

Abstract Submitted
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Cerebrospinal fluid influx is the earliest contributor to brain edema following stroke¹ JEFFREY TITHOF, University of Rochester, HUMBERTO MESTRE, TING DU, AMANDA SWEENEY, GUOJUN LIU, University of Rochester Medical Center, LOGAN BASHFORD, EDNA TORO, DOUGLAS KELLEY, University of Rochester, MAIKEN NEDERGAARD, University of Rochester Medical Center — Stroke is one of the leading causes of death worldwide, affecting 10 million people annually. The most detrimental complication is cerebral edema, which is the abnormal accumulation of fluid, thought to enter the brain from the blood. However, we demonstrate that rapid influx of cerebrospinal fluid (CSF) is the principal mechanism for brain edema in the first several minutes following stroke. Specifically, we block a large artery in the brain of a living mouse and then image fluorescent CSF tracers (infused prior to the stroke). By performing particle tracking velocimetry and front tracking velocimetry, we quantify CSF influx at both microscopic and brain-wide scales, respectively. Rapid influx of CSF occurs along the glymphatic pathway, which includes periarterial spaces (annular channels surrounding arteries). Our measurements demonstrate that constriction of arteries following stroke increases the effective size of the periarterial spaces and drives influx of CSF. Our results may lead to novel treatment strategies for stroke and suggest that glymphatic edema may be an important contributor to other acute brain pathologies, such as traumatic brain injury.

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Jeffrey Tithof
University of Rochester

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