikawa T, Fukuhara R, Komori K, Hokoishi K, Tanabe H	Frequency and clinical characteristics of early-onset dementia in consecutive patients in a memory clinic	Dement Geriatr Cogn Disord	24	42-47	2007
Arai A, Matsumoto T, Ikeda M, Arai Y	Do family caregivers perceive more difficulty when they look after patients with early onset dementia compared to those with late onset dementia	Int J Geriatr Psychiatry	22	1255-1261	2007
品川俊一郎, 池田学	ピック病の症状・経過について	老年精神医学雑誌	18	591-597	2007
橋本衛, 池田学	家族性アルツハイマー病症例の神経心理学的所見	Cognition and Dementia	6	217-233	2007
谷向 知, 池田学	4大認知症疾患の非薬物療法的対応	精神科治療学	22(12)	1427-1430	2007

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
宮永和夫	認知症のサイコエデュケーション	精神科	13(3)	200-205	2008
宮永和夫	若年認知症	カレントセラピー	26(4)	75	2008
宮永和夫	タウ蛋白と神経変性前頭側頭型認知症と介護	Cognition and Dementia	7(2)	59-67	2008
宮永和夫	健康な加齢の支援	精神科臨床サービス	8(2)	162-168	2008
宮永和夫	若年認知症	臨床精神医学	37(5)	511-520	2008
宮永 和夫	若年認知症とうつ病	精神科	11(1)	6-13	2007
宮永 和夫	地域住民に求める若年認知症ケア	日本住宅ケア学会誌	11(1)	9-16	2007
宮永 和夫	4大認知症の疫学	精神科治療学	22(12)	1359-1372	2007
Okumura Y, Tanimukai S, Asada T.	Effects of short-term reminiscence therapy on elderly with dementia: A comparison with everyday conversation approaches.	Psychogeriatrics	8(3)	124-133	2008
Shinagawa S, Toyota Y, Ishikawa T, Fukuhara R, Hokoishi K, Komori K, Tanimukai S, Ikeda M.	Cognitive function and psychiatric symptoms in early- and late-onset frontotemporal dementia.	Dement. Geriatr Cogn Disord.	25(5)	439-444	2008
谷向 知, 小森憲次郎, 銚石和彦, 福原竜治, 石川智久, 豊田泰孝, 檜林哲雄, 清水秀明, 品川俊一郎, 池嶋千秋	ピック病の病感について	愛媛医学	27(3)	157-159	2008

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
石川智久, 小森憲次郎, 福原竜治, 榎林哲雄, 清水秀明, <u>谷向知</u>	前頭側頭葉変性症の精神症状に対する抑肝散の使用経験	精神医学	51	in press	2009
松本光央, <u>谷向知</u> , 塩田一雄	精神病院におけるBPSDへの対応と課題	老年精神医学雑誌	18(12)	1333-1339	2007
<u>谷向知</u>	若年性アルツハイマー病	日本臨床	66 (増刊号1)	332-335	2007
田邊 敬貴	ピック病の位置づけー前頭側頭型認知症との関連ー	老年精神医学雑誌	18(6)	585-590	2007
Toyota Y, Ikeda M, Shinagawa S, Matsumoto T, Matsumoto N, Hokoishi K, Fukuhara R, Ishikawa T, Mori T, Adachi H, Komori K, <u>Tanabe H.</u>	Comparison of behavioral and psychological symptoms in early-onset and late-onset Alzheimer's disease.	Int J Geriatr Psychiatry	22(9)	896-901	2007
Matsumoto N, Ikeda M, Fukuhara R, Shinagawa S, Ishikawa T, Mori T, Toyota Y, Matsumoto T, Adachi H, Hirono N, <u>Tanabe H.</u>	Caregiver's burden associated with behavioral and psychological symptoms of dementia in the local community elderly people.	Dement Geriatr Cogn Disord	23	219-224	2007
Mori T, Ikeda M, Fukuhara R, Nestor PJ, <u>Tanabe H.</u>	Correlation of visual hallucinations with occipital rCBF changes by donepezil in DLB.	Neurology	66	935-937	2006

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
松本直美, 池田学, 福原竜治, 兵頭隆幸, 石川智久, 森 崇明, 豊田泰孝, 松本光央, 足立浩祥, 品川俊一郎, 銚石和彦, <u>田辺敬貴</u> , 博野信次.	日本語版 NPI-D と NPI-Q の妥当性と信頼性の検討.	脳神経	58	785-790	2006
松本光央, 池田学, 豊田泰孝, 石川智久, 上村直人, 博野信次, <u>田辺敬貴</u> .	アルツハイマー病の運転能力低下に関するスクリーニング検査—ドライビングシミュレーターを用いた運転能力評価について—	老精医誌	17	977-985	2006

### Ⅲ. 研究成果の刊行物・別刷





Clinical Study

## Dementia and mild cognitive impairment among non-responders to a community survey

Misa Miyamoto<sup>a,d</sup>, Chiine Kodama<sup>a</sup>, Toru Kinoshita<sup>b</sup>, Fumio Yamashita<sup>a</sup>, Shin Hidaka<sup>a</sup>, Katsuyoshi Mizukami<sup>a</sup>, Tatsuyuki Kakuma<sup>c</sup>, Takashi Asada<sup>a,\*</sup>

<sup>a</sup> Department of Neuropsychiatry, Institute of Clinical Medicine, University of Tsukuba, Tsukuba, Japan

<sup>b</sup> Kodama Clinic, Tokyo, Japan

<sup>c</sup> Department of Biostatistics, Center of Statistics, Kurume University, Kurume, Japan

<sup>d</sup> Department of Neurology, Case Western Reserve University, Cleveland, OH, USA

Received 2 October 2007; accepted 2 March 2008

### Abstract

We aimed to estimate the prevalence of mild cognitive impairment (MCI) among elderly non-responders to a community-based survey. We conducted a two-phase, population-based cross-sectional study of community-dwelling individuals aged 65 years or older in Tone, located in central Japan. The first phase of the study consisted of physical and cognitive examinations of individuals who responded to the first recruitment (quick-responders), whereas the second phase included individuals who did not respond in the first phase (delayed-responders). We compared the prevalence of MCI and dementia between delayed-responders and quick-responders. Of the 2,698 potential candidates, 1,888 (1,619 quick-responders, 225 delayed-responders, and 44 nursing home residents) were enrolled (70.0%). The prevalence of MCI was 2.3-fold increased in delayed-responders compared to the quick-responders (OR = 2.27, 95% CI: 1.37–3.77,  $p = 0.002$ , aged  $\leq 74$ ). In order to develop a method for the early detection of dementia, we must pay more attention to delayed-or non-responders.

© 2008 Elsevier Ltd. All rights reserved.

**Keywords:** Cognitive function; Community survey; Long term care insurance; Mild cognitive impairment; Non-responder

### 1. Introduction

To avoid underestimating the prevalence of dementia in epidemiological studies, it is important to consider the non-responders.<sup>1</sup> Response rates decline with age and the cognitive states of non-responders are lower than responders.<sup>2–4</sup> Some recent studies have examined the cognitive functions of non-responders; individuals who do not respond to a community-based study. Norton et al. evaluated the characteristics of non-responders in a community survey of elderly individuals aged 75 years and older and reported that non-responders appeared to be disproportionately cogni-

tively impaired.<sup>5</sup> In addition, Launer et al. compared cognitive functioning between non-responders and responders among community-dwelling elderly aged 65 years and more.<sup>3</sup> They reported that non-responders aged 74 years or younger, but not those aged 75 years and older, showed poorer performances on a cognitive test compared to responders. However, the results of non-responders are still inconsistent.<sup>6</sup>

During the last decade, there have been several attempts to distinguish abnormal cognitive impairment from normal cognitive decline associated with aging. Herein, the term mild cognitive impairment (MCI) is used to describe such transitional states. Currently, MCI<sup>7</sup> and Ageing-Associated Cognitive Decline (AACD)<sup>8</sup> are widely accepted definitions of the boundary states between normal aging and dementia. Although the reported conversion rate to dementia varies widely, individuals with MCI<sup>9</sup> and

\* Corresponding author. Present address: Tennodai 1-1-1, Tsukuba City, Ibaraki 305-8575, Japan. Tel.: +81 29 853 3178; fax: +81 29 853 3182.

E-mail address: [tasadai@md.tsukuba.ac.jp](mailto:tasadai@md.tsukuba.ac.jp) (T. Asada).

AACD<sup>10</sup> develop dementia at a rate of 10% per year and 28% over 3 years, respectively.

To our knowledge, the relationship between the prevalence of MCI and non-responders has not been examined in a relatively large community study. Thus, the aim of the present study was to compare the prevalence of MCI and dementia between responders and non-responders in a community-based study of the elderly.

## 2. Methods

We conducted the survey in Tone, a town consisting of 22 districts, in a rural area, Ibaraki, about 40 km northeast of central Tokyo, Japan. On 1 May 2001, 3,083 inhabitants aged 65 years and older (the potential candidates) lived in the town (15.7% of the total population of Tone). The proportion of the elderly in Tone was similar to that of the whole of Japan as of 2001.

Seven psychiatrists, eight psychologists and public health nurses were trained for the present study by the primary investigator. The protocol of this study was approved by the ethics committee of the University of Tsukuba.

### 2.1. The first phase

The first phase of the project (Fig. 1) was conducted from December 2001 to April 2002. Before the baseline examination, we sent a letter to each potential candidate and explained the project's objectives. After the study was explained to the individuals and written informed consent obtained, all responders underwent a screening interview. One week before the group screening, we telephoned each candidate and asked him or her to participate. We also asked the local welfare commissioners (*Min-sei-in*: persons who are vested with promoting social welfare in each local area) to recommend individual residents to participate in the research. The individuals with whom a local welfare commissioner could not meet or contact after three telephone calls were excluded from the study (hereafter referred to as uncontactable individuals).

We visited each of the 22 districts once per week and conducted group screenings. We also visited a nursing home and examined 44 individuals using the same procedures as follows.

### 2.2. Assessment procedures

#### 2.2.1. Demographics, medical and psychiatric factors

The interview consisted of a structured questionnaire recording age, sex and education and assessing previous medical and psychiatric diseases and dementia risk factors, including alcohol and tobacco consumption. We also measured the height and weight of each responder.

#### 2.2.2. Mood state

The interview was followed by the 15-item short version of the Geriatric Depression Scale (GDS) for mood assess-

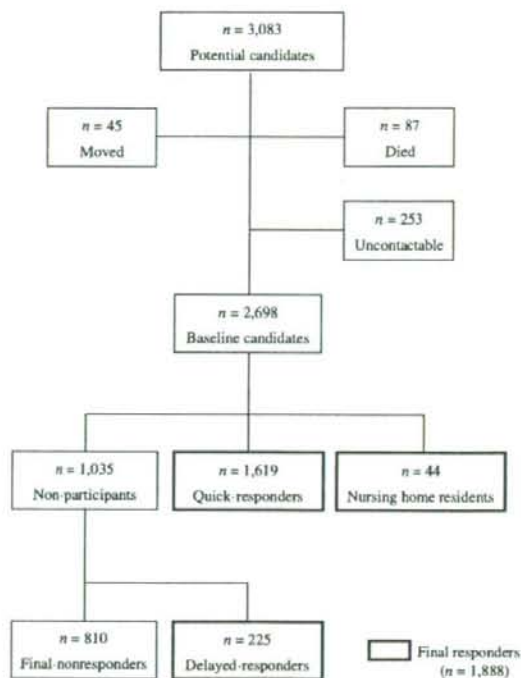


Fig. 1. Study population of the community-based survey conducted in Tone, Japan.

ment.<sup>11</sup> Those who scored six or more were considered to have depressive symptoms.

#### 2.2.3. Perceived memory difficulty

Responders were asked whether they had memory difficulties in general, as well as difficulties in specific areas according to the 19 items of the Détérioration Cognitive Observée (DECO), which was originally developed for an objective assessment of memory difficulty.<sup>12</sup> Responders were considered to have memory complaints if they indicated that they had problems on one or more of the items.

#### 2.2.4. Assessment of activities of daily living

Basic activities of daily living were measured using N geriatric rating scale for activities of daily living (N-ADL),<sup>13</sup> which determines the level of independence in five activities: walking/transferring, living area, dressing/bathing, eating and toileting. Responders were considered to be functionally intact if they reported no difficulty on any of the five items of the N-ADL.

#### 2.2.5. Neuropsychological assessment

After completing the interview, all responders underwent a group assessment which used a set of five tests measuring the following cognitive domains: attention, memory, visuospatial function, language and reasoning. We named this set of tests thereafter the 5-Cog. We evaluated atten-

tion by using a Japanese version of a set dependent activity.<sup>14</sup> The test assesses alternating attention, which refers to the capacity for mental flexibility that allows individuals to shift their focus of attention between tasks with different cognitive requirements. In this test, there were three rows on the page (top, middle and bottom) with three Chinese characters that meant “top”, “middle” or “bottom”. Some of the characters were placed in the incorrect rows. The responders were required to choose the characters that were placed in the correct rows. In order to assess the memory ability, we used a Category Cued Recall test.<sup>15</sup> A Clock Drawing test, which required the subjects to draw clock hands showing the time at “ten after eleven”<sup>16</sup> was used to assess visuospatial function. We examined language ability by using a category fluency test.<sup>17</sup> The subjects were asked to generate as many examples as possible in two minutes from the semantic category “animals”. The total number of animals named was the score for the test. To assess abstract reasoning ability, we employed the similarity subset of the Wechsler Adult Intelligence Scale-Revised (WAIS-R).<sup>18</sup>

This cognitive assessment was conducted in a group setting (maximum 50 participants) by an examiner with the use of a projector. Each screening was supervised by about 10 members of our research team. The mean length of the 5-Cog examination was 35 minutes. For responders who had difficulty understanding the tasks or had impaired hearing or vision, we conducted the examination using an individual version of the 5-Cog in a face-to-face setting.

During the interview and examinations, we estimated the visual acuity, hearing and speech ability of each subject. We also identified those individuals who could not respond to our instructions and/or some of the scales because of obvious cognitive impairment.

### 2.3. Consensus diagnosis

After each assessment, a group of psychiatrists and neuropsychologists reviewed the functional, medical, neurological, psychiatric and neuropsychological data and reached a consensus regarding the presence or absence of dementia according to the DSM-IV criteria.<sup>19</sup>

#### 2.3.1. Mild cognitive impairment diagnostic criteria

Criteria for MCI were retrospectively applied to individuals without dementia after the consensus conference. Consistent with standard criteria, for all subtypes of MCI,<sup>20</sup> those considered for MCI were required to have: (i) a memory complaint (defined previously); (ii) objective impairment in at least one cognitive domain based on the average of the scores on the neuropsychological measures within that domain, and 1 standard deviation (SD) and 1.5 SD cut-off using normative corrections for age, sex and years of education; (iii) essentially preserved activities of daily living (defined above); and (iv) no diagnosis of dementia at the consensus conference.

We identified each subtype of MCI<sup>21</sup> to estimate the overall prevalence of MCI. First, for our subtype of MCI-amnesic, memory impairment was defined as a score less than 1 or 1.5 SD below the demographically corrected mean on the Category Cued Recall test, and performance on scores from all other cognitive domains (i.e. attention, language, visuospatial and reasoning) was required to fall within normal limits (score must be more than 1 or 1.5 SD below the demographically corrected mean).

The second subtype was classified as nonamnesic MCI single domain. The nonamnesic MCI single domain has a cognitive impairment in a single nonmemory domain and performance on scores in all other cognitive domains fell within normal limits.

Finally, a diagnosis of MCI-multiple cognitive domains with memory impairment was made if there was objective impairment on the memory domain score and if there was impairment on one or more cognitive domains. The diagnosis of MCI-multiple cognitive domains without memory impairment was assigned if there was impairment in two or more of the four nonmemory domains, and if the memory domain score was within normal limits. The classification into each MCI subtype was mutually exclusive.

### 2.4. The second phase – delayed-responders

At the completion of the first phase of the study, we identified a total of 1,035 non-responders who were contacted but who had refused to participate, excluding the uncontactable individuals as defined above. We attempted a door-to-door survey of those non-responders. The second phase of the study was conducted with the aid of general practitioners and local welfare commissioners. We asked them to contact and explain our project to the individuals who appeared on the non-responders list. Subsequently, between April and June 2002, 225 of the non-responders who did not respond to the first phase of the survey agreed to participate (hereafter referred to as delayed-responders). A psychiatrist (T.A.) and a psychologist visited each delayed-responder's home and conducted the same interview and examinations that were used in the first phase. The individual version of the 5-Cog was used for cognitive assessment. When we suspected that an individual had dementia, we used the same procedure to diagnose dementia as described above.

### 2.5. Long-Term Care Insurance

In Japan, care services for frail community-dwelling elderly individuals are provided by a public Long-Term Care Insurance (LTCI) system that was launched in April 2000.<sup>22</sup> Currently, many frail elderly individuals use services provided by the LTCI system. On 30 June 2001, the Tone town office approved our use of data from the LTCI system, provided we maintained anonymity of the participants and limited our use of the data to the present study. The data comprised demographic and medical information from all 263 individuals (131 quick-responders, 10 delayed-

responders, 122 final-nonresponders) except for 44 nursing home residents who were aged 65 years and older and who were registered in the LTCI system.

We compared the rate of LTCI use between the responders (i.e. quick-responders and delayed-responders) and final-nonresponders. We also compared the prevalence of dementia between LTCI users and non-users among the responders.

### 2.6. Statistical analysis

The criteria of MCI require the normative corrections for age, sex and years of education. For the normative data, we excluded the data from responders who did not complete the series of interviews and examinations of cognitive assessment, and from those who had a diagnosis of dementia, including the 44 nursing home residents. Consequently, we analyzed the data from 1,449 of 1,619 (89.5%) of quick-responders and 153 of 225 (68.0%) of delayed-responders. We calculated mean and SD for scores in each of the five cognitive domains after controlling for age, sex and years of education to classify MCI.

In epidemiological research, it is known that old-old subjects (those 75 or older) are the most difficult to recruit. Thus, age may be an important factor for estimating the cognitive states of non-responders. We determined the cognitive states for young-old (aged 65–74 years) and old-old (aged 75 years and older) groups separately.

We compared the prevalence of dementia and MCI between quick-responders and delayed-responders by using two cut-off values (1 SD and 1.5 SD). Comparison of the performance of the 5-Cog was also conducted.

We employed a t-test and chi-square test for continuous and categorical variables, respectively. A statistical signifi-

cance level of 0.05 was used for all analyses. All analyses were performed using SPSS software version 15.0 (SPSS, Inc., Chicago, IL, US).

## 3. Results

### 3.1. The survey population

Of the 3,083 potential candidates, 132 were excluded (Fig. 1). Specifically, 87 had died and 45 had changed location before the initial examination. Additionally, 253 residents were uncontactable individuals. Thus, the remaining 2,698 residents were considered the candidates at the baseline. Of the 1,035 residents who refused to participate (non-responders), 225 became delayed-responders. Consequently, 1,888 (1,619 quick-responders, 225 delayed-responders, and 44 nursing home residents) (70.0%) of 2,698 baseline candidates were enrolled.

### 3.2. Demographics

Results of the baseline characteristics and clinical outcomes of quick-responders and delayed-responders along with the age and sex of nursing home residents are shown in Table 1. The results indicated that quick-responders were younger and more highly educated and showed better functioning than delayed-responders.

In addition, we also investigated age, sex and use of LTCI of final-nonresponders. These three variables were compared between final-responders (i.e. quick-responders and delayed-responders) and final-nonresponders. The final-nonresponders showed significantly higher rate in LTCI use, especially aged over 75 years (13.8% and 30.4%, respectively) ( $p < 0.001$ ).

Table 1  
Demographics and clinical data for the participants of the community-based survey

Characteristics	Participants total ( <i>n</i> = 1,888) No. (%)	Quick-responders ( <i>n</i> = 1,619) No. (%)	Delayed-responders ( <i>n</i> = 225) No. (%)	Nursing home residents ( <i>n</i> = 44) No. (%)	<i>p</i> value <sup>b</sup>
Age <sup>a</sup>	74.5 ± 6.6	74.1 ± 6.2	75.7 ± 7.5	84.0 ± 7.7	< 0.001***
Sex (% of women)	1137 (60.2)	962 (59.4)	147 (65.3)	28 (63.6)	0.090
Years of education <sup>a</sup>	9.8 ± 2.7	9.9 ± 2.7	9.0 ± 2.7	–	< 0.001***
GDS score <sup>a</sup>	3.0 ± 2.8	3.1 ± 2.8	2.4 ± 2.8	–	0.003**
N-ADL score <sup>a</sup>	48.7 ± 5.1	48.8 ± 5.0	47.9 ± 5.8	–	0.017*
BMI <sup>a</sup>	22.8 ± 3.3	22.8 ± 3.3	22.7 ± 3.3	–	0.657
Cerebral vascular disease	81 (4.5)	74 (4.6)	9 (4.0)	–	0.658
Hypertension	499 (27.5)	439 (27.1)	62 (27.6)	–	0.978
Diabetes mellitus	94 (5.2)	86 (5.3)	8 (3.6)	–	0.239
Smoking	630 (35.6)	563 (34.8)	67 (29.8)	–	0.979
Alcohol consumption	595 (33.6)	539 (33.3)	56 (24.9)	–	.247

GDS = Geriatric Depression Scale (higher score indicates more depressed state); N-ADL = N geriatric rating scale for activities of daily living (higher score indicates better function). \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

<sup>a</sup> Mean ± SD.

<sup>b</sup> Comparisons between quick-responders and delayed-responders.

Table 2  
Comparison of the risk of dementia and mild cognitive impairment between quick-responders and delayed-responders

	Quick-responders (n = 1619) No. (%)	Delayed-responders (n = 225) No. (%)	Unadjusted models			Adjusted models		
			OR	95% CI	p value	OR	95% CI	p value
Dementia	60 (3.7)	19 (8.4)	2.40	1.40–4.10	0.001**	2.27	0.96–5.36	0.062
Age 65–74 years	13 (1.4)	2 (1.8)	1.31	0.29–5.90	0.723	1.72	0.23–13.12	0.599
Age 75 years or over	47 (6.8)	17 (14.7)	2.36	1.30–4.27	0.005**	2.42	0.92–6.39	0.075
MCI-1SD below	567 (38.9)	67 (47.2)	1.40	0.99–1.98	0.055	1.44	0.99–2.10	0.055
Age 65–74 years	301 (34.4)	37 (50.7)	1.96	1.21–3.17	0.006**	2.27	1.37–3.77	0.002**
Age 75 years or over	266 (45.7)	30 (43.5)	0.91	0.55–1.51	0.726	0.83	0.47–1.46	0.513
MCI-1.5SD below	276 (18.9)	28 (19.7)	1.05	0.68–1.62	0.822	1.19	0.75–1.87	0.458
Age 65–74 years	161 (18.4)	14 (19.2)	1.05	0.57–1.93	0.869	1.33	0.71–2.51	0.374
Age 75 years or over	115 (19.8)	14 (20.3)	1.03	0.56–1.92	0.917	0.97	0.50–1.88	0.924

For mild cognitive impairment (MCI) analyses, 1,457 quick-responders and 142 delayed-responders were included.

\*\*  $p < 0.01$ .

Adjusted odds ratios (ORs) were calculated after controlling for age, sex, years of education, Geriatric Depression Scale (GDS) and Nishimura's Activities of Daily Living (ADL). CI = confidence interval, SD = standard deviation.

### 3.3. Dementia

As a result of the consensus diagnosis meeting, 60 quick-responders were identified as having dementia. We estimated the prevalence of dementia among quick-responders to be 3.7% (60/1,619). On the other hand, the second phase showed that 19 of the 225 subjects (8.4%) had dementia. Thus, the prevalence of dementia was significantly higher for delayed-responders than quick-responders ( $p = 0.001$ ). In total, we estimated the overall prevalence of dementia in our community samples to be 6.5% ((60 + 19 + 44)/(1,619 + 225 + 44)), which is similar to the estimated dementia prevalence of 7.3% for the whole of Japan as of 2001 (Table 2).

### 3.4. Mild cognitive impairment

Among the samples with complete data for cognitive assessment, 1,457 quick-responders and 142 delayed-responders without loss of information on subjective memory complaint were included for this analysis. Using 1 SD and 1.5 SD cut-off values, 567 and 276 of 1,457 (38.9%, 18.9%) quick-responders and 67 and 28 of 142 delayed-responders (47.2%, 19.7%) were indicated to have some type of MCI, respectively. In order to examine the results more thoroughly, we used logistic regression analysis. As shown in Table 2, the rate of MCI (1 SD cut-off) was significantly higher for delayed-responders aged 74 or younger, even after controlling for age, sex, years of education, GDS score and ADL (adjusted odds ratio [OR] = 2.27, 95% confidence interval [CI]: 1.37–3.77,  $p = 0.002$ ). The unadjusted OR for dementia was significantly higher in the old-old group; however, the significance disappeared after adjusting these variables.

### 3.5. Cognitive performance on five domains

We also compared cognitive function between quick-responders and delayed-responders after excluding individuals with dementia. The scores on memory function were

Table 3  
Distributions of dementia among the users of long-term care insurance

Long-term care insurance	Dementia No. (%)	Non-dementia No. (%)	p value
User	43 (30.5)	98 (69.5)	< 0.001
Non-user	36 (2.1)	1,667 (97.9)	

significantly lower for delayed-responders than quick-responders, both in those aged 65–74 and over 75 years ( $p < 0.001$  and  $p = 0.039$ , respectively).

### 3.6. Long-Term Care Insurance

To provide further details on the non-responders, we also examined the data on LTCI. While 141 responders (131 of quick-responders and 10 of delayed-responders) proved to be the LTCI users, only 39 of these 141 provided complete data, which indicated that 102 of the 141 users were cognitively and/or physically so frail that they could not complete some of the examinations. We compared 141 LTCI users and 1,703 non-users among responders in terms of prevalence of dementia. The comparison revealed a significantly higher prevalence of dementia for the LTCI users (30.5%) than the non-users (2.1%,  $p < 0.001$ ) (Table 3).

## 4. Discussion

Participation rate is one of the most important issues for an epidemiological study. We recruited 1,888 (1,619 quick-responders, 225 delayed-responders and 44 nursing home residents) of the 2,698 potential candidates. Participation rates of recent large studies, for example, the Amsterdam study of the Elderly<sup>3</sup> and the Canadian Study of Health and Aging<sup>23</sup> were 71.5% and 72.1%, respectively. Therefore, participation rate of our study (70.0%) appears to be acceptable.

We found that the prevalence of MCI (1 SD cut-off) was higher for delayed-responders aged 74 or younger. In contrast to previous studies,<sup>3</sup> the present study indicated that delayed-responders had a higher prevalence rate of dementia in the old-old group. The discordance is presumably attributable to methodological differences, namely recruitment of non-responders or assessment of cognitive functions. We, however, believe that non-responders in general are in lower cognitive states for the following reasons. First, the prevalence of LTCI use was significantly higher among final-nonresponders than the responders ( $p < 0.001$ ). In addition, the LTCI data revealed that the prevalence of dementia was significantly increased in the LTCI users than the non-users among the responders (Table 3). These results suggest that the prevalence rate of dementia is higher in final-nonresponders.

It has been said that if a person is identified as having amnesic MCI, this subtype will have a high likelihood of developing Alzheimer's disease.<sup>7</sup> When compared with quick-responders in our study, delayed-responders had a 2.3-fold higher prevalence of MCI (OR = 2.27, 95% CI: 1.37–3.77) and significantly impaired memory function ( $p < 0.001$ ). These results suggest that the delayed-responders have increased likelihood of MCI and developing dementia in later in life.

With regard to methodological issues, we used different settings of examining cognitive functions between quick-responders and delayed-responders. These differences might have affected the results. It has been said that face-to-face interaction is more effective than other methods in a health education area.<sup>24</sup> One of the reasons for the effectiveness of face-to-face interaction is that participants can receive timely feedback. Despite this advantage, delayed-responders exhibited significantly lower cognitive scores. Furthermore, we used only the data from 1,449 of 1,619 (89.5%) quick-responders and 153 of 225 (68.0%) delayed-responders for the normative data. However, the difference in the rate of use of data does not appear to have contributed to the poorer cognitive function observed among delayed-responders. The primary reason for the lower rate of delayed-responders (68.0%) was that many had such severe cognitive impairment that they could not complete the series of examinations. Thus, we may have overestimated cognitive functions of delayed-responders. Even with the possibility of overestimation, our results indicated lower cognitive function among delayed-responders.

The present study has some strength. While many of the previous similar studies<sup>3,5</sup> evaluated the cognitive function by using simple screening tests such as the Mini-Mental State Examination, we used an extensive cognitive test battery. Furthermore, we employed 1 and 1.5 SD cut-off using normative corrections for age, sex and years of education. These methods allowed us a more precise estimate of cognitive functions.

The present study also has limitations. One of the limitations is that the local welfare commissioners recom-

mended individual residents for participation in the research, although the uncontactable individuals were excluded from the study. Excluding subjects and final-nonresponders may have produced distortions in the results. Nevertheless, we also confirmed the data regarding final-nonresponders including age, sex and LTCI use. Using the LTCI data made it possible to understand some basic characteristics of final-nonresponders. However, there is a possibility we may not be able to fully clarify the details of final-nonresponders. Second, we followed 8.3% (225/2,698) of delayed-responders. According to the previous research, approximately 6% to 14% non-responders were studied.<sup>3,4,6</sup> Moreover, Launer et al. attempted to collect 10% of all non-responders to clarify the characteristics and 8.5% of non-responders were studied.<sup>3</sup> In our study, 21.7% (225/1,035) of whole non-responders were followed. Thus, these delayed-responders could be compared with quick-responders. Third, we conducted a cross-sectional study. Further longitudinal study would be required to reveal a lifelong cognitive trajectory of non-responders.

In conclusion, we found that the prevalence of MCI was increased 2.3-fold in delayed-responders aged 74 or younger compared to the quick-responders. Our findings also suggest that non-responders are, in general, in lower cognitive states and have a higher prevalence of dementia. In order to develop services for persons with dementia, including early interventions, we must pay more attention to non-responders.

#### Acknowledgements

Funding for this research was obtained from the Ministry of Health, Labour and Welfare (Grant No. H13-dementia and fracture-003). The authors sincerely appreciate Dr Peter J. Whitehouse, Dr Terri Mester, Daniel R. George and Bradley D. Farnsworth for their assistance with the manuscript and Ms Keiko Murata for her effort with the project.

#### References

- Forbes WF, Barham JF. Concerning the prevalence of dementia. *Can J Public Health* 1991;82:185–8.
- Herzog AR, Rodgers WL. Age and response rates to interview sample surveys. *J Gerontol* 1988;43:S200–5.
- Launer LJ, Wind AW, Deeg DJ. Nonresponse pattern and bias in a community-based cross-sectional study of cognitive functioning among the elderly. *Am J Epidemiol* 1994;139:803–12.
- Jacomb PA, Jorm AF, Korten AE, et al. Predictors of refusal to participate: a longitudinal health survey of the elderly in Australia. *BMC Public Health* 2002;2:4.
- Norton MC, Breitner JC, Welsh KA, et al. Characteristics of nonresponders in a community survey of the elderly. *J Am Geriatr Soc* 1994;42:1252–6.
- Boersma F, Eefsting JA, van den Brink W, et al. Characteristics of non-responders and the impact of non-response on prevalence estimates of dementia. *Int J Epidemiol* 1997;26:1055–62.
- Petersen RC, Doody R, Kurz A, et al. Current concepts in mild cognitive impairment. *Arch Neurol* 2001;58:1985–92.

8. Levy R. Aging-associated cognitive decline. Working Party of the International Psychogeriatric Association in collaboration with the World Health Organization. *Int Psychogeriatr* 1994;6:63–8.
9. Luis CA, Loewenstein DA, Acevedo A, et al. Mild cognitive impairment: Directions for future research. *Neurology* 2003;61:438–44.
10. Ritchie K, Artero S, Touchon J. Classification criteria for mild cognitive impairment: A population-based validation study. *Neurology* 2001;56:37–42.
11. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: A preliminary report. *J Psychiatr Res* 1982;17:37–49.
12. Ritchie K, Fuhrer R. A comparative study of the performance of screening tests for senile dementia using receiver operating characteristics analysis. *J Clin Epidemiol* 1992;45:627–37.
13. Nishimura T, Kobayashi T, Hariguchi S, et al. Scales for mental state and daily living activities for the elderly: Clinical behavioral scales for assessing demented patients. *Int Psychogeriatr* 1993;5: 117–34.
14. Sohlberg M, Mateer CA. *Attention Process Training Manual*. Washington: Association for neuropsychological research and development; 1986.
15. Grober E, Buschke H, Crystal H, et al. Screening for dementia by memory testing. *Neurology* 1988;38:900–3.
16. Freedman M, Leach L, Kaplan E. *Clock drawing. A neuropsychological analysis*. New York: Oxford University Press; 1994.
17. Solomon PR, Pendlebury WW. Recognition of Alzheimer's disease: The 7 Minute Screen. *Fam Med* 1998;30:265–71.
18. Wechsler D. *WAIS-R: Manual: Wechsler Adult Intelligence Scale-Revised*. New York: Harcourt Brace Jovanovich for Psychological Corp; 1981.
19. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. Fourth ed. Washington DC: APA; 1994.
20. Petersen RC. *Mild Cognitive Impairment: Aging to Alzheimer's Disease*. New York: Oxford; 2003.
21. Petersen RC, Morris JC. Mild cognitive impairment as a clinical entity and treatment target. *Arch Neurol* 2005;62:1160–3, discussion 1167.
22. Tsutsui T, Muramatsu N. Care-needs certification in the long-term care insurance system of Japan. *J Am Geriatr Soc* 2005;53:522–7.
23. The Canadian Study of Health and Aging Working Group. The incidence of dementia in Canada. *Neurology* 2000;55:66–73.
24. Araki I, Hashimoto H, Kono K, et al. Controlled trial of health education through face-to-face counseling vs. e-mail on drinking behavior modification. *J Occup Health* 2006;48:239–45.

## ORIGINAL ARTICLE

## Effects of short-term reminiscence therapy on elderly with dementia: A comparison with everyday conversation approaches

Yumiko OKUMURA,<sup>1,2</sup> Satoshi TANIMUKAI<sup>1</sup> and Takashi ASADA<sup>2</sup>

Department of Clinical Psychology, Faculty of Health and Welfare, Kawasaki University of Medical Welfare, Kurashiki, Okayama, Department of Clinical Neuroscience, Graduate School of Comprehensive Human Sciences, University of Tsukuba, Tsukuba, Ibaraki and Department of Neuropsychiatry, Neuroscience, Ehime University Graduate School of Medicine, Itoon, Ehime, Japan

Correspondence: Yumiko Okumura MA, Department of Clinical Psychology, Faculty of Health and Welfare, Kawasaki University of Medical Welfare, Matsushima, Kurashiki, Okayama 701-0193, Japan. Email: yokumura@mwk.wakwasaki-u.ac.jp

Received 5 November 2007; accepted 29 February 2008

**Key words:** elderly with dementia, non-verbal communication, reminiscence therapy, verbal fluency.

### INTRODUCTION

As the importance of individual care for elderly people with dementia is increasingly recognized, improving the quality of care is becoming the expected norm. In particular, psychological and sociological therapeutic approaches are being introduced in the hope that they will help maintain an optimal mental condition of the

demented elderly. Reminiscence therapy is one of these approaches, in which the elderly recall various experiences from their past life and share them with others. Through this process, it is expected that emotional stability will be promoted and that the elderly will be able to share their knowledge and areas of expertise.<sup>1–6</sup> Psychological and sociological

### Abstract

**Background:** Recent research has demonstrated the usefulness of reminiscence therapy as a psychosociological approach to the care of the demented elderly. However, to date neither the variables (e.g. evaluation methods and the optimal number of therapy sessions related to this technique) have been established, nor have the differences between reminiscence and other verbal interventions been clarified. In the field of clinical and nursing care in which reminiscence therapy is undertaken, in order to facilitate the participation of as large a number of elderly people as possible, both short- and long-term courses of sessions are needed. The present study conducted five therapy sessions using closed groups. Mainly, a verbal fluency task was used to assess the efficacy of therapy.

**Method:** The results of the five sessions that were conducted with a reminiscence therapy group (reminiscence group;  $n = 8$  ambulant elderly women with Alzheimer's-type dementia) were compared with those of an everyday conversation group (conversation group;  $n = 8$  ambulant elderly women with Alzheimer's-type dementia).

**Results:** In the reminiscence group, there was a significant increase in the number of words recalled at the end of the fifth session compared with that recalled at the end of the first session. In addition, the number of words recalled increased significantly compared with that recalled by the conversation group. Furthermore, the interchanges through non-verbal communication between others in the group improved and a positive change in participants' everyday life circumstances was observed. Moreover, the participants in the reminiscence group reported that they enjoyed the sessions.

**Conclusions:** Reminiscence therapy performed over a short period of time in closed groups was shown to be more effective than everyday conversations in the treatment of elderly people with dementia. It is suggested that the effectiveness of group reminiscence therapy should be ascertained not only by the verbal fluency tasks, but also by changes in patients' interactions with others through non-verbal communication.



approaches to caring for the demented elderly are necessary to draw a distinction between non-pharmacological therapies and recreation therapies.<sup>9</sup> However, studies have suggested that it is difficult to place reminiscence therapy within these classifications.<sup>10,11</sup> In addition, methods for evaluating the adequacy of reminiscence therapy, as well as the optimal means of implementing it, are still under investigation.<sup>12,13</sup> In particular, it is necessary to undertake investigations regarding the exact therapeutic pathways that are realized through reminiscence therapy in the context of care that supports the everyday lives of elderly people with dementia.

Prior research on reminiscence therapy has evaluated its effectiveness by analyzing the content of the memories recalled<sup>14</sup> and the interactions that took place during the sessions.<sup>2</sup> Other research has examined general cognitive functions, the ability to perform everyday living activities, personality, attentiveness, reaction times, and verbal/visuospatial functions.<sup>15</sup> However, in many studies, the assessment has been designed to fit the intentions and needs of the therapist.<sup>16</sup> It is important to undertake easy and simple evaluation methods that assess the efficacy of treatment approaches based on improvements in the patients' conditions. In addition, evaluation methods should take into account the context in which the therapy will ultimately be implemented.

In most cases, reminiscence therapy is conducted as a course consisting of approximately eight to 10 sessions with fixed members. However, when there are a large number of sessions and participation is fixed, it is likely that many elderly people suffering from dementia will not have the chance to participate in therapy. In the field of clinical and nursing care, a fewer number of sessions is preferable and considered more practical.

In a previous study, because reminiscence therapy is a verbal approach, the effectiveness of reminiscence therapy in elderly patients with Alzheimer's disease was investigated with a verbal fluency task reflecting the operation of verbal functions.<sup>17</sup> The results were compared with a group that did not receive reminiscence therapy intervention. The design of the study included a small number of sessions with a semiclosed group. Results indicated that, in the treatment group, the number of words recalled in the verbal fluency tasks increased significantly after five sessions and, moreover, increased significantly com-

pared with the number of words recalled by elderly people in the non-treatment group. The positive effects of reminiscence therapy, observed using a short-term, semiclosed treatment format, suggested that it was an appropriate means of fitting the treatment to the individual needs of patients. In addition to the benefits of long-term therapy with a closed group that have been reported in the literature, the results of that study of short-term therapy with a semiclosed group indicated the benefits of introducing reminiscence therapy to more elderly people with dementia. Furthermore, the study indicated the usefulness of verbal fluency tasks. However, the differences between the effects of reminiscence therapy and other verbal approaches to treatment have not been clarified, because prior studies have only used no-treatment control groups. In view of this limitation, the present study compared a reminiscence therapy group with an everyday conversation (control) group to determine the efficacy of reminiscence therapy.

## METHODS

The research was approved by the ethics committees of all the care facilities that participated in the study and was conducted according to their guidelines.

### Reminiscence and conversation groups

The two interventions (reminiscence and conversation) occurred over a course consisting of five therapy sessions that were designed similar to those in prior studies that used verbal fluency tasks for evaluation purposes,<sup>17</sup> with the exception that in the present study a closed group (all participants were fixed) was used in order to clarify the effects of the two different approaches. The sessions took place once a week for approximately 1 h.

At each session, the reminiscence group began with greetings (informing participants of the start of the meeting, the agenda, and the date, among other things) and then moved on to reminiscence. The session concluded with closing greetings (informing participants of the end of the meeting and other information). The group leader was one of the authors (YO), with one or two staff members participating as coleaders. There were four reminiscence themes: (i) childhood play; (ii) helping with housework; (iii) school memories; and (iv) memories centered on the current

**Table 1** Characteristics of the elderly subjects with dementia participating in reminiscence therapy or the everyday conversation group

	Reminiscence group (n = 8)	Conversation group (n = 8)
Sex	Women only	Women only
Age (years)		
Mean ( $\pm$ SD)	84.0 $\pm$ 4.7	84.0 $\pm$ 8.5
Range	(74–89)	(68–93)
MMSE (points)		
Mean (SD)	15.5 $\pm$ 3.6	14.9 $\pm$ 2.2
Range	(10–22)	(12–19)

season. The sessions were designed so that the first and final (fifth) sessions were based on the same theme.

A group engaging in everyday conversations was set up as a verbal control group to compare with the reminiscence group. There were no set themes for this group and they discussed everyday topics. With this exception, all other aspects of the sessions conducted with the conversation group were identical to those of the reminiscence therapy sessions.

### Participants

The participants consisted of elderly with dementia who were either in hospital, in a group home, or using day service centers. In accordance with the guidelines of the ethics committee of each facility, oral or written informed consent to participate in the study was obtained either from the participants or their families. The group receiving reminiscence therapy (reminiscence group) consisted of eight ambulant elderly women with Alzheimer's-type dementia (mean age 84.0  $\pm$  4.7 years; range 74–89 years) with mean scores on the Mini-Mental State Examination (MMSE)<sup>18</sup> of 15.5  $\pm$  3.6 points (range 10–22 points). The group participating in everyday conversations (conversation group) also consisted of eight ambulant elderly women with Alzheimer's-type dementia (mean age 84.0  $\pm$  8.5 years; range 68–93 years) with mean scores on the MMSE of 14.9  $\pm$  2.2 points (range 12–19 points; see Table 1). There were no significant differences in age ( $t_{(14)} = 0.00$ , NS) or MMSE score ( $t_{(14)} = 0.42$ , NS) between the two groups.

### Evaluation of outcomes

Treatment outcomes were evaluated in the same way in both groups. The MMSE was administered before

the initial session. In order to assess the effect of participating in the treatment, a four-item verbal fluency task was administered to the two groups. This included: (i) animal names; (ii) words beginning with the letter 'A'; (iii) words beginning with other letters ('KA', 'SA', 'TA', and 'NA'); and (iv) words related to the theme of the day in the reminiscence group. Similar to the method used in a prior study,<sup>17</sup> item (iii) was changed weekly with new letters according to the order of the Japanese syllables, 'KA', 'SA', 'TA', and 'NA'. The verbal fluency tasks were designed so that the first and final evaluations were based on the same items. After each session, participants returned to their living area, such as private rooms or common rooms, and individually recorded the words they could remember over a period of 1 min.

Furthermore, we used additional evaluation scales to ascertain whether there were changes beyond the number of words recalled.

The appearance of the reminiscence group at each session was evaluated using the Todai-shiki Observational Rating Scale (TORS).<sup>19,20</sup> This scale consists of 20 items designed to evaluate verbal communication, non-verbal communication, attention/interest, and emotion. One point was awarded to a participant each time an item on the scale was observed, such that higher scores indicated a better condition. The inter-rater reliability of the TORS in elderly dementia patients was confirmed.<sup>20</sup>

The participants' subjective feelings were also evaluated by asking them about their level of happiness after each group session, as they returned to their living areas. Mood was evaluated on a scale ranging from 1 (very unpleasant) to 5 (very good). Happiness was evaluated similarly on a scale ranging from 1 (didn't feel happy at all) to 5 (felt very happy).

Furthermore, the everyday condition of the participants was evaluated before the first session and after the last session using the Saint Marianna Hospital's Elderly Dementia Patients' Daycare Evaluation Table for care-giving staff<sup>21</sup> (hereafter, the Daycare Evaluation Table). The Daycare Evaluation Table was originally developed to evaluate the condition of the elderly while participating in daycare. The reliability and validity of the evaluation table was not confirmed. This evaluation table was adopted in the present study because its evaluation items and standards were considered an easy means by which to assess the condition of elderly patients with dementia.

Because the 31 items in total also include items concerning the condition of patients undertaking activities at the daycare site, one psychiatrist and one clinical psychologist independently extracted appropriate items to evaluate the condition of the elderly with dementia in everyday life. Finally, 10 items ('facial expression', 'cooperativeness', 'emotional tendency', 'reliance tendency', 'anxiety tendency', 'damage tendency', 'depression state', 'talking', 'spontaneously talking to others', and 'showing interest in others') were adopted as items for evaluation chosen by both the psychiatrist and clinical psychologist. In this scale, a lower the score indicates a better condition. The evaluations were performed by a psychologist or the care-giving staff. The conversation group was also evaluated in a similar manner.

### Analysis of results

Two-way analysis of variance (ANOVA) was conducted on the number of words recalled in the verbal fluency task. In addition, *t*-tests were performed on the results of TORS, the subjective feelings of the participants, and the Daycare Evaluation Table. Next, two-way ANOVA was conducted on the first and final evaluations on the verbal fluency task, TORS score, the subjective feelings of the participants, and the Daycare Evaluation Table for the two groups. A multiple comparison test (Dunnett's *t*-test) was used to determine any significant changes in the number of words for each session. Furthermore, correlation analysis was performed to ascertain whether there were any relationships among the scales indicating significant changes for the reminiscence group.

Because the reliability and validity of the Daycare Evaluation Table was not confirmed, in the present study a value of internal consistency of 10 items was calculated using Cronbach's alpha coefficient (Cronbach's  $\alpha = 0.88$ ).

The significance level was set at below 5%.

## RESULTS

### Comparison of first scores on each scale

The results of two-way ANOVA on the number of words remembered on the four verbal fluency tasks at the first evaluation were not significantly different within ( $F_{(3,42)} = 2.14$ , NS) or between ( $F_{(1,14)} = 0.23$ , NS) the two groups. Furthermore, no significant differences were found between the two groups on evaluation of the participants' condition during the first evaluation

of TORS verbal communication ( $t_{(14)} = 0.60$ , NS), non-verbal communication ( $t_{(14)} = -0.72$ , NS), attentiveness/interest ( $t_{(14)} = 0.86$ , NS), emotion ( $t_{(14)} = 0.51$ , NS), subjective feelings 'Mood' ( $t_{(14)} = 0.00$ , NS), and 'happiness' ( $t_{(14)} = -1.00$ , NS), or for the 10 items investigated using the Daycare Evaluation Table ( $t_{(14)} = 1.48$ , NS).

### Changes in verbal fluency scores between the two groups

#### Comparison of first and final evaluations

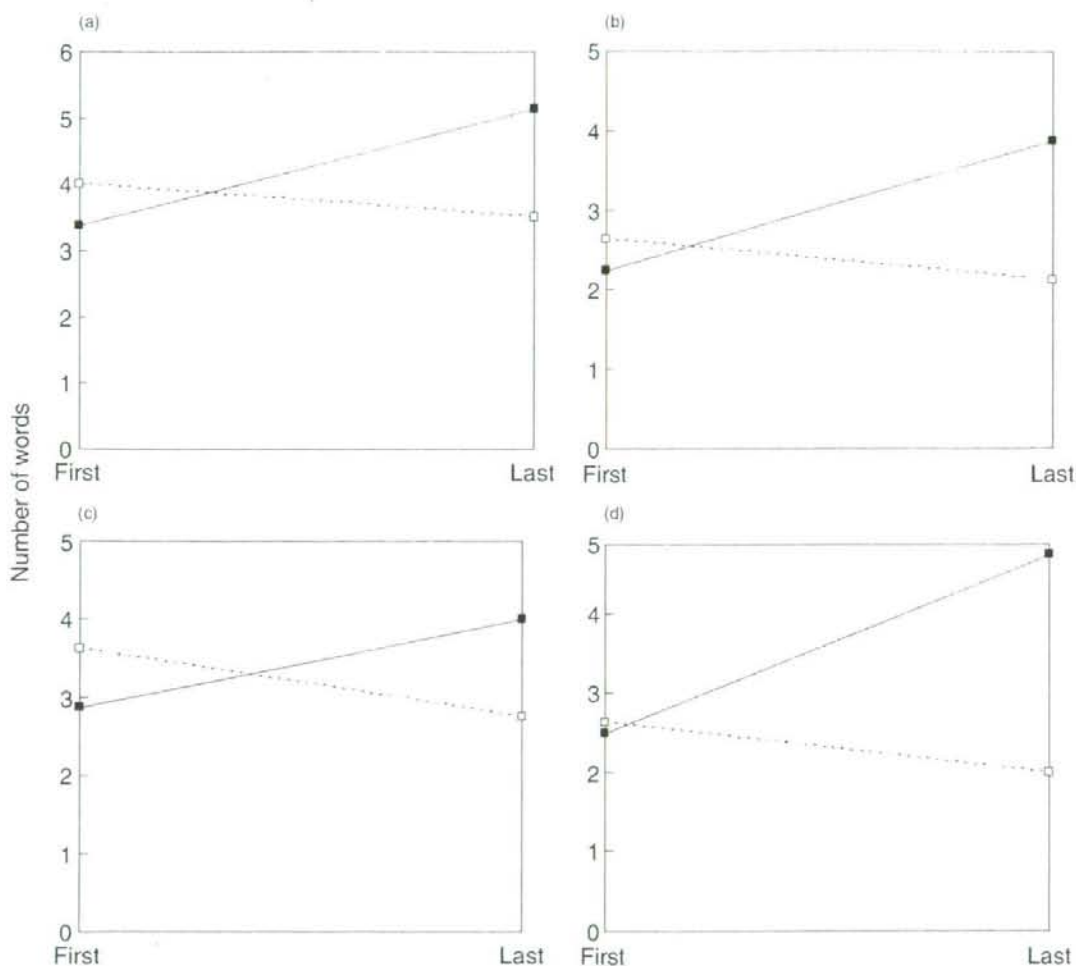
The mean verbal fluency score of the reminiscence group on the first and final evaluations changed from 3.4 to 5.1 for animal names (Fig. 1a), from 2.3 to 3.9 for words beginning with 'A' (Fig. 1b), from 2.9 to 4.0 for words beginning with another letter (Fig. 1c), and from 2.5 to 4.8 for words relating to the reminiscence theme of the day (Fig. 1d). These results clearly show that the number of words increased between the first and the final evaluations.

Conversely, the mean verbal fluency score of the conversation (control) group on the first and final evaluations changed from 4.0 to 3.5 for animal names (Fig. 1a), from 2.6 to 2.1 for words beginning with 'A' (Fig. 1b), from 3.6 to 2.8 for words beginning with another letter (Fig. 1c), and from 2.6 to 2.0 for words relating to the reminiscence theme of the day (Fig. 1d). It is clear that, in this group, the number of words between the first and final evaluations did not increase in any of the categories.

Next, the change in the total number of words on the first and final evaluations was compared for the two groups. In the conversation group, the mean number of words decreased from 12.9 to 10.4, whereas in the reminiscence group the mean number of words increased from 11.0 to 17.8 (Fig. 2). Two-way ANOVA revealed an interaction between the total number of words recalled on the first and final evaluations for each group ( $F_{(1,14)} = 13.79$ ,  $P = 0.002$ ). There was a significant difference in the number of words recalled on the first and final evaluations between the two groups (Table 2).

### Changes in the number of words recalled following the sessions

Changes in the total number of words recalled by the reminiscence group after each treatment session are shown in Fig. 3. Figure 3 shows that the number of



**Figure 1** Changes in the number of (a) animal names, (b) words beginning with the letter 'A', (c) words beginning with the letter 'KA', and (d) words relating to the theme recalled by patients in the reminiscence (■) and conversation (□) groups at the first and fifth evaluations of therapy.

words increased with the number of times reminiscence therapy was repeated. A multiple comparison test was used to investigate changes in the number of words over the five sessions. Compared with the first session, the number of words increased significantly in the reminiscence group from the third session onwards (after the third session,  $P=0.003$ ; after the fourth session,  $P=0.012$ ; after the fifth session,  $P=0.000$ ). Conversely, there was no significant

change in the number of words recalled by the conversation group between the first and the following sessions (Fig. 3).

#### Changes in other evaluations

Evaluation of patients on the first and final sessions using TORS indicated that there were significant differences only for non-verbal communication items between the two groups ( $F_{(1,14)}=13.60$ ,  $P=0.002$ ).