Exercising After a Stroke or Brain Injury

A stroke takes place when blood flow to the brain is blocked, resulting in a loss of brain function for 24 hours or more. Most strokes are a result of a thrombosis or embolism, with a small percentage stemming from a blood vessel hemorrhaging and leaking into the brain. Stroke is more common in men than women, and is the third greatest cause of death in North America. Common effects of stroke include aphasia (problems using and comprehending language), loss of sensory input ,a very short attention span, poor short-term memory, and struggles with emotional control.

Acquired traumatic brain injury (TBI) may result from a hit or strong bump to the head, or from being furiously shaken, such as Shaken Baby Syndrome. Falls and motor vehicle accidents make up the majority of incidences of TBI. TBI causes permanent injury to brain, resulting in deficits in memory, language, reasoning, judgement, sensory and motor abilities, and information processing, to name just a few.

People who have experienced stroke or TBI tend to have a much lower ability to take in enough oxygen for cardiovascular exercise. This means that these people need to work with lower maximal workloads. After a stroke or TBI, aerobic capacities tend to be 67-74% lower than average levels. The end result is that these survivors breathe harder with exercise, grow very tired much more quickly, and have diminished motor skills and activities of daily living (ADL). There can be a cascade of events flowing from this situation. They may drift towards a sedentary lifestyle, with the negative health issues that go along with that. Such a lifestyle may also decrease even more their ability to perform at work or to engage in social activities.

Survivors typically take several medications, including blood thinners, vasodilators, anti-seizure agents, or medications to combat hypertonia, or an abnormal increase in muscle tension. Also, some medications may be used to contend with cognitive deficits. As with all medications, there are side effects that speak to the person's ability to exercise, and should be taken into consideration when designing an exercise program for such survivors. For instance, someone taking a vasodilator may need a longer cool-down period in order to avoid low blood pressure after exercise. A person taking a medication to limit cardiac output may not be able to achieve as high a heart rate during exercise as an average person. Also, dysrhythmias may occur if the survivor is taking a diuretic, because the fluid volume in the body is decreased, and the electrolyte balance is compromised.

It's true that coronary heart disease and subsequent strokes are the leading causes of death after stroke. But we know that exercise alone can reduce this mortality rate by at least 20% - that is a very significant influence from only one therapy. Also, people with TBI who are physically more active tend to be less depressed and have fewer cognitive problems. Exercise in both groups leads to improvements in blood pressure, resting heart rate, cholesterol levels, and peak oxygen uptake. There are typically also improvements in walking speed and functional mobility. Often the person relies less on mobility assistive devices, such as a cane or walker.

So how does a survivor of stroke or TBI become more fit? The first step is to enter exercise testing, keeping in mind that many in this population either have, or are at significant risk for, cardiovascular disease. This testing can be modified to work around the limbs and capacities affected. For instance, if the person has minimal motor skill deficits, a treadmill can be used to determine cardiovascular limits. However, a seated stepper machine, such as a NuStep, or a combined arm and leg ergometer can be used instead, depending on the level of motor skill impairment. Flexibility, or range of motion

at any particular joint, should be assessed and monitored regularly to deal with the increase in muscle tension.

Aerobic guidelines for this group are to work to 40-70% of VO2 peak (the maximum amount of oxygen the body can use during intense exercise). The person can get to this goal using ergometers, treadmill, seated stepper, or recumbent bicycle. Aerobic exercise should be done 3-5 days per week, with a duration of 20-60 minutes per session.

Strength training, using a mix of weight machine, dumbbells, and isometric exercise (such as a plank), should be done 2 days per week, with a goal of 3 sets of 8-12 reps per exercise. Flexibility, or stretching, will increase the range of motion of the affected limbs, and prevent contractures. Stretching should be done every day, after exercise, or at the end of the day.

Doing coordination and balance exercises will help with the neuromuscular deficits and ideally should be done in conjunction with the strength training exercises, or 2 days per week.
These exercises should be modified by the trainer to suit the needs of the particular person, such as using dumbbells for the upper body while seated, to compensate for balance problems or lower limb mobility. Many core strength exercises can be performed lying on a treatment table, if getting down and back up from the floor poses a challenge or risk. The trainer also must create an exercise environment free of obstacles, and with equipment the survivor can easily access. Equipment may need to be modified, such as adding a harness to the upper body, or a waist belt to help stabilize the person exercising.

Aerobic exercise is a vital part of any training program, and yet many of us aren't sure of what type to do, for how long, or how often. As a personal trainer, I apply the FITT principles to any kind of physical activity – Frequency, Intensity, Time and Type.

Most of us should aim to do aerobic activity between three and five times per week, for 30-45 minutes per session. This means getting your heart rate elevated for a sustained period of time, and you should feel tired, but not flat-out exhausted, at the end of it. This brings us to the intensity of your cardio workout.

People new to exercise may want to stick to a moderate pace, still getting to fatigue, until these workouts become easy, and they notice that their results – cardiovascular endurance, weight lost – are plateauing. At this point I encourage clients to vary their cardio workouts both in intensity and duration, or time. First, I get the client's resting heart rate, and determine the range of elevated heart rate we're going for. Then I set them up into different types of cardio challenge, varying the type within the week. The client may be doing up to four types of cardiovascular challenge: Long Slow Distance, Continuous Interval, and Supramaximal Training. Here's what such a program might look like (the bpm – heart rate – is a suggestion and will change for each person).