



# Striking

After a series of transient ischemic attacks — or “mini-strokes” — last spring, Wayne Stoner had treatment to help prevent a real stroke. It was an easy decision for Stoner, here with his wife, Brigette, and children, Logan, Mareesa, and Alexa.

PHOTO: JASON WACHTER

# back at stroke

Stroke Center's rapid response pays off when every minute counts

THIS PAST APRIL, Wayne Stoner, 42, was lying on the love seat in his home outside Little Falls, Minnesota, when the first attack occurred.

His daughter was hosting a sleepover for her birthday, and she'd just told her dad that she was looking for a spare pillow. But when Stoner tried to answer, he discovered that he couldn't move or speak clearly.

"That spell lasted about 30 seconds; then I came to and went out to get some air," he recalls.

Two weeks later, he had a recurrence — this time when the alarm clock went off for work. Stoner lay unable to move for about a half a minute, then got up, glanced at himself in the mirror, and decided, "I look fine."

He wasn't worried. Even though he smoked a pack to a pack and a half of cigarettes a day — and had a family history of stroke and heart disease — he says, "I thought my health was wonderful."

Stoner's state of denial ended abruptly with yet another attack later that weekend, when he experienced slurred speech and severe dizziness while watching a movie at home with his wife, Brigitte. The following Monday, his family doctor ordered an MRI of his head.

Just days later, Stoner met with Adnan I. Qureshi, M.D., executive director of the University of Minnesota's Stroke Center, who told him he'd been experiencing TIAs, or transient ischemic attacks. Sometimes called "mini-strokes," TIAs are a red flag for an impending major stroke caused by the occlusion, or blockage, of blood vessels. Stoner's MRI images had revealed two small areas of damage due to arterial blockages in his brain.

He had, Qureshi informed him, a choice to make: Ignore the TIAs and go home, in which case he faced a high risk of being felled by a major stroke within the next few weeks. Or undergo neurointerventional surgery that would include an angioplasty



PHOTO: RICHARD ANDERSON

Adnan I. Qureshi, M.D., executive director of the University's Stroke Center, says scientists' knowledge about stroke diagnosis and treatment is quickly expanding.

(insertion of a balloon-like instrument or self-expanding stent that opens the blood vessel) and placement of a stent to keep the blood vessel open.

"I was scared, I'll tell you that," Stoner says. "I have a wife and three young kids. I didn't really feel like I had a choice."

He underwent the procedure on May 28.

"I was awake the whole time," Stoner marvels. Today, besides the aspirin he takes daily as a blood-thinner and the 15 pounds he's gained since he quit smoking, his life is back to normal. Stoner was lucky. Had he lived somewhere else, his story might have had a very different outcome—one that ended in death or long-term disability.

#### Stroke teams at the ready

Every year, some 10,000 Minnesotans are hospitalized for stroke. About 2,400 of them die. Stroke is the third-leading cause of death in the United States and the leading cause of disability.

Fortunately, Stoner ended up in the right place at the right time. Formed in

2006, the Stroke Center, which offers services at the University of Minnesota Medical Center, Fairview, and Hennepin County Medical Center, is one of only a handful of its type in the country—with a cross-disciplinary team of doctors, nurses, and other specialists trained in interventional neurology, neurosurgery, or neuroradiology to improve outcomes for stroke patients.

Although Stoner's TIAs required urgent care, his symptoms were temporary. When the symptoms don't clear rapidly on their own, a stroke is occurring, and the patient needs immediate treatment. Using clot-busting medications and other means, it is now possible to reverse some strokes if the patient is treated within three hours—and the sooner the better—of symptom onset.

The most common kind of stroke, called "ischemic" stroke, is caused by a blockage of blood flow to a region of the brain—the same condition that threatened Stoner's health. Ischemic strokes account for 85 percent of all strokes suffered in the United States each year. The other 15 percent are called hemorrhagic strokes—those

## Novel research

SCIENTISTS AND CLINICIANS affiliated with the University of Minnesota Stroke Center through the Zeenat Qureshi Stroke Research Center are seeking innovative ways to both prevent strokes and lessen their impact. Here are some of their current and proposed research projects:

□ A multicenter clinical trial funded by the National Institutes of Health and led by Adnan I. Qureshi, M.D., executive director of the Stroke Center, will test the effectiveness of medications used to control blood pressure in patients with hypertension in acute treatment of hemorrhagic strokes not caused by rupture of a visible aneurysm.

"Bleeding into the brain usually continues after the small blood vessel has ruptured," Qureshi explains. "We want to see if drugs that reduce blood pressure might also reduce continuing bleeding and thus reduce the damage caused by tissue disruption and pressure on the brain."

- Robert Taylor, M.D., assistant professor of neurology, neurosurgery, and radiology and associate director of vascular neurology fellowships, will be leading a study to look at the role of the brain's vascular biology in precipitating strokes.
- In partnership with the School of Public Health, Stroke Center neurologist Muhammad Fareed K. Suri, M.D., has just begun a two-year epidemiological study involving 15,000 patients that seeks to identify genes associated with a specific kind of

caused by bleeding that most often results when a weakened portion of a blood vessel, known as an aneurysm, bursts. Both types of strokes require rapid treatment for optimal outcome, but the goal is clearest for those with ischemic stroke: to open the vessel and restore blood flow as soon as possible.

At the Stroke Center, almost 20 percent of ischemic stroke patients receive acute neurological treatment to open the blocked vessel. That's in line with research showing that 20 percent of stroke patients need that type of care. Nationally, however, only 2 percent of patients receive acute treatment.

What's more, the elapsed time between when a patient arrives at one of the Stroke Center medical facilities until neurointervention is just 43 minutes. Nationally, the average is an hour. And those 17 minutes can be critical, especially for patients who are experiencing a major ischemic stroke.

In their earliest stages, ischemic strokes cause a core of brain cells to die as a result of loss of blood flow. Around them is a "penumbra" of cells

that are in danger but still living. "Time is brain" has become a familiar refrain in neurology circles because the more quickly a stroke victim receives acute treatment that restores blood flow, the greater the likelihood that the penumbral cells will survive.

Even 17 minutes can mean the difference between a quick recovery with few, if any, long-term symptoms and permanent disability or death. In fact, up to 40 percent of ischemic stroke patients achieve complete recovery with acute clot-buster treatment administered within three hours of onset, as opposed to only 25 percent of patients who don't receive treatment that quickly.

#### **Combining research, education, and care**

In addition to clinical care, the Stroke Center also offers education, training about six fellows a year, as well as research conducted through its investigational arm, the Zeenat Qureshi Stroke Research Center, to improve treatment methods already available, discover new therapies, and find ways

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To hear more about the signs of stroke, stroke susceptibility, and treatment, go to [www.mmf.umn.edu/mb/strokecenter](http://www.mmf.umn.edu/mb/strokecenter).

ischemic stroke called small vessel disease stroke. The findings, he says, could help doctors identify genetic markers for more common forms of stroke.

- Collaborating with the Centers for Disease Control and Prevention and the Minnesota Department of Health, Stroke Center neurologist Kamakshi Lakshminarayan, M.D., is collecting data on stroke treatment provided at Minnesota hospitals to help them measure and improve their quality of patient care.
- Current stroke treatment focuses on saving brain cells. Vallabh Janardhan, M.D., also a neurologist with the Stroke Center, is leading a study to determine whether stem cell therapy might be effective in replacing cells that have already died.

- The Stroke Center is also involved in trials aimed at standardizing the way specific treatments are selected for individual patients. Currently, matching treatment to patient relies on neuroradiological imaging and a physician's diagnostic experience—and is as much art as science.

"The key to success for acute treatment of stroke lies in knowing who is an appropriate candidate for each kind of therapy," says Ramachandra Tummala, M.D., a vascular neurosurgeon with the Stroke Center. "The arteries of the brain are much more fragile than elsewhere in the body, so each form of neurointerventional therapy carries some risk."



ILLUSTRATION: BRIAN CROVIN

to prevent strokes from occurring in the first place. The research center is off to a strong start, having published 85 research papers in scientific and medical journals in its first two years.

For Qureshi, the quest for new ways to treat and prevent stroke has roots in personal history. His mother, for whom the Zeenat Qureshi Stroke Research Center is named, died of a massive hemorrhagic stroke in his native Pakistan when she was only 39. The experience, he says, “was definitely a factor” in his decision to specialize in neurology. Meanwhile, the resources uniquely available at the University of Minnesota led to his decision to direct the Stroke Center.

“The University was the perfect venue because we don’t just provide clinical care,” he says. “We wanted a strong education and research component as well, which only the University can provide. We have one of the largest research and fellowship programs in the country right now.”

#### Treatment advances

Formation of the Stroke Center followed more than a decade of dramatic improvements in the treatment of both kinds of stroke.

For ischemic strokes, “thrombolytic therapies”—mechanical or, increasingly, pharmaceutical, methods of dissolving or removing blood clots—have become standard practice. This approach has been coupled with the development of increasingly sophisticated endovascular therapy—the delivery of clot-busting drugs directly to the site of the clot.

“Endovascular therapy decreases the dosage of the drugs we need to use while at the same time increasing

their effectiveness,” says Mustapha Ezzeddine, M.D., director of neurocritical care at the Stroke Center.

In fact, when this kind of therapy is used, the clot-busters are twice as effective in opening vessels as when they are administered intravenously—the standard approach until now.

Though hemorrhagic strokes are not as common as ischemic strokes, they are deadlier, with a mortality rate of 30 percent as compared with 10 percent for strokes caused by clots. Fortunately, new endovascular therapies have greatly improved survival and recovery rates for these types of strokes as well.

For example, “coiling” aneurysms has become a standard treatment for the half of hemorrhagic strokes in which an aneurysm has ruptured. In this therapy, a physician places a small coil of platinum inside the bulging blood vessel to provide structural support and prevent the vessel from rupturing again.

Meanwhile, aftercare for both ischemic and hemorrhagic strokes has also advanced. “Neurocritical care optimizes recovery and minimizes injury,” says Ezzeddine. “It also treats the medical complications that often follow a stroke.”

Says Qureshi, “The science of stroke is expanding quickly. We are seeing advancements in both rapid diagnosis and treatment.”

And for that, Wayne Stoner is grateful. “The treatment I received was wonderful,” he says. “I feel I was given a new lease on life.” <sup>MB</sup>

By RICHARD BRODERICK, a freelance writer living in St. Paul

## STROKE SIGNALS

“In the last 10 years, the ability to intervene and save the brain from dying after stroke has increased exponentially,” says Stephen Haines, M.D., chair of the Department of Neurosurgery at the University of Minnesota. “These treatments work—if the patient gets to the hospital within a certain window of opportunity.”

Those advances, Haines says, mean that we should think about strokes the way we think about heart attacks: “The instant there are any symptoms, people need to get to the hospital.”

Any of these symptoms can be a sign of stroke:

- Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body
- Sudden confusion, trouble speaking or understanding
- Sudden trouble seeing with one or both eyes
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden, severe headache with no known cause