

Alzheimer's disease

What is Alzheimer's disease?

Alzheimer's disease (AD) is a neurodegenerative disease in which brain cells are destroyed causing a loss of cognitive, memory and physical function. AD mostly affects older people, and is the leading cause of dementia. Approximately 332 000 Australians had dementia in 2014, and this number is expected to increase to 550 000 people by 2030, and 891 000 people by 2050 (1). The biggest reason for the increase in AD incidence is Australia's aging population, caused by greater life expectancy and the post-war increase in birth rates (the 'baby boomer' generation) (2).

What are the risk factors for Alzheimer's disease?

Although we do not completely understand the causes of Alzheimer's disease, we do know that AD and heart disease have some of the same risk factors. These include reduced physical activity, obesity, and the metabolic syndrome (being overweight, high cholesterol and blood pressure, reduced glucose tolerance or type 2 diabetes, and a higher proportion of body fat compared with muscle mass) (4). In addition, the decreased testosterone levels that occur naturally with ageing in both men and women are correlated with the cognitive decline seen in AD. Testosterone appears to be important for maintaining brain cell structure and function, and research has shown that testosterone levels of older men can predict their future risk of developing AD (5).

How can exercise help in Alzheimer's disease?

The risk factors for AD — which are largely associated with reduced physical activity — suggest that exercise can help to prevent or delay AD. Exercise can also be used as a 'medicine' for managing established AD by:

- slowing the progression of AD in people with mild to moderate cognitive impairment
- improving physical and mental function
- slowing or reversing the muscle wasting often associated with advanced disease
- improving mood and depression in patients with existing disease
- lessening behavioural problems in people with advanced disease.

People who are physically active have a lower risk of developing AD than those who are inactive. Furthermore, starting and maintaining an exercise program is associated with reduced levels of beta amyloid — a protein that forms plaques on the brain and is currently thought to be the main cause of AD (3). Exercise reverses all aspects of metabolic syndrome (including in people with type 2 diabetes), so it is reasonable to assume the same benefits will be gained for AD. Exercise (particularly resistance or weight training) also increases testosterone levels, which can help to protect brain cells and preserve cognitive function.

Exercise can benefit people who already show signs of AD by improving their quality of life, slowing down the disease progression, and improving physical function and health. In addition, social interaction and cognitively stimulating environments slow disease progression. Exercising in a group environment with mentally challenging and changing exercises should be of greater benefit. Even patients with advanced AD should engage in regular exercise to reduce physical and functional decline. Life-threatening muscle wasting (cachexia) is a major issue and exercise can help by stimulating appetite, as well as muscle and bone growth. People with moderate to advanced AD are easier to care for if they engage in regular exercise. Even a single bout of exercise can improve cognition and memory in people with AD. The strongest evidence for the benefit of exercise for people with AD is improved quality of life, and improved ability to perform tasks of daily living. Therefore, exercise medicine can be considered essential on these outcomes alone.



Dr. Ronald Petersen, Director of the Alzheimer's Research Center at the US Mayo Clinic, has stated that 'regular physical exercise is probably the best means we have of preventing Alzheimer's disease today, better than medications, better than intellectual activity, better than supplements and diet'.(6)

What type of exercise is recommended?

The goals of exercise to prevent or manage AD are to maintain or increase muscle mass and strength; decrease risk factors for cardiovascular disease and metabolic syndrome; increase testosterone levels; and provide a socially engaging and interactive environment.

General recommendations for preventing and managing AD is to meet or exceed the following:

- Continuous or intermittent aerobic (cardiovascular) exercise for 20–60 minutes per session, 3–5 times per week at 60–90% of your maximum heart rate (the maximum heart rate is estimated as 220 minus your age in years). Rating of perceived exertion (RPE) is also a useful method to prescribe the desired intensity of the exercise. RPE for older people should be between 13 and 15 on a 20-point scale, provided you have no other health issues that require a lower intensity. Your total weekly exercise should be at least 120–150 minutes, depending on the intensity of your aerobic exercise.
- Resistance (weight) training at an intensity of 6–12 repetitions maximum (RM) performed over 3 sets of 6–8 exercises per session, with the goal of 2 or more sessions per week. It is important to exercise all the major muscle groups each week and select functional movements such as squat, upright row, shoulder press and other exercises that are similar to tasks of daily living. RM intensity refers to the maximum weight that can be lifted for a given target set. For example, 6 RM is the weight that can be lifted only 6 times through the full range of movement while maintaining correct technique. However, it is not necessary to continue each set until the movement cannot be completed due to fatigue, because similar benefits are derived from less intense sets.
- Flexibility exercises for major muscle groups involving 2–4 sets of each exercise 2–3 times per week should also be completed.

People with signs of muscle wasting should be prescribed more anabolic resistance training (which builds proteins and tissue). Combining this type of exercise with nutritional strategies can further optimise muscle growth. Additional benefits include more effective control of blood glucose, and reduced whole-body inflammation (due to increased muscle mass), a major risk factor for cardiovascular disease, diabetes and AD. Testosterone release is greater with resistance training involving large muscle groups and high intensity (3–8 RM). Given the benefits of increased testosterone for AD, such exercise should be incorporated where possible. If body fat is increased (particularly if accompanied by other indicators of metabolic syndrome and cardiovascular disease), then exercise and nutritional strategies should be followed to attain healthier body composition. The American College of Sports Medicine guidelines recommend following a higher total volume of aerobic exercise per week combined with caloric restriction.

Related information and references

Exercise is Medicine Australia www.exerciseismedicine.org.au

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