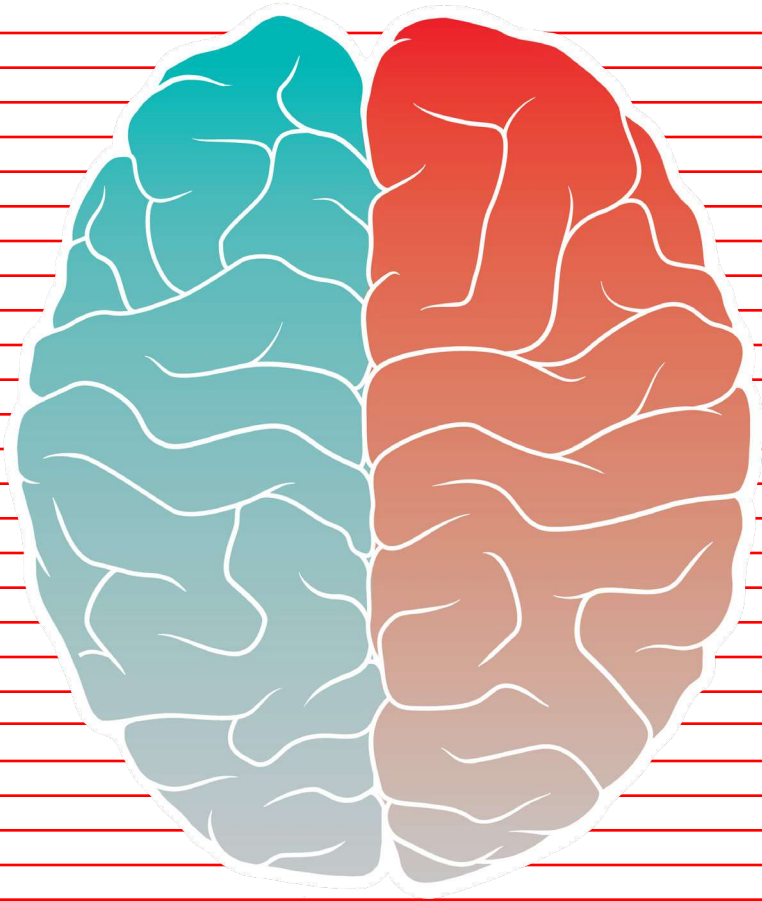


# Understanding





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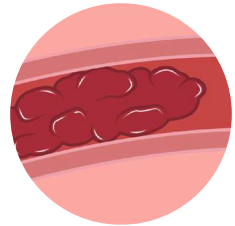
# What is Stroke?

The brain depends on a constant supply of blood for the oxygen and nutrients it needs to survive. Pipe-like vessels called arteries carry oxygenated blood from the heart and lungs to all parts of the brain. A stroke can occur when blood flow through one of these arteries is blocked. It can also happen when a tiny section of a blood vessel's wall weakens, stretches, and eventually bursts. In either case, stroke robs the brain of oxygen, causing brain cells to become damaged or die. As a result, parts of the body controlled by those cells often become disabled.

## Types of Stroke

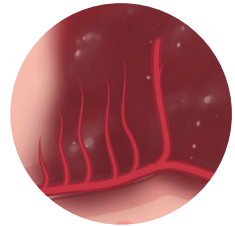
### Ischemic

**Ischemic** stroke typically occurs when blood flow is blocked by clot (a thickened mass of blood) that develops within a brain artery or travels to the brain from elsewhere in the body. Narrowed arteries, caused by a buildup of fatty deposits, can also cause stroke. Ischemic stroke represents 87% of all strokes.

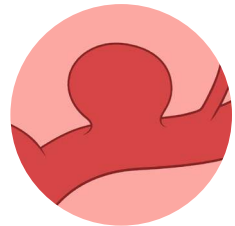


### Hemorrhagic

**Intracerebral hemorrhage (ICH)** occurs when diseased arteries within the brain burst open, allowing blood to leak into surrounding tissue. ICH is typically the result of chronic high blood pressure, which can cause arteries to harden.



**Subarachnoid hemorrhage (SAH)** occurs when an artery located outside the brain ruptures, allowing blood to leak into the fluid-filled space between the brain and the skull. The cause is often a cerebral aneurysm, a weakened area on an artery that bulges and sometimes breaks open. The first sign of SAH is typically a severe headache that comes on suddenly with no known cause.

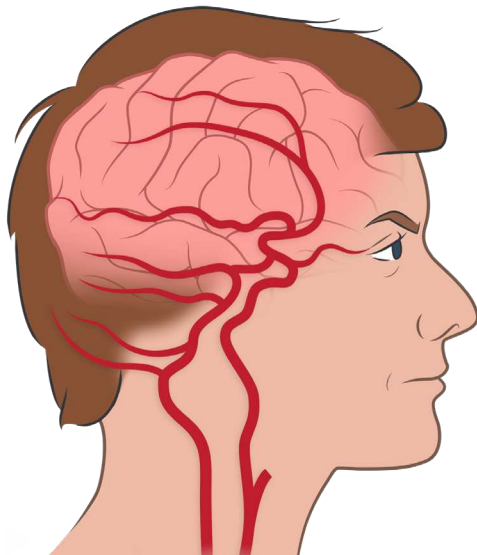


## Stroke in the Brain

The brain—the control center of all human function—depends on a vast network of arteries to carry oxygenated blood to the brain's many regions, each of which controls a specific set of mental and/or physical functions. For example, brain cells in one section control functions such as problem solving and body movement, while cells in another section control functions such as hearing and memory.

Stroke is a leading cause of death and a major cause of serious long-term disability.

When blood flow through an artery within a specific section of the brain is blocked, cells in that area cannot get oxygen and begin to die. Functions controlled by those cells (e.g., speech, balance, etc.) can become damaged or permanently lost. Knowing that a stroke's location in the brain is linked to specific injuries can help some patients, caregivers, and family members better understand their individual experience.



# Ischemic Stroke

## Symptoms of Ischemic Stroke

All types of stroke can cause serious, sometimes fatal, complications. Stroke symptoms can vary from person to person depending on stroke type and location in the brain. BE FAST (Balance, Eyes, Face, Arm, Speech and Time) is a popular acronym used to help people spot stroke. Symptoms require immediate medical attention.

### They can include:

- Sudden weakness
- Sudden confusion
- Vision problems
- Trouble speaking or understanding speech
- Trouble walking, loss of balance, dizziness, or lack of coordination
- Paralysis or numbness of the face, arm, or leg

## How an Ischemic Stroke May Affect the Brain

The brain is divided into various regions, which are the cerebrum (the largest part), the cerebellum (located below the cerebrum), and the brain stem, which connects the brain to the spinal cord. Each region controls specific brain functions. Regardless of type, a stroke in any one of these areas can put the functions controlled by cells in that area at risk.

The cerebrum is divided into two nearly identical halves called hemispheres (left and right), with each hemisphere consisting of four lobes (frontal, temporal, parietal, and occipital). Areas within each lobe control different mental and/or physical functions. For example, a stroke in an area located in the left frontal lobe can cause a person to lose the ability to transform thoughts into words. Furthermore, nearly all of the nerve signals that travel from the brain to the body (and the body to the brain) are controlled and processed by opposite sides of the brain. Damage to the left hemisphere primarily affects the right side of the body and vice versa. A stroke in the left half of the brain, for example, can leave a person's right side paralyzed.

# Areas of the brain and specific functions they control include:

## Cerebellum

- Balance
- Coordination

## Brain Stem

- Breathing
- Heart rate

## Cerebrum

### Frontal Lobe (front)

- Problem solving
- Behavior
- Body movement
- Reasoning

### Temporal Lobe (side)

- Hearing
- Memory

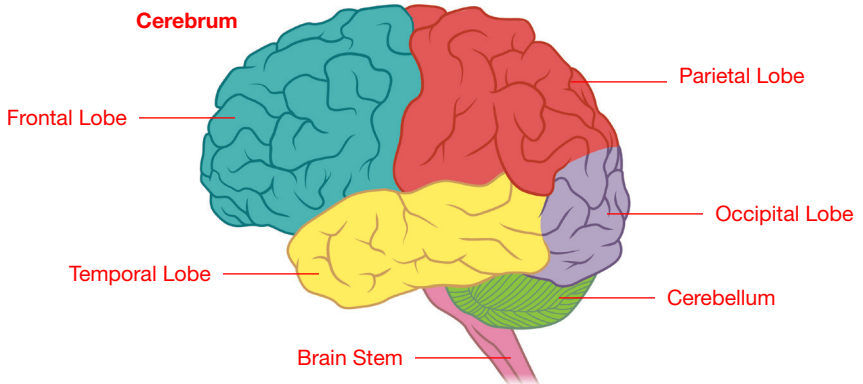
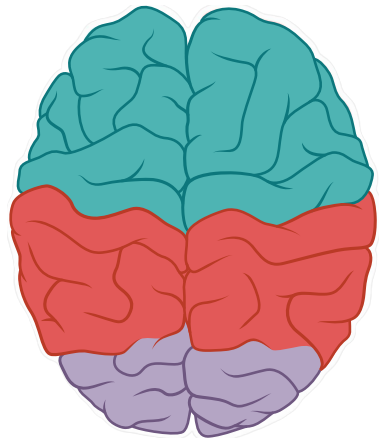
### Parietal Lobe (middle)

- Sense of temperature, taste, and touch
- Body orientation
- Ability to read and do math

### Occipital Lobe (back)

- Vision

Left Hemisphere      Right Hemisphere



# Transient Ischemic Attacks

Transient Ischemic Attacks (TIAs) are often labeled “mini-strokes” because they can be relatively mild compared to acute ischemic strokes, a leading cause of long-term disability. A TIA is caused when something, often a blood clot, temporarily blocks blood flow through an artery in the brain.

TIA symptoms come on suddenly and are similar to those experienced during an acute stroke. Symptoms can last anywhere from a matter of minutes to 24 hours. If they last longer than a day it may be due to a stroke.

While a TIA typically does not cause lasting brain damage, it is an important warning sign. A person who has a TIA is at a higher risk for a more serious and debilitating stroke. In fact, a significant number of people who experience a TIA eventually have an acute stroke. Like an acute stroke, a TIA is a medical emergency and should not be ignored. If you experience any of these signs, it is important to seek medical attention.



## TIA Warning Signs

- Weakness, numbness, or paralysis in the face, arm, or leg (typically on one side of the body)
- Slurred or garbled speech or difficulty understanding others
- Blindness in one or both eyes or double vision
- Dizziness or loss of balance or coordination
- Sudden, severe headache with no known cause

Call 911 immediately if you suspect that you or someone else is having a TIA.

Seek medical care even if symptoms pass quickly.



# Ischemic Stroke Treatment

Medical treatments available to acute ischemic stroke (AIS) patients have advanced by leaps and bounds since they were first introduced in the 1990s. Today's innovative technologies and techniques can remove clot and restore blood flow through the brain more effectively and in less time than ever before.

Swift medical treatment is needed because the brain relies on a constant supply of blood for the oxygen and nutrients it needs to survive. When circulation through a blood vessel is blocked, brain cells nearest the occlusion may become damaged or die. Restoring blood flow within the first hours of symptom onset is crucial to achieving positive patient outcomes.

## Stroke Treatment Procedures

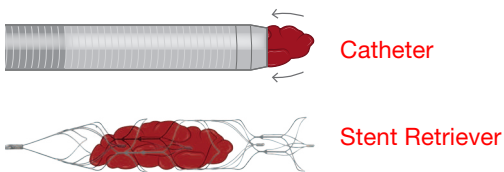
**Mechanical thrombectomy** is an endovascular procedure that uses a thin tube-like device called a catheter to clear blocked arteries and restore blood flow.

- Catheters use suction or deploy a stent retriever to remove clot. Sometimes both approaches are used during a single procedure.
- Catheters are inserted into a leg artery and slowly threaded through the body up to the blocked vessel in the brain.
- Mechanical thrombectomy should be performed as soon as possible after symptom onset.

## Technologies and Techniques

Mechanical thrombectomy may be the only option for a significant segment of the AIS patient population, including patients who either miss the window to receive tPA and/or have large vessel occlusions (LVOs) for which thrombolysis has limited efficacy.

Other patients benefit from a combination of intravenous and endovascular treatments. Increasingly, practitioners are taking advantage of the benefits of each type of intervention in order to help save patients from irreversible brain damage.



## Stroke Risk and Prevention

Individuals can help lower their chances of having a first or recurrent stroke by preventing or controlling certain health conditions, such as high blood pressure, diabetes, atrial fibrillation (a heart rhythm disorder), or other vascular disease. After a first stroke, there is an increased risk of having a second one within five years. In order to reduce stroke risk, physicians may prescribe one of the following treatments:

- **Antiplatelet agents:** interfere with the blood's ability to clot
- **Anticoagulants:** interfere with the blood's ability to clot
- **Statins:** reduce cholesterol production by the liver
- **Carotid endarterectomy:** surgical removal of clot or fatty plaque from a neck artery
- **Balloon angioplasty and stents (implantable steel screens):** procedures that treat and reduce fatty buildup in order to prevent clots from entering the bloodstream

# Ischemic Stroke Risk Factors

Stroke can affect anyone, regardless of age, gender, or ethnicity. However, some individuals are at a higher risk for stroke than others due to a combination of risk factors that include personal traits, lifestyle behaviors, and medical conditions.

Some risk factors can be changed, for example: smoking, diet choices, and physical activity levels. Other risk factors, such as age, gender, and family history, cannot be changed. The more risk factors a person has, the more likely they are to have a stroke. Regular medical checkups can help identify personal risk factors and lead to healthier choices.

Whether your risk factors are within your control or not, your heart and brain are best served by healthy lifestyle choices.

## Risk Factors

- **High Blood Pressure:** This is a main risk factor for stroke. It is important to check blood pressure levels on a regular basis.
- **Diabetes:** Poor dietary choices and a lack of insulin cause elevated blood sugar levels, which can damage blood vessels and interfere with delivery of oxygen to the brain.
- **Heart Disease:** Coronary artery disease, for example, is when plaque builds up in the arteries, potentially blocking the flow of blood to the brain. Other conditions can include atrial fibrillation and heart valve defects.
- **Smoking:** Smoking damages blood vessels, raises blood pressure, and may reduce the amount of oxygen that reaches your body's tissues.
- **Age:** Stroke risk increases with age. Two-thirds of all strokes occur in people over 65 years old.
- **Gender:** Men have more strokes earlier in life than women. More women die from stroke because their strokes occur later in life.
- **Race and Ethnicity:** Strokes occur more often in African American, Alaska Native, American Indian, and Hispanic adults than in white adults.

- **Previous Stroke or Transient Ischemic Attack:** Individuals who have had a stroke or a warning stroke and/or have family members who have had these conditions are at a higher risk for stroke.
- **Brain Aneurysms or Arteriovenous Malformations:** These are conditions in which blood vessels can leak or rupture.
- **Alcohol Abuse:** High levels of alcohol consumption can increase blood pressure as well as levels of a type of fat that can harden arteries.
- **Illegal Drug Use:** Drug abuse has been associated with an increased risk for stroke.
- **Physical Inactivity and Obesity:** Being inactive, obese, or both can increase the risk for stroke.
- **Unhealthy Diet:** Diets high in saturated fat, trans fat, salt, cholesterol, and/or calories increase the risk for stroke.
- **High Cholesterol:** Diets high in cholesterol, a waxy, fat-like substance, can lead to circulation problems. Blood vessels become narrow due to a buildup of excess cholesterol.
- **Carotid Artery Disease:** Fatty deposits build up in arteries, which can lead the vessels that carry blood to the brain to become more narrow.
- **Peripheral Artery Disease:** This disease is caused by fatty deposits that build up in arteries that carry blood to leg and arm muscles.
- **Sickle Cell Anemia:** This is a blood disorder in which red blood cells form abnormal sickle shapes that stick to artery walls and block blood flow.
- **Hormonal Changes within Women:** Hormonal changes during pregnancy, childbirth, and menopause can increase the risk for stroke.



# Women and Stroke

Stroke is the third leading cause of death in women. Nearly 60% of stroke deaths are in women, and stroke kills twice as many women as breast cancer.

## Women and Risk Factors

- High blood pressure is a main risk factor for stroke. More than 2 in 5 women have high blood pressure or are taking medicine to control it.
- Hormonal changes during pregnancy, childbirth, and menopause can increase the risk for stroke.
- Certain types of birth control medicines may increase the risk for stroke in women who have high blood pressure. The risk is higher in smokers.
- Although women have fewer strokes than men, women are more likely to die from their strokes. This is because women tend to live longer and have strokes at an older age.
- Mental health illness raises a person's risk for stroke. Women are twice as likely as men to experience depression and anxiety.

# Men and Stroke

Stroke is the fifth leading cause of death and a leading cause of long-term disability among American men. Stroke kills almost the same number of men each year as prostate cancer and Alzheimer's disease combined.

## Men and Risk Factors

- High blood pressure is a main risk factor for stroke. Nearly one in three men with high blood pressure does not know he has it.
- Men are more likely to be smokers than women.
- Being overweight or obese increases a person's risk for stroke. Nearly 75% of American men are in weight ranges that increase the risk for stroke.
- Diabetes increases the risk for stroke. Poor dietary choices and a lack of insulin cause elevated blood sugar levels, which can damage blood vessels and interfere with delivery of oxygen to the brain.
- Men are more likely than women to drink too much alcohol.
- 75% of American men do not get enough physical activity.

# Post-Stroke Rehabilitation

Stroke is the fifth leading cause of death and a leading cause of long-term disability in the US. Of the more than 800,000 people who experience stroke each year, approximately two-thirds survive and require rehabilitation services.

**Stroke-related injuries typically fall into the following categories:**

- Paralysis or problems controlling movement
- Sensory disturbances
- Problems using or understanding language
- Problems with thinking and memory
- Emotional disturbances

Patients often engage in rehabilitation to relearn mental and/or physical activities, such as talking and walking. Individuals can relearn skills because the brain is highly adaptable and, with proper training, can have the potential to be “rewired” to take on functions damaged by stroke. Patients also may learn to cope with a particular disability by learning new ways to perform certain tasks, such as buttoning a shirt or using a keyboard with one hand.

Rehabilitation is one of the most important phases of recovery, and repetitive practice can yield positive outcomes.

It is common for rehabilitation to start in the hospital within 48 hours following stroke. Once stable, patients are encouraged to exercise. Even limited movement, such as changing positions while lying in bed, is important to recovery. Over time, a variety of therapists may work with patients to help them build strength and perform more complex and demanding tasks. Regaining skills to carry out the basic activities of daily living (i.e., bathing, going to the bathroom) is considered the first stage towards achieving independence, a primary goal of rehabilitation.



Upon discharge from the hospital, many patients continue rehabilitation efforts on an inpatient or outpatient basis. Other options include nursing facilities and home-based programs. Hospital staff typically meet with patients and their families to determine the appropriate next step.

## Inpatient Rehabilitation

Inpatient facilities may be freestanding or part of the hospital. The length of stay is usually 2 to 3 weeks and patients engage in an intensive physical, occupational, and speech rehabilitation program 5 to 6 days a week for at least 3 hours each day.

## Outpatient Rehabilitation

Outpatient facilities are often part of a larger hospital complex and provide access to physicians and the full range of therapists specializing in stroke rehabilitation. Patients typically participate in several hours of coordinated therapy sessions, often 3 days a week, and return home each night.

## Skilled Nursing Facility

Skilled nursing facilities offer a level of rehabilitation services that exceeds that of traditional nursing homes. However, skilled nursing facilities typically offer fewer hours of therapy compared to inpatient and outpatient rehabilitation units.

## Home Health Rehabilitation

Home rehabilitation allows patients to receive therapy in the comfort of their own homes, where they learn strategies to navigate their actual living spaces. This option is often best suited for people who engage in one type of therapy.

No matter the setting, rehabilitation specialists work with each patient to determine an appropriate treatment plan. Programs typically address issues such as mobility, communication, social interactions, and activities of daily living (ADLs).

## Patients typically work on the following skills:

- Feeding
- Bathing
- Dressing
- Using a toilet
- Speaking
- Problem solving
- Transferring (bed to chair)
- Personal grooming
- Cooking
- Housecleaning
- Driving
- Strengthening muscles
- Balancing
- Walking

## Post-stroke rehabilitation often involves the following specialists:

- **Physician:** manages and coordinates a patient's general health and long-term care.
- **Physiatrist:** specializes in physical medicine and rehabilitation.
- **Neurologist:** leads acute-care stroke teams, directs patient care during hospitalization, and sometimes participates in the long-term rehabilitation team.
- **Rehabilitation Nurse:** helps patients manage health conditions that affect stroke and adjust to life after stroke.
- **Physical Therapist:** helps patients with movement and balance; suggests exercises to strengthen muscles for walking, standing, and other physical activities.
- **Occupational Therapist:** teaches strategies to manage daily activities, such as eating, bathing, dressing, writing, or cooking.
- **Speech-Language Pathologist:** helps patients re-learn language skills (talking, reading, and writing); shares strategies to help with swallowing problems.
- **Recreational Therapist:** teaches strategies to improve thinking and/or movement skills needed to join in recreational activities.
- **Vocational Therapist:** provides career counseling to people who need help returning to the workforce.

Rehabilitation can be a slow and frustrating endeavor, lasting for a period of months or years. However, it is extremely valuable, so a positive outlook is essential.

# Rehabilitation Using Virtual Reality

An effective rehabilitation program can help patients achieve improved cognitive and/or physical function. To be considered effective, therapy must be performed with more intensity and frequency over longer periods of time. Patients who engage in this more intense, more frequent therapy tend to have better outcomes.<sup>1</sup>

However, it's not uncommon for stroke survivors to prematurely abandon prescribed physical therapy due to a lack of motivation caused by depression or, more simply, dissatisfaction with conventional rehabilitation methods.<sup>1</sup>

For patients who may be anxious to see improvement, progress can be painfully slow to develop and difficult to visualize. Furthermore, traditional feedback mechanisms may miss minor yet significant milestones, and often offer very little in the way of incitement, especially compared to the amount of effort involved on the part of the patient. Together, these factors can chip away at a patient's willingness to participate in a conventional program.

## Neurorehabilitation Technology

Research shows that neurorehabilitation technology can enhance neuroplasticity and drive the relearning of skills affected by stroke, better than conventional therapy alone.<sup>1</sup> Neuroplasticity is the brain's ability to form and reorganize neural pathways, both functionally and physically in response to new learning or physical therapy following an injury to brain cells.<sup>2</sup>

Research also shows that pathway strength is related to the amount of time patients dedicate to therapy with functional goals in mind.<sup>2</sup> Therefore, more time can result in stronger connections, leading to a faster reorganization of the brain.

1. Perez-Marcos, et al. Increasing upper limb training intensity in chronic stroke using embodied virtual reality: a pilot study. *J Neuroeng Rehabil.* 2017;14:119.
2. Kleim JA, Jones TA. Principles of experience-dependent neural plasticity: implications for rehabilitation after brain damage. *J Speech Lang Hear Res.* 2008;51:S225-S249.
3. Proffitt R, Lange B. Considerations in the efficacy and effectiveness of virtual reality interventions for stroke rehabilitation: moving the field forward. *Phys Ther.* 2015;95(3):441-448. doi:10.2522/ptj.20130571.

# Virtual Reality Technology

Virtual Reality (VR), a hardware and software technology, has the potential to engage patients in rehabilitation effectively, which, in turn, can motivate them to follow their prescribed course of therapy.<sup>1,3</sup> VR transports users to a virtual world, allowing individuals to view their bodies as virtual images (avatars) engaged in activities not often feasible in the actual world.<sup>3</sup> VR has been shown to induce neuroplasticity, improve range of motion, and enhance cognitive skills.<sup>1,3</sup>

With VR technology, for example, the affected side of a patient's avatar can be programmed to mirror the actions of the unimpaired side during bi-lateral (two-sided) movement.<sup>1</sup> During a VR therapy session, a patient with an affected left arm might view that arm function similarly to the unaffected arm. The brain is then triggered to create new neural pathways upon observing both arms functioning normally in the virtual world.<sup>4</sup>

The virtual world itself can be programmed with functional and engaging games that help patients relearn activities of daily living, as well as offer reward-driven cognitive puzzles. The motor tasks and cognitive puzzles can be adjusted to support each patient's recovery state so that their complexity increases in step with individual progress.<sup>3</sup>

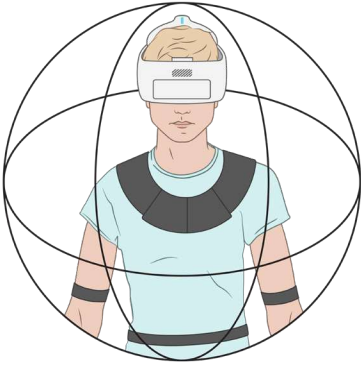
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4. Celnik P, Webster B, Glasser DM, Cohen LG. Effects of action observation on physical training after stroke. *2008;39(6):1814-1820.* doi:10.1161/STROKEAHA.107.508184

## Benefits of virtual reality can include:

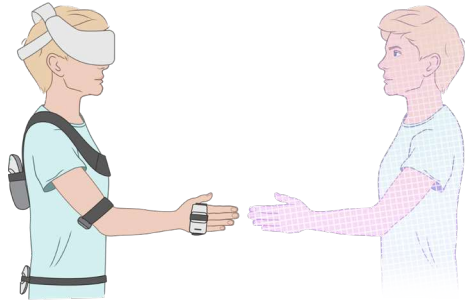
- A full presence, virtual avatar that mirrors patient movements in real time. This helps the patient's brain accept the avatar as the patient's actual body.<sup>1,3</sup>
- Employment of popular video game elements such as variability, rewards, and progress tracking. This helps maximize patient enjoyment and engagement.<sup>3</sup>
- A rehabilitation environment that patients perceive as encouraging and efficient<sup>1</sup>
- Activities tailored to each patient's individual needs
- Documentation of session-to-session progress<sup>3</sup>

1. Perez-Marcos, et al. Increasing upper limb training intensity in chronic stroke using embodied virtual reality: a pilot study. *J Neuroeng Rehabil.* 2017;14:119.  
2. Kleim JA, Jones TA. Principles of experience-dependent neural plasticity: implications for rehabilitation after brain damage. *J Speech Lang Hear Res.* 2008;51:S225-S249.  
3. Proffitt R, Lange B. Considerations in the efficacy and effectiveness of virtual reality interventions for stroke rehabilitation: moving the field forward. *Phys Ther.* 2015;95(3):441-448. doi:10.2522/ptj.20130571.

## VR allows you to:



See the virtual world everywhere you look (full immersion).



View your body as a virtual image (avatar) engaged in activities that would not be feasible in the actual world.

# Memory and Stroke

Memory is the ability to collect, store, and retrieve information. Far from a simple function, memory is a complex system of processes that work in and across various parts of the brain. Damage to any of these areas due to stroke, caused by a disruption of blood flow, will likely impair some aspect of a person's memory.

Damage to brain cells that control verbal memory, for example, may affect the ability to recall words, names, and stories. Similarly, damage to visual and spatial memory may make it difficult to remember faces, shapes, routes, etc. Stroke can interfere with the ability to learn new information or cause people to repeat themselves unnecessarily and confuse facts. They might recall an event, but forget specifics or mix up the details.

Up to half of patients experience memory problems in the first few months following a stroke, and as many as 30% report problems after one year.<sup>1</sup>

While memory can improve spontaneously, a variety of rehabilitation methods may aid in individual recovery. Typical methods include coping strategies, remediation-oriented therapies (e.g., virtual reality or computer-based programs), and medications for issues such as anxiety or sleeping problems.<sup>1</sup> Additionally, efforts to prevent further strokes (through exercise, healthy eating habits, and social activity) can have a positive impact on current memory and overall brain health.

## Coping Strategies

- Keep notepads handy to write messages, lists, etc.
- Display key information and schedules on a bulletin board.
- Use a single location for keys, glasses, wallets, etc.
- Label rooms, food for expiration dates, pill boxes, etc.
- Make a photo book of significant people and places.

1. Spreij L, Visser-Meily JMA, van Heughten CM, et al. Novel insights into the rehabilitation of memory post acquired brain injury: a systematic review. *Front Hum Neurosci.* 2014;8:993.



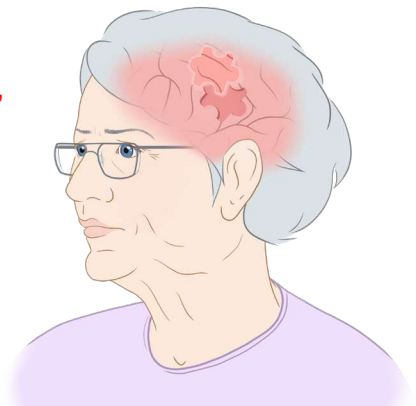
## Healthy Habits

- Stay connected to other people: visit friends and family or participate in social activities and community programs.
- Keep your mind active. Volunteer, pursue a hobby, read, play games, teach or take a class, etc.
- Be physically active through regular exercise, household chores, or other activities.
- Limit use of alcohol and don't smoke.
- Get enough sleep, generally 7 to 8 hours each night.
- Eat a healthy diet—limit solid fats, sugar, and salt.
- Manage chronic health problems like high blood pressure, high cholesterol, and depression.
- Get regular health screenings.

## When to Seek Help

People who have a sudden loss of memory or become very confused should get medical help right away. Make an appointment to see a doctor if you notice these symptoms:

- Having memory or concentration problems that concern you
- Asking the same question or repeating the same story over and over
- Becoming lost in familiar places
- Not being able to follow directions
- Getting confused about time, people, and places
- Not taking care of yourself—eating poorly, not bathing, or being unsafe



# Stroke and Aphasia

Stroke often causes communication problems as a result of damage to the brain's language centers. Problems can range from trouble finding the right words to use to the inability to speak or understand speech. The type of communication disorder that develops depends on which language center was affected and the extent of the damage.

For most people, damage to one or more areas on the left side of the brain produces a disorder called aphasia, which interferes with a person's ability to express or understand language, as well as read or write. Survivors with damage to the front left of the brain may understand others and know what they want to say, but use "choppy" or non-fluent speech. Those with damage to the back left of the brain often speak at a normal rate and rhythm, yet use incorrect or made-up words. They also typically have difficulty understanding what people say.

## Types of Aphasia

- **Expressive aphasia** (Broca's aphasia): A person may understand speech, yet have difficulty expressing ideas.
- **Receptive aphasia** (Wernicke's aphasia): A person hears a voice or sees print, but cannot make sense of the words. A person may produce fluent, connected speech; however, it has no meaning and sounds like a "word salad" to the listener.
- **Anomic aphasia or anomia**: A person has difficulty using the right names for objects, people, places, or events. This is the least severe form of aphasia.
- **Global aphasia**: A person cannot speak or understand speech, nor read or write. It is caused by widespread damage to the language centers of the brain, and is the most severe type of aphasia.

## Treatment and Recovery

The most common treatment is speech-language therapy. Survivors work with speech pathologists who conduct extensive exercises in which individuals read, write, follow directions, and repeat what they hear.

## Through therapy, aphasia patients can learn to:

- Restore their language abilities as much as possible.
- Use remaining language abilities.
- Use other ways to communicate, such as gestures, pictures, or electronic devices.

## Caregiver and Family Support Tips

- Participate in therapy sessions.
- Simplify language by using short, uncomplicated sentences.
- Maintain a natural conversational manner appropriate for an adult.
- Minimize distractions, such as a loud radio or TV.
- Include the person with aphasia in conversations.
- Ask for and value the opinion of the person with aphasia, especially regarding family matters.
- Encourage any type of communication, whether it is speech, gestures, pointing, or drawing.
- Avoid correcting the person's speech.
- Allow the person plenty of time to talk.
- Help the person become involved in activities outside the home.
- Seek out support groups to connect with others who share similar experiences.



# Depression after Stroke

A stroke survivor's emotional health can boost or block their recovery efforts. Unfortunately, many survivors are too overwhelmed by negative feelings to focus on rehabilitation. Feelings of fear, sadness, and anger, while not pleasant, are a natural response to such a life-changing event.

In some cases, however, the mental and physical effects of stroke can have a more serious and lasting impact. Brain damage, for example, can cause changes in personality, behavior, and judgment. Survivors may have difficulty controlling emotions or difficulty expressing emotions appropriately. These problems, in addition to physical challenges, can lead to feelings of anxiety, frustration, and depression.

One of the most common emotional disorders experienced by stroke survivors is clinical depression, a sense of hopelessness that interferes with a person's ability to function.

The particular factors that contribute to depression vary from person to person. Problems can surface as a person starts to grieve for their former life or as they become increasingly aware of their daily challenges. Many patients have emotional reactions to their physical issues, loss of friends, reduced activities, or poorer health. As their insight into their condition grows, they are more likely to become irritable, anxious, or easily frustrated.



## Signs of Depression

- Feeling down, depressed, or sad most of the day
- Changes in sleeping habits, such as sleeping poorly or sleeping more than usual
- Loss of interest in usual activities, such as favorite hobbies, time with family, or outings with friends
- Increased use of alcohol, drugs, or tobacco
- Decrease or increase of appetite, independent of hunger
- Strong feelings of sadness, despair, or hopelessness
- Thoughts of suicide
- Lack of concentration or motivation

## Overcoming Depression

It is important to know that depression can be treated.

**Effective treatment options may include:**

- talk therapy
- medication
- support groups

If you are experiencing signs of depression, don't hesitate to seek help from your healthcare provider.

# Self-Esteem and Stroke

Self-esteem is the way individuals think and feel about themselves. While some of what people think and feel is a matter of personality, self-esteem is also affected by daily experiences. When a stroke happens, it is not uncommon for survivors to criticize themselves and doubt their self-worth.

Following a stroke, the health of a person's self-esteem depends on several factors, including the extent of injury and its effect on a person's day-to-day activities. Survivors who grapple with low self-esteem may isolate themselves, opting for safe and familiar routines.

Social isolation and loneliness are linked to poorer health, depression, and increased risk of early death.

In contrast, survivors with healthy self-esteem may be more willing to take chances and interact with people. Research shows that having a variety of social relationships may help reduce stress and heart-related risks, improve the ability to fight off germs, and foster a more positive outlook on life.

Individuals can build self-esteem by nurturing themselves, practicing positive self-talk, and performing self-affirming exercises. It may help to join a local or online support group to connect with people who are going through similar experiences.

## Self-Affirming Activities

### Make a list of...

- at least five of your strengths: e.g., persistence, courage, friendliness, creativity
- at least five things you admire about yourself: e.g., the way you have raised your children, your good relationship with a sibling, or your spirituality
- 10 ways you can “treat” or reward yourself that don't include food and that don't cost anything, such as taking a walk, window-shopping, people watching, gazing at a beautiful object (e.g., flowers or night sky), or chatting with a friend
- 10 things you could do to help someone else

## Tips to Improve Self-Esteem

- **Pay attention to and respect your own needs and wants.**
- **Eat well.** Cook healthy meals and make good choices when dining out.
- **Exercise.** Moving your body can help you feel better and improve self-esteem. Consult your doctor about making exercise a regular part of your day.
- **Get something done that you have been putting off.** Clean out that drawer. Wash that window. Write that letter.
- **Spend time with people who make you feel good about yourself.** Avoid people who treat you badly.
- **Make meals a special time.** Turn off the television, etc. Set the table, even when eating alone. Light a candle or put flowers on the table. When you eat with others, encourage discussion of pleasant topics.
- **Take advantage of opportunities to learn something new or improve your skills.** Take a class or go to a seminar.
- **Do something nice for another person.** Smile, say a few kind words to someone, send a card to an acquaintance or volunteer for a worthy organization.
- **Find ways to treat yourself well every day.** Write about these moments in a daily journal.



# Stroke and Relationships

Individuals who experience the debilitating effects of stroke often require a level of care that changes the lives of their loved ones in addition to their own.

This is especially true for spouses and significant others, many of whom take on their partner's share of responsibilities following a stroke. The full brunt of financial obligations, children's issues, household duties, caregiving, and more often rests squarely on a partner's shoulders. Such arrangements can last for a matter of days to years depending on the extent of a person's injuries.

Many partners are surprised by the amount of time and energy they dedicate to caregiving.

Unfortunately, the role's physical and emotional demands often go unnoticed by extended family and friends, leaving caregivers without enough outside support. As a result, these relationships can become strained.

Perhaps most distressing is the strain placed on the couple. The harmful effects of stroke can alter the survivor as a person and a partner. It is not unusual for a survivor to have new personality traits, anxieties, and/or lack of self-control. These issues are compounded in cases in which one partner is forced to assume a parental role for the sake of a loved one's safety. The resulting shift from an equal to an unequal partnership can create hurt feelings and resentment on both sides.

## Care for the Caregiver

With so much responsibility, primary caregivers typically find little time for their own interests. However, personal neglect is dangerous because it can increase the risk of serious illness. For this reason, it is important to give friends and family an accurate account of home life, and to ask for help. Taking regular breaks from caregiving responsibilities is critical to preserving one's health and happiness.



### Caregivers may want to consider the following tips:

- Exercise, eat healthy, and visit your doctor regularly.
- Maintain personal interests, hobbies, and friendships.
- Ask friends and family for help.
- Join a local or online support group.
- Organize your caregiving routine and build your skills.
- Don't try to be the perfect caregiver. Set reasonable expectations to lower stress.
- Try relaxation methods, such as mindfulness, meditation, or yoga, to help reduce stress.

### Meditation

Meditation is a way to relax and renew the mind, body, and spirit. It is thought to help increase calmness, improve psychological balance, cope with illness, and enhance one's overall health and well-being.

#### Basic Steps:

1. Settle into a relaxed and comfortable position.
2. Exhale completely, leaving a slight pause at the end.
3. Allow the body to naturally inhale. Mentally say "one" while you inhale. Allow a slight pause before exhaling again.
4. As you exhale, release all tension. At the same time, mentally say a single syllable word that holds either neutral or positive connotations (words like love, joy, fresh, etc.).
5. Continue the cycle in a slow, relaxed fashion. Repeat for 3 to 5 minutes every day—or choose a shorter duration of 1 minute and work your way up over time.
6. Slowly and gently bring your attention back to the present.
7. Take a few minutes before you return to the rest of your day.

# Understanding Grief

A profound feeling of loss is a common reaction to stroke and its harmful effects. Survivors who experience severe disabilities, such as partial paralysis, vision loss, or chronic pain, frequently suffer emotional distress in response to their changed lives.

With loss comes grief, a normal response to intense and painful emotions. The grieving process, often described as an emotional rollercoaster, can be divided into stages in order to help survivors better anticipate and understand strong feelings they might face.

Each stage—**denial**, **anger**, **bargaining**, **depression**, and **acceptance**—is associated with a particular mindset that influences how a person interprets the world around them.

It is important to remember that grieving is personal; there is no right or wrong way to grieve.

The stages are meant to serve as a guide and confirm that intense feelings are normal. People should not expect to pass through the stages in a precise order, nor should they expect to pass through all five. It is not uncommon for people to skip entire stages, repeat stages, or experience additional emotions. There is no right or wrong way to grieve.

## Stages of Recovery

- **Denial** allows individuals to suspend reality by refusing to accept the truth about an intolerable event. Like a shield, denial protects the mind from bearing the full weight of a painful situation all at once, giving people more time to adjust. Some survivors may tell their personal stroke stories again and again, which may help them deal with trauma and make distressing experiences real.
- **Anger** and frustration may be among the most difficult emotions to manage after certain strokes. Damage to the brain's frontal lobes, areas that help plan and control behavior, may cause survivors to behave impulsively and experience emotions with more intensity. Uncontrolled anger can weaken one's ability to solve problems, make good decisions, and get along with others.



- **Bargaining** is characterized as a period when people try to rewrite the past. Survivors imagine a time before the stroke and search for ways to change the current reality. They tend to focus on what they or others could have done to avoid the stroke altogether—if only they had recognized symptoms sooner, headed to the hospital earlier, or gone to a different hospital, etc. They also may try to convince themselves and others that the stroke was not as harmful as it was.
- **Depression** is a natural response to challenges that may follow a stroke, such as physical limitations, loss of independence, or poorer health. Signs of depression include feeling down most of the day, changes in sleeping habits, loss of interest in activities, change in appetite, and strong feelings of despair. Clinical depression, a sense of hopelessness that interferes with a person's ability to function, is one of the most common emotional disorders experienced by stroke survivors.
- **Acceptance** of one's situation is generally marked by a sense of inner peace or calm. Over time, painful emotions are likely to be offset by a growing number of positive feelings. New priorities and relationships often develop during this phase.

*If you have questions or concerns about your emotional well-being, please talk to your doctor or contact a mental health professional.*

# Finding Support

Surviving stroke can be a difficult journey that no one should face alone. Beyond friends and family, survivors often talk to therapists and/or join support groups for additional guidance.

Support groups are meetings for survivors and those whose lives have been affected by stroke. Among their many benefits, support groups give people the opportunity to be with others who have similar stroke experiences.

While many groups meet in person, others connect participants via phone or online. Contact your local hospital or community center to inquire about groups in your area. You can also do an online search.

## **Support groups can:**

- Help you feel better, more hopeful, and not so alone
- Give you a chance to talk about feelings and work through them
- Help you deal with practical problems

## Choosing a Support Group

When you are ready to join a support group, you might ask yourself the following questions: Will I be comfortable talking about personal issues (or hearing other people's issues)? What do I want to share with the group? What do I hope to gain from the experience?

Collect information from multiple groups and compare the pros and cons of each. Consider the following:

- How large is the group?
- Who attends (survivors, family members, age range)?
- How long are the meetings? How often does the group meet?
- How long has the group been together?
- Who leads the meetings—a professional or a survivor?
- Is the main purpose to share feelings, or do people also offer tips to solve common problems? If I go, can I just sit and listen?

# Moving Forward

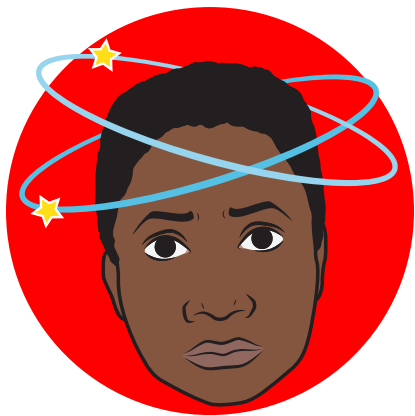
Accepting life as a survivor is an important part of recovery. Individuals who adopt this mindset are more likely to engage with family, friends, and community, which can improve the quality of their daily lives.

## Activities to Consider

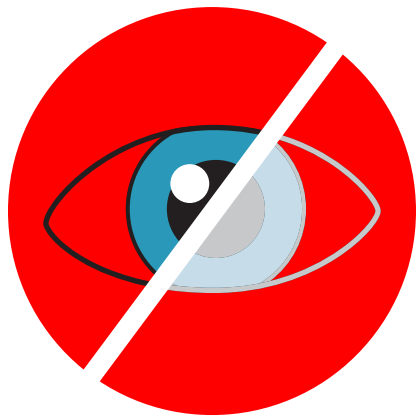
- Visit a senior center and take part in its events and activities.
- Play cards or other games with friends.
- Go to the theater, a movie, or a sporting event.
- Try different restaurants.
- Join a group interested in a hobby like knitting, hiking, birdwatching, painting, or wood carving.
- Reconnect with old friends through your high school or college alumni association.
- Visit local museums.
- Take a cooking, art, dance, language, or computer class.
- Form or join a book or film club.
- Try yoga, tai chi, or another new physical activity.
- Serve meals or organize clothing donations for people in need.
- Care for dogs and cats at an animal shelter.
- Volunteer at a school, library, hospital, or place of worship.
- Organize a park clean-up through your local recreation center or community association.
- Join a local theater troupe or community choral group.
- Rediscover a favorite childhood pastime or teach it to a new generation— embroidery, photography, building models, etc.
- Garden or do yard work; help with a community garden project.
- Take an exercise class or do exercises at home.
- Join a sports club, like a bowling club or bocce league.

# BE FAST

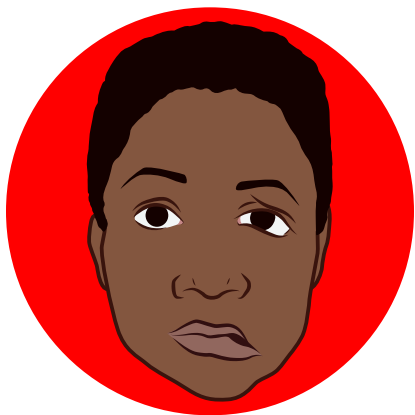
Time is Brain. Call 911 at the first signs of stroke.



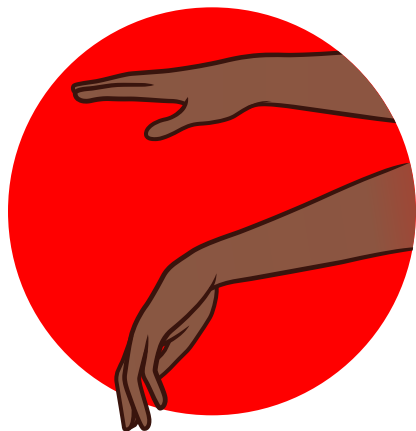
**B** BALANCE



**E** EYES



**F** FACE  
drooping



**A** ARM  
weakness



**S** SPEECH  
difficulty



**T** TIME  
to call 911





# Sources

Centers for Disease Control and Prevention

Pages: 1, 5, 6, 9–16, 29, 30

Department of Health and Human Services

Pages: 27, 28

National Institutes of Health

Pages: 1–10, 11–12, 13–16, 17–20, 21–30

National Institutes of Aging

Pages: 21–22, 33–34

National Institutes of Deafness and Other Communication Disorders

Pages: 23–24

National Institutes of Mental Health

Pages: 25–26

U.S. Department of Veteran Affairs

Pages: 21–22, 25–26, 29–34

