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# MODELING FLUID FLOW IN PERIVASCULAR NETWORKS

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Flow of cerebrospinal fluid in perivascular spaces is one of the key mechanisms underlying the brain clearance processes. While experimental studies have demonstrated net flow along the perivascular space, the mechanisms involved remain disputed. We have developed a three-dimensional model simulating perivascular fluid flow in realistic geometries obtained from patient data to investigate a set of plausible mechanisms. This model was able to generate net and oscillatory perivascular flow, quantitatively comparable with experimental findings. However, such a three-dimensional model becomes prohibitively expensive when it comes to complex perivascular networks. We introduce a geometrically-reduced perivascular flow model based on topologically one-dimensional centerlines of the perivascular network, providing approximations of the cross-section average pressure and cross-section flux. The agreement between full and reduced model predictions demonstrates the robustness of the reduced model, with a gain in computational time of several orders of magnitude.

In this talk, we will present our three-dimensional perivascular flow model together with the resulting insights regarding mechanisms involved in brain clearance. We will then introduce the geometrically-reduced model and its ability to simulate perivascular flow patterns in complex perivascular networks.