Abstract Submitted
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MRI-based modeling of CSF flow in the spinal canal[1] JENNA J LAWRENCE, WILFRIED COENEN, University of California San Diego, CANDIDO GUTIERREZ-MONTES, Universidad de Jaen, ANTONIO L SANCHEZ, University of California San Diego, CARLOS MARTINEZ-BAZAN, Universidad de Jaen, KEVIN KING, Huntington Medical Research Institutes, VICTOR HAUGHTON, University of Wisconsin Madison, JUAN C LASHERAS, University of California San Diego — The oscillatory flow of cerebrospinal fluid (CSF) in the subarachnoid space of the spinal canal is driven by the intracranial pressure fluctuations associated with cerebral blood flow and by the thoracic pressure fluctuations associated with the respiratory cycle. We have previously derived simplified flow models by exploiting the slenderness of the subarachnoid space and the limited deformation of the dura membrane. Application of these models to a specific human subject requires knowledge of their spinal-canal anatomy and of both their spinal-canal and cranial-cavity compliance. We show how this specific information can be extracted from high-resolution magnetic resonance (MR) imaging of the anatomy, along with MR phase-contrast flow measurements of venous and arterial blood flow at the C2 level and of CSF flow at several transverse sections along the spinal canal. We then show how the resulting subject-specific model can be used to predict steady bulk motion and drug-dispersion rates.

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