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Abstract for an Invited Paper
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Brain cerebrospinal fluid flow¹

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Cerebrospinal fluid flows around and into the brain, driven by intricate mechanisms, with profound implications for human health. According to the glymphatic hypothesis, in physiological conditions, that fluid flows primarily during sleep and serves to remove metabolic wastes like the amyloid-beta and tau proteins whose accumulation is believed to cause Alzheimer's disease. I will discuss in vivo experiments and theoretical studies to quantify drivers, particularly a peristalsis-like mechanism caused by pulsation of nearby arteries. I will also show that observed vessel shapes appear to be evolutionarily optimized for efficiency. In pathological conditions including stroke, heart attack and traumatic brain injury, swelling is a major cause of long-term tissue damage. I will present evidence that early swelling is caused not by fluid from the blood, as has long been believed, but by cerebrospinal fluid moving along glymphatic pathways. I will close with a discussion of drug delivery and other clinical implications of the fast-changing field of brain fluid dynamics.

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