

**Vol 3, 2005 CEC ARTICLE (2 CEC's)**  
**STROKE RECOVERY**  
By B. Jacobsmeyer

Strokes can be devastating. A once physically active, socially involved person suddenly cannot walk; use their arm or sometimes even talk clearly. Stroke recovery is often a tremendously difficult time for both the stroke victim and their family.

A stroke is caused by a blood clot that has lodge in a blood vessel in the brain cutting off blood flow to that area. If it is in the right hemisphere of the brain it will paralyze the left side of the body. If it is in the left hemisphere of the brain not only will it paralyze the right side but it will also affect speech. According to Newsweek March 8, 2004 700,000 Americans had stroke in 2004, two thirds of them over the age of 60. Of those that survive the stroke 75% of them will have long-term disabilities.

It was believed until recently that after six month post stroke no further functional improvement could happen. Consequently, all rehab ended after six months. In fact, I had quite a difficult time getting a doctor's release for my first stroke client because he did not believe that it would be of any benefit to his patient since he was two years post stroke.

Research has proven differently. The following research study done by Dr. Silver and Dr. Macko and Prof. Smith and Forrester and published in the Sept. 2001 BioMechanics Publication showed that improvements could be made a full two years after a stroke. Their study consisted of 30 participants with limited gait mobility, all an average of two years post stroke. The group walked on a treadmill for six months. At the end of six months their walking speed improved by 32 % and they were able to walk 44% further in a six minute timed walk. They also had improvement in strength in their quadriceps and hamstrings with the greatest improvement in the affected leg. Significantly, the participants with the greatest improvement were the ones who were the most neurological impaired.

Another study done by Prof. Potempa & Prof. Lopez published in the March 1999 BioMechanics found that participants working at 40-60% of their MHR were achieving the same health benefits as healthy individuals working at 75-85% of their MHR. The group consisted of 21 to 77 year old participants who were 6 month to 5 years post stroke. This group rode a stationary recumbent bike modified for their affected leg two to three times a week, for thirty minutes at 40 to 60% of their MHR. The results were that all lowered their blood pressure, cholesterol and weight, as well as improved in leg strength, mobility and physical endurance. This study is significant because the life expectancy of a stroke survivor post eighteen months is nearly the same as everybody else.

The last study I will talk about in this article was done by Dr. Fielding and Dr. Andrews and published in the Nov. 2000 BioMechanics Publication. This study was on strength training. The group consisted of 7 participants all one to five years post stroke. The group

used resistance equipment two times a week for twelve weeks. They lifted 70% of their maximum ability for 8-12 repetitions. Every two weeks they were retested and the weight increased. Five muscle groups were tested; the quadriceps, the hamstrings, hip abductors, hip flexors, and gluteus maximus. The results were that ALL the muscles groups' strength improved an average of 100%.

What these studies tell us is that .....

Stroke survivors working at a low aerobic intensity have the same health benefit improvements as non-stroke individuals working at a higher intensity.

Aerobic activity improves their endurance, balance, gait and leg strength.

Continuous repetitive aerobic activity seems to stimulate interaction between the brain, nerves, and muscles to improve coordination.

The stronger their muscles are the easier it is for them to move.

Unfortunately, I have not been able to find any studies done in the aquatic environment on stroke survivors. Everything I have learned has been from personal experience working with my stroke recovery clients. If any of you who are reading this article have personal working experience with stroke clients in the water I would love to hear about what you are doing.

I feel that the water is the perfect environment to work with stroke recovery clients because of the following properties:

Buoyancy supports and assists in body movement, also improving flexibility. It is easier to stay upright and lift the leg in the water because buoyancy is assisting the person.

Resistance in water is twelve to fourteen times the resistance of air. As the person walks or even does range of movement exercises they are pushing against this resistance strengthening the lower body muscles and core stabilizers.

Fluid environment affects the senses and psychomotor skills. (YMCA Water Fitness Manual) The water movement stimulates the senses associated with body position awareness, which help improve balance, coordination and reaction speed.

When I work with my clients I take the above properties into consideration and use them to their fullest potential.

Every stroke client is different, so the first thing I do is a fitness evaluation. I check posture, balance, flexibility, strength and gait, making note of areas of concern. An example of this is a stroke client I have whose affect side's hip externally rotates. This affects his gait, causing him to drag that leg behind and turn towards the affected side.

This external rotation is partly caused by a lifetime of sitting with his legs turned out. So for this client I focus on strengthening internal hip rotators and rotating the hip in as he walks, as well as sitting with his legs together and feet flat on the floor.

I have found that all the muscles on the affected side must be considered from the feet to the neck. Clients will sometimes be unaware of tilting their head to one side, which affects their balance. Others may walk on the outside of their affected foot, which can cause pain as well as affect their balance. Each joint and muscle must be observed and a program developed to bring the body back into alignment, either by strengthening or stretching the necessary muscles.

After evaluating my client I set up a program that incorporates continuous rhythmic aerobic movement, strength trains the necessary muscles and provides plenty of flexibility work for the tight, spastic muscles. We often begin by holding on to the side of the wall and marching in place. We then progress to traveling the length of the pool while holding on to the side. Remember when you reach the end you will have to turn and walk the length without holding on due to their affected arm. At first I position myself behind the client assisting them by holding onto their waist. As they become more comfortable in the water and become stronger their balance improves and they begin taking a few steps without my assistance. When they can walk the length of the pool without my assistance I move to the front and side and start fine-tuning their gait. I encourage them to take larger steps, roll from heel to toe, etc. We then start walking backwards, start and stop, and do side steps to improve their balance and reaction time.

I like to spend at least half the session on walking to get as much continuous, repetitive movement in as possible. The rest of the session focuses on strength training and flexibility work. Some clients do better with resistance through the range of movement; others do not. This is particularly noticeable with the arm. One client I have does better with me gently moving his arm in all directions gradually increasing the range of movement each time. Another does better if I resist him, giving him something to push against. Sometimes a client will get better range of movement if they assist the affected arm with their unaffected arm. When working with the client's affected arm, everything from the shoulder to the fingers must be considered. Range of movement exercises for the fingers, thumb, wrist, elbow and shoulder must be utilized. I find the Arthritis Foundation Manual very helpful.

Strength training the upper body can be done by you resisting the movement or by adding equipment. Once I have established range of movement I start resisting the movement being careful to only apply enough resistance to make the move slightly challenging. I often utilize a soft ball to squeeze and a short foam noodle with a slice in the middle. I can slide the noodle on to their hand. The extra surface area provides resistance as they move their arm through the water. This also gives them something to focus on as they try to move. Strength training the lower body must be done in slow, careful stages. First check range of movement. Are they keeping their knee and hip in proper alignment as they lift the leg? Are they strong enough to lift the leg to full range of movement? If not, start with range of movement exercises for the knee and hip. When they are stronger start

adding resistance, either by you, the trainer, providing the resistance or by adding equipment. I find a buoyancy cuff works well. Get several sizes or one that you can modify the buoyancy. Several strength training exercises can be done while holding onto the wall. I do hamstring curls, quad extensions, inner / outer thigh sweeps, glut pull down, and bicycles. Remember when working with a buoyant piece of equipment you are often working the opposite muscle you would be working on land. For instance, the hamstring curl will work the quadriceps in the water, not the hamstring. Stabilizing the joints is especially important when adding equipment. Watch the knee and ankle to make sure they stay in alignment. I only use the equipment on the affected leg, but if you had time you could also work the unaffected side.

I like to use myself as a piece of resistance equipment because I can apply just the right amount of force or resistance. I have more control then when using equipment, which often works several muscles at one time. I can also tell when my client is getting stronger and I can focus on a specific muscle that may be weak.

I have found that this works best when the client is floating on their back with a buoyancy belt at the waist and/or a noodle under the shoulders and hips. I also like to have a family member assist by standing at the head of the client to support, stabilize and repeat my instructions. Some of the exercises we do are the hamstring curls, leg extensions, abduction and adduction (jack legs). In each exercise I resist the movement. At first I allow the client to use his or her unaffected leg to assist the affected leg. Then we progress to using only the affected leg.

While I have my client on his or her back I find this is a good time to work on range of movement in the feet, especially the affected foot. We point, flex and rotate the feet, first focusing on movement. Then I transition to stretching holding the point, flex and inversion and eversion of the foot for a minimum of fifteen seconds each. This is also a good time to stretch the hamstrings, quadriceps and hip flexors.

I try to incorporate activities my client did before their stroke. For instance, one of my clients use to lap swim, so while he's on his back I have him kick his legs and travel up and down the pool. If a client use to jog before the stroke, then I have them hold onto the side of the pool and jog. We have a basketball hoop by the side of our pool so if they use to play basketball I get a small basketball and stabilize them while they try to shoot with their unaffected arm. Not only does it seem to trigger a nerve muscle response but it also improves their mental attitude, being able to do something they use to do before the stroke. I try to do anything to improve their mental attitude, tell jokes, and talk about their family or interests. I have found that if their mental attitude is good they will put forth more effort in the workout. My focus with all my personal training clients has always been their total well being, not just the physical, but also their mind and spirit.

A good way to develop a stroke recovery clientele is to volunteer to speak at support groups. They are often organized and run through the hospitals. You can also contact the rehab departments at the hospitals specializing in stroke. Therapist and family are often

looking for other options when insurance will no longer cover rehab. Once you start working with a few clients your name gets passed along very quickly.

The water is an amazing environment, adaptable for any fitness ability. I feel that it is the perfect environment to work with clients who have nerve and/or muscle disorders, such as stroke, Parkinson's, and Multiple Sclerosis. The medical community is realizing this and offering its support. These organizations are now offering aquatic certifications and/or aqua programs. If you are interested in working with this group of clients contact the Parkinson's Foundation or the Multiple Sclerosis Society in your area for information. The doctor that I mentioned early who was reluctant to give me permission to work with his patient has become a believer. He has seen the continuous improvement of his patient and now refers other patients to the water!

### **CEC ARTICLE QUESTIONS VOL 3, 2005**

1. What causes a stroke?
2. T or F in 2004 it was reported that 2/3 of stroke victims will have long-term disabilities.
3. T or F after 6 months post stroke no further functional improvement can happen.
4. T or F in 2001 it was found that improvement could be made up to 2 months after a stroke.
5. In the study by Silver, Macko and Forrester which participants made the greatest improvements?
6. Why is it important that stroke survivors work out cardiovascularly even as low as 40-60% MHR?
7. With progressive lower body strength training in the study by Fielding and Andrews, how much improvement in strength occurred in the 12 weeks of the study?
8. What are the 4 things that the studies mentioned in this article tell us?



15. T or F It is particularly true that during the strength training for the arms it is best to resist through the range of motion.
16. For the upper body and arm, which range of motion exercises are important?
17. T or F it is important to establish range of motion before adding resistance.
18. List 2 pieces of equipment that can be used for the upper body resistance training.
19. What are three considerations/check before strength training the lower body?
20. What are 5 lower body exercises that can be done holding onto the wall with a buoyancy cuff on the foot?
21. What muscle group does the hamstring curl with a buoyancy cuff work?
22. What are 3 reasons a trainer might want to use themselves as resistance equipment?
23. What are the advantages of having a client work on their back in a belt?
24. Why would you incorporate exercises or movements they use to do before the stroke?

25. T or F You should keep your client mind focused on the serious aspects of their recovery so they will put forth more effort.

26. T or F A good way to develop recovery clientele is to attend support groups.

27. T or F Although water is very good for stroke recovery patients it is not appropriate for Parkinson's disease patients.

28. T or F The medical community has been fully behind this by offering certifications and programs in the water for these patients.

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