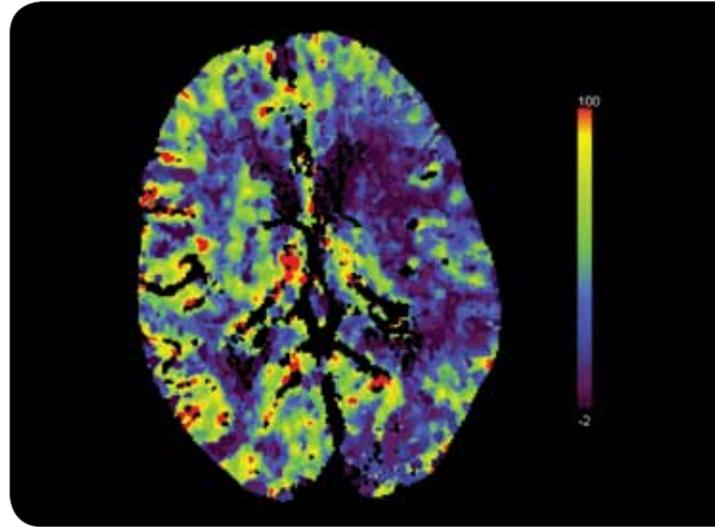


Stroke Care

Cerebrovascular Center



A RESOURCE FOR PATIENTS

Cleveland Clinic's Cerebrovascular Center, nationally recognized for its stroke care, has nine Primary Stroke Centers certified by The Joint Commission, an independent, non-profit organization that evaluates and accredits nearly 15,000 health-care organizations and programs. This means these facilities have met stringent national stroke care standards. Our Primary Stroke Centers are at Cleveland Clinic Main Campus, Euclid, Fairview, Hillcrest, Lakewood, Marymount, Medina and South Pointe hospitals and at the Ashtabula County Medical Center. In addition, patients at Cleveland Clinic may have access to investigational therapies and new surgical procedures that are not widely available.

USING THIS GUIDE

Please refer to this guide as you examine your treatment options. Remember, it is your right as a patient to ask questions and seek a second opinion.

If your primary care physician is not on staff at Cleveland Clinic, he or she can keep in constant contact with our team via a dedicated consultation line and through our DrConnect secure online network.

No matter which Cleveland Clinic facility you choose, you are assured of standardized stroke care across our health system. Patients receive comprehensive treatment by an interdisciplinary team of stroke specialists including neurologists, neurosurgeons and interventional neuroradiologists, as well as rehabilitation, emergency medicine and nursing specialists with expertise in stroke care.

In addition, patients at Cleveland Clinic's Cerebrovascular Center have access to investigational therapies and new surgical procedures that are not widely available. Our staff provides the highest-quality stroke care available anywhere.



“This was such a scary thing to go through. I really needed answers and hope. Since my treatment, I have talked with a few people who know someone who is suffering from similar mini-stroke-like episodes, and I always refer them to Cleveland Clinic. I even carry the phone number to Cleveland Clinic in my cell phone to have ready to hand out! Without Cleveland Clinic, I really could have suffered irreversible brain damage.”

*– Teresa Martens, 23,
of Higginville, Missouri*

WHAT IS A STROKE?

Each year, more than half a million Americans suffer from strokes; stroke is the third leading cause of death in the United States and a leading cause of serious long-term disability, according to the American Heart Association and American Stroke Association.

A stroke, or “brain attack,” occurs when the blood supply is cut off from part of the brain. When this happens, the blood-deprived brain loses its supply of oxygen and nutrients. When the brain is deprived of blood for even a few minutes, it begins to die.

There are two types of stroke — ischemic and hemorrhagic.

In ischemic strokes, brain arteries become blocked and prevent blood from nourishing the brain. In hemorrhagic strokes, brain arteries rupture from damage caused by high blood pressure and other risk factors or an aneurysm (an abnormal out-pouching of a blood vessel). This causes blood to flood the brain, creating pressure that leads to brain-cell death.

Strokes do occur in young patients, and pediatric stroke requires highly specialized care. We maintain a dedicated pediatric stroke program for the evaluation and management of childhood stroke from birth to age 18. We are also part of the International Pediatric Stroke Study group, actively participating in pediatric stroke clinical trials and data collection. Our pediatric neurology team works closely with pediatricians and pediatric specialists at Cleveland Clinic Children’s Hospital, offering advanced medical care and rehabilitation services.

Remember that for every minute brain cells are deprived of oxygen during a stroke, brain damage increases. The chances for survival and recovery improve when treatment begins within the first few hours of stroke warning signs.

Immediate treatment of a stroke may limit or prevent brain damage. A thrombolytic agent or “clot buster” medication may be given within the first three hours of the onset of stroke symptoms. Hence, it is critical to get to the hospital quickly if you experience stroke symptoms. The fastest way is to call 9-1-1.



WHAT ARE RISK FACTORS FOR A STROKE?

If your primary care physician has diagnosed you as being at risk for a stroke, a Cleveland Clinic stroke neurologist can help determine your best course of treatment.

Many factors increase the risk for stroke. Some factors can be controlled; others cannot.

- **Family history:** Those who have a family history of strokes or a prior stroke are at higher risk for having a stroke.
- **High blood pressure:** Strokes are four to six times more likely to occur in people with high blood pressure.
- **High cholesterol:** People with high cholesterol are at double the risk of having a stroke.
- **Heart disease:** Strokes are six times more likely to occur in people with heart disease.
- **Excess weight:** Being overweight can lead to heart disease and high cholesterol, which, in turn, increase chances of having a stroke.
- **Alcohol use:** Heavy drinking increases the risk for stroke.
- **Tobacco use:** Smokers have double the risk for stroke as nonsmokers.
- **Gender:** Men are more likely to have strokes than women.
- **Race:** African-Americans have a higher rate of stroke than other races.
- **Age:** After age 55, there is an increased likelihood of stroke.
- **Chronic disease:** Diabetics are at higher risk for stroke.

How can I reduce my risk?

- Control your blood pressure.
- Find out if you have heart disease, especially an irregular heartbeat known as atrial fibrillation (AF).
- Don't smoke.

- Find out if you have a diseased carotid artery (arteries that provide blood flow to the head).
- Lower your cholesterol.
- Limit your alcohol intake.
- Control your weight.
- If you have diabetes, manage the disease.

WHAT ARE THE WARNING SIGNS?

Many warning signs indicate you may be suffering a stroke. Depending on the function of the part of the brain affected, the person suffering the stroke suddenly may become paralyzed, blind or unable to speak.

It is crucial to get to a hospital immediately. If you experience any of these major stroke warning signs, call 9-1-1:

- sudden loss of speech
- slurred speech
- sudden loss of vision
- blurry or double vision
- sudden paralysis
- sudden weakness
- sudden dizziness
- sudden, severe headache, often accompanied by neck stiffness and vomiting

For patients with risk factors, medications for blood pressure, diabetes and high cholesterol are important preventive measures. Smoking must stop. A person who has had transient ischemic attacks (also known as TIAs or ministrokes) or a stroke may be treated with aspirin or other antiplatelet or anticoagulant medications to reduce the risk of another attack. A type of surgery called carotid endarterectomy is sometimes recommended to reduce the risk of a major stroke. In this procedure, the fatty deposits in the carotid artery that block blood flow to the brain are removed. Non-surgical options for opening blocked carotid arteries include angioplasty and stenting.



Toni Greaves

WHAT TREATMENT OPTIONS ARE AVAILABLE?

Our highly trained, diverse team of board-certified specialists and sub-specialists collaborates to provide comprehensive care for stroke patients. That team includes:

- vascular neurologists
- cerebrovascular and endovascular neurosurgeons
- interventional neuroradiologists with training in neurosurgery, radiology and neurology
- neurointensivists (physicians specially trained in neurocritical care)
- pediatric stroke neurologists
- neuroanesthesiologists
- stroke rehabilitation specialists

CRITICAL CARE TRANSPORT

If you or someone in your family is having a stroke, expedited transport is crucial. Cleveland Clinic's critical care transport team is available 24 hours a day to transport patients to our facility from anywhere in the world. Our fleet consists of mobile ICU vehicles, helicopters and fixed-wing aircraft.

Specialty care teams of physicians, nurse practitioners, critical care nurses, paramedics and allied health professionals provide customized care, including pediatric care for infants, children, teens and young adults. In transit, these teams can communicate with your primary care physician or any doctor who has been treating you.

As indicated by our national awards and certifications, Cleveland Clinic's Cerebrovascular Center has a rigorous stroke care protocol that meets or exceeds national standards and guidelines that improve outcomes. Diagnostic tools such as brain image scans help guide treatment, and neurologists conduct fast but thorough patient evaluations. Further, Cleveland Clinic has been recognized for its fast "door-to-needle" time – the time from arrival at the hospital to administration of intravenous therapies. This timing is recognized as crucial in stroke treatment.

Cleveland Clinic's Neurological Intensive Care Unit (ICU) is staffed 24/7 by a team of critical care neurologists.

For pediatric stroke patients, we offer a dedicated pediatric ICU staffed full time by experienced pediatric intensivists and pediatric neurologists.

At our Neurovascular Ultrasound Laboratory, we perform advanced diagnostic examinations to detect abnormalities in the circulation of blood through the brain. This aids in assessing why a patient has suffered a stroke or transient ischemic attack (TIA) and helps determine the best therapies.



WHAT CAN I EXPECT FROM REHABILITATION?

In collaboration with the Neurological Institute's Department of Physical Medicine and Rehabilitation, we offer a full spectrum of rehabilitation services designed to return stroke patients to the best possible quality of life.

Our continuum of care spans all phases of the rehabilitative process, from hospital to home. Our multidisciplinary team of rehabilitation specialists includes physiatrists, neurologists, rehabilitation nurses, physical and occupational therapists, speech and language pathologists, psychologists, social workers, recreational therapists and case managers.

These professionals help patients with cognition, mobility, communication, self-care and more. Rehabilitation begins at the inpatient stage and continues on an outpatient basis, including support from Cleveland Clinic Home Care Services, if needed. Comprehensive rehabilitation services for pediatric patients are offered through our Children's Hospital for Rehabilitation.

WHAT RESEARCH IS BEING DONE TO IMPROVE STROKE CARE?

Lerner Research Institute, the basic science research arm of Cleveland Clinic, houses 36 scientists working on neurologically based research projects. Ongoing cerebrovascular research includes several stroke-related studies such as:

- subcortical stimulation for rehabilitation of motor deficits following stroke
- delivery of antioxidant enzymes in cerebral stroke
- cognitive training that may enhance motor function in stroke patients
- functional and anatomical adaptations of the brain after stroke and as a result of medical rehabilitation



Access to Clinical Trials

The Cerebrovascular Center has led several major international trials of stroke medications, including the first-ever trial of intra-arterial thrombolysis in acute stroke. Our patients have the opportunity to participate in other leading-edge clinical research trials, such as:

- an investigation of insulin resistance intervention after stroke
- a study of stenting and aggressive medical management for preventing recurrent stroke
- an evaluation of mechanical retrieval and recanalization of stroke clots using a surgical technique called embolectomy
- a trial of stenting devices for symptomatic ischemic stroke

Patients also may qualify to participate in studies investigating possible genetic links to the development of brain aneurysms.

To learn more about our clinical trials, call Amy Richmond at **216.444.9524**.



WHY CHOOSE CLEVELAND CLINIC?

Cleveland Clinic is a nonprofit multispecialty academic medical center, consistently ranked among the top hospitals in America by *U.S. News & World Report*. Founded in 1921, it is dedicated to providing quality specialized care and includes an outpatient clinic, a hospital with more than 1,300 staffed beds, an education institute and a research institute.

One of 26 institutes at Cleveland Clinic, the multidisciplinary Neurological Institute is committed to improving outcomes while treating patients with compassion and respect. By bringing together physicians from different training backgrounds and experiences, the Institute's Cerebrovascular Center offers a collaborative, multidisciplinary environment to meet the needs of patients suffering from cerebrovascular disorders. This unique disease-centered approach allows individualized care for each patient, bringing together a variety of expert perspectives, including:

- Board-certified vascular and interventional neurologists
- Board-certified cerebrovascular and endovascular neurosurgeons
- Board-certified Interventional neuroradiologists
- Board-certified neurointensivists
- Stroke prevention and rehabilitation specialists
- Pediatric stroke neurologists

Cerebrovascular Center patients are seen at our main campus in Cleveland and at locations throughout Northeast Ohio.

In addition to strokes, the Cerebrovascular Center provides treatment for brain aneurysms, brain and spinal vascular malformations, carotid stenosis, intracranial atherosclerosis and other cerebrovascular conditions. If you or someone you know has a cerebrovascular disorder, please do not hesitate to contact us.

NEED A SECOND OPINION BUT CANNOT TRAVEL TO CLEVELAND?

Our MyConsult service offers secure online second opinions for patients who cannot travel to Cleveland. Through this service, patients enter detailed health information and mail pertinent test results to us. Then, Cleveland Clinic experts render an opinion that includes treatment options or alternative recommendations regarding future therapeutic considerations. To learn more about MyConsult, please visit clevelandclinic.org/myconsult.



AMERICA'S BEST HOSPITALS

U.S. News & World Report's "America's Best Hospitals" survey has consistently ranked both our Pediatric and Adult Neurology and Neurosurgery programs among the top 10 in the nation and best in Ohio.



QUESTIONS TO ASK WHEN CONSIDERING A PROVIDER FOR STROKE CARE

Q: Is the Neurologist/Neurosurgeon Fellowship trained?

A. Our stroke neurologists and cerebrovascular and endovascular neurosurgeons are fellowship trained. Their areas of expertise combine research, education and clinical practice to provide innovative and scientifically based treatments for cerebrovascular disease with the highest quality patient care.

Q: Do you work within a multidisciplinary team?

A. The Cerebrovascular Center at Cleveland Clinic understands the importance of tailoring therapy for each patient. By bringing together physicians from different training backgrounds and experiences, we offer a collaborative, multidisciplinary environment to meet the needs of patients suffering from cerebrovascular disorders. This unique disease-centered approach allows us to approach each patient with a consensus plan, benefiting from a variety of expert perspectives including:

- Board-certified vascular neurologists
- Board-certified cerebrovascular and endovascular neurosurgeons
- Interventional neuroradiologists with training in neurosurgery, radiology and neurology
- Neurointensivists
- Neuro-anesthesiologists
- Stroke prevention and rehabilitation specialists

Q: How many cerebrovascular cases does the surgeon treat each year?

A. Our Cerebrovascular Center team completed more than 1,000 surgical/interventional procedures last year with 1,499 admissions and 4,219 outpatient visits.

Q: Will I be cared for in a dedicated NICU (Neurological Intensive Care Unit) with Neurointensivists present in the unit 24/7?

A. Within our 22-bed, state-of-the-art dedicated Neurointensive Care Unit (NICU), we treat more than 1,300 patients per year, with 24/7 coverage. This full service NICU is equipped to treat any patient with neurological injury, regardless of the severity. The NICU also is equipped to handle any heart, lung and gastrointestinal problems that may arise in neurological patients. In addition, we have specialized equipment specifically for the treatment of patients with neurological illnesses, including inside-the-brain oxygen sensors and blood flow monitors, and portable head Computed Tomography (CT) scanning.

Q: What is the average length of stay?

A. The length of your stay in the hospital is one indication of how good the entire care team, from physicians to nurses and others, are in expediting your recovery and return to home. At the Cleveland Clinic Cerebrovascular Center, we have achieved and maintained average lengths of stay for our patients consistently below national benchmarks for four years in a row. The expected length of stay in the hospital will vary based on your particular condition and treatment, but at the Cerebrovascular Center many treatments can now be done without a single night spent in the hospital.

Q: What are your mortality rates?

A. Cleveland Clinic Cerebrovascular Center mortality rates have remained well below the national averages for several years. This results from our patients having access to the highest levels of specialty care and the resources available to respond to patient needs 24 hours per day. Make sure the physician you select has extensive experience treating your condition and has a multidisciplinary team. Experience counts and good outcomes similar to the Cerebrovascular Center depend on a team approach.



Our staff



Peter Rasmussen, MD, FAHA, FAANS
Director, Cerebrovascular Center

Specialty Interests: cerebrovascular and endovascular neurosurgery



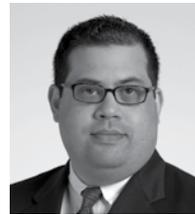
Jennifer A. Frontera, MD

Specialty Interests: Neurointensive care; cerebrovascular diseases, subarachnoid, intracerebral or subdural hemorrhage, acute or malignant stroke, vascular malformations, aneurysms, status epilepticus, delirium, encephalopathy, coagulopathy, traumatic brain injury, spinal cord injury, autoregulation, hepatic encephalopathy



Mark Bain, MD

Specialty Interests: Microsurgical and endovascular treatment of cerebral aneurysms, vascular malformations, skull base cerebrovascular surgery, treatment of giant intracranial aneurysms, intracranial bypass, treatment of spinal cord vascular lesions, endovascular treatment of stroke and intracranial occlusive disease, stenting and surgical treatment of carotid disease



Joao Gomes, MD

Specialty Interests: acute stroke treatment, stroke imaging, therapeutic hypothermia for neuroprotection, intracranial hemorrhages, vascular malformations and aneurysm, neurocritical care



Dhimant Dani, MD

Specialty Interests: ICU management of stroke, subarachnoid hemorrhage, traumatic brain injury, neurological emergency requiring ICU care



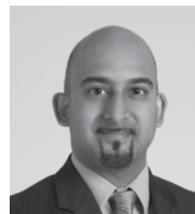
Ferdinand Hui, MD

Specialty Interests: interventional and therapeutic neuroradiology, MR flow imaging, cerebrovascular disease, intracranial atherosclerosis, kyphoplasty



Erin Dyer, MD

Specialty Interests: comprehensive neurosurgical and endovascular management and treatment of brain and spinal vascular lesions, carotid artery disease and emergency interventional stroke treatment



M. Shazam Hussain, MD, FRCPC

Specialty Interests: cerebrovascular diseases, acute stroke therapy, neuroimaging, carotid dissection, vertebral artery stenosis/blockage, endovascular therapy (coiling, stenting)



Neil Friedman, MBChB

Specialty Interests: pediatric neuromuscular disease, pediatric stroke and cerebrovascular disease, neurocardiology, fetal and neonatal neurology



Irene Katzan, MD, MS

Specialty Interests: stroke, intracranial stenosis, carotid stenosis, outcomes of cerebrovascular diseases

**John Lee, MD**

Specialty Interests: neurorehabilitation, geriatric rehabilitation, spasticity management, exercise physiology

**J. Javier Provencio, MD, FCCM**

Specialty Research Interests: neurological intensive care, neuroinflammation in clinical illness

**Mei Lu, MD, PhD**

Specialty Interests: cerebrovascular disease, intracerebral hemorrhage, stroke, neuromuscular disease

**Andrew Russman, DO**

Specialty Interests: stroke, TIA, cervical artery dissection, intracranial and extracranial stenosis, concussion, post-concussion syndrome

**Gwendolyn Lynch, MD**

Specialty Interests: neurocritical care, stroke, neurocritical care quality measures, stroke epidemiology, risk factor modification

**Susan Samuel, MD**

Specialty Interests: ICU management of subarachnoid hemorrhage, intracerebral hemorrhage, cerebral edema, stroke

**Edward Manno, MD**

Specialty Interests: cerebrovascular disease, AVMs, intracranial aneurysms, hemorrhagic and ischemic stroke, neurocritical care, neurological intensive care, stroke epidemiology

**Gabor Toth, MD**

Specialty Interests: aneurysm coiling, AVM, carotid-cavernous fistula, intracranial stenosis/blockage, neuroimaging, stenting, stroke and cerebrovascular disease, TIA, carotid and vertebral artery stenosis/blockage, carotid and vertebral artery dissection/pseudo aneurysm

**Thomas Masaryk, MD**

Specialty Interests: interventional and therapeutic neuroradiology, MR flow imaging, cerebrovascular disease, degenerative diseases of the spine

**Ken Uchino, MD**

Specialty Interests: carotid artery disease, hemorrhagic stroke, intracranial stenosis, ischemic stroke, neurovascular ultrasound, stroke epidemiology

**Laurie McWilliams, MD**

Specialty Interests: intracranial hemorrhage, cerebral hemorrhage and hemorrhagic stroke, status epilepticus

CONTACT US

Please call **216.636.5860** or toll free at **866.588.2264** to schedule an appointment. Or call the Cerebrovascular Center Consultation Line at **216.445.1587** or Toll Free: **800.CCF.CARE**, extension 51587.

For more information, visit clevelandclinic.org/stroke



About Cleveland Clinic

Cleveland Clinic is an integrated healthcare system with a main campus, 18 family health centers, eight community hospitals and locations in Ohio, Florida, Nevada, Toronto, and Abu Dhabi. It is a not-for-profit group practice where nearly 3,000 staff physicians and scientists in 120 medical specialties, collaborate to give every patient the best outcome and experience. Cleveland Clinic is ranked among America's top hospitals overall, and among the nation's leaders in every major medical specialty (*U.S. News & World Report*).

Its multidisciplinary Neurological Institute, one of 26 institutes at Cleveland Clinic, is internationally known for superior diagnosis and treatment of neurological disorders ranging from the common to the most complex. More than 300 specialists combine clinical expertise, academic achievement and innovative research to accelerate transfer of investigational therapies unavailable elsewhere, for the benefit of adult and pediatric patients. The institute is committed to improving outcomes while treating patients with compassion and respect.

The Cerebrovascular Center integrates a multidisciplinary team of neurologists, neurosurgeons, neuroradiologists, neurointensivists and rehabilitation specialists who provide expert diagnosis and medical, endovascular and surgical management of all cerebrovascular conditions.



Every life deserves world class care.



Every life deserves world class care.

9500 Euclid Avenue, Cleveland, OH 44195

Cleveland Clinic's Neurological Institute is dedicated to the diagnosis and treatment of common and complex neurological disorders of adult and pediatric patients. Its more than 300 specialists combine expertise and compassion to achieve measurably superior results. By promoting innovative research, the Neurological Institute accelerates the development and application of new treatments and technologies to patient care. The Neurological Institute is one of 26 institutes at Cleveland Clinic, a not-for-profit academic medical center ranked among the nation's top hospitals (*U.S. News & World Report*), where nearly 3,000 physicians in 120 specialties collaborate to give every patient the best outcome and experience.
clevelandclinic.org