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1. Long distance skiers who remain physically active throughout their life are less likely to have depression and develop vascular dementia, but do not have a reduced risk of Alzheimer's disease, according to research from Sweden. The study, conducted by researchers at Lund University, looked at data from 200,000 people who had participated in a long-distance, cross-country ski race in 1989 and compared their health over a two-decade period. Their findings showed that fewer than 50% of the skiers were affected by vascular dementia and depression, and manifestation of Parkinson's disease in those that went on to develop it was delayed. However, there was no reduction in Alzheimer's risk, leading researchers to suggest that physical activity does not affect the chance of developing the disease.

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2. Herbal medicine for treating vascular dementia is being trialled in a study at the Royal Adelaide Hospital Clinical Trials Centre. The medicine, called *Sailuotong*, is a herbal blend of ginseng, saffron and gongko and aims to reduce inflammation in the brain. The trial will be conducted over a 12 month period and the researchers hope the anti-inflammatory properties of the herbs will improve brain functions such as memory, reasoning and problem-solving, with fewer side effects than conventional medical treatments.

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3. Atrial fibrillation (AF – a type of abnormal heart rhythm that causes the upper chambers of the heart to quiver instead of beating abnormally) and dementia are highly prevalent conditions, with experts anticipating an increase in both as our populations age. AF is thought to be a risk factor for cognitive decline. A recent study based in South Korea has examined the associations between AF and the risk of developing dementia, as well as looking at the impact of strokes and the administration of oral coagulants on these associations. Researchers compared results from over 260,000 patients aged 60+ years who did not have AF, dementia, stroke or valvular heart disease at the time of enrolment. During follow-up periods, AF was found to increase the likelihood of developing dementia by 50%. Further to this, the use of anticoagulants appeared to reduce dementia risk among patients with AF by as much as 60%.

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4. Researchers from the Stanford University School of Medicine have found that damage in cells from patients with Alzheimer's is increased by a mutation in a key enzyme involved in metabolism. The common mutation in aldehyde dehydrogenase (or ALDH2), which is prevalent in East Asian populations, is characterised by facial flushing (sometimes known as "Asian Glow") following the consumption of alcohol, and causes the activity of the enzyme to be greatly reduced. This results in a build-up of acetaldehyde, a toxic product of alcohol metabolism, to which the body responds with skin flushing and inflammation. Inflammation is known to be a risk factor in the development of Alzheimer's disease.

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5. New research suggests that eating a ketone-supplemented diet may protect neurons from death during the progression of Alzheimer's disease. SIRT3, a protein that preserves mitochondrial functions, is compromised by the accumulation of amyloid beta. Mice models, genetically engineered to have reduced levels of SIRT3, fed a diet rich in ketones, via a specific type of fatty acid, experienced a much lower mortality rate and less seizures than mice denied the diet.

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6. Scientists have been working with gamma rhythm power in the brain, to see how it affects the pathology and symptoms of Alzheimer's disease. Exposing mice to light flickering or sound buzzing at 40Hz, a method scientists call "GENUS" (Gamma Entertainment Using Sensory Stimuli), strengthens the rhythm across the brain and changes the gene expression and activity of multiple brain cell types. The scientists noted a decline in tau and amyloid build-up, as well as a reduction in neural degeneration. Learning and memory also appeared to be retained better in mice who had received GENUS.

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7. Scientists have found that ultrasound may be used to help drug treatments break through the blood-brain barrier and target Alzheimer's-affected areas. The blood-brain barrier, a network of blood vessels and tissues that protect the brain from foreign substances (including those administered to fight disease) via the bloodstream. With the use of focused ultrasound administered to animal models under MRI, the barrier can be opened allowing medications through, seemingly with no adverse effects to the patient. Even without medications, opening the blood-brain barrier appeared to increase the clearing of toxic substances from the brain. Further investigation is required to ascertain if the procedure is safe for humans.

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8. A team from the University of Bath have used a combination of maths, computation and chip design to create a replicant nerve cell. The “brain chips” mimic, in circuit form, what neurons do naturally, and may be used in the near future to treat neurological disease like Alzheimer’s. The scientists replicated two types of neurones, including hippocampal cells, which are largely responsible for memory. The brain chips provide a method of reproducing the electrical properties of real neurons in minute detail.

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