# Brain health

*Leading naturopath Tania Flack investigates what can go wrong with the body's control centre – and how you can prevent problems before they start.*

THE brain can be looked upon as the control centre of the body, masterfully coordinating a range of complex physiological processes, receiving messages and responding to our environment, ensuring our survival, creating our emotions and storing our precious memories. But what happens when things go wrong? Brain fog and difficulty concentrating are so common in our busy world, where information overload, continuous multi-tasking, poor sleep and fatigue all negatively impact the function of the brain. Combine this with the inflammation and oxidative stress caused by the standard Western diet and sedentary lifestyle, and we may well have a perfect recipe for neurological disaster.

Once considered the territory of advanced old age, dementia and Alzheimer's disease are on the rise in Australia and are slowly but surely making their presence known among younger generations. Recently these diseases have claimed many well loved public figures including Robin Williams, Glen Campbell, David Cassidy and our own, seemingly invincible, Malcolm Young of AC/DC fame, at the tender age of 64. So what can we do to protect and even enhance our brain health and when should we start putting preventive measures in place?

## Alzheimer's and dementia

Dementia is the second leading cause of death in Australia, contributing to 5.4% of all deaths in men and 10.6% of all deaths in women. Each day, approximately 244 people are diagnosed with dementia in Australia, and without a significant medical breakthrough it is projected that over one million Australians will be living with dementia in 2056. If that comes to pass, it is expected to cost Australian taxpayers over $36.8 billion dollars, significantly impacting our national health budget.

Alzheimer's disease is the most common cause of dementia, accounting for approximately 70% of all cases in Australia. It robs us of our memories by depositing amyloid beta-plaques and neurofibrillary tangles in the brain, which impair nerve synapses so signals cannot pass between the cells. According to the Australian Alzheimer's Association, once someone reaches the age of 65 their risk of developing Alzheimer's disease doubles every five years, and while common among the elderly it can even affect people in their forties in rare cases. Symptoms of Alzheimer's disease may include difficulty remembering certain places, people or events, changes in mood or personality, trouble completing tasks that were once easy, and problems with communication.

Vascular dementia is the second leading cause of dementia in Australia. It is usually caused by a stroke or a series of mini-strokes due to tiny blood clots repeatedly blocking vessels in the brain. This leads to the death of brain cells and causes slow and steady decline in brain function. It is strongly associated with obesity, diabetes, heart arrhythmias,


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atherosclerosis (narrowing of blood vessels), and high blood pressure. Smoking significantly increases the risk of vascular dementia. Symptoms can include behavioural changes, difficulty understanding, disorientation, and inability to create new memories. Thanks to the clearly defined risk factors, it has the best scope for preventive care through diet and lifestyle modification.

Lewy body dementia shares many similarities to Alzheimer's disease and is the third leading cause of dementia. It is characterised by the presence of Lewy bodies, which are abnormal sphere-shaped structures that interfere with cell signalling and ultimately damage brain cells. Sufferers may experience hallucinations, mood disruption and changes in alertness and attention.

There is a well-established connection between metabolic syndrome and dementia, including both vascular dementia and Alzheimer's disease. Metabolic syndrome is diagnosed when someone has central obesity (a waist measurement over 102 cm for men and 88 cm for women) accompanied by other factors such as high blood pressure, diabetes and high cholesterol. It is essentially a disease of Westernised cultures, where a sedentary lifestyle, combined with a diet high in refined carbohydrates, sugar, saturated fat and processed foods, disrupts normal metabolic function. Like dementia, metabolic syndrome is on the rise, statistics from 2014-2015 show that a staggering 64% of all Australians are overweight or obese, which is the primary cause of metabolic syndrome.

## Alzheimer's and insulin resistance

While the exact cause of Alzheimer's disease is unclear, researchers have identified a range of possible contributing factors, including environmental, biochemical and immune-mediated influences. Most recently, research has identified problems with insulin signalling, glucose utilisation and energy metabolism within the brain as a potential cause, and the findings of myriad of both human and animal studies have contributed to the mounting evidence. Such is the weight of this evidence some researchers have described Alzheimer's disease as 'Type III diabetes' or brain-based insulin resistance. So how does this work?

Insulin can be considered a transport molecule whose primary role is to facilitate the entry of glucose into the cell to provide energy. Insulin is produced in the pancreas and released into the bloodstream when glucose is absorbed from the food we eat. When insulin is present it helps unlock a cellular 'door' that allows glucose to enter the cell. In type I (autoimmune) diabetes, the pancreas fails to make enough insulin to facilitate this process, and in type II diabetes the receptor sites on the cells become damaged, so insulin is unable to connect with the cell and open the door. In both cases, cells become starved of fuel and glucose floats around in the body at high levels, causing oxidative stress, which damages cells.

The brain's primary source of fuel is glucose, so when insulin fails to do its job the brain cells

## TOP 13 brain busters

1. Stress
2. Excess alcohol
3. Lack of sleep
4. Lack of exercise
5. Obesity/overweight
6. Diabetes
7. Insulin resistance
8. Unbalanced gut microbiome
9. High intake of saturated fats
10. Inflammatory diet
11. Smoking
12. High blood pressure
13. Heart rhythm abnormalities

## Brain boosters

**Co enzyme Q10** (CoQ10) is an enzyme found in every cell in the body. It plays an important role in intracellular energy production and acts as a powerful antioxidant that helps to reduce the oxidation of low-density lipoprotein (bad cholesterol) and protect blood vessels and throughout the body. A large Japanese study found lower serum CoQ10 levels were associated with a greater risk of dementia, while other studies have shown that it can help to improve cerebral energy and symptoms in supranuclear palsy and Parkinson's disease.

**Ginkgo** This magnificent, long-living tree with heart-shaped leaves has been used in herbal medicine for thousands of years. It is renowned for its potent effect on circulation and brain health. A 2012 study found that taking ginkgo for 24 weeks improved cognition, mood, mental function and quality of life in patients with mild to moderate Alzheimer's disease and vascular dementia. It has also been shown to improve the ability to perform demanding cognitive tasks among healthy middle-aged volunteers, indicating its potential as a cognitive enhancing supplement.

**Bacopa** This has been traditionally used in Ayurvedic medicine to protect brain health and promote mental clarity. Animal studies show that it has antioxidant, cell-protective effects and increases cerebral blood flow. In 2008, an Australian randomised, double-blind, placebo-controlled trial showed that 300mg of bacopa per day, for 12 weeks, improved memory and decreased depression and anxiety in healthy, older adults. An Indian study found it improved self-control, restlessness, learning problems, attention-deficit, impulsivity, and psychiatric problems in a group of participants with attention deficit hyperactivity disorder.

**Rosemary** The phrase "rosemary for remembrance" is no coincidence, and this humble backyard herb has been proven to

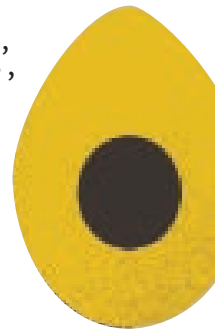
literally 'starve', which causes oxidative stress, destroying the cells inbuilt regulatory processes and ultimately leading to the death of brain cells. The deposition of amyloid-beta plaques and neurofibrillary tangles is thought to be due to disruption of normal cell biochemistry, which in turn leads to further increased insulin resistance. Metabolic syndrome causes a perfect biochemical storm of insulin resistance, oxidative stress and inflammation, which are all pivotal factors in the development of both vascular dementia and Alzheimer's disease. Insulin may also play a role in the development of Lewy body dementia and studies show that disruption of insulin-like growth factor may be involved.

## Brain fog and the gut

Could your gut play a role in how clearly you think on a day-to-day basis? The research certainly suggests this is true. We know that cognitive function declines in the presence of low grade systemic inflammation; this is one of the reasons your memory and mental performance suffer when you have a cold or a flu virus. However, these are usually self-limiting, so the brain fog will lift as you get better.

In the case of inflammation caused by an unbalanced gut microbiome, however, the effects are longer-lasting. We all carry trillions of bacteria in our gut, and in a healthy person these bacteria are essentially self-policing, in that they keep a healthy balance by nature of their diversity so no one group overpowers the other. However, stress, a diet high in saturated fat and processed foods, antibiotics, chemicals, pesticides, alcohol, and sugar can all contribute to an overgrowth of opportunistic bacteria. Some bacteria produce microscopic particles of endotoxin that can pass across the gut barrier, into the bloodstream, causing low-grade continuous inflammation. One placebo-controlled, double-blind, cross-over study involving 12 healthy young men introduced endotoxins from bacteria into their bloodstream, and within 24 hours their inflammatory markers increased up to seven times their normal level and their memory was significantly impacted.

> Such is the weight of evidence linking insulin resistance to Alzheimer's disease, some researchers describe it as 'Type III diabetes', or brain-based insulin resistance.



It is never too early to start looking after your brain health. Focus on maintaining excellent cardiovascular health, stay active, get enough rest and manage stress. You should see your local health practitioner for personalised support if you have a family history of dementia.

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enhance cerebral circulation and memory in several clinical trials. One study found that even short-term administration of 750mg of rosemary leaf powder improved the speed of memory in the hours following administration in a group of older adults, while smelling the essential oil improved the overall cognitive performance, alertness and mood among healthy volunteers.

**Omega-3s** Omega-3 essential fatty acids from fish and seafood have a range of benefits for brain health. They have powerful anti-inflammatory effects, support cell membranes and neurological health, including the brain. They also help maintaining healthy cholesterol levels and protect against cardiovascular disease. This may be a key factor in the success of the Mediterranean diet in protecting brain health. A 2005 Italian study found that consuming 4 grams of fish oil daily (1,600mg EPA and 800mg of DHA) improved mood and concentration in healthy adults, while other studies have demonstrated that eating fresh fish, even just once a week, was associated with a decreased the incidence of dementia.

**Phosphatidyl serine** (PS) This is an essential brain nutrient, vital for the healthy function of nerve cells and myelin, which covers the nerves. Various animal studies have shown that it crosses the blood-brain barrier, and slows or even prevents damage to neurological tissue. It has a beneficial effect on neurotransmitter release and neurotransmitter receptor concentrations in the brain. Human studies have shown that it supports cognitive function, including the formation of short-term memory, and also helps to consolidate long-term memory and create new memories, enhance concentration, recall and attention, and support reaction times and healthy reflexes.

**B group vitamins** play an essential role in brain health, especially folate and vitamins B12 and B6 which are vital co-factors in the methylation pathway, which is involved in energy production in the cells and DNA replication and repair. When folate intake is inadequate homocysteine levels rise, which is associated with an increased risk of damage to blood vessels and atherosclerosis. Many studies have investigated the impact of these nutrients on the development of dementia. One large Italian study followed the progress of over 800 elderly participants and found that those that developed dementia were more likely to have low serum folate levels and elevated homocysteine.

**The Mediterranean diet** A meta-analysis of the available studies has shown that the Mediterranean diet, which is in rich in plant foods, fibre, whole grains and seafood, is the best nutritional intervention to protect against the development of Alzheimer's disease and dementia. This is likely due to its plentiful supply of folate, B group vitamins, omega 3 essential fatty acids, fibre, minerals and broad range of antioxidants and polyphenols, which all combine to protect the brain against oxidative damage while supporting cardiovascular and metabolic health.