

Acquired brain injury and exercise

What is acquired brain injury?

In Australia, acquired brain injury (ABI) is the term most commonly used to describe any damage to the brain that occurs after birth. More than 430,000 (2.2%) Australians have an ABI. Causes include trauma resulting from an external force (e.g. a direct blow to the head, crush injury or penetration injury), hypoxia (lack of oxygen to the brain), substance abuse (e.g. alcohol), and tumours or infections (e.g. meningitis).

There are two other major causes of ABI - stroke and neurodegenerative conditions such as Multiple Sclerosis (MS) and Parkinson's disease (PD). However stroke, MS and PD have unique exercise implications and therefore each is addressed in a separate EIM factsheet.

The consequences of ABI vary considerably, and are determined mainly by which area/s of the brain are affected and the severity of the injury. Other factors include age at the time of injury, the time since injury, and the social support systems available (e.g. family support, community resources). Consequences of ABI include:

- Cognitive impairments affect nearly all people with ABI. The most common are impairments of memory, attention and arousal (e.g. lethargy, fatigue, distractibility), language and communication (e.g. dysnomia and difficulty with high-level receptive and expressive language), and planning and organisation (e.g. making and keeping appointments or goal setting).
- Physical impairments such as impaired strength, hypertonia (increased muscle tone), contracture, ataxia (impaired coordination and balance), seizure disorders and pain.
- Behavioural impairments including disinhibition (a lack of acceptable social restraint), impulsivity, reduced insight and egocentricity. These impairments frequently have significant social consequences.
- Social consequences which can be profound even in mild ABI. For example, a high proportion of people with ABI have difficulty forming and maintaining close personal relationships, and most families of people with ABI experience significant disruption. Unemployment among people with ABI is very high.
- Mental health consequences, the most common being clinical depression, which affects nearly 50% of people with ABI. The incidence tends to be higher among those with mild to moderate impairments, because these people often retain good personal insight.

How does exercise help?

The evidence presented in this factsheet is relevant for people with ABI who have been discharged from hospital and who undertake exercise similar to that undertaken by the general population. Evidence relating to inpatient rehabilitation and specific neurological rehabilitation techniques (e.g. body weight supported treadmill training, movement constraint therapy and Functional Electrical Stimulation) is not reviewed.

Evidence indicates that people with ABI are among the most physically inactive members of society. Furthermore, among people with ABI, those with high support needs are less active than those with mild to moderate impairments. This profound physical inactivity is very harmful for health, fitness and function, and compounds the consequences of ABI. There is strong scientific evidence to indicate that:

- Aerobic exercise (e.g. walking, jogging, swimming or wheelchair pushing) improves cardiorespiratory fitness in people with ABI. Furthermore, the quantity and intensity of exercise required for improvements is similar to the general population.
- Resistance training improves muscular strength in people with ABI. While the quantity and intensity of exercise required for improvements is similar to the general population, it should be noted that no studies have specifically investigated the effects of strength training on people with ABI who are affected by spastic hypertonia, an impairment that could potentially affect outcomes.



- Regular exercise can improve measures of function, such as balance, sit-to-stand, walking speed, walking duration and running. However it should be noted that some exercise programs improved cardiorespiratory fitness and/or muscular strength but did not improve measures of function.
- Exercise can alleviate depressive symptoms as well as improve other aspects of mood and quality of life.

In addition to the above benefits, emerging scientific evidence indicates that:

- Aerobic exercise can positively influence cognitive function including global cognition, selective attention and working memory.
- Exercise in group settings can assist community re-entry by providing opportunities for social interaction and acquisition and development of social skills (e.g. inter-personal communication).

What exercise is best for people with ABI?

Because the ABI population is extremely varied and the quantity and quality of research is limited, specific, prescriptive recommendations for exercise programs are not possible. However some general recommendations can be made:

- people with ABI are particularly inactive; therefore, health professionals should strongly encourage people with ABI to be as physically active as they can be;
- for people with ABI who are commencing an exercise program for the first time, priority should be given to establishing a regular, weekly exercise routine: of less importance are the type of exercise that is done, and the duration and intensity of each exercise session;
- for optimal health, people with ABI who have minor disabilities should follow the exercise recommendations for the general population;
- people with ABI who have moderate to profound disabilities should undertake exercise programs tailored according to the type of impairment/s, the severity of impairment/s, their interests, and the available social support and community access;
- people with altered joint mechanics (e.g. resulting from contracture or altered muscle tone) can undertake strength training with weights, but joint health (e.g. pain, swelling) should be monitored carefully;
- exercise programs for people with functional goals (e.g. improved sit-to-stand or walking speed) should incorporate functional activities; and
- where possible, exercise which provides opportunities for social interaction should be encouraged.

References and further information

Exercise is Medicine Australia www.exerciseismedicine.org.au

Find an Accredited Exercise Physiologist www.essa.org.au

Exercise Right www.exerciseright.com.au

Brain Injury Australia www.bia.net.au

Synapse Inc www.synapse.org.au

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