AbstractID: 4823 Title: Using Flow Information to support 3D Vessel Reconstruction from Rotational Angiography

Purpose: For the assessment of cerebral vessel diseases, it is very beneficial to obtain three dimensional morphologic and haemodynamic information about the vessel system. Our goal is to determine both concurrently using one rotational angiography sequence. To enable the extraction of flow information, the rotational angiography images should show inflow and outflow of contrast agent. Images with this property however, are not well suited to standard volume reconstruction algorithms. This work shows how flow information can support the vessel reconstruction to overcome this conflict. **Method and Materials:** In our method flow information is used as follows to determine, for every voxel, the likelihood of being inside a vessel: First, the rotational time intensity curve (R-TIC) is determined from the image intensities at the projection points of the current voxel. Next, the arrival time of the contrast agent bolus at the voxel is estimated from the R-TIC. Finally, a measure of the intensity and duration of the contrast enhancement is determined. The likelihood is used to steer the Fast Marching algorithm, which determines the order in which voxels are analyzed. This enables the centreline of the vessels to be extracted by backtracking. The proposed method was tested on 80 computer simulated rotational angiography sequences with systematically varied blood flow and contrast agent injection parameters. **Results:** The mean error in the 3D centreline and radius estimation was 0.62 mm and 0.28 mm respectively. Pulsatile blood flow was found to increase the error only slightly (0.05 mm). **Conclusion:** Under pulsatile and non-pulsatile conditions, flow information can be used to enable a 3D vessel reconstruction from rotational angiography with inflow and outflow of contrast agent. Future work will aim to extract more quantitative flow information. **Conflict of Interest:** Research sponsored by Philips Research Aachen