



**ACSM (2021) Recommendations for Individuals
with a Cerebrovascular Accident (Stroke)**

Introduction

When blood flow to a region of the brain is obstructed (i.e., cerebrovascular accident, CVA, or stroke), brain function deteriorates quickly and leads to neuronal cell death. This can result in motor (functional), sensory, emotional, and cognitive impairments, the extent of which are greatly influenced by the size and location of the affected area and presence or absence of collateral blood flow. The aetiology of a stroke is most often ischemic (87%, due to either thrombosis or embolism) or haemorrhagic. Each year, nearly 800,000 U.S. residents suffer a stroke, with women having a higher lifetime risk of stroke than men.

Physical and occupational therapy are typically utilized for up to 3–6 month following a stroke to improve/restore functional mobility, balance, and return to ADL. The AHA/American Stroke Association recommend PA and exercise for stroke survivors across all stages of recovery. Loss of physical stamina, mood disturbance, and adoption of sedentary behaviours are common in stroke survivors, which may result in several complications including increased frequency of falls and balance issues. Although the exercise programming is often adapted to the functional abilities of the individuals, exercise training improves exercise capacity (10%–20%, as measured by $\dot{V}O_2$ peak) and may improve overall quality of life and help manage risk for a secondary event.

Exercise Testing

Compared to those who have not suffered a stroke, oxygen uptake is higher at a fixed submaximal level and reduced at peak effort among stroke survivors. In addition, the functional capacity of stroke survivors is significantly reduced. During exercise testing, both chronotropic incompetence and early-onset fatigue are common.

Exercise testing should employ a mode of testing that accommodates an individual's physical impairment.

Cycle ergometry (work rate increase of 5–10 W · min⁻¹ or 20 W per stage) and dual action semi recumbent seated steppers may be preferred if sitting is needed to

mitigate any balance deficiencies. In each case, modifications of the device (e.g., pedal type, swivel seated, seated back, flip up arm rest) may be needed to facilitate safety and ease of use.

Treadmill testing protocols should increase work rate by 0.5 to 1–2 METs · 2–3 min⁻¹ stage and only be considered if the individual can stand and demonstrate sufficient balance and ambulate with very minimal or no assist. Balance impairments demand caution, including dual sided handrails on treadmills and/or a body-weight support system.

Exercise Prescription

Strong evidence exists to support exercise therapy for individuals with history of stroke, as reported in the review done for the Public Health Agency of Canada in 2013. Many individuals suffering a stroke are elderly, and many have multiple comorbidities including other CVDs, arthritis, and metabolic disorders. All comorbidities and their associated medications should be considered when performing exercise testing and prescribing exercise. After an individual suffers a stroke, a main objective is to restore ability to return to ADL. Exercise therapy should occur in each of the three phases of recovery: acute (in-hospital), subacute (rehab facility/home), and maintenance (home). After the acute phase of rehabilitation, aerobic, neuromuscular, and muscle-strengthening exercises can be engaged to further improve function, facilitate secondary prevention, and improve fitness in the prolonged maintenance phase of stroke recovery. Future guidelines may need to address the continuum of care in stroke rehabilitation. The following FITT guidelines for exercise programme are **general recommendations** for individuals with cerebrovascular disease.

Exercise Training Considerations

Avoid the Valsalva manoeuvre during resistance training to avoid excessive elevations in BP.

Treadmill should begin at a slow speed (0.8 mph) and provide harness apparatus for individual safety or, if needed, partially unloaded walking. Careful use of the HR for intensity monitoring is recommended, as age predicted maximal HR is rarely achieved

by the stroke individual during a maximal exercise test. All components of exercise training (aerobic, muscle strengthening, and balance training) are important to stroke exercise therapy.

FITT RECOMMENDATIONS FOR INDIVIDUALS SUFFERING A CEREBROVASCULAR ACCIDENT			
	Aerobic	Resistance	Flexibility
Flexibility	Minimally 3 d · wk ⁻¹ ; preferably up to 5 d · wk ⁻¹	At least 2 d · wk ⁻¹ performed on non-consecutive days.	≥2–3 d · wk ⁻¹ with daily being most effective.
Intensity	If HR data are available from a recent GXT, use 40%–70% of HRR. In the absence of a GXT or if atrial fibrillation is present, use RPE of 11–14 on a 6–20 scale.	50%–70% of 1-RM.	Stretch to the point of feeling tightness or slight discomfort.
Time	Progressively increase from 20 to 60 min · d ⁻¹ . Consider multiple 10-min sessions.	1–3 sets of 8–15 repetitions.	10–30 s hold for static stretching; 2–4 repetitions of each exercise.
Type	Cycle ergometry and semi recumbent seated steppers; may need modification based on functional and cognitive deficiencies. Treadmill walking can be considered if individual has sufficient balance and ambulation with very minimal or no assist.	Use equipment and exercises that improve safety in those with deficits (e.g., strength, endurance, movement, balance): machine vs. free-weight, bar vs. hand weights; seated vs. standing as indicated.	Static, dynamic, and/or PNF stretching.
1-RM, one repetition maximum; GXT, graded exercise test; HR, heart rate; HRR, heart rate reserve; PNF, proprioceptive neuromuscular facilitation; RPE, rating of perceived exertion.			

Other Considerations

Comprehensive stroke care involves being attentive to affective issues such as mood, motivation, frustration, and confusion. Correctly managing affective issues can favourably influence how an individual conducts, adheres to, and responds to a prescribed exercise regimen. Strategies aimed at minimizing negative influences include close supervision, individualized instruction until independence is established, involvement of family members, repetition of instructions, and alternate teaching methods. In addition, CVD risk factor reduction is essential.

Exercise therapy should be initiated only after the individual is medically stable. Early-onset local muscle and general fatigue are common and should be considered when setting work rates and rates of progression.