

# Stroke Recovery Tips

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## WHAT IS WRONG WITH MY HAND?

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**Figure 1**  
Hook Fist



**Figure 2**  
Bending at the Knuckles (MCPs)



**Figure 3**  
Monofilament Testing



**Figure 4**  
Grip and Testing Dynamometers

A frequent complaint after having a stroke is that the affected hand does not work properly. In some cases, it is apparent that the hand is paralyzed and not moving at all, but in many other cases, the hand is moving but doesn't function properly. When the hand is moving, it is important to determine what areas of function have been most affected so that this can be addressed. The areas that need to be assessed are movement, sensation, proprioception, strength, and coordination.

When assessing movement, you want to see how the whole hand moves as well as each finger individually. Movements to look for are making a full fist, opening the hand all the way, spreading the fingers apart and together, bending and straightening each finger individually, touching the thumb to each finger (opposition) making a hook fist (figure 1), and bending the fingers at the knuckles/MCP joint (figure 2). If any of these movements are lacking or poor in quality, then you would practice performing the movement or activities that involve the movement. For example, if it is difficult to bring the thumb to touch each finger, you could practice picking up objects like a block or marble between the thumb and each finger.

In addition to movement, you want to check sensation and proprioception of the hand. It is best to have an occupational therapist do a thorough evaluation of hand sensation. When checking sensation, it is important to check light touch, vibration, hot/cold, and sense of position. When checking light touch, I prefer that mono-

filaments are used (figure 3). Simply touching someone's hand is not adequate in testing light touch. Monofilaments come in different sizes and can help you determine the severity, if any, of light touch sensation impairment.

When checking position sense, you can close your eyes and have someone move your fingers or hand into different positions, and you will see if you can identify what position the hand is in (e.g. you bent my little finger, you straightened my pointer finger). Vibration can be tested with a small vibrator/massager seeing if you can identify which finger the vibration was applied to. Hot and cold can be tested with warm and cold objects (e.g. ice vs. a warm compress). When testing hot/cold, make sure not to test with anything that is too hot because you don't want to cause burns. If you determine that sensation is a problem, you can practice sensory re-education exercises (visit <http://www.stroke-rehab.com/sensory-re-education.html>).

For strength testing, an occupational therapist can do a grip and pinch strength test with a dynamometer (figure 4). If strength is an issue, there is various equipment that can be used and exercises that can be done to increase hand and pinch strength. Some examples would be squeezing hand grippers, pinching clothespins or skirt hanger clips, performing theraputty exercises, kneading dough, spreading a rubber band with the fingers, opening jars, etc.)

When checking coordination, you want to look at the ability

of the hand to manipulate objects. A simple test you can do at home is to see if you can perform the movements of translation, rotation, and shift. Translation is moving an object from the fingertips to the palm and palm to fingertips. To check translation, try picking up a small object (marble, penny, dice) with the index finger and thumb and moving it into the palm. Keep that object in the palm, and try to pick up another object the same way. Once you have 4 or 5 of the objects in your hand, try to move each object one at a time from your palm to your thumb and index fingertips to place back down on the table without dropping any of the objects in your hand. To check rotation, try rotating a pen in your hand away from your body several times and then toward your body. To check shift, hold a pen in your hand as if going to write, then walk your fingers to the top of the pen and back down. To see an example of translation, rotation, and shift you can view the following video at <https://www.youtube.com/watch?v=wGdyXpqO7Jo>. If you discover you have problems with coordination, then practice translation, rotation, and shift. You can view other hand coordination exercises at <http://www.stroke-rehab.com/hand-exercises.html>.

When you test individual components of hand function, you may find that one area is especially impaired, so you will want to focus on that area. If you find that all areas are impaired, then you can work on all of the components. Many times, individuals think they have a coordination deficit, when in reality they have a sensation deficit. If you can perform coordination movements but frequently drop items, it may be more of a sensation problem. An experienced OT can help you identify what impairments you have and assign appropriate exercises.

## Understanding Techniques to “Rewire” the Brain



Mirror Therapy Lower Limb



Mirror Therapy Upper Limb

One of the challenges I have with patients is understanding how the brain works and why activities like mirror therapy and mental imagery might be helpful to recovery. Many patients want me to use electrical stimulation so they can watch their paralyzed body parts move, or they want to practice movements with the affected body part. These are activities a patient understands because they can see their affected body part moving. What patients do not often understand though is the purpose of therapies targeted specifically at the brain that do not involve actively moving the affected arm or leg such as mental imagery or mirror therapy.

Mirror therapy and mental imagery are not magical therapies that will fix the brain and return movement miraculously, but these techniques have shown to be successful in research trials with a number of stroke patients. In studies, when the right arm or leg is moved, the left motor cortex of the brain is shown to be active. This is because the left motor cortex controls movement of the right arm and leg. Similarly, the right motor cortex controls the left arm and leg. This is why when someone has a stroke on one side of the brain, the opposite side of the body is affected. When we lose use of a body part through paralysis or amputation, activity in the motor cortex for that body part deteriorates.

Amazingly, mirror therapy allows us a way to stimulate that portion of the brain even if the body part can't move. When using mirror therapy, you are watching the reflection of the non-affected or “good” arm or leg in the mirror, but your vision perceives it as your affected or “bad” side. This leads to stimulation in the motor cortex for the affected side and has shown in studies to help some patients with movement, sensation, and pain regulation.

A more simple explanation is that mirror therapy “tricks” the brain into thinking that the affected arm is moving normally causing the brain to “rewire” itself in a way that helps improve limb movement and/or decrease pain if present. The problem is that these therapies have been beneficial for some but not for all stroke patients. Scientists and researchers are still trying to learn how the brain works and how recovery occurs for some but not others. The positive benefit for stroke patients though is that mirror therapy and mental imagery is a simple technique anyone can try at home. If you are one of the patients that mirror or mental imagery helps, then it will be well worth the effort to try it. If it turns out that mirror therapy has no effect for you, at least you will have tried it without harm and with no to little cost. In addition, the time needed to try mirror therapy is about 30 minutes a day (divided in increments throughout the day) for 4 weeks which is a minimal time investment for trying a therapy that may possibly positively impact your recovery.

To learn about the positive benefits of mirror therapy/mental imagery with more technical explanations, please read <http://brain.oxfordjournals.org/content/132/7/1693>. If you are more interested in just trying the techniques with less technical explanations, you can visit <http://www.gradedmotorimagery.com/>.

Please note that there are several websites that sell mirror boxes, but you can also make your own mirror box at home or possibly use a mirror you already have at home to minimize the cost. To learn more about making your own mirror box, you can view <https://www.youtube.com/watch?v=gHFOkVakRkw>. This particular video is describing how to use a mirror box for phantom limb pain for an amputee, but the way you make the box is the same. If you wanted to make a mirror box for the leg, you would just need a long-er mirror and box.



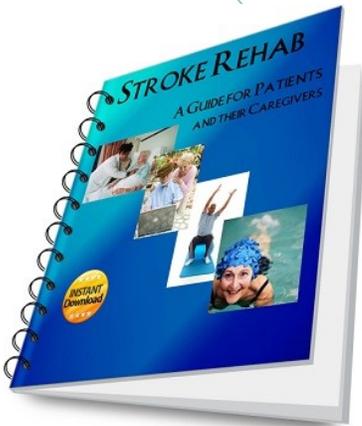
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## CAREGIVERS' CORNER – Finding a Therapist

Caregivers often have the task of finding a therapist or facility for their loved one that has experienced a stroke. In many cases, patients and caregivers simply go to a facility that is conveniently located or recommended by someone else. I suggest, however, that you “interview” your facility and therapists before committing. A simple visit and the right questions may help you make the best choice.

All therapists are not equal when it comes to stroke rehabilitation. You will want to find out what experience the therapist has in working with stroke victims. In addition, you should ask what type of continuing education toward stroke rehabilitation the therapist has received. Just because someone has worked primarily with stroke patients doesn't mean they are up to date with stroke treatment. Information taught 15 years ago is different than information taught today, so it is important to make sure the therapist you select is staying current.

A therapist that is familiar with stroke rehabilitation should be able to talk to you about neuroplasticity of the brain or the ability of the brain to change and make new connections or rewire itself after stroke. They should also be able to tell you what treatments have had positive results in research. Some treatments you would look for them to mention might be forced use or constraint induced therapy, functional electrical stimulation, mirror therapy/graded motor imagery, task specific training, gait training, virtual reality, and robotics to name a few. Of course, not all facilities will have every type of therapy or equipment, but you do want a therapist that is knowledgeable of at least some of the techniques.

Some techniques or therapies have proven **not** to be effective or have not been tested in research. I recommend writing down the names/techniques that the therapist mentions to you and researching online to find out more. I personally am not against trying new or untested techniques, but I would prefer not to use a technique that has been shown to be ineffective repeatedly in quality research studies.

It's important to know that not all studies are of good quality, and there are many techniques/treatments out there that have not been studied to the extent needed to make a conclusion about their effectiveness. Other studies may be tainted by a company's financial interest in a product. If you find something you are unsure about, feel free to ask a therapist. A good therapist will not be threatened by you researching stroke rehabilitation. In fact, they should be willing to discuss/and or learn about new information you bring to them.

A therapist does not need to know everything about stroke to be a good therapist. In fact, if a therapist claims to know everything about stroke, you should probably run because information is forever changing and evolving. Sometimes, an inexperienced therapist who is willing to research stroke rehabilitation turns out to be a really good choice because they are staying on top of current information. On the other hand, a therapist with many years of experience that hasn't opened a book or been to a stroke continuing education course in years may end up being a poor choice due to their lack of current knowledge. These are all things to consider when looking for the right therapist. Don't just leave your loved one's treatment up to chance. Make sure you do some research before choosing a therapist. In the U.S., the National Stroke Association has a stroke certification for therapists. You can find out therapists in your area that have this certification by visiting <http://www.stroke.org/sites/default/files/homepage-slides/CSRS%20List%20of%20Certificants%201.27.2015.pdf>.

Lastly, make sure the therapist's personality is appropriate for your loved one. If your loved one becomes frustrated very easily, then a forceful, talkative therapist may not be the right choice. On the other hand, if your loved one is gruff and likes to be pushed hard, an overly cautious and timid therapist may not work. Luckily, many therapists can adapt their attitudes and personalities. If you do see red flags when you first meet a therapist, then you should address the issue before making a final decision to proceed with the therapist.