

Abstract Submitted
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Inverted Peristaltic Pumping in Brain?¹ BRUCE GLUCKMAN, FRANCESCO COSTANZO, Penn State University — Clearance of brain waste products – metabolites and macromolecules – has been implicated in diseases such as Alzheimer’s Disease. Brain does not have a lymphatic system, so the mechanics of clearance are unknown. The glymphatics model – that traveling diameter variations of penetrating cerebral arterioles due to heart-driven blood pressure pulsations induces an inverted peristaltic pumping of fluid into and through brain – is an attractive model. Here we investigate through rigorous Arbitrary Lagrangian-Eulerian fluid structure interaction modeling different physical formulations and relevant parameters, and whether the biological constraints of the system could support significant flows. Special attention is given to the explicit boundary conditions and values of the problem. The flowrates generated can be significant under many conditions, but not within biophysically relevant pressure differences that otherwise deform the brain tissue.

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