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Clot-busting therapy helps stroke victims—but only if they get treatment in time

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What is an ischemic stroke?
Stroke is a "brain attack" causing a blockage of blood to the brain that can lead to damage of the brain. It is like a blocked pipe under the sink that prevents water from going down the drain. A patient who has a stroke will typically develop weakness, numbness, or speech problems. (More information about stroke can be found on the next page.)

What is thrombolytic therapy?
Thrombolytic therapy is the injection of a medication—tissue plasminogen activator (tPA)—that breaks up a blood clot ("clot buster"). tPA can be injected with a needle into a vein (intravenous [IV]), an artery (intra-arterial [IA]), or both (IV/IA)—one after the other. It is like liquid "Draino" for the blocked sink (figure).

How is tPA given?
IV tPA must be given very early after a stroke by a neurologist, emergency room physician, or other physician specifically trained in stroke. It is given within 3 hours after the first appearance of the stroke. IA tPA can be given up to 6 hours after the stroke has occurred under x-ray guidance to the blood vessels to the brain by a specially trained doctor. Not all hospitals have the equipment and types of doctors needed to use IA tPA.

What about the combination of IV and IA tPA?
In this issue of *Neurology*, Flaherty et al.[1] looked at giving IV and IA tPA together. This study describes 62 patients who came to the hospital early enough to be treated with IV thrombolysis. The patients were first treated with IV tPA and then given IA tPA. They were evaluated after 3 months to see how well they recovered from their strokes.

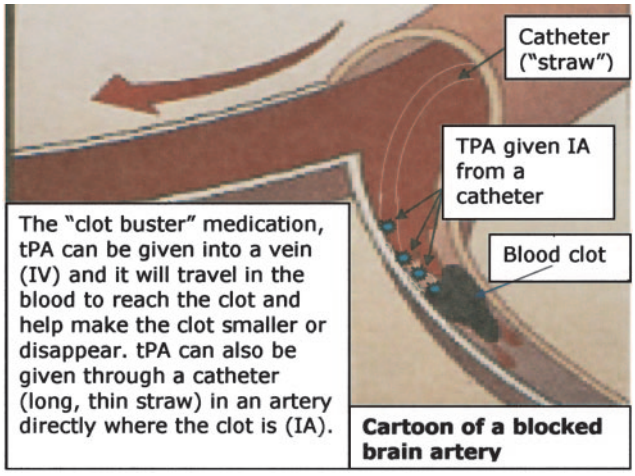

Figure. Cartoon of a blocked artery in the brain that will cause a stroke if the blood clot that is blocking the blood to the brain is not removed/broken up. IV tPA travels in the blood throughout the body and can attack the blood clot. IA tPA is given through a catheter (straw) right where the clot is.

What did this study show?
About 35% to 50% of patients had relatively good recovery. In other words, 3 months after their stroke, up to half of the patients receiving IV/IA treatment were able to live their daily lives without significant problems. Patients who had severe stroke symptoms at the onset of their stroke and received IV/IA had better recovery and less long-term disability, than patients in other studies with similarly bad strokes. Patients over the age of 80 years old had more significant disability at 3 months. This has also been seen in other studies.

What are some of the complications of this therapy?
Bleeding into the brain is the most feared complication and can occur after IV, IA, or IV/IA administration. This occurred in one out of every 12 to 13 patients. Another complication is death. The overall death rate after IV/IA was about 1 in 6 people (18%). The death rate appeared to be higher in patients over the age of 80-years-old (63%) compared to those less than 80 years old (11%). However patients over age 80 years had more severe strokes before treatment.

This study was not meant to say that IV/IA therapy is better than either IV or IA tPA alone. It does suggest that researchers should do more studies comparing these treatments. The combined treatment has the benefit of early treatment with IV tPA plus more directly attacking the "plug" in the artery with IA tPA. Another advantage of IA tPA is that it can be injected at the exact site of the blockage causing the stroke. Because of this it may be better than IV tPA for large blood clots. As a rule, the sooner someone gets tPA after stroke symptoms start, the better it will work. Remember, stroke is an emergency! If you think you might be having a stroke, get to the hospital as quickly as you can by calling 911.

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What is stroke?
A stroke, or brain attack, is caused by the sudden loss of blood flow to the brain or bleeding inside the head. A stroke can cause brain cells to die. This damage can cause paralysis, speech problems, loss of feeling, memory and reasoning problems, coma, and possibly death. Fortunately, there are effective ways to prevent stroke. If you develop a stroke, seeking immediate medical attention can help reduce your chances of death and disability.

How common is stroke?
Every year, about 750,000 people in the United States suffer a stroke and about 160,000 die. Stroke is the nation's number three killer after heart disease and cancer. Stroke is the number one cause of adult disability.

Stroke is an emergency.
Call 911 immediately if you or someone you know experiences any of the above warning signs. Jot down the time the symptoms started. Sometimes these warning signs last for only a few minutes and then stop. But, even if that happens or if you feel better, call 911 for help.

Risk factors for stroke that can be treated or changed

- High blood pressure
- Atrial fibrillation (an irregular heart beat)
- Diabetes
- Cigarette smoking
- Hyperlipidemia (high fat level in the blood)
- Alcohol abuse
- Obesity
- Sickle cell disease

What causes a stroke?
There are two types of stroke or brain attack. Ischemic stroke is caused by an interruption of blood flow to the brain. Hemorrhagic stroke is caused by bleeding inside the brain.

Eighty percent of all strokes are ischemic. Ischemic stroke can be caused by narrowing of the large arteries to the brain, also known as atherosclerosis. If a clot forms in the neck vessels, pieces can break off and block a brain blood vessel. Clots may also form in the heart and travel by blood flow to the brain vessels where they become lodged.

Hemorrhagic stroke is caused by the bursting of a blood vessel in the brain. It accounts for 20% of strokes. Subarachnoid hemorrhage occurs when there are weak spots on brain arteries (aneurysms) that burst and cover the brain with blood. Blood vessels in the brain can also burst if they are weakened by high blood pressure, diabetes, and aging. Severe headache usually occurs with this type of stroke, as well as impaired consciousness and vomiting.

What are the treatments for stroke?
Immediate medical care is critical for the person who is having a stroke or brain attack. New treatments work only if given within a few hours after the onset of a stroke. For example, a clot-busting drug must be given within three hours of stroke onset.

How is stroke prevented?
Some risk factors—age, sex, race, and a history of stroke in the family—cannot be changed. However, many others can be controlled. Most controllable risk factors relate to the health of the heart and blood vessels. The following can help prevent stroke:

- Having regular medical check-ups
- Controlling high blood pressure
- Not smoking—stopping if you do
- Treating heart disease, especially an irregular heart beat called atrial fibrillation
- Improving diet: Avoid excess fat, salt, and alcohol
- Exercising
- Controlling diabetes
- Seeking immediate medical attention for warning signs of stroke

For more information
American Academy of Neurology
www.aan.com

American Academy of Neurology Foundation
www.thebrainmatters.org

National Stroke Association
www.stroke.org

American Stroke Association, a Division of the American Heart Association
www.strokeassociation.org

Reference

1. Flaherty ML, Woo D, Kissela B, et al. Combined IV and intra-arterial thrombolysis for acute ischemic stroke. Neurology 2004;64:386–388.

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