

First-of-its-kind head patch monitors brain blood flow and oxygen

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A research team led by investigators at Mayo Clinic in Florida has found that a small device worn on a patient's brow can be useful in monitoring stroke patients in the hospital. The device measures blood oxygen, similar to a pulse oximeter, which is clipped onto a finger.

Their study, published in the Feb. 1 issue of [Neurosurgical Focus](#), suggests this tool, known as frontal near-infrared spectroscopy (NIRS), could offer [hospital physicians](#) a safe and cost-effective way to monitor patients who are being treated for a [stroke](#), in real time.

"About one-third of stroke patients in the hospital suffer another stroke, and we have few options for constantly monitoring patients for such recurrences," says the study's senior investigator, neurocritical care specialist William Freeman, M.D., an associate professor of neurology at Mayo Clinic.

"This was a small [pilot study](#) initiated at Mayo Clinic's campus in Florida, but we plan to study this device more extensively and hope that this bedside tool offers significant benefit to patients by helping physicians detect strokes earlier and manage recovery better," he says.

Currently, at most hospitals nurses monitor patients for new strokes and, if one is suspected, patients must be moved to a hospital's radiology unit for a test known as a [CT perfusion](#) scan, which is the standard way to measure blood flow and oxygenation. This scan requires that a contrast medium be used, and the entire procedure can sometimes cause side

effects such as excess [radiation exposure](#) if repeated scans are required. Also, potential kidney and [airway damage](#) can result from the [contrast medium](#).

Alternately, for the sickest patients, physicians can insert an oxygen probe inside the brain to measure blood and [oxygen flow](#), but this procedure is invasive and measures only a limited brain region, Dr. Freeman says.

This NIRS device, which emits near-infrared light that penetrates the scalp and underlying [brain tissue](#), has been used in animals to study brain blood, so the Mayo Clinic team thought that measuring the same parameters in stroke patients might be useful. They set up a study to compare measurements from NIRS with CT perfusion scanning in eight stroke patients.

The results show that both tests offer statistically similar results, although NIRS has a more limited field for measuring [blood oxygen](#) and flow. "That suggests that perhaps not all patients would benefit from this kind of monitoring," he says.

The device sticks like an adhesive bandage onto each of the patient's eyebrows and works like the pulse oximeter that is usually used on a patient's finger to monitor health or brain perfusion during surgery.

If the device is successfully tested in upcoming studies and miniaturized, the NIRS might also be useful in military settings to assess and monitor blood functioning due to brain injuries, Dr. Freeman says.

Researchers from the University of South Florida College of Medicine and the University of North Florida College of Medicine participated in the study, along with several college students who were participating in Mayo Clinic's Clinical Research Scholar Program (CRISP).

"This research could not have been accomplished without the dedication and assistance from our CRISP premedical student Brandon O'Neal, and vascular neurosurgery fellow Philipp Tausky, M.D.," notes Dr. Freeman. "We are excited about the future possibilities in which this tool would be very useful."

The study was approved by the Mayo Clinic IRB and not sponsored or funded by any company. The authors declare no conflicts of interest.

Provided by Mayo Clinic

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