

## HEALTH

As we age, so does our brain. But, writes *Sofia Auld*, new research shows healthy lifestyle choices can dramatically slow the process and reduce the risk of diseases such as dementia.

# Brain saves

With the average human brain consisting of about 100 billion neurons, with trillions of connections, it's no wonder scientists are yet to unravel all the mysteries that lie within its folds. Given that dementia is now the leading cause of death for Australian women, an obvious area of interest is how the brain ages, what things accelerate that process, and what – if anything – can be done about it.

Professor Kaarin Anstey, a senior principal research scientist at Neuroscience Research Australia (NeuRA), explains that, on average, the brain loses about 5 per cent of its weight each decade after the age of 40.

There are several causes of brain ageing, she says. It is partly the result of the normal maturation process: "Just like the body ages, the brain ages." Additional factors include hormonal effects, genetics, lifestyle and some medical conditions. In particular, conditions affecting the blood vessels can adversely affect the brain, because it has such a rich blood supply. "Tiny changes in the microvasculature [minute blood vessels] of the brain leads to more brain ageing [and] neuropathology," she explains.

Demographics also influence how well a brain fares through life, including things such as gender, education level, marital status and where you were born. So do environmental factors such as air pollution and passive smoking.

Anstey is keen to point out that accounts about brain ageing shouldn't all be bad news. "We focus mostly on what causes brain ageing and brain atrophy," she says. "There's also the positive impact of life experience and good health behaviours that enable the brain to age well. It goes in both directions."

Last year, researchers published findings from the world's largest study into brain ageing in the *Journal of Alzheimer's Disease*. Led by American psychiatrist, author and brain health expert Dr Daniel Amen, the team evaluated 62,454 brain SPECT (single photon emission computed tomography) scans of more than 30,000 individuals from nine months to 105 years of age.

SPECT imaging looks at blood flow throughout the brain, which is reduced in various disorders. The researchers examined 128 brain regions to predict the chronological age of the patient. When the age predicted from the scan was older than the actual age of the patient, this was interpreted as accelerated ageing.

They found that several brain disorders and other factors predicted accelerated ageing. Schizophrenia topped the list, accelerating brain ageing by an average of four years. Cannabis abuse ranked second at 2.8 years, followed by bipolar disorder at 1.6 years, ADHD 1.4 years, and alcohol abuse 0.6 years.

Amen says the most important thing people should know about the findings is that untreated mental health issues and lifestyle patterns can definitely accelerate brain ageing. Better treatment of mental health disorders could slow or even halt the accelerated ageing process.

The thing that surprised Amen most was the

Professor Kaarin Anstey, a senior principal research scientist at Neuroscience Research Australia.

cannabis finding. "Marijuana was one of the worst things to accelerate ageing," he says. "We suspected alcohol and smoking would do it, but marijuana was worse, according to our study."

Nonetheless, he is reluctant to criticise attempts to legalise recreational cannabis use. "Legalisation and 'good for you' are separate issues," he says. "I don't think we should criminalise people who use marijuana, but we should also not say it is good for us."

Anstey notes that, in Australia, the two biggest risk factors for dementia are obesity and lack of physical activity. "We know now that obesity in middle age increases your risk of dementia in late life," she says. Some studies have shown greater brain shrinkage in people with midlife obesity, she explains, although scientists are still figuring out why.

Physical activity is a protective behaviour for the brain, but Australians are not meeting recommended activity levels, she adds. Australia's current guidelines recommend adults aged 18 to 64 be active on most days, accumulating 150 to 300 minutes of moderate intensity activity or 75 to 150 minutes of vigorous intensity activity every week, combined with muscle strengthening activities at least two days a week.

Both risk factors are interrelated with others, such as high cholesterol, high blood pressure, mental health problems and diabetes, which makes it difficult for researchers to tease out exactly what is causing the damage.

With type 2 diabetes, for example, "we know that the brain is impacted by insulin resistance, so diabetes increases the risk of late-life dementia." However, type 2 diabetes is often associated with obesity and lack of physical activity, so pointing the finger at the cause is difficult.

Anstey says smoking also impacts brain ageing. However, "smokers don't live as long, so if you look at statistics it's often hard to see because they've got competing risks for other diseases. But it is a risk factor for dementia ... I've known smokers give up smoking when they found that out."

She notes that having a risk factor doesn't necessarily mean you will get dementia. "Just like some smokers don't get lung cancer, it doesn't mean that if you have these risk factors you will inevitably develop dementia," she says. "Likewise, if you don't have a risk factor, you won't. It's important that we get a balanced message."

When it comes to preserving a healthy brain, diet is a great place to start. Anstey says there is some evidence that following the MIND diet – which combines aspects of the Mediterranean and Dietary Approaches to Stop Hypertension (DASH) diets – may help. It emphasises eating foods that seem to be protective of the brain, like green leafy vegetables, berries, nuts and olive oil.

Adequate physical activity is also vital. It can

increase oxygen to the brain, improve insulin resistance, and lower heart rate and blood pressure, Anstey says. It is also a mood stabiliser, which is important given depression is an independent risk factor for dementia. "Physical activity just has so many different pathways by which it is protective."

She explains that some animal studies have shown that exercise interventions have led to growth of new nerve cells. "If you're physically active there could be a direct benefit to the brain, but there could also be all these indirect pathways as well. It's a win-win."

Anstey adds that the adage "good for your heart, good for your brain" is mostly true. However, national surveys have shown that many Australians aren't aware that cardiovascular risk factors are also risk factors for dementia. "Things like managing hypertension [and] cholesterol, keeping physically active – they're all good for your heart and they're all good for your brain. Similarly with depression, it increases your risk of heart disease and it also increases your risk of dementia, so managing your mental health is important for both outcomes."

Interestingly, Dr Amen's team did not observe accelerated brain ageing in people with depression. They suggested their finding may be because different brain patterns are associated with this disorder.

Amen suggests three things to help minimise risk and protect the brain. The first is "love it – you have to care about your brain". Second, "avoid anything that hurts it", including smoking, alcohol, marijuana, high blood pressure, obesity and diabetes. Finally, he advises engaging in brain-healthy habits, focusing on diet, exercise and taking omega-3 fatty acids.

He says it is never too late to start making positive changes: "You can make your brain better even if you have been bad for it."

Anstey adds there is evidence that people who have a cognitively stimulating lifestyle have a reduced risk of dementia. Studying this relationship is difficult, however, because once people develop memory problems they start to withdraw from those sorts of activities. This makes it impossible to tell whether the dementia caused the loss of cognitive engagement, or vice versa.

Nonetheless, people with higher levels of education and who do more intellectual work, participate in cultural activities, write more emails and play games that are intellectually stimulating seem to have a reduced risk, Anstey says, even though the mechanism isn't fully understood.

Perhaps her most important advice is to not put off making healthy changes. "Start in middle age if you haven't started already. Don't wait," she says. "It's a bit like investing in superannuation. Investing in your brain – it accumulates slowly over the life course. You can't wait until retirement and go 'I better start putting in my super now'. You do need to be thinking about looking after your brain health throughout your life." ●



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