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## BRAIN GAMES

### Video and computer 'workouts' help older people keep their wits sharp

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Advancing age is not stopping Rebecca Grossman from thinking young. At 86, the Whitestone woman is an enthusiastic participant in the latest vogue: mental fitness.

"Doctors tell people to take walks and exercise, but they never talk about the brain," said Grossman, who spent much of her working life as a secretary and bookkeeper. To keep her brain fit, she does crossword puzzles and Jumbles and is a voracious reader. A few weeks ago at her senior center in Queens, she enrolled in a class on "neurobics."

That buzzword reflects a growing interest in brain-building activities beyond simple puzzles. Inspired by recent studies and aided by the scientists who conducted them, entrepreneurs are building games and computer programs that some experts believe could strengthen brain power and perhaps even stave off common age-related diseases like Alzheimer's.

Venture capital is flowing to inventor-scientist partnerships that hope to profit from the aging population's enthusiasm. Close on the heels of the mental fitness gold rush, medical and educational institutions are moving to subject the new ventures to scientific scrutiny.

"It's important for all people to be mentally and physically challenged in all stages of their life," said Dr. Robert Friedland, professor of neurology at



Case Western Reserve University in Cleveland. He has conducted studies on large groups of older people that showed that people who had engaged in more challenging mental activities between ages 20 and 60 were about 30 percent less likely to develop Alzheimer's. Others have reached similar findings.

In another study, Friedland found a strong association between television watching and the risk for dementia in later life. "The work of the heart is pumping, the work of the brain is learning," said Friedland, who advises his patients to learn - and keep learning.

He said brain games could be a good way to learn new things, but they have to keep people interested for a few hours every day. "People should find things they enjoy learning - and do that," he said.

'It's got to be fun'

Grossman has found her thing. She is one of 1,200 seniors nationwide exercising their brains on an integrated computer system called mPower by Dakim, a California-based company. There's no mouse or keyboard to confuse elderly people who may not be familiar with computers, and the programs are designed to stimulate and activate brain regions that control attention, memory, visual and auditory processing, and overall cognitive fitness. Every day new material is downloaded from the company's Web site to the computer - a measure against boredom.

Each system sells for \$6,000 - plus \$100 a month to track individuals' progress and create new tasks each day - and can be used by up to 20 people. So far it is available only to senior centers and assisted-living facilities. Dakim is coming out with a home version at the end of the year.

"It's got to be fun," said Dan Michel, a 60-year-old former advertising agency owner and now chief operating officer of Dakim. His father suffered with Alzheimer's for a dozen years before he died. "Many people say that they fear Alzheimer's over death," he said. "And I understand how they feel. It is the single greatest threat to the quality of life. There's no point in exercising, eating right, and then turning 80 and losing your mind."

Study after study suggests that people who engage in cognitive exercises can improve their performance, and that is the point behind many games for people in midlife and beyond. The classic study, published in 2003 in the *New England Journal of Medicine*, was conducted in the Bronx by scientists at the Albert Einstein College of Medicine. Dr. Joe Verghese and his

colleagues studied 400 seniors and reported that those who continued learning throughout life - classes, learning new languages and games, playing chess and participating in group discussions - had a 63 percent reduced risk for dementia.

At Pennsylvania State University, a federally funded test of three cognitive training programs - for memory, reasoning and speed of processing - showed that those trained in 10 90-minute sessions performed better than control groups. With booster sessions over a five-year period, those results stuck. And by the end of the study period, older people who had received the cognitive training said they were better able to handle daily cognitive tasks than those who did not have training.

"There is ongoing research, but we don't have enough information" about the benefits of the brain games, said Sherry Willis, a professor of human development at Penn State who collaborated in the study. One of her colleagues there is testing a cognitive gaming approach, and more studies on brain gaming are getting under way. UCLA scientists will be testing the benefits of the programs over time in a population of older people.

What's important to brain building is not the repetition of familiar mental activities but novelty-seeking, Michel said. "For cognitive benefit, it has to be ongoing. There is no finish line."

Friedland agrees and adds, "It doesn't matter what kind of learning, it's how much you do of it."

Dr. Gary Small, an expert on memory and aging and director of the UCLA Center on Aging, is heading Dakim's scientific advisory board, and he's also had a hand in the content that appears in the handheld Brain Games by Radica. Brain Games teaches basic memory tricks that Small has pitched in his bestselling books, "The Memory Bible" and "The Memory Prescription." Brain Games costs \$20 and offers five memory games, but it's a low-end entry in the rush to build a brain market for baby boomers who want to defy aging.

By contrast, Dakim's system is like a television game show with classic movie clips and graphics and brain-stimulating exercises that change daily and increase in skill level as the person improves. Users may watch a clip from a popular 1940s movie, for example, and then answer a number of questions about the clip, referring to both its visual and auditory information.

It's designed to be exercise for the mind that is equivalent to exercise for the body. "Mental activities help neurons function better in the same way

that working out strengthens the muscle of the heart," Small said.

## Exercising for efficiency

Cognitive abilities such as memory and verbal reasoning, and visual acuity and hearing can be enhanced with exercise, but scientists still can't say for sure whether these benefits will ultimately delay the onset of dementia. Small thinks they can. Brain scan studies conducted on people who participate in mental exercises on a weekly basis suggest that the frontal cortex uses less energy compared to a pre-exercise brain state.

Small also recently developed a one-day brain "boot camp" - a scaled-down version of a five-week memory program he developed.

Scientists say that mental aerobics is the best way to improve memory and a host of other cognitive functions.

Mike Merzenich, professor of otolaryngology in the Keck Center for Integrative Neurosciences at the University of California at San Francisco, has been developing brain-based programs for more than a decade. The first was for dyslexia, and the latest is on brain fitness. He founded a company, Posit Science, that has used the latest findings in neuroscience to fashion a fitness program that is being studied at a number of medical centers.

The Brain Fitness program, which costs about \$400, is downloaded to a computer and tracks a person's improvement on dozens of mental tasks. A person may be asked to listen to two very similar sounds - dah and gah - and then find "dah." Once they pick out the answer, they move on to another sound in an attempt to train the brain to more accurately pick up subtle information from the environment.

"There is such an interest in these types of programs," said Henry Mahncke, vice president for research and outcomes at Posit Science, who earned his doctorate in neuroscience in Merzenich's lab at UCSF.

"I want this field to be scientifically grounded," he added. "My fear is that it's developing like the diet industry."

The Brain Fitness program is being tested by independent scientists at Stanford University; the Mayo Clinic in Rochester, Minn.; the University of California in San Francisco, and the University of Southern California in Los Angeles.

Mahncke said that Merzenich began thinking about old age as a plasticity problem, in which the loss of memory and speed in the aging brain was contributing to dwindling brain function, and he devised a way to push that plasticity in the right direction - and improve a person's speed, memory and cognitive strength.

"You can take healthy young people and perturb their memory by adding noise in the background," Mahncke said. In the opposite way, brain gaming can quiet the older brain and make it run more cohesively, he said. In fact, Mahncke said that scientists working to develop the program had found that people using it consistently have a three-fold improvement in their processing speed. That means that they were three times faster in responding to an answer.

And their memory seemed to equal that of a person 10 years younger, he said. This change in processing speed is not a use-it-or-lose-it phenomenon, he added. "You need to do more than just keep busy. Your brain is a learning machine, and it needs challenge," Mahncke said.

Brain imaging studies show that once a brain is heavily practiced in something, the activity does not engage the whole brain anymore. "But when a kid is learning to ride a bike, every part of his brain and body is engaged in that," the scientist added.

Learning has to be carefully structured and individualized. The Brain Fitness program by Posit, for instance, tracks a person's responses and "helps drive it into full speed," Mahncke said. "You begin to hear things more clearly and accurately. And when you go to fetch something, the memory is more reliable."

The program has been designed to focus on the brain's auditory system. Posit Science is developing a new version that also helps strengthen the brain's visual processing system, and another program that works on improving the brain's frontal lobe, the region that keeps track of cognitive information.

## Big-game names

Nintendo is also getting into the race.

Lynn Lipton of Poughkeepsie is 67 years old and spends a lot of time these days with Nintendo's Brain Age. Last fall, her teenage grandson accompanied her to an event at Rockefeller Center for a coolest grandmother of the year

contest. She didn't win, but she was introduced to the sleek handheld Nintendo DS unit and played Brain Age. She's been playing it every day since then.

"I thought I was really good in math," she said. Every day, she gets better at solving the problems. "I feel like it's making a difference in how fast I think things through," she said. She now takes the device to a nearby senior center to let residents get their mental workout.

She's also using Nintendo's Wii console with the sports pack that allows her to work out her body as well as her mind. The technology attaches to a television to allow people to simulate playing tennis or bowling using a motion-sensor handheld device instead of a racket or ball. It's also being used at nursing homes and assisted-living environments, according to Beth Llewelyn, a Nintendo spokeswoman.

### What's available on the Web

There are a host of Internet-based brain fitness games, such as [happyneuron.com](http://happyneuron.com) and [sharpbrains.com](http://sharpbrains.com). Both sites have a mix of games to sharpen visual and auditory processing, word retrieval and math computing skills. The idea, experts say, is that strengthening the brain to get faster doing these exercises may ultimately keep the brain more youthful.

"No one can promise that it reduces the risk for Alzheimer's," said Alvaro Fernandez, chief executive and co-founder of Sharp Brains, touted as a virtual brain fitness center. Because studies have shown that novelty is the key ingredient to a better brain, the Sharp Brain site offers 21 activities. The site also has a wealth of information on the brain research that is helping push the neurobics movement forward.

Fernandez got the idea after reading several books by neuropsychologist Elkhonon Goldberg, including "The Executive Brain" and "The Wisdom Paradox." He contacted Goldberg, a clinical professor of neurology at New York University School of Medicine, and discussed the idea for a mental fitness site. Goldberg became co-founder and chief scientific officer of the company. The site has been running since October and hosts about 1,000 people worldwide every day. SharpBrains.com is also supporting courses on college campuses throughout the country.

Happy Neuron is also stocked with a lot of variety and challenging mental workouts. In "An American in Paris," players are shown maps of major cities and asked to remember names, locations and the order of travel to famous

sites. A word-play game, similar to the card game Concentration, is designed to enhance the brain's frontal lobe, which is essential in paying attention and carrying out a series of tasks.

Remember, Friedland said, that the key to all these learning tasks is to enjoy doing it. "People shouldn't feel obligated to do things," the Alzheimer's researcher said. "Find things you enjoy, and keep learning."

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