The Science Behind dakim BrainFitness™

The value of cognitive stimulation in fighting dementia and improving quality of life —the findings of nine research studies.

INTRODUCTION

Every seventy-one seconds, another senior is diagnosed with Alzheimer's disease. By age 85, half the population is afflicted! As a result, dementia caused by Alzheimer's disease represents the most severe threat to the quality of life of seniors. Staving off and/or slowing down the development of dementia is therefore the obvious reason for seniors to engage in a dedicated brain fitness program. Empowering seniors and their caregivers to fight this battle is the reason the Dakim® BrainFitness System was created.

Decades of medical research (see summarized articles below) have confirmed that frequent and long-term participation in cognitive stimulation is associated with a significant reduced risk of dementia—more than 60 percent.

What seniors want to know is, if they participate in a dedicated brain fitness program for the next five years, will they be better off for having done so? While there are no guarantees, Dakim BrainFitness has been designed to motivate the frequent, long-term participation in highly stimulating cognitive exercise medical research has shown is required to achieve this goal. However, the clinical trials proving this benefit for Dakim BrainFitness will take many years to conduct. In the near-term, Dakim has just completed a pilot study of Dakim BrainFitness, and in 2008 currently conducting a large scale clinical trail.

The following summarizes the medical research studies which support the value of rigorous cognitive exercise in helping seniors reduce their risk of dementia.

1. *Journal of the American Medical Association*

Long-term effects of cognitive training on everyday functional outcomes in older adults (2006)

Willis SL, Tennstedt SL, Marsiske M, Ball K, Elias J, Koepke KM, Morris JN, Rebok GW, Unverzagt FW, Stoddard AM, Wright E. Journal of the American Medical Association, 296: 2805-2814.

Conclusion: Overall, improvement in each cognitive ability trained was retained after 5 years. Significantly less difficulty in the instrumental activities of daily living (IADL) was reported from the reasoning training group only, when compared to the control group. Additionally, when controlling for baseline age and cognitive function, participants who received booster training in the speed-of-processing intervention training group demonstrated better performance on functional measures of everyday speed-of-processing, compared to those who did not receive booster training.

Study Details: Approximately 2,800 subjects, 65-94 years of age, residing independently in the community, without significant functional or cognitive decline or diagnosis of AD were enrolled and followed in the ACTIVE (Advanced Cognitive Training for Independent and Vital Elderly) study. The ACTIVE study included three intervention groups (memory training, reasoning training, speed-of-processing training), and one no-contact control group. Booster training was provided to a random subsample within each intervention group. Memory training involved verbal episodic memory; reasoning training involved the ability to solve problems that follow a serial pattern; and speed-of-processing training involved visual search skills as well as the ability to identify and locate visual information quickly in a divided-attention format. Sixty-seven percent of the sample was retained 5 years after training (approximately 1,800 individuals).

Alzheimer's is the fastest growing disease in the developed world. By age sixty-five, 1 in 8 Americans is afflicted. By age 85, half the population is afflicted.

—Alzheimer's Association

Direct and indirect costs of Alzheimer's and other dementias, amount to more than $148 billion annually.

—Alzheimer's Association

A Mayo Clinic study found that seniors fear Alzheimer's more than death.

The secret to successful aging is ongoing mental stimulation.

—Paul David Nussbaum, M. D., Professor of neurology at the University of Pittsburgh School of Medicine, address to the American Society on Aging

In 25 years, the U.S. will have two kinds of people. Those who have Alzheimer's, and those who are caring for someone with Alzheimer's.

—Allen D. Roses, M.D., Senior Vice President, Genetics Research, GlaxoSmithKline

Memory loss is not an inevitable consequence of aging. Our brains can fight back. We can improve our memory performance immediately and stave off, possibly even prevent, future memory decline. The sooner all of us begin our memory program, the sooner we will be on the path to keeping our brains young and healthy for the rest of our lives.

—Gary W. Small, M.D., Director of The UCLA Center on Aging, The Memory Bible

2. *The New England Journal of Medicine*

Leisure activities and the risk of dementia in the elderly (2003)

Verghese J, Lipton RB, Katz MJ, Hall CB, Derby CA, Kuslanksy G, Ambrose A, Sliwinski M, Buschke H. The New England Journal of Medicine, 348: 2508-2516.

Conclusion: Participation in cognitive activities was associated with a reduced risk of Alzheimer's disease, vascular dementia, and mixed dementia. Further, subjects who frequently participated in cognitively stimulating activities "had a risk of dementia 63 percent lower than that among subjects" who participated less frequently. Lower levels of participation were also associated with higher levels of depression.

Study Details: Beginning in 1980, the Bronx Aging study enrolled and followed 469 subjects for a median follow-up of 5.1 years. All subjects were between the ages of 75 and 85 years, and had no diagnosis of dementia. Clinical and neuropsychological evaluations were conducted at baseline, with follow-up visits every 12 to 18 months. Frequency of participation in six cognitive activities (reading books or newspapers, writing for pleasure, doing crossword puzzles, playing board games or cards, participating in organized group discussions, and playing musical instruments) was assessed.

3. *Neurology*

Leisure activities and the risk of dementia in the elderly: The Three-City study (2009)

Akbaraly TN, Portet F, Fustioni S, et al. Leisure activities and the risk of dementia in the elderly. Neurology. 2009;73:854-861.

Conclusion: At a 4-year follow-up, researchers found that stimulating leisure activities were associated with a 50% reduction in risk of dementia in participants with high or moderate levels compared to those with the lowest levels of activity.

Study Details: As part of a multi-site cohort study, researchers assessed 5,698 dementia-free, community-dwelling persons aged 65 years and older from Dijon and Montpellier, France. Leisure activities were assessed at baseline, measuring frequency of participation in various types of activities. Among the activities, "stimulating leisure activities," described as cognitive activities in which seeking or processing information played a central role, included doing crosswords, playing cards, attending organizations, going to cinema/theater, and practicing an artistic activity.

4. *Neurology*

Cognitive activity and cognitive decline in a biracial community population (2003)

Wilson RS, Bennett DA, Bienias JL, Mendes de Leon CF, Morris MC, Evans DA. Neurology, 61: 812-816.

Conclusion: On average, subjects who frequently participated in cognitively stimulating activities experienced 35% less cognitive decline than those with infrequent cognitive activity.

Study Details: This population-based longitudinal study of aging and Alzheimer's disease enrolled and followed more than 4,000 adults, aged 65 years and older as part of the Chicago Health and Aging Project. Persons with memory impairment at baseline were not excluded from the study group. Subjects were interviewed at approximately 3-year intervals, with a mean follow-up of 5.3 years. Cognitive performance tests were administered at baseline, and subjects rated the frequency of participation in seven cognitive activities (same as those listed in study directly above).

5. *Journal of Geriatric Psychiatry and Neurology*

Participation in novelty-seeking leisure activities and Alzheimer's disease (2005)

Fritsch T, Smyth KA, Debanne SM, Petot GJ, Friedland RP. Journal of Geriatric Psychiatry and Neurology, 18: 134-141.

Conclusion: Greater participation in novelty-seeking and exchange-of-ideas activities across the life span was associated with decreased odds of developing Alzheimer's disease.

Study Details: Using a case-control design, researchers collected data on 16 types of activities performed between the ages of 20 and 60 years. 264 subjects with AD served as cases, and 545 subjects without cognitive impairment served as controls. Participation in novelty-seeking activities (defined in this study as: learning a new skill, learning about a new subject, doing things that are challenging mentally, solving a problem, getting a new experience, taking up a new hobby) had the greatest association with reduced risk for AD.

Mentally engaging hobbies may lay down new neural pathways. The cerebral cortex and hippocampus, which are critical to these activities, are remarkably plastic, and they rewire themselves based upon their use.

—Joseph T. Coyle, M.D., Chairman Consolidated Department Of Psychiatry, Harvard Medical School

6. *Annals of Internal Medicine*

Healthy Aging and Dementia: Findings from the Nun Study (2003)

Snowden, David. Annals of Internal Medicine, 139: 450-454.

Conclusion: A considerable proportion of subjects with mild to moderate stages of Alzheimer's disease pathology showed no symptoms of memory impairment. It is hypothesized that cognitive reserve, believed to be influenced by educational and occupational attainment, as well as participation in mentally challenging activities, helped these subjects to resist the clinical expression of symptoms of AD.

Study Details: 678 Catholic sisters, ages 75 to 102 years of age, participated in the Nun Study, a longitudinal study of Alzheimer's disease and aging. Researchers analyzed convent archives, annual physical and cognitive examinations, and brain autopsies upon death to determine correlations between aging and dementia among this population. The conclusion stated above was found by comparing the results of the last cognitive examination before death to level of neuropathology in the brain after death.

We're not seeking a fountain of youth, but a fountain of aging well.

—Thomas Perls, M.D., Boston Medical Center

7. *Journal of the American Medical Association*

Participation in cognitively stimulating activities and the risk of incident Alzheimer disease (2002)

Wilson RS, Mendes de Leon CF, Barnes LL, Schneider JA, Bienias JL, Evans DA, Bennett DA. Journal of the American Medical Association, 287: 742-748.

Conclusion: With a mean follow-up of 4.5 years, results indicated that those who reported frequent involvement in cognitive activity at baseline were 47% less likely to develop AD than those with infrequent cognitive activity.

Study Details: Beginning in 1994, approximately 730 subjects aged 65 years or older without a clinical diagnosis of dementia were enrolled and followed in the Religious Orders Study. Baseline assessments consisted of structured evaluations, which were repeated annually, including a medical history, neurological examination, assessment of cognitive function, and a review of brain scan when available. Investigators assessed the frequency of participation in "seven common activities that involve information processing as a central component: viewing television; listening to radio; reading newspapers; reading magazines; reading books; playing games such as cards, checkers, crosswords, or other puzzles; and going to museums."

Individuals who participated in highly mentally stimulating leisure activities had a 63 percent lower risk of dementia than those who did not participate in such activities.

—Verghese J, Lipton RB, Katz MJ, Hall CB, Derby CA, Kuslanksy G, Ambrose A, Sliwinski M, Buschke H. The New England Journal of Medicine, 348: 2508-2516.

Mental training in old age can boost intellectual power, help maintain mental functions like problem solving, and reverse memory decline. Even if they haven't received the benefits of good early education and experience, older adults can still do much to keep their brains in shape.

—Ronald Kotulak, Inside the Brain: Revolutionary Discoveries of How the Mind Works (based on his Pulitzer Prize-winning series for the Chicago Tribune), address to the 45th Annual Meeting of the American Society on Aging

If nothing is done to curb the impact of Alzheimer's, it will cost millions of lives and $700 billion a year by 2050.

—David Shenk, The Forgetting

8. *British Journal of Psychiatry*

Cognitive stimulation therapy for people with dementia: a cost-effectiveness analysis (2006)

Knapp M, Thorgrimsen L, Patel A, Spector A, Hallam A, Woods B, Orrell M. British Journal of Psychiatry, 188: 574-580.

Conclusion: In relation to the two primary outcome measures, cognition and quality of life, the investigators determined that there seems to be a high probability that cognitive stimulation therapy is more cost-effective than treatment as usual.

Study Details: An evidence-based cognitive stimulation program was developed based on reality orientation and reminiscence therapy for dementia. All subjects met DSM-IV criteria for dementia and scored between 10 and 24 on the MMSE, and had a baseline mean age of approximately 85 years. There were approximately150 subjects at the 8-week follow-up. Cognitive stimulation groups consisted of five participants and two staff members, ran for seven weeks, with a mean attendance of 11.6 sessions. Primary and secondary outcome measures were based on the Mini-Mental State Examination and Quality of Life in Alzheimer's Disease (QoL-AD) assessment. Changes in MMSE and QoL-AD scores were used to determine cost-effectiveness of the cognitive stimulation training (CST) compared to treatment as usual.

9. *Neurology*

Cognitive activities delay onset of memory decline in persons who develop dementia (2009)

Hall CB, Lipton RB, Sliwinski M, Katz MJ, Derby CA, Verghese J. Cognitive activities delay onset of memory decline in persons who develop dementia. Neurology. 2009;73:356-361.

Conclusion: Among a subset of participants that developed dementia at follow-up, researchers found that a typical study participant who reported frequent participation in cognitive activities at baseline (around 11 activities) per week), had his or her accelerated decline delayed by 1.29 years. This is compared to a typical study participant who only reported 4 cognitive activities per week. Additional findings from the study also suggest that regardless of the number of years of education one has attained, late life engagement in cognitive activities might maintain cognitive vitality.

Study Details: Researchers from the Bronx Aging Study examined 101 participants who were cognitively normal at baseline and developed dementia at follow-up (average of 5 years later). Participants' average age at baseline was 79.5 years.

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