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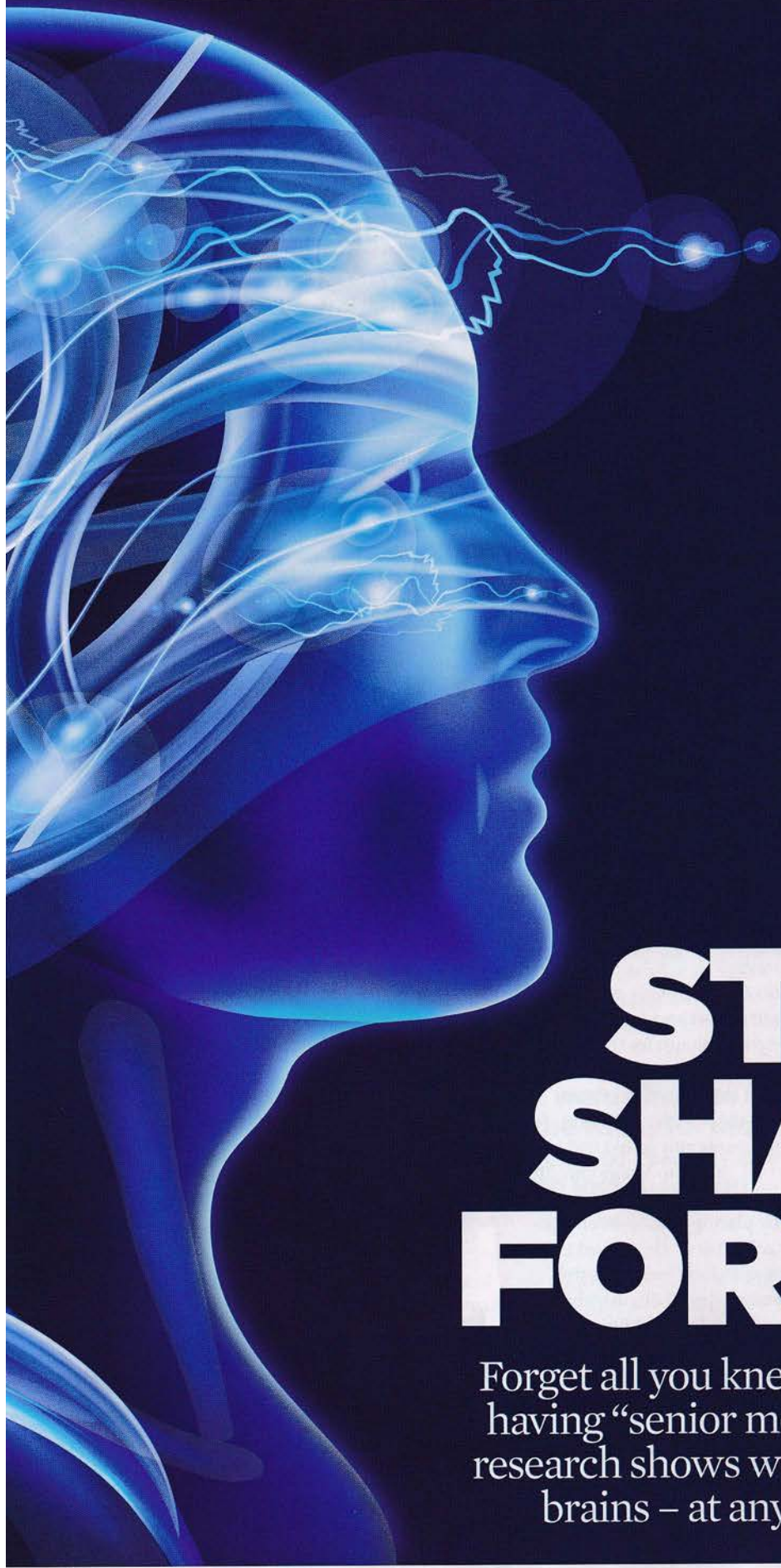
Masterton's Bob Francis & his fight with the gangs

## RANGINUI WALKER

His last unpublished column & Paul Spoonley's tribute







# STAY SHARP FOR LIFE

Forget all you knew about memory and having “senior moments”. Compelling research shows we can supercharge our brains – at any age. **by NICKY PELLEGRINO**



It is highly unlikely Stewart Rundle would have survived the 30m fall from the cliff beside his Auckland home if he hadn't spent a lifetime doing a lot of things right. Now 86, the former school principal has always been physically and mentally active. Before the accident, he and wife Pauline were keen on tramping and climbing. When he retired, he became an artist, researched his family tree and taught at Senior Net. He is a living example of everything experts say we should do to stave off cognitive decline. So in 2015, when the section of cliff, previously considered safe, gave way beneath Rundle's feet, there wasn't a moment of mental fuzziness.

"I managed to spread-eagle myself and in doing that slowed myself down," says Rundle, of the fall on Auckland Anniversary Day. "I grabbed everything I could, which meant I slid over the edge instead of shooting over it, and that's one of the things that saved my life."

Rundle landed with his shoulder wedged between rocks. Every time he tried to free it the pain was so great he fell unconscious.

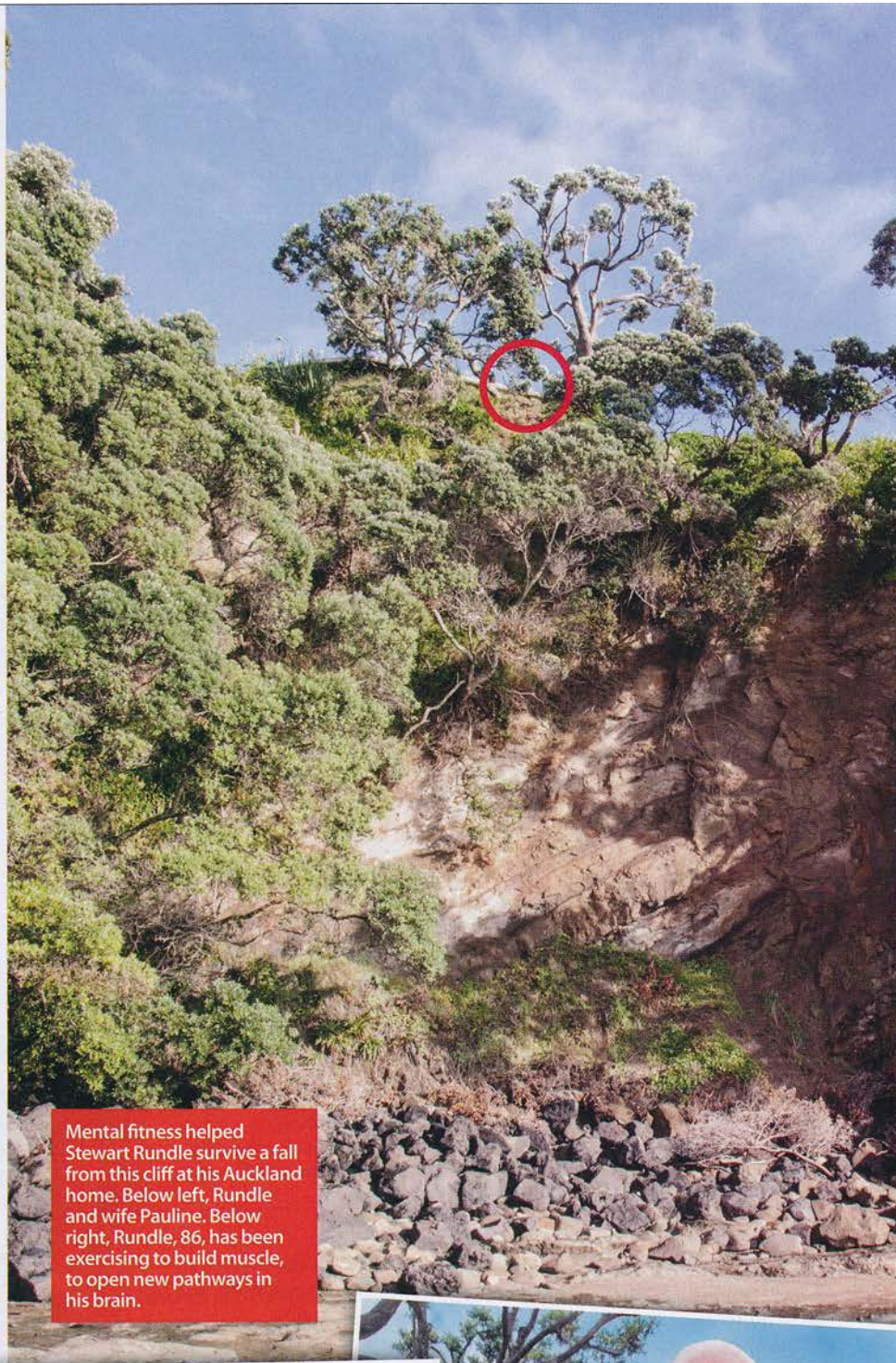
"I did that for three and a half hours until

## He called 111. "They said it was the only time they'd had a seriously injured person direct operations."

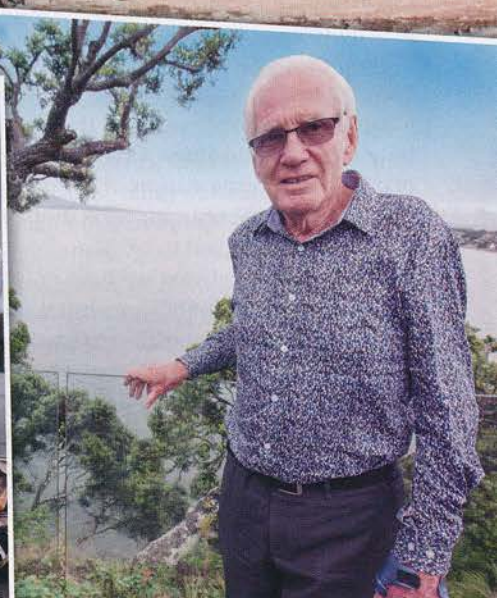
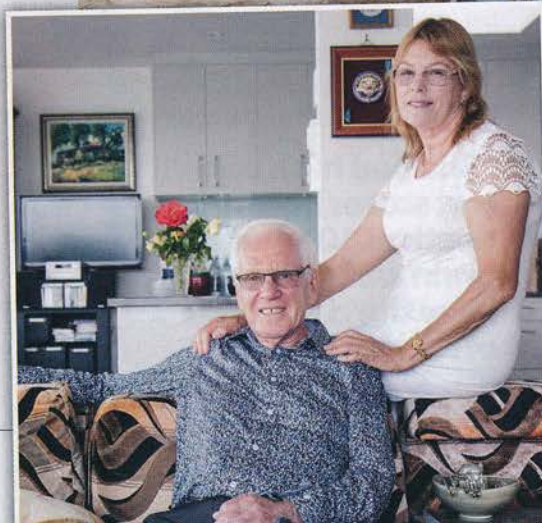
I realised if I kept going I'd keep getting the same result – which was nothing – and I'd die there because it was late afternoon and getting cold," says Rundle. "I decided the only thing to do was scream to distract myself from the pain. So I got up a really good pitch and managed to pull myself out."

Meanwhile, up above in their house, his wife was desperately wondering where he had got to. Rundle's phone, in his left pocket, was unreachable with his damaged left arm so he wriggled out of his pants to grab it with his right hand and call 111. He then explained to the operator exactly what services were needed for his rescue. "They said it was the only time they'd had a seriously injured person direct operations."

Mental fitness helped Rundle survive the fall; physical fitness and sheer



Mental fitness helped Stewart Rundle survive a fall from this cliff at his Auckland home. Below left, Rundle and wife Pauline. Below right, Rundle, 86, has been exercising to build muscle, to open new pathways in his brain.





determination were what kept him alive. The morning after his admission to hospital, one of the surgeons came by and said, "Is that old guy still here?"

"He wasn't thinking like I would be," says Rundle, "and damn him he should have been."

To be fair, he was a mess – cuts, bruises, haematomas, several broken ribs and vertebrae, a damaged lung and a smashed shoulder that has left him with paralysis in one arm. While he waits for the optimum time for surgery, he is busy trying everything he can – exercises to build muscle, to open new pathways in the brain. A corner

**COGNITIVE RESERVES**

If small things tend to slip your mind, most likely this is because the brain is designed to forget. "Otherwise we'd be overloaded because information is coming at our five senses all the time," says Auckland psychologist Allison Lamont. "The brain filters it out unless we need it."

We tend to think of remembering as an automatic process, but Lamont says actually it is very active, particularly as we get older. It takes an average of seven seconds to process information into a long-term memory and in modern life, with interruptions and stress and our attention divided, very often

and growing. She has studied what happens in the memory of healthy adults from the ages of 20 to 97 and her findings challenged the idea that there is a steady decline from 40 until late old age.

"Even though people in middle age were complaining their memory was shot, it actually holds up really well until well past 70, closer to 80, and then it starts to drop off quite quickly," Lamont says. "We decided to find ways to ameliorate that so it wasn't quite so precipitous. My personal catch cry is that I don't want it to be my drop-off and it's jolly well not going to be either."

She and Eadie are inspired in part by



Educator Gillian Eadie, left, and psychologist Allison Lamont run the Memory Foundation. Inset: the Nun Study of Ageing and Alzheimer's shattered several misconceptions about ageing and memory.

of his living room is devoted to his work researching what else he could be doing to help himself.

Rundle's motto is and always has been "Take control". It is a philosophy that pretty much every neuroscientist on the planet believes we should share. Often we think of ourselves as being victims of our brains. It's my age, we say, my memory is shot, my mind isn't what it used to be.

Science is now proving we have misunderstood the resource and our control over it. We can sharpen our brains; make them smarter and faster. And many of us can build up cognitive resilience and delay decline; potentially even hold off the ravages of disease.

we forget things because we haven't stored them away in the first place.

Lamont, 70, along with her sister, educator Gillian Eadie, 73, runs the Memory Foundation, an initiative that is based on her research into what is needed to keep our brains alert

**"She had high cognitive test scores before her death at 101, but her brain was found to have the classic lesions of Alzheimer's."**

their mother, Jeanie Paton, who began to show signs of Alzheimer's at 92. The sisters believe her decline would have started much earlier if she hadn't built up cognitive reserves with a lifetime of learning and new challenges.

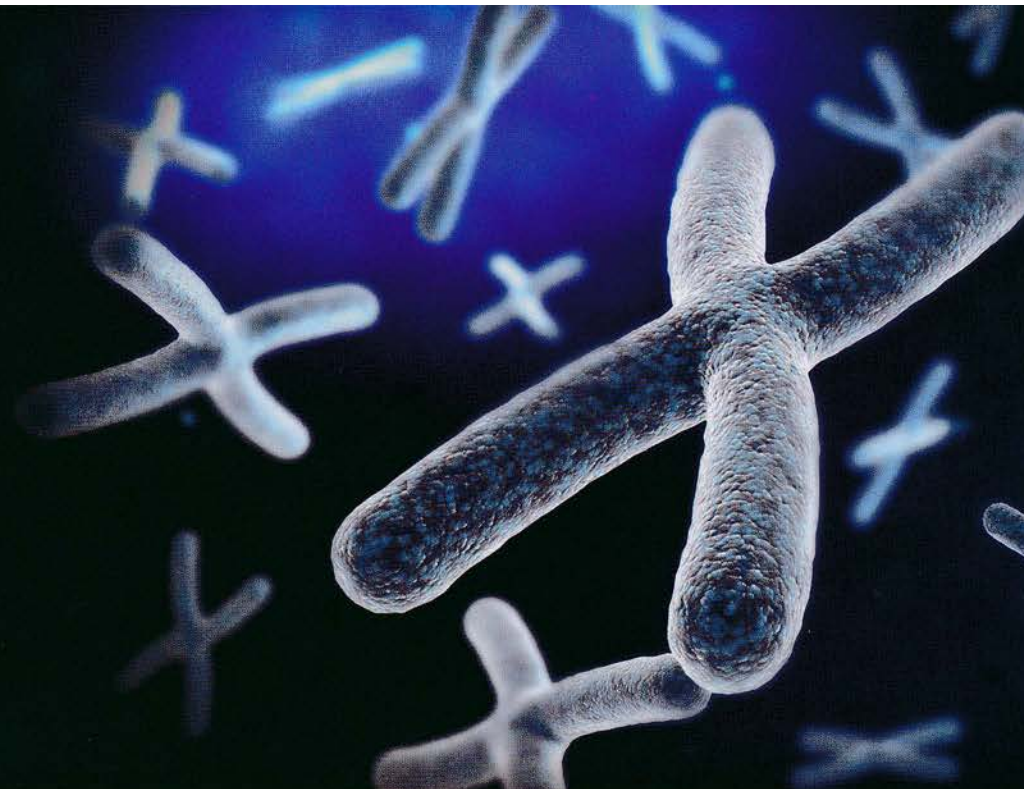
They cite the Nun Study of Ageing and Alzheimer's disease involving 678 Roman Catholic sisters in the US, some of whom donated their brains to the University of Kentucky. Sister Mary, who is considered the gold standard of the study, had high cognitive test scores before her death at the age of 101, but her brain was found to have the tangles and plaques that are the classic lesions of Alzheimer's.

Researchers concluded her lifetime as an educator meant that she had entered old age with superior cognitive ability and this ▶



# Gene genie

An experimental therapy aims to slow ageing by relengthening DNA structures called telomeres.



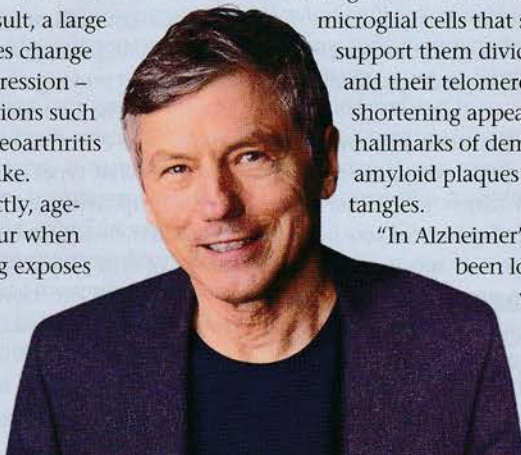
Imagine a world with no age-related diseases. Bones and hearts stay strong, minds stay sharp, joints remain flexible and skin and muscles are firm well up to our current lifespan and far beyond.

In the opinion of American professor Michael Fossel, we are on the cusp of a scientific breakthrough that holds the key to all of that. He is a leading expert on treatments to slow the ageing process and the author of a new book, *The Telomerase Revolution* (Allen & Unwin).

The telomere theory of ageing is controversial but growing in acceptance. Telomeres are DNA structures at the ends of chromosomes – often they are compared to the hard plastic tip on a shoelace. Every time a cell divides, its telomere shortens. With each shortening, the cells' ability to repair and recycle slows down and eventually they become dysfunctional and unable to divide any further. As a result, a large number of our genes change their pattern of expression – that is when conditions such as heart disease, osteoarthritis and Alzheimer's strike.

"To put it succinctly, age-related diseases occur when telomere shortening exposes our genetic flaws,"

Michael Fossel: pinning his hopes on a trial of telomerase therapy.



explains Fossel. The theory is that if we can re-lengthen telomeres, we can keep the cells young and essentially reverse ageing. The potential to do this exists in an enzyme called telomerase.

Research progress has been slow and to date all that is available is a supplement, TA-65, that is based on the telomerase-activating plant *Astragalus membranaceus*. This has been shown to have some positive effects, but Fossel believes telomerase therapy has the potential for more dramatic rejuvenation.

He is pinning his hopes on a trial he plans for 2017, finance and approvals permitting, to see if telomerase therapy can reverse cognitive decline in patients with moderate Alzheimer's.

Although adult neurons don't divide, the microglial cells that surround and support them divide constantly and their telomeres shorten. This shortening appears to precede the hallmarks of dementia, including amyloid plaques and tau protein tangles.

"In Alzheimer's research we've been looking in the wrong place," says Fossel. "People are coming round to

the idea there is something happening upstream."

Even if telomerase therapy gives the results Fossel hopes for, there are risks of side effects such as cancer. Hence his focus on what he describes as a "high hanging fruit" of diseases, Alzheimer's, a leading cause of death with no existing treatment.

"If I was to offer experimental therapy with possible side effects to someone with osteoarthritis, it makes sense for them to go with a knee replacement instead. No one dies of osteoarthritis," he says.

Fossel will work with eight to 12 patients and hopes to start seeing results within two to three months.

"I need to do this carefully because credibility is key at this point," he says.

"Even if I show that I've reversed Alzheimer's in some patients, there will be people who shake their heads and deny it, so I have to make sure that those who look at the data say, it's true, he's done it."

If he succeeds, then telomerase therapy could significantly extend life. Fossel remains upbeat in the face of the social implications of this – vastly increased populations, for instance.

"We're extending the number of people who are effective. We're not going to give you 30 more years in a nursing home. So it doesn't need to be seen as a drag on the human race. People are a resource not just an encumbrance."

**"In Alzheimer's research we've been looking in the wrong place."**



supplied her with a level of protection as the disease spread in her brain.

The latest research from the Mayo Clinic Study of Ageing has found that even carriers of the Alzheimer's gene, APO-E4, can benefit from ongoing intellectual enrichment. Brain imaging showed that participants with a higher education who continued to be mentally active throughout middle age had fewer amyloid plaques than those who did not engage their minds with continued learning.

There are now 10,000 people in the Memory Foundation community, mostly New Zealanders but also from Australia, the US and the UK. The sisters run brain fitness courses online and off, speak to community groups and produce books. Lamont also runs the Auckland Memory Clinic.

She has identified 67 different types of memory, but has narrowed those down to six key skills vital for continuing independence into old age. They are verbal memory, non-verbal memory, working memory, face recognition, prospective memory (remembering to do something later on) and short-term memory – probably the most misunderstood.

"People think of it as what they had for dinner last night, but actually it's what is in your head right now," says Lamont. "Your average short-term memory capacity is seven items and its longevity is 20 to 30 seconds, just long enough for you to select what you want to remember."

In a seven-week pilot study of their online training course, Memory Tune, participants showed improvements in all those areas. There is now a larger study happening at the University of Auckland.

The Memory Foundation focus is on lifestyle advice combined with puzzles and mental challenges to stretch the brain and keep it growing new neural connections. These are designed for a user-friendly and confidence-building experience. Eadie tells a story of trying to do a timed brain game on her iPad, getting flustered and having a giant "fail" flash up on the screen. Panic and stress interrupt the normal memory processes, she points out, so seem counterproductive in a brain-training exercise, particularly for older adults.

"We're about pushing yourself a little further than you're comfortable with, but doing it in your own time," she says. "You keep going until you've got it, then you move on and challenge yourself with something new."

Often older people say the exercises have given them hope. "Sometimes their families have told them they're losing it," says Eadie. "Even medical specialists tell them, 'what do you expect at your age?' What we say is that from now on there is no such thing as having a senior moment. It's their responsibility to get out there and do things that are hard or they think they're too old for."

### BUILD A BRAIN BUFFER

The earlier you can start building a cognitive buffer, the better. The brain has hit its peak by 30, but at any age it is possible to improve attention and control, as well as how fast you learn, how well you retain information, and even how quickly you perform tasks, if you think about exercising the brain in the

## **"If you can increase your brain span to match your life span with a 30-minute daily mental workout, why wouldn't you give it a go?"**

same way you would the body.

"It really can advantage everybody," says neuroscientist Professor Michael Merzenich, a pioneer in brain plasticity.

"Everyone can improve in any faculty, it doesn't matter if they are 20 or 100. But the level of improvement from the starting point is not greatly different so the trained 20-year-old always has the advantage."

A professor at the University of California, Merzenich also has a company, Posit Science, that has developed a range of plasticity-based therapies. Marketed under the name BrainHQ, many of the exercises are backed by research studies and proven to change cognitive function.

Memory might be the issue bothering most baby boomers, but the benefits of brain training have to go deeper than that, says Merzenich.

"What good is it to train your brain if it doesn't apply to your everyday life? You want to see real impact, not just learn some trick on a computer. So you have to do things that are not specifically about memory, that are more elemental. We're driving changes across the whole system, not just at the highest level where we perceive there are problems. It's designed to correct the whole machine."

BrainHQ's exercises focus on areas such as attention, brain speed, listening skills and navigation as well as memory. Studies have shown change in everyday skills that aren't being specifically trained for, such as driving.

"We're not training anyone to drive a car but we've seen improvements in driving ability," says Merzenich. "In fact it's been shown to reduce at-fault crash risk by almost half."

The effects can endure. For the Active study conducted in six US states, nearly 3000 participants aged 65 and older were put through three types of training. The BrainHQ exercise focused on speed of processing. Not only did it show the best results, but 10 years down the track those who had trained with it retained some benefits. They were faster, more alert and better able to perform everyday tasks such as shopping and handling finances.

Merzenich maintains that with training you can have the brain of an untrained 50- or 60-year-old in your eighties. So if you can increase your brainspan to match your life span with a 30-minute daily mental workout, why wouldn't you give it a go?

"You can go into intensive training at any point in your life and it doesn't have to be a programme like ours; there are lots of things that will keep your brain fit," he says.

"You have this resource and you should be using it. It's not like anyone is neurologically dull, but we have this flowering in our youth and then settle into the routine of dull middle life, not doing any new learning. That's foolish. Our brain demands to be challenged. Why not decide to grow and just keep growing to the end?"

### MORE TESTING NEEDED

The brain-training industry is booming and not without controversy. Two years ago, a statement signed by 69 cognitive psychologists and neuroscientists criticised it for making exaggerated and misleading claims, and preying on the anxiety of baby boomers. They advocate more testing to prove how effective brain training is and discover what types of challenges translate best to improving real-world skills.

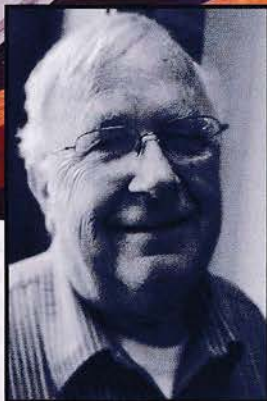
Merzenich is involved in more testing, much of it in ground-breaking areas. He is trying to find out how cognitive training might be applied to correct significant distortions in brains.

"We're looking at a whole series of clinical indicators: depression, bipolarism, head





University of Auckland neurobiologist Melanie Cheung is testing the effect of computer exercises on the brain. Left: Michael Merzenich, a pioneer in brain plasticity.



injuries, stroke patients. We're running studies in people who've had a terrible early life and trying to determine the extent to which we can normalise their neurology.

"We're working with people in prison and those who are addicted to see if we can contribute to rehab."

Among those collaborating with him is University of Auckland neurobiologist Melanie Cheung, who is using a Fulbright Scholarship to investigate whether computer-based brain exercises can delay the onset of some of the symptoms that come with the genetic neurodegenerative disorder Huntington's Disease (HD).

Sufferers often begin with mood and cognition problems and their mental abilities continue to decline into dementia.

Cheung says she stopped believing in drugs as the answer a long time ago.

"Doing drug studies, I wasn't going to have results for 30 or 40 years. I was working with hun-

dreds of people with the potential to get sick but couldn't offer hope for them, only perhaps their grandchildren."

With the team at Posit Science she has developed exercises to strengthen the neural pathways involved in attention, working memory and brain speed. "All affect things downstream like depression and anxiety,

**Panic and stress interrupt the normal memory processes.**

and a lot of the processes that happen in Huntington's," she says.

"We want to try to strengthen those pathways before they weaken. There is evidence that sick cells [in HD patients] have fewer branches and their function is compromised. What we're trying to do is give them more."

Cheung is one year into a three-year study, working with people from 18 to their early sixties, although most are in middle age. Each has to do 100 hours of training over less than a year.

"It's quite challenging to keep them motivated," she says. "Once they get into the rhythm of it and feel the benefits, they want to continue. The trick is getting them through that first month."

Only 10 people have completed the programme so far. Cheung is wary of giving false hope, but says the results have been



encouraging. "There could be a placebo effect so we need to be careful with that," she says, "but it appears that some of the HD brains are becoming faster and there are also reports of less depression and anxiety. It's really outdone what I expected."

**EXERCISE ADDICTION**

The HD participants start out significantly worse than the controls, but so far half have improved and become as good as the controls, even when the controls have also done training. Cheung is trying to work out why the other half haven't benefited. Do they need to train more or is it a matter of designing more exercises to target their primary problems?

Cheung, 39, has been doing the exercises herself, and has her family in Auckland and the Bay of Plenty addicted to brain training. "We even had a family competition – and I'm not the sharpest by far," she says.

She has noticed some improvements to her memory; she no longer forgets things she needs to pick up while shopping, for instance.

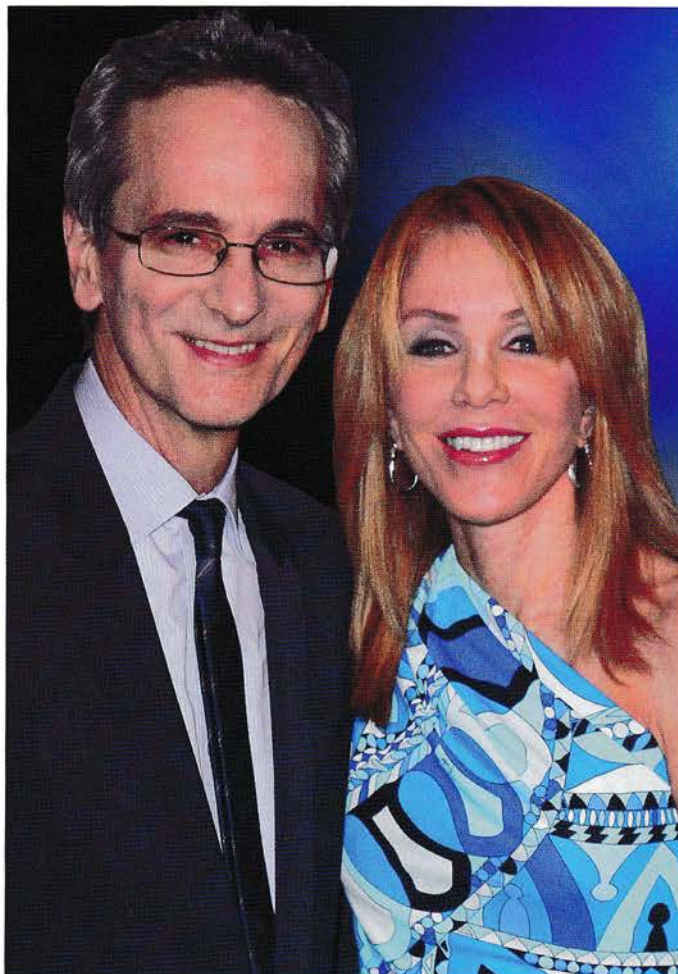
"And I'm a much better listener now. The exercises I had the most difficulty with were auditory training – I was terrible at them."

But we are not just brains on sticks, points out Gary Small, a professor of psychiatry at the University of California and an authority on Alzheimer's disease. Anything that is good for the body has a pay-off for the brain, from physical exercise to a nutritious diet, enough rest and relaxation.

Along with his wife, Gigi Vorgan, Small is the author of several books including *The Alzheimer's Prevention Programme* (Workman Publishing). His message is that genetics account for only part of the risk for Alzheimer's, and lifestyle choices can have a tremendous impact.

"The average person has much more control than they realise," says Small.

"We've done multiple studies, large scale, involving thousands of individuals, and not only can you improve mental skills in a couple of weeks but you have sustained benefits for years."



**Gary Small and Gigi Vorgan: lifestyle matters.**

Small, who visits New Zealand from March 8-9 as a guest of the Neurological Foundation to give free public lectures in Auckland and Christchurch, has a science-backed, holistic approach to brain health. It's one he practises himself. "I'm 64 and I've been walking the walk ... and I feel

**"Not only can you improve mental skills in a couple of weeks, but you have sustained benefits for years."**

better than I did 10 or 15 years ago."

Since this has to become a way of life, one of the keys is to find a way to stretch your brain that is also fun. Small enjoys doing newspaper crossword puzzles, but says they vary in difficulty depending on the day of the week. "On Monday it isn't challenging enough and on Friday and Saturday it's too

challenging to be fun. So I'm a Tuesday through to Thursday crossword guy."

Balance is also a part of his message. If you have a sedentary, brain-taxing occupation, then getting some physical exercise may be a better option than spending your spare time doing crosswords.

A recent Finnish study found that sustained aerobic exercise, such as running, increases neurogenesis (the birth of new brain cells).

Inspired by this, Small is embarking on a study getting people to play brain games while on exercise bikes to see if there is a synergy. Plus he is recruiting participants within the UCLA health system, looking specifically for those with risk factors for cognitive impairment such as diabetes or obesity, and will put them on a three-month programme of physical exercise, nutritional advice and stress management to see if it improves cognitive abilities.

"We've also been collaborating with Gallup Poll to collect data on 18,000 people aged 18 to 99. What we found is the people with healthier lifestyles – who exercise more, eat lots of fruit and vegetables and don't smoke – have fewer memory complaints."

He finds that many people are resistant to changing their diet. But the brain is hungry, Small points out, and it can be one of the first areas where they notice compelling benefits.

"I'm a big advocate of grazing throughout the day. The brain's main energy source is glucose and if that gets depleted you're not going to think properly.

"I eat six times a day, lighter meals and protein bar-type snacks."

Low levels of antioxidants in the blood are associated with memory impairment, but laboratory animals fed antioxidant-rich berry extract are better at finding their way through mazes. Small advises eating lots of foods high in ORAC units (oxygen radical absorbency capacity), a nutritional measure nutritionists use to determine a food's ability to fight oxidation. Cranberries, prunes, plums and pomegranates have high



levels. Recent work from UCLA showed that drinking a glass of pomegranate juice a day improved memory in people aged 50 to 70.

### AGILITY IN MIDDLE AGE

It's not all bad news for the ageing brain, although yes, they do change with the years. Canadian scientists showed there are very different brain-wave patterns between young and older adults performing the same task. The younger participants in their study had slower brain waves, which is important for memory. In older adults they were faster, which is better for attention.

It is now believed the middle-aged brain (aged 35 to 55) hits a sweet spot where it is especially agile. Vocabulary improves and it is more efficient at processing information it has gathered over its lifetime.

Scientists think this might be because of higher quantities of white matter coating part of the neurons in middle-aged brains, allowing efficient communication between the cells. The two separate hemispheres of the brain also begin to communicate better as we age. So although we may be more forgetful, we might also be better at seeing the big picture and problem solving.

Still, it makes sense to develop techniques to compensate for memory issues as we hit older age. At times, octogenarian Rundle finds it difficult to remember names, so he'll put in preparation before going to a gathering of people he hasn't seen in a while.

"I'll go over the names, write them down, put them in my pocket if need be," he says.

Comedian Billy Connolly, 73 and now suffering from Parkinson's disease, keeps a notebook with all the words he tends to forget because the same ones crop up all the time.

As for Small, he advises thinking of the memory as a neighbourhood, and creating associations and links, often using visual imagery.

"If Lisa has a pretty smile then you might think of the Mona Lisa. You get the mind to make these connections.

"It might sound silly and it can be hard



Comedian Billy Connolly: keeps a book of words.

work, but you get very good at it and it's actually fun."

A recent study published in the *New England Journal of Medicine* suggests that lifestyle factors may be having a positive impact. It was found that dementia rates had decreased by 44% in the town of Framing-

**"You need something that pushes you and makes you happy, because happiness is good for the brain."**

ham, Massachusetts, where, since 1948, the health of generations of its citizens has been studied. Researchers are only cautiously optimistic – the population is predominantly white and most of the changes occurred among people with a good education. They believe a reduction in strokes, and better stroke care, may account for the drop.

### CREATIVE SOLUTION

Neuroscientist Jenni Ogden, 67, hopes she has found her own recipe for long-term brain health. Now retired and living on Great Barrier Island, she has started writing fiction and her debut novel, *A Drop in the Ocean* (She Writes Press), will be released in April.

"Like everyone else, I have those tip-of-the-tongue moments when I can't remember the word I want to use," says Ogden.

"But interestingly, when I'm writing, I don't have a word-finding problem. I think that's because I'm in a flow and my subconscious is engaged. Creative writing has to be involving the memory part of the brain because what we write doesn't come out of nothing; it's bits and pieces of memory we put together in different ways.

"I always think, even if no one ever buys my book, at least writing it has given my brain a workout."

Ogden has never been keen on puzzles, but loves writing.

"These last couple of years have been my happiest since I was a young neuroscientist," she says.

"I think that's the answer when you're older. You need something that will make you feel that same passion you had when you were young, that pushes you and makes you happy, because happiness is good for the brain."

Richard Faull agrees. He is the Auckland neuroscientist who led the ground-breaking research that proved the human brain continues to make new cells in adulthood. Now director of the University of Auckland's Centre for Brain Research, Faull is 70, but says he feels 55. He lists the things that are known to help a brain thrive: avoid head injuries, be socially active, eat lots of fish, get enough vitamin D, keep the cardiovascular system healthy with plenty of exercise, don't smoke, and avoid high blood pressure and high cholesterol.

"Whatever you do, enjoy doing it," says Faull. "Fun is important and being sad isn't good for the brain; we know that. So have a dream, a passion, do things that stimulate your mind. Above all, love life." ■