

# Mayo Clinic Q & A - World Stroke Day - Dr. James Meschia

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## SUMMARY KEYWORDS

stroke, patients, treatment, called, tissue, symptoms, blood flow, catheter, clot, blood vessel, brain, mayo clinic, ischemic strokes, words, important, drug, big, onset, refers, noting

## SPEAKERS

Narrator, Jason Howland, Dr. James Meschia

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**N** Narrator 00:01  
Coming up on Mayo Clinic Q&A...

**D** Dr. James Meschia 00:03  
A stroke refers to a clinical syndrome, a collection of symptoms that involve the nervous system, affecting speech, language, vision, strain, sensation. All sorts of things can potentially be involved in how stroke presents.

**N** Narrator 00:22  
Knowing the warning signs of stroke and acting fast may save a life or prevent damage to the brain. But it's also important to know the risk factors for stroke, so you can hopefully prevent one in the first place.

**D** Dr. James Meschia 00:34  
What kind of drives the risk of having a stroke, cigarette smoking, hypertension, obesity, high cholesterol level, elevated blood sugar, all of these things contribute to stroke. So clearly, if people with one or more of the so-called vascular risk factors you would be at risk of stroke.

**J** Jason Howland 00:57  
Hello, and welcome, everyone to Mayo Clinic Q&A. I'm Jason Howland sitting in for Dr. Halena Gazelka. When someone has a stroke, every second is crucial. The longer it takes to receive treatment, the more likely it is that damage to the brain will occur. World Stroke Day is

recognized each year on October 29th. The aim is to teach the public about stroke risk factors and stroke prevention, and to raise awareness about the warning signs of stroke, so people recognize when a loved one may be having a stroke and can take action. Joining us today is Dr. James Meschia, a neurologist and stroke expert at Mayo Clinic. Welcome to the program.

D

Dr. James Meschia 01:36

Thank you for having me.

J

Jason Howland 01:38

Well, first of all, let's start with the basics. What is a stroke? Is it the same as a brain aneurysm?

D

Dr. James Meschia 01:45

So a stroke refers to a clinical syndrome, a collection of symptoms that involve the nervous system, affecting speech, language, vision, strain, sensation, all sorts of things can potentially be involved in how stroke presents. But there are basically two key qualities to it. One is sudden in onset. And two, the collection of symptoms correspond to an impairment in a region of the brain supplied by a blood vessel. So, for example, a stroke involving the left side of the brain, the left hemisphere, around the lateral aspect would cause right-sided weakness, difficulty with language, either comprehension or verbal expression. So those sorts of things imply dysfunction in the middle cerebral artery distribution. So the territory supplied by a specific artery and therefore, if you had sudden onset of those symptoms, you would have a stroke. Now you mentioned brain aneurysm and certainly, when a brain aneurysm, when and if a brain aneurysm ruptures, you can have stroke or stroke-like deficits, in addition to a severe headache. So, an aneurysm that ruptures can lead to a stroke, but stroke is a broader term.

J

Jason Howland 03:32

And are there different kinds of strokes?

D

Dr. James Meschia 03:35

There are and so in a broad brush, kind of the first refinement, if you will, of the diagnosis of stroke are ischemic strokes versus hemorrhagic strokes. So ischemic strokes, the word ischemia refers to impairment of function due to impairment of blood flow. So if this decreased blood flow is severe enough, drops low enough and lasts long enough, it'll lead to infarction which is irreversible cell death. So tissue damage. Ischemia can be milder or shorter duration where the tissue remains viable or can recover if you reestablish blood flow. So we talk about ischemic strokes, those typically due to blood clots blocking up our brain arteries, and hemorrhagic strokes, those due to rupture of a blood vessel in the brain. And either because there was a preexisting aneurysm or arteriovenous malformation, or simply a brittle blood vessel that looks normal in appearance, grossly. So, those are the big two categories. Now,

ischemic stroke, 85% of all strokes are ischemic stroke and the remaining 15% are hemorrhagic stroke. Both can, of course, rapidly alter lives and be serious. So neither one can be taken lightly.

**J** Jason Howland 05:29

So what happens when brain cells died due to stroke?

**D** Dr. James Meschia 05:33

Yeah, so brain cells require a constant supply of energy, supply of oxygen and glucose given in the bloodstream keep the cells healthy. The cells are, because they're living tissue, they require energy to keep going. Just like a potted plant, if you don't water it, give it sunlight, it just withers and dies. Cells being living tissue, you can't like shut off the supply of oxygen and glucose and come back seven days later, say, and try to turn that back on. The cell needs the oxygen and glucose just to keep living, much less functioning, and sending electrical signals to its buddies, it's fellow nerve cells. So that's what happens when you cut off blood flow, you cut off the supply of oxygen and glucose and that leads to tissue damage or tissue dysfunction, which ultimately leads to cell death.

**J** Jason Howland 06:54

So who is most risk for a stroke?

**D** Dr. James Meschia 06:57

Yeah, well, we know quite a lot from epidemiological studies about what the risk factors for stroke are actually. We know this more than perhaps any other neurologic disease, what kind of drives the risk of having a stroke? Cigarette smoking, hypertension, obesity, high cholesterol level, elevated blood sugar, all of these things contribute to stroke. If you had to pick one thing to modify, because of the most overwhelming risk of stroke you know, overwhelming driver of the risk of stroke it would be high blood pressure or hypertension. So, clearly if you have people with one or more of these so-called vascular risk factors, you would be at risk of stroke.

**J** Jason Howland 07:58

What are the signs of stroke?

**D** Dr. James Meschia 08:02

Yeah, well, it can get complicated. But fortunately, because of the advent of acute treatments, there have been steps taken to simplify the warning signs of stroke or the symptoms of stroke so that the broader audience, the general public can be made aware of what to consider stroke and to take prompt action. So, one of the acronyms or memory devices to kind of cover the

waterfront of stroke symptoms is so called BE FAST, B E F A S T and that stands for: Balance, so sudden loss of balance is something that can be experienced with stroke say from cerebellar stroke. E stands for eyes and in this case, vision loss in one or both eyes. F stands for face, so the face looks uneven. In many stroke patients a facial droop, we call it loss of the nasal labial, fold the creases of the face, on one side. A stands for arm, but it doesn't necessarily have to be the arm it could be the leg and it refers to weakness, or dragging or drooping of the arm. S stands for speech. And here we're talking about both the articulation of words, the use of the lips and the tongue and the throat to make sounds, syllables and sounds like words, as well as trouble with production of words. So you can have good articulation, but the words coming out are all jumbled, or substituting a sort of made up word for a real word. So that's all under the S in be fast. And T is not actually one of the stroke symptoms, but it refers to time because we want people to note the time of onset of abnormal stroke symptoms that I described. The balance the eyes, the face, the arm. Basically, time needs to be noted, because it's one of the drivers behind whether clot-busting drug TPA, or its relative TNK TPA, can be given safely and help patients. If you give the clot busting drug too late, you can actually make things worse. If you give it early, things can be made better, the stroke deficit can be reduced. If you give it ultra early, that's even better. So the sooner the better. People talk about "time is brain" meaning, the sooner you get to restoring blood flow, the better for the patient.

J Jason Howland 11:22

So what should someone do if they think that someone is having a stroke?

D Dr. James Meschia 11:28

Yes, well, definitely, as I said, noting the time is important. Notice, noting the nature of the symptoms. So being observant in those ways. And then also treat it as a 911 emergency. So, if you see someone who normally has perfect balance and speaks fluently, and all the rest, suddenly staggering, and having that one side of the face droop, for example, it should be called in like a 911 emergency, like any other emergency, like you would if you saw someone hit by a car. It's that level of emergency. Now, the challenge that we run into with stroke is that oftentimes, it can impair the judgment of the person having the stroke. So you know, sometimes we run into situations where patients have what's called neglect, particularly if they have left-sided symptoms. So right-sided stroke, left-sided symptoms, where they tend to downplay the seriousness of what they have. So that makes it a little tricky. Sometimes you have to kind of exert executive decision making and sort of encourage patients to get medical help, and hopefully, accept when 911 is called, and go to the hospital and get checked out. But really, the simple thing is, if you think somebody's having a stroke, or you think you're having a stroke, call it in as 911. You could say, "well, the hospital is down the block, maybe I should get in my car instead." What I would argue there is that may sound good, it may seem appropriate. But what can happen is stroke can progress. Or you can have early recurrent stroke. Also, your driving skills will not be pristine. There are no treatments that can be started in a passenger vehicle versus an ambulance. An ambulance has the ability to get an EKG, start drawing blood start getting an IV in. All of these things will shave minutes off of the time it takes to treat a person with a stroke. So I would really argue that it's a 911 thing.

J Jason Howland 14:17

Well, you talked about how acting quickly matters and time is so important. How are strokes treated and how have treatments improved over the years?

**D** Dr. James Meschia 14:29

Yes, well, I think that first big sort of treatment revolution happened around in the 90s and in 1995 we finally kind of narrowed in on a dose and a time window to give a clot busting drug known as tissue plasminogen activator or the short form, TPA. Now what I mean by the time window is time from onset of symptoms to when a patient receives the treatment and still benefits from it. Like we talked about, cell death, how brain cells, if you reverse the problem soon enough, they can recover. If you wait too long, they can't. Again, back to the plant analogy, if you forget to water your plants for one day, you know they'll perk up, if you water them the second day. If you travel for a couple of weeks and come back, it's not the same. That ability to regenerate is lost. So in this case, time window is important and so is the dose. Clot busting drug is great for breaking up clots, as the name implies. Not so great for the side effect, which is bleeding. And so you have to balance the risks of clotting and bleeding. Those are a function of time to treatment, severity of the stroke and in dose of the drug. But in the 90s, the mid 90s, we finally had a drug where we found a dose that worked in a time window that works, so initially, it was .9 milligrams per kilogram given within three hours was proven to reduce morbidity. The degree of functional impairment, the degree to which people would need long term help from others, say at 90 days, and that was a major advance. Suddenly stroke had a proven treatment. And time, the time relationship was also demonstrated. The sooner you got the treatment in the better patients did. So the "time is brain" mantra came up. Systems had to shift. They needed ERs that could evaluate patients quickly, select appropriate candidates, get a CT, examine the patient, give the treatment and so forth. And provide supportive care, which includes tight control of blood pressure and monitoring the neurologic exam. So that was one big advance. And then in the 2000s, we had trials that showed the added benefits of so called mechanical thrombectomy. That's where a catheter is inserted in one of the peripheral arteries. And under guidance by an x-ray camera, the tip of the catheter is positioned in or near the clot. And treatments are given. Typically, the treatments now are mainly mechanical thrombectomy. That means pulling out the clot as opposed to instilling, injecting a drug through the catheter, but rather using the catheter to grab the clot and pull it out. And the early catheters that proved successful were called stent retrievers. So they have a little kind of mesh-like a tube at the end that reaches in and grabs the clot and you can pull it out. They also have suction devices and all sorts of new ways of mechanically opening blood vessels. But clot-busting drug or what we call thrombolysis was the first advance followed by mechanical opening of blood vessels. So used in combination or by itself. And those have been major, major advances in the therapy

**J** Jason Howland 19:14

And those types of treatments, those are emergent treatments to get essentially, to get blood flow going back to the brain, correct?

**D** Dr. James Meschia 19:23

Correct. Absolutely emergent treatment. You need to, just like with IV drugs, to break up the clot, the sooner the better. The same thing is true with the catheter procedures. Now, with

clot, the sooner the better. The same thing is true with the catheter procedures. Now, with modern brain imaging, we can now get some insight into how much tissue is permanently lost versus reversible tissue injury. What we call the penumbra, which is comes from the Latin meaning shadow. So this is not dark, dead tissue. This is in the shadow somewhere between living tissue, normal living tissue, and dead tissue. So this penumbra is salvageable tissue. And we now, with imaging, can get a handle on that in patients even beyond 12 hours, but within 24 hours some patients can benefit if the stars align, and the imaging is favorable in that long time window. That was not possible until very recently. So that's what I would say is another advance.

**J** Jason Howland 20:44

Beyond the emergent treatment, is there treatment ongoing after the stroke? And what's the prognosis after a stroke? I guess it would probably depend on how much damage has been done to the brain, right?

**D** Dr. James Meschia 21:00

Right. So I would say, a good predictor but not perfect predictor is kind of the initial stroke scale, because we use a clinical exam driven point system, assigning points for various neurological symptoms and signs, and come up with a stroke scale score. So an NIH Stroke Scale score. The higher the points, the worse the stroke. And the initial stroke scale used to be very predictive until we came up with these new, highly effective treatments, you know, thrombolysis, with or without mechanical thrombectomy. Now I would say that the 24-hour Stroke Scale is a good predictor. So what's left after kind of the hubbub of trying to get the blood flow restored, you know, is a very good predictor. If you have minor deficit 24 hours post stroke, you'll probably do reasonably well. Moderate deficit may benefit from inpatient rehabilitation, for example. And severe deficit, may unfortunately mean that you will need help from others moving forward. So those are kind of, I would say, the Stroke Scale of 24 hours or one day after hospitalization is very predictive.

**J** Jason Howland 22:44

So after the fact, are there times where patients have had a severe stroke where they have a loss of speech function, or perhaps, you know, you talked about the arms or legs, were after the stroke that they have to go through physical or speech therapy, that sort of thing?

**D** Dr. James Meschia 23:09

Yeah, absolutely. So one of the important points with stroke is that it is sudden in onset, and often maximally severe at onset. There are some exceptions, but I would say about 9 out of 10 are maximally severe at onset. And then over the course of 1 to 3 months, with appropriate rehabilitation, be it speech, physical or occupational therapy, or a combination thereof, patients do rally and improve significantly. And it is one of the things to be aware of, because sometimes patients and family can almost feel like giving up. I think that would be unfortunate and kind of tragic because there are, at least in the short term, the prognosis is favorable for some level of recovery. A lot of steps are taken to prevent recurrent stroke. And that's

important because if you try to recover, you know, you try to pick yourself up off the floor and then you're knocked down again. That's quite, quite serious and troubling and affects performance in a big way. But if we prevent recurrent stroke, and the patient gets the rehabilitation they need, I would say that most patients achieve some level of independence, if not full independence then at least some level, often a meaningful and acceptable level once patients learn adaptation skills.

J Jason Howland 23:12

Well, we're just about out of time. But before we wrap things up, let's talk prevention. What can be done, if anything, to reduce the risk of stroke?

D Dr. James Meschia 25:28

Sure. So I often use as a teaching tool, the American Heart Association's Life's Simple Seven. And the simple seven things are to quit smoking if you smoke. Or if you quit more than 12 months, it's considered low risk state. So stop smoking, eat better, and that's a challenge. But I would say things like the DASH diet or the Mediterranean diet, which you can look online for are very important here. Get physically active. So ideally, that's at least 150 minutes per week of at least moderate intensity exercise. Lose weight. So ideal body weight would be body mass index of 18.5 to 25. And there are lots of online calculators you put your height and weight in and can spit out a number for you. Manage blood pressure, ideally to less than 120 over 80, which we used to take is ideal, but now ideal is less than that. And control cholesterol with ideal being less than 200. Reduce blood sugar, with the ideal being less than 100. Those are things patients can do for themselves.

J Jason Howland 26:59

All great words of advice. Our thanks today to Mayo Clinic neurologist and stroke expert, Dr. James Meschia, for joining us today. Thank you, sir.

D Dr. James Meschia 27:09

Thank you.

J Jason Howland 27:11

And thank you all for joining us. Have a great day.

D Dr. James Meschia 27:14

Take care.



Narrator 27:15

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