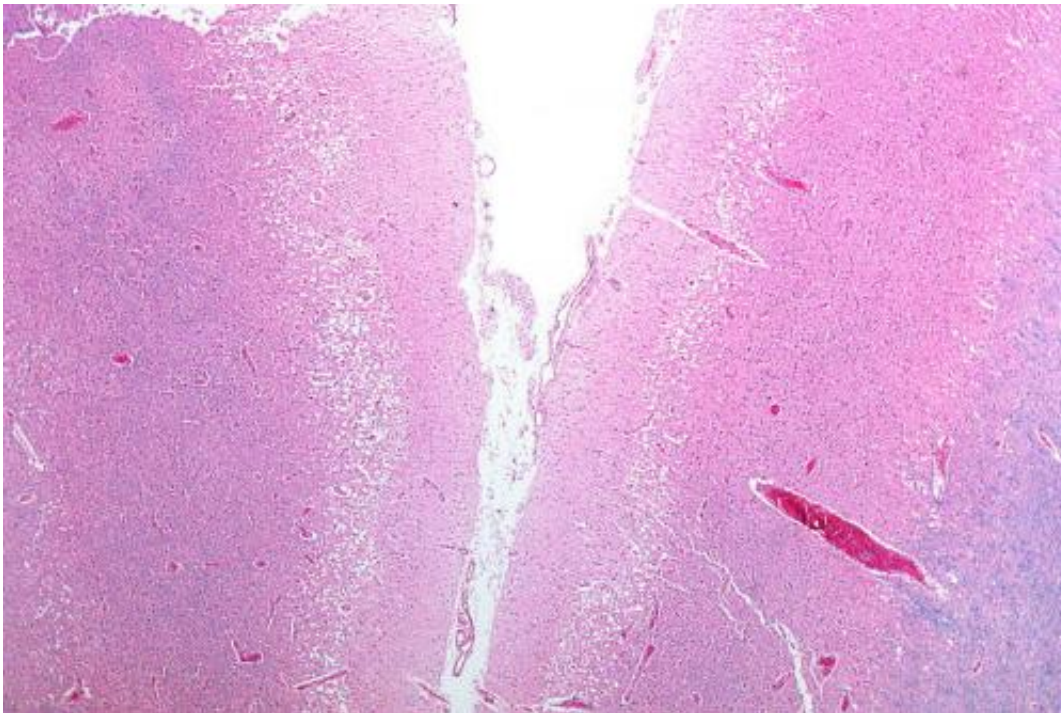


Paramedics may be first source of treatment for stroke patients, study finds

February 4 2015



Micrograph showing cortical pseudolaminar necrosis, a finding seen in strokes on medical imaging and at autopsy. H&E-LFB stain. Credit: Nephron/Wikipedia

In the first study of its kind, a consortium led by UCLA physicians found that paramedics can start medications for patients in the first minutes after onset of a stroke. While the specific drug tested, magnesium sulfate, did not improve patient outcomes, the research has resulted in a new method to get promising treatments to stroke patients

quickly.

The study found that, by working with paramedics in the field, intravenous medications can be given to stroke patients within the "golden hour," the window in which patients have the best chance to survive and avoid debilitating, long-term neurological damage. That finding is a "game changer," said study co-principal investigator Dr. Jeffrey Saver, director of the UCLA Stroke Center and professor of neurology at the David Geffen School of Medicine at UCLA.

"The trial succeeded in its goal of devising a means to deliver promising drugs to stroke patients in the first minutes, when there's the greatest amount of brain to save. We have opened a new therapeutic window that is now being used to test other compounds and deliver clot-busting drugs to patients in the field," Saver said. "Stroke is a true emergency condition. Time lost is brain lost - for every minute that goes by without restoration of blood flow, two million nerve cells are lost. If these patients don't get protective drugs until two, three or four hours later, irreversible brain damage will have already occurred."

The study appears in the Feb. 5, 2015 issue of the peer-reviewed *New England Journal of Medicine*.

The Phase III Field Administration of Stroke Therapy - Magnesium (FAST-MAG) clinical trial involved collaboration between 315 ambulances, 40 [emergency medical service](#) agencies, 60 receiving hospitals, 715 emergency physicians, 210 neurologists, 26 neurosurgeons and 2,988 paramedics. The study demonstrated that half of the 1,700 patients in Los Angeles and Orange counties had the study drug administered within 45 minutes, while 74 percent were treated within the first "golden hour."

"This study involved an unprecedented cooperative effort of paramedics

in the field and emergency physicians serving as investigators," said co-principal investigator Dr. Sidney Starkman, co-director of the UCLA Stroke Center and professor of emergency medicine and neurology at the David Geffen School of Medicine at UCLA. "What they did was really quite heroic, and through this study we were able to instill permanently in everyone's mind the idea that 'time is brain.' We believe this represents a paradigm shift in the treatment of stroke and potentially numerous other neurological conditions."

Starkman reiterated that the study would not have been possible without the approval and confidence of the California and local emergency medical service agencies and the administrations of the participating hospitals.

"Never before have so many emergency physicians, neurologists, neurosurgeons, nurses and such a large number of paramedics worked together in a National Institutes of Health study. Rapidly and without transport delay, we identified patients who were having a stroke with 96 percent accuracy," Starkman said. "We demonstrated that paramedics not only are eager to provide the best possible patient care, but also are capable of being invaluable partners in an intense, time-dependent clinical trial."

Today, the only treatments for strokes caused by blockage of blood vessels are reopening the arteries with the clot-busting drug tissue plasminogen activator (tPA) or with catheter devices that physically remove the clot. Typically, these treatments cannot be used until the patients arrive at the hospital and undergo a CT scan to rule out bleeding in the brain. Only afterwards can additional treatments be offered. By the time these treatments are started, substantial brain injury has often already occurred.

For the FAST-MAG trial, magnesium was chosen because it dilated

blood vessels in the brain in animal studies, increasing blood flow. It also countered the damaging calcium build up that occurs in cells deprived of oxygen. It had been already approved to treat medical conditions in people, was known to have a good safety profile and paramedics were familiar with it.

"Now we are tasked with finding a different agent or combination of agents that can improve stroke outcomes within that golden hour," Saver said. "The ambulance treatment platform can be used around the world to test promising agents. FAST-MAG has opened a new, earlier-than-ever window for treatment that has the potential to significantly improve outcomes for the hundreds of thousands of people each year who suffer a stroke."

Dr. Bill Koenig, medical director of the Los Angeles County Emergency Medical Service (EMS) agency, worked closely with Saver and Starkman on the FAST-MAG study. He said the benefits of the agency's participation in the FAST-MAG trial "cannot be overstated."

"To assist paramedic recognition of [stroke victims](#), the nationally recognized Los Angeles Pre-hospital Stroke Screen was developed. FAST-MAG also served as an impetus to create the Los Angeles County System of Stroke Hospitals, which every year treats over 10,000 stroke victims," Koenig said. "When the day comes that a medication can successfully treat stroke in its early stages, this novel system in Los Angeles will be well positioned to immediately apply the treatment to our patients. I am confident that with the dedicated investigators, along with a finely tuned EMS system, that discovery will be sooner rather than later."

Dr. Walter Koroshetz, acting director of the National Institute of Neurological Disorders and Stroke, said this study "shows that it is possible to get treatments to stroke patients even before they arrive at a

hospital."

"Because a blocked blood vessel causes brain damage over minutes to hours, this pre-hospital approach to treatment is sure to be adopted and refined in clinical research studies," Koroshetz said. "Ultra-early brain salvage in [stroke patients](#) will someday surely reduce the tremendous burden of disability and death due to stroke."

Saver said there are currently clinical trials being conducted in United States, Canada and England testing new compounds using the early treatment infrastructure created by the FAST-MAG study.

Stroke is the fifth leading cause of death in the United States and is a major cause of adult disability. About 800,000 people in the United States have a stroke each year. One American dies from a [stroke](#) every four minutes, on average.

More information: Saver et al. "Prehospital Magnesium Sulfate as Neuroprotection for Acute Stroke," *New England Journal of Medicine*, February 5, 2015.

Provided by University of California, Los Angeles

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