

Validation of the Ornim UTLight™ Flowmetry Device in the Measurement of Cerebral Blood Flow in Acute Stroke Patients Undergoing Emergent Endovascular Therapy

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Introduction

Until recently, no device existed that allows for non-invasive, real-time continuous monitoring of cerebral blood flow. Acousto-optic monitoring utilizing Ultrasound Tagged Light (UTLight™) is a novel form of optical contrast measurement using a combination of highly coherent near-infrared laser light spectroscopy (NIRS) coupled with ultrasound (US). The novel c-FLOW™ monitor (Ornim Medical, Kfar Saba, Israel) incorporates this technology, and we report its validation by studying its performance in patients undergoing emergent endovascular therapy for acute ischemic stroke.

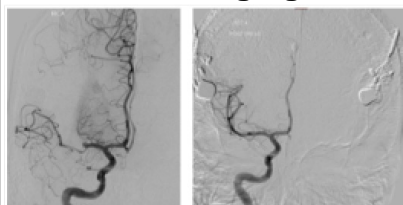
Methods

Three patients with hemispheric strokes due to acute occlusion of the middle cerebral artery were studied. Continuous UTLight™ monitoring was started prior to emergent thrombectomy and continued throughout the procedure and for up to 24 hours post-enrollment. Cerebral Flow Index (CFI) data were captured for both hemispheres independently with UTLight™ probes placed over the frontal and/or temporal head regions. Results of these variables were correlated with systemic vital signs and other neuroimaging studies.

Results

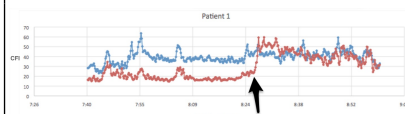
The CFI was markedly decreased within the symptomatic hemisphere and rapidly normalized shortly after successful thrombectomy. Rebound hyperemia was noted post-thrombectomy in one patient. Normalization of the CFI did correlate with improvement in cerebral perfusion imaging.

Patient 1 Angiogram



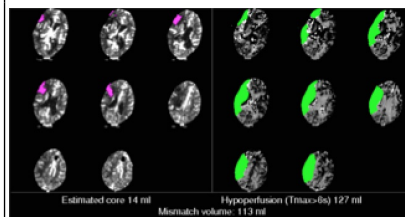
Left: Before clot extraction.
Right: After clot extraction.

Patient 1 Cerebral Flow Index



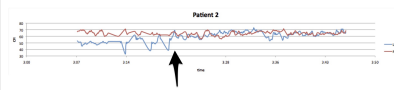
Cerebral Flow Index with proximal left Middle Cerebral Artery occlusion. Arrow indicates time of restoration of flow.

Patient 1 CT Perfusion Scan



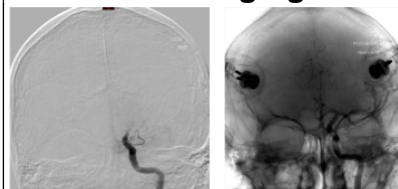
Right-sided hypoperfusion

Patient 2 Cerebral Flow Index



Cerebral Flow Index with proximal right Middle Cerebral Artery occlusion. Arrow indicates time of restoration of flow.

Patient 2 Angiogram

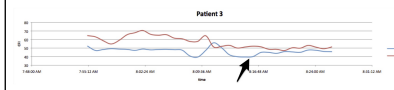


Left: Before clot extraction.
Right: After clot extraction.

Conclusions

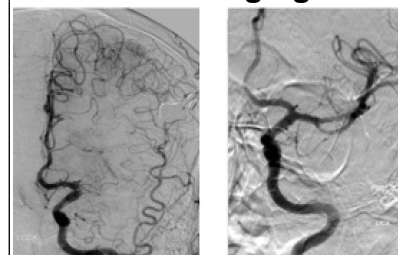
Temporal changes in the CFI measured by the UTLight™ monitor in response to successful thrombectomy suggest that this novel technology can quickly and accurately assess cerebral blood flow non-invasively. As such, UTlight™ technology may be used to optimize cerebral blood flow in critical ill patients. Numerous other applications of this novel technology may exist including screening for vessel reocclusion after thrombectomy or for vasospasm after SAH, or in the de nova diagnosis of stroke.

Patient 3 Cerebral Flow Index



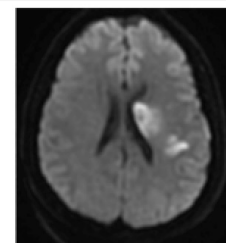
Cerebral Flow Index with proximal left Middle Cerebral Artery occlusion. Arrow indicates time of restoration of flow.

Patient 2 Angiogram



Left: Before clot extraction.
Right: After clot extraction.

Patient 2 Post-angio MRI



Small residual left core infarction

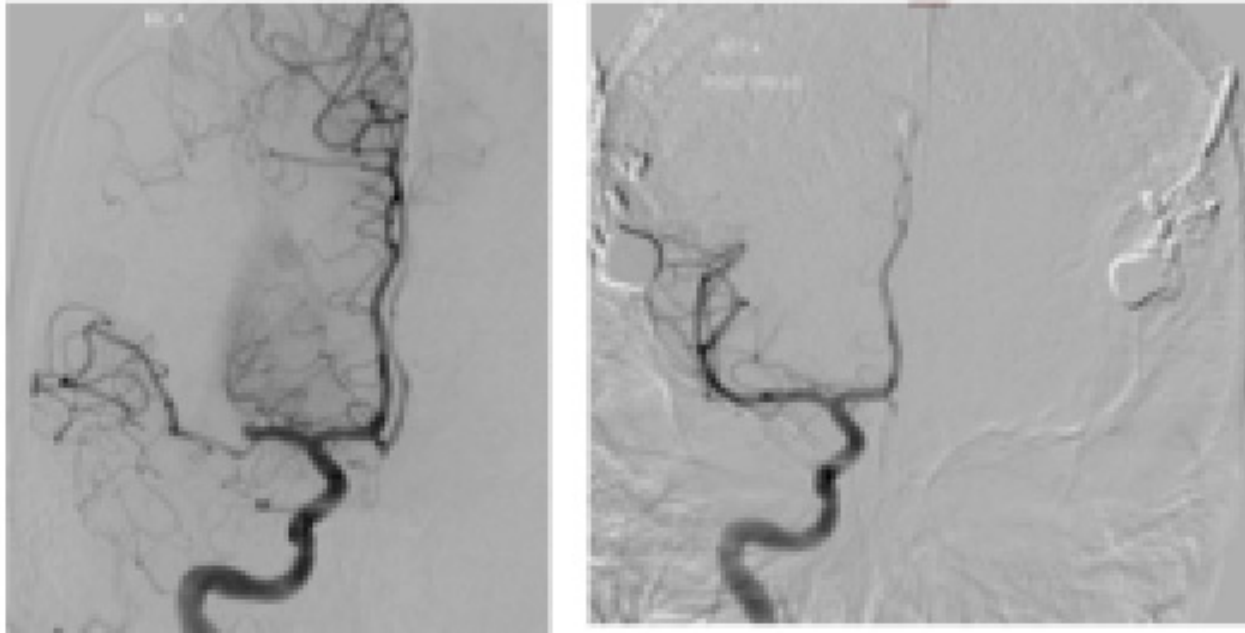
Learning Objectives

By the conclusion of this session participants should be able to: 1) describe the basis of UTLight™ technology, and 2) understand the use of the c-FLOW™ monitor used in this experimentation.

References

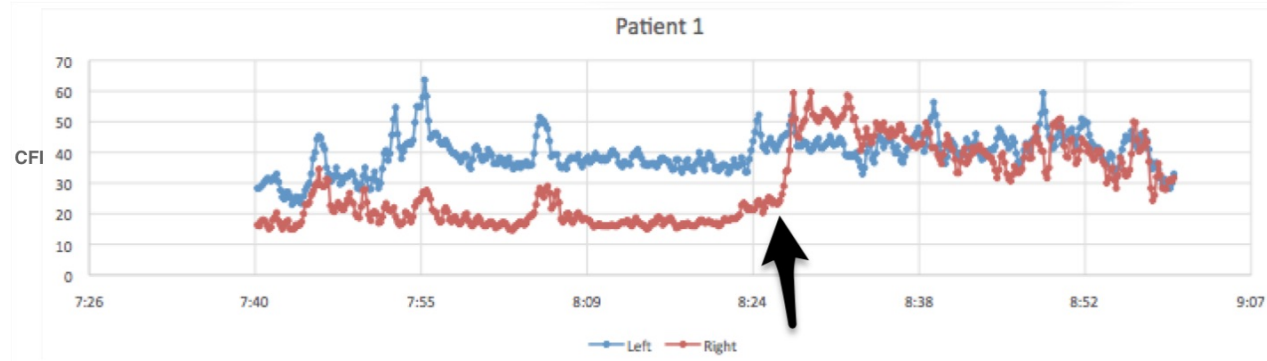
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Patient 1 Angiogram



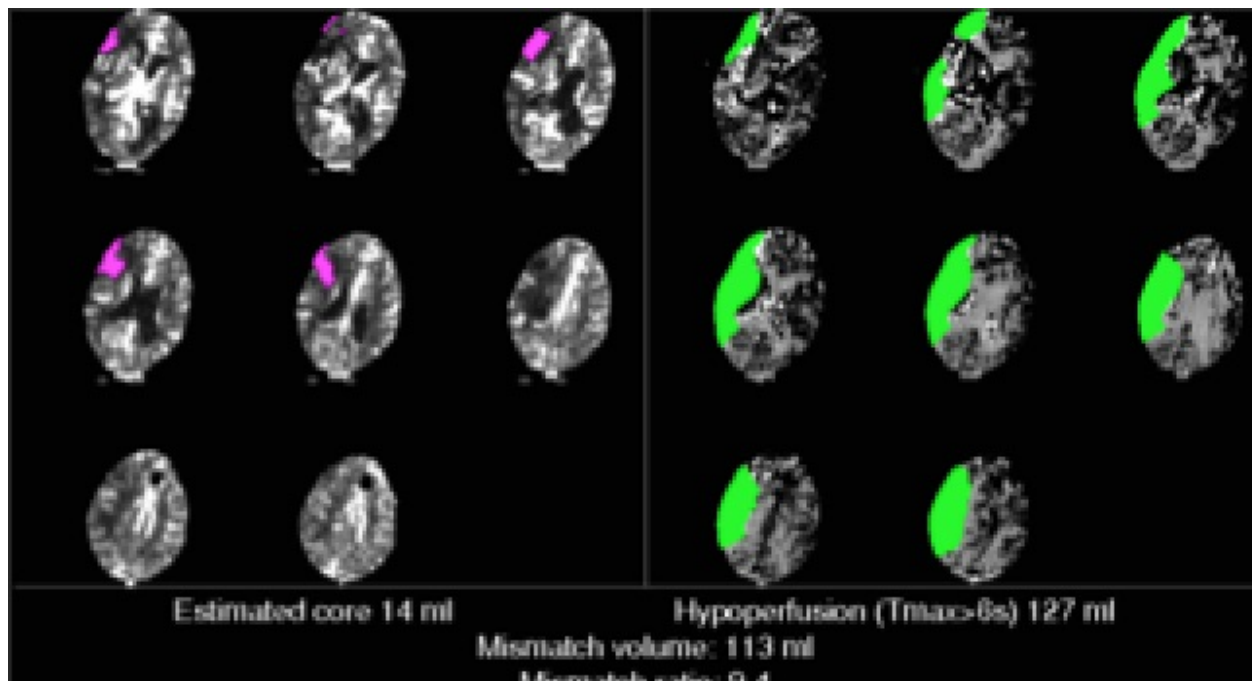
Left: Before clot extraction. Right: After clot extraction.

Patient 1 Cerebral Flow Index



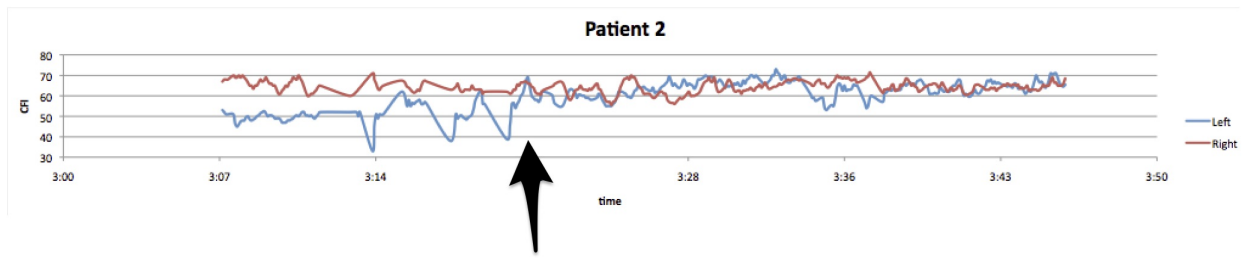
Cerebral Flow Index with proximal left Middle Cerebral Artery occlusion. Arrow indicates time of restoration of flow.

Patient 1 CT Perfusion Scan



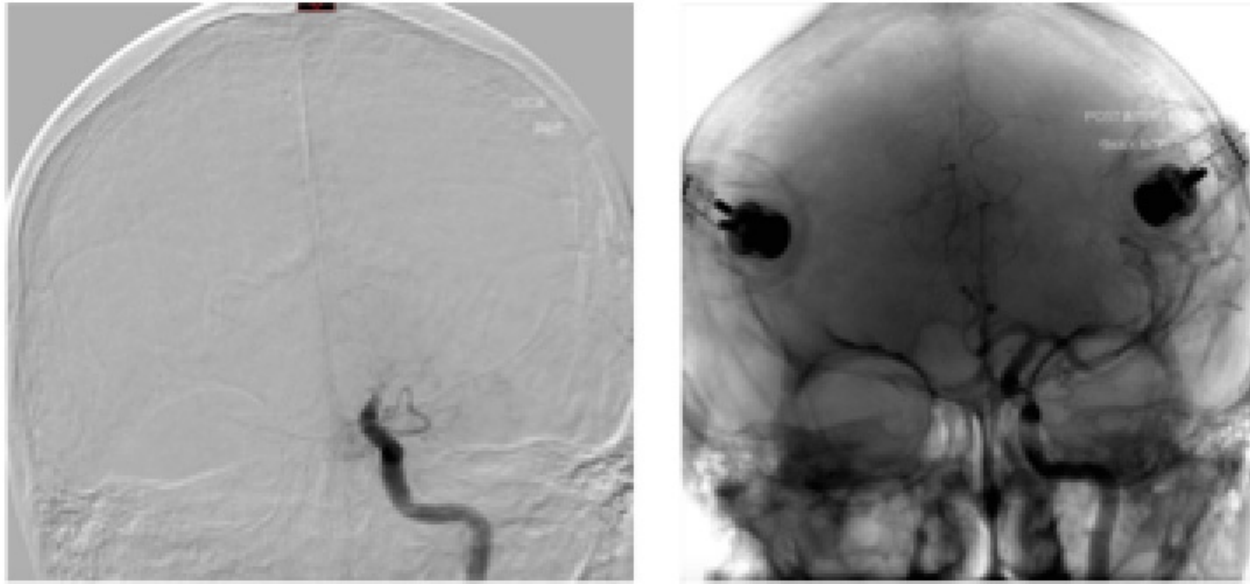
Right-sided hypoperfusion

Patient 2 Cerebral Flow Index



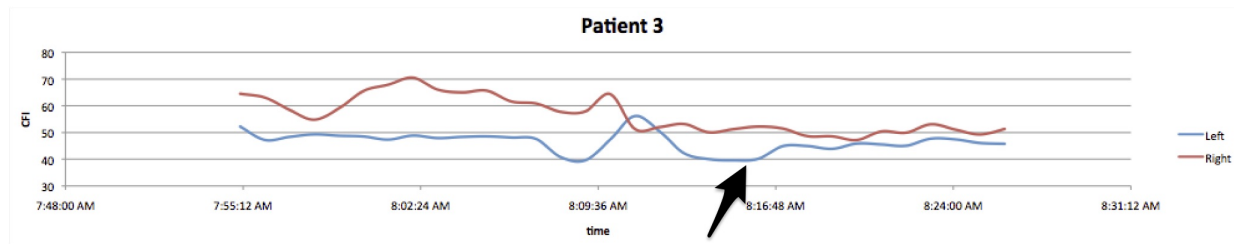
Cerebral Flow Index with proximal right Middle Cerebral Artery occlusion. Arrow indicates time of restoration of flow.

Patient 2 Angiogram



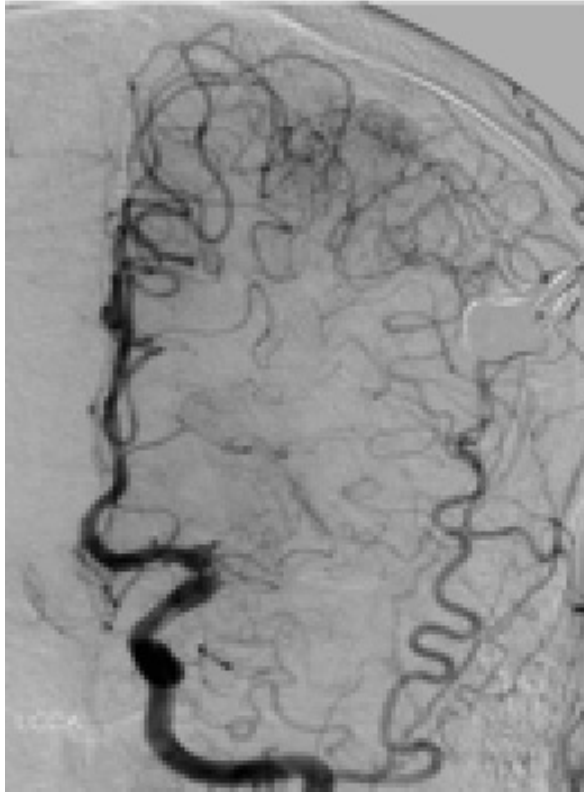
Left: Before clot extraction. Right: After clot extraction.

Patient 3 Cerebral Flow Index



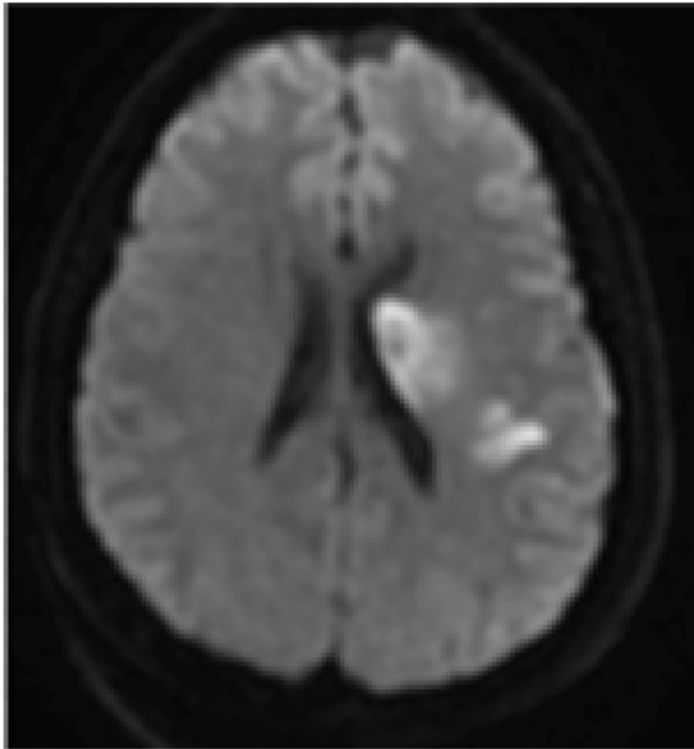
Cerebral Flow Index with proximal left Middle Cerebral Artery occlusion. Arrow indicates time of restoration of flow.

Patient 2 Angiogram



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Patient 2 Post-angio MRI



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