

# Physiotherapy Briefings for Physicians

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In this third of a series of *Briefings for Physicians* on the topic of therapeutic exercise, our focus is on how physiotherapy can benefit patients who have sustained a stroke.



## Early exercise intervention key for stroke rehabilitation – Physiotherapists can help

Stroke is the third most common cause of death in North America.<sup>1,2</sup> Although the mortality rate has decreased, the incidence of stroke has increased. Approximately two-thirds of patients survive initial stroke, making it the most common cause of long-term adult disability.<sup>3</sup>

Between 50-70% of stroke survivors deal with residual motor impairments and disabilities, including loss of strength and dexterity, reduced mobility, poor balance, and muscle weakness.<sup>1,4</sup> Such disabilities limit physical activity and affect people's daily activities, independence and quality of life.

**Extensive recent studies have confirmed that therapeutic exercise – one of the primary interventions prescribed by physiotherapists for stroke survivors<sup>5</sup> – is one of the most effective forms of post-stroke rehabilitation for those with mild to moderate disability.**

This is true particularly if such interventions are started **soon after the initial stroke.**<sup>7</sup> For instance a 2006 systematic review and meta-analysis of 21 studies found that the overall effect of progressive resistance exercises on patients' strength and level of functional activity was greater for those in the acute phase (less than six months) following stroke. However, even chronic (more than six months post-stroke) survivors saw improvements.<sup>3</sup> The reviewers suggest that the difference in effects may be due to the fact that patients more than six months post-stroke have greater loss of strength from decreased muscle and motor unit activity.

Aerobic training – which is often prescribed by physiotherapists – can have significant positive effects for mild to moderately impaired patients at any stage of stroke recovery, according to a 2006 review and meta-analysis of seven randomized controlled trials involving 480 participants.<sup>1</sup> Aerobic training can include walking, stepping, running, cycling, and rowing. A stationary bike, which requires less postural control than treadmill walking, is an alternative for those with poor balance. Water may also serve as an excellent exercise medium, offering resistance, reducing joint impact loading and providing partial weight support – an important factor since people who have sustained a stroke often have reduced ability to weight-bear on the paretic leg. A 2004 systematic review of 151 studies also found strong evidence that people benefit from exercise programs in which functional tasks are directly and intensively trained. As noted previously, such functional training of both upper and lower limbs is particularly effective when applied intensively and early after stroke onset.<sup>7</sup>

Post-stroke interventions have been used to reduce pain and spasticity, as well as to restore motor control, increase range of motion, and improve muscle tone, mobility, walking ability, and upper limb function, as well as overall physical fitness.<sup>2</sup>



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## ● Study: Exercise enhances bone health in chronic stroke

A recent study by BC researchers sought to establish the efficacy of physical activity in reducing the risk of fragility or low-trauma fractures in people after a stroke (stroke survivors have more than a sevenfold risk of fragility fractures, compared with aged-matched healthy individuals, due to compromised bone health and increased number of falls).<sup>1</sup> The randomized controlled trial included 60 participants who completed a 19-week exercise program. Half of the subjects did exercises designed to enhance lower-extremity strength as well as aerobic fitness and balance; the control group did only seated upper-extremity exercises. The researchers used peripheral quantitative computed tomography (pQCT) to measure tibial bone changes. After the five-month intervention, participants in the lower-extremity exercise group had more gain in bone mineral content and cortical

thickness on the paretic leg compared with the control group.

This is the first report of the use of pQCT to investigate tibial bone changes in people after stroke, and while the relationship between pQCT measurements and fracture risk has not yet been established, the researchers suggest this study shows promise for reduced fracture risk in stroke survivors.

<sup>1</sup> Pang MY, Ashe MC, Eng JJ, McKay HA, Dawson AS. A 19-week exercise program for people with chronic stroke enhances bone geometry at the tibia: A peripheral quantitative computed tomography study. *Osteoporosis Int.* 2006;17:1615-1625.

## ● Bilateral movement: physiotherapists exercise both sides of the brain

Bilateral movement training, a technique used by physiotherapists, is based on the idea that voluntary movements of the intact limb by stroke patients may facilitate

voluntary movements in the paretic limb. A 2006 paper published in the *Journal of the Neurological Science* reviews 11 studies of the effects of bilateral movement training in stroke survivors. The authors found a significant overall mean effect size, indicating bilateral movement training is beneficial for improving motor recovery.<sup>1</sup>

A basic assumption of the therapy is that symmetrical bilateral movements activate similar neural networks in both hemispheres of the brain, so when homologous muscle groups are used simultaneously, activation of the undamaged hemisphere may promote neural plasticity, and activate the damaged hemisphere. However, the researchers suggest it may not be necessary for the movements to be symmetrical (in-phase); anti-phase (i.e. push/pull movements) may also be effective.

<sup>1</sup> Stewart KC, Cauraugh JH, Summers JJ. Bilateral movement training and stroke rehabilitation: A systematic review and meta-analysis. *J Neurol Sci.* 2006; 244:89-95.

*Early Exercise Intervention...continued from front page*

The evidence is clear – exercise as part of the early intervention can help prevent secondary disabling conditions associated with stroke, and positively influence these individuals' functional activities and ability to live independently. However because of their reduced mobility, people living with the residual effects of a stroke often have poor exercise capacity – approximately 40% below age- and gender-adjusted norms for sedentary individuals.<sup>6</sup> **Physiotherapists, as members of the health care team with expertise in mobility activities, are in a good position to work with people to help increase their exercise capacity.**

### References

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Suite 402-1755 West Broadway  
Vancouver, BC V6J 4S5  
Tel 604.736.5130 Toll free 1.888.330.3999  
[pabc@bcphysio.org](mailto:pabc@bcphysio.org) [www.bcphysio.org](http://www.bcphysio.org)