

Abstract Submitted
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Cilia driven flow networks in the brain YONG WANG, MPI Dynamics and Self-Organization, REGINA FAUBEL, MPI biophysical Chemistry , CHRSTIAN WESTENDORF, MPI Dynamics and Self-Organization, GREGOR EICHELE, MPI biophysical Chemistry, EBERHARD BODENSCHATZ , MPI Dynamics and Self-Organization — Neurons exchange soluble substances via the cerebrospinal fluid (CSF) that fills the ventricular system. The walls of the ventricular cavities are covered with motile cilia that constantly beat and thereby induce a directional flow. We recently discovered that cilia in the third ventricle generate a complex flow pattern leading to partitioning of the ventricular volume and site-directed transport paths along the walls. Transient and daily recurrent alterations in the cilia beating direction lead to changes in the flow pattern. This has consequences for delivery of CSF components along the near wall flow. The contribution of this cilia-induced flow to overall CSF flow remains to be investigated. The state-of-art lattice Boltzmann method is adapted for studying the CFS flow. The 3D geometry of the third ventricle at high resolution was reconstructed. Simulation of CSF flow without cilia in this geometry confirmed that the previous idea about unidirectional flow does not explain how different components of CSF can be delivered to their various target sites. We study the contribution of the cilia-induced flow pattern to overall CSF flow and identify target areas for site-specific delivery of CSF-constituents with respect to the temporal changes.

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