

***Biomedical Informatics Grand Rounds***  
**Wednesday, March 9th, 2022 1:00 pm – 2:00 pm**



**Brain cerebrospinal fluid flow**

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**Remote Access**

Join Zoom Meeting <https://stonybrook.zoom.us/j/95617197636?pwd=KytzZ2pVRG9SZGpKZUtpNXJISjNjZz09>  
Meeting ID: 956 1719 7636 Passcode: 924293

**Bio:** Dr. Douglas H. Kelley is an Associate Professor of Mechanical Engineering at the University of Rochester. He and his group study biophysical and technological fluid mixing, especially cerebrospinal fluid flow in the brain and metal melt flows in liquid metal batteries and aluminum reduction cells. Doug earned a PhD in physics from University of Maryland and did postdoctoral research at Yale University in mechanical engineering and Massachusetts Institute of Technology in materials science and engineering. He won a National Science Foundation CAREER Award, the University of Rochester's David T. Kearns Faculty Teaching and Mentoring Award, and the University's G. Graydon Curtis '58 and Jane W. Curtis Award for Nontenured Faculty Teaching.

**Abstract:** The brain is surrounded by water-like cerebrospinal fluid, which flows around and through brain tissue, with profound implications for human health. Occurring almost exclusively during sleep, the flow serves to remove metabolic wastes like the amyloid-beta and tau proteins whose accumulation is believed to cause Alzheimer's disease. In unhealthy situations like stroke and cardiac arrest, however, the fluid contributes to the severe swelling that permanently damages brain tissue. My team and I study the fluid dynamics of cerebrospinal fluid in the brain, from simulation, theory, and analysis of in vivo experiments. I will talk about the characteristics of the flow, its drivers, efforts at brain-wide modeling, and potential clinical implications.

**Educational Objects:** Upon completion, participants should be able to:

- Become familiar with the glymphatic model of fluid transport in the brain, including its proposed pathways, functions, and sleep / wake variation.
- Explore the fluid dynamics of some mechanisms that drive cerebrospinal fluid through the brain, including arterial pulsation and artery constriction caused by spreading depolarization.
- Consider clinical relevance of glymphatic flow to stroke, cardiac arrest, and drug delivery.

**Disclosure Statement:** The faculty and planners have no relevant financial relationship with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing health care products used by or on patients.

**Continuing Medical Education Credits:** The School of Medicine, State University of New York at Stony Brook, is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. The School of Medicine, State University of New York at Stony Brook designates this live activity for a maximum of **1 AMA PRA Category 1 Credits™**. Physicians should only claim credit commensurate with the extent of their participation in the activity.