Abstract Submitted
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Modeling contrast agent flow in cerebral aneurysms: comparison of CFD with medical imaging[1] VITALIY RAYZ, University of Wisconsin - Milwaukee, ALIREZA VALI, Medical College of Wisconsin, MONICA SIGOVAN, Hospital de la Croix-Rousse - Creatis, Lyon, France, MICHAEL LAWTON, DAVID SALONER, Univrsity of California San Francisco, LOIC BOUSSEL, Hospital de la Croix-Rousse - Creatis, Lyon, France — PURPOSE: The flow in cerebral aneurysms is routinely assessed with X-ray angiography, an imaging technique based on a contrast agent injection. In addition to requiring a patient's catheterization and radiation exposure, the X-ray angiography may inaccurately estimate the flow residence time, as the injection alters the native blood flow patterns. Numerical modeling of the contrast transport based on MRI imaging, provides a non-invasive alternative for the flow diagnostics. METHODS: The flow in 3 cerebral aneurysms was measured in vivo with 4D PC-MRI, which provides time-resolved, 3D velocity field. The measured velocities were used to simulate a contrast agent transport by solving the advection-diffusion equation. In addition, the flow in the same patient-specific geometries was simulated with CFD and the velocities obtained from the Navier-Stokes solution were used to model the transport of a virtual contrast. RESULTS: Contrast filling and washout patterns obtained in simulations based on MRI-measured velocities were in agreement with those obtained using the Navier-Stokes solution. Some discrepancies were observed in comparison to the X-ray angiography data, as numerical modeling of the contrast transport is based on the native blood flow unaffected by the contrast injection.

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Vitaliy Rayz
University of Wisconsin - Milwaukee

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