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**Cerebral Vascular Super Resolution Imaging and Blood Flow Measurement Using Ultrasound Enhanced Particle Tracking Velocimetry.** ZENG ZHANG, JOSEPH KATZ, The Johns Hopkins University, MISUN HWANG, Childrens Hospital of Philadelphia, TODD KILBAUGH, Childrens Hospital of Philadelphia; Perelman School of Medicine, University of Pennsylvania — Hypoxic ischemic encephalopathy is a major cause of neonatal death. It is usually initiated with ischemia and hypoxia followed by blood reperfusion leading to brain damage. While conventional MRI gives hemodynamic information, it cannot be used for cerebral histology, which is vital for understanding the mechanism of reperfusion, and developing appropriate therapies. Therefore, contrast enhanced ultrasound particle tracking velocimetry (echo-PTV) is utilized to generate maps of the cerebral vasculature and blood flow velocity simultaneously. The microbubbles are injected intravenously, and the raw ultrasound images are collected using clinical systems. Blind deconvolution, local background removal, and modified histogram equalization are applied to enhance the image and map the bubble spatial distribution. Subsequently, particle tracking is initiated using cross-correlation and updated with a Kalman filter to calculate the velocity field. The microvascular map is generated by a superposition of the bubble trajectories that can be tracked for over 5 frames. The larger vessels are represented by integrating the enhanced images over the acquisition time. Results show 27% and 48% decrease in blood velocity and micro-vessels number with flow, respectively, 3 hours after ischemia.

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