

AbstractID: 6694 Title: Contrast-enhanced microCT imaging of rodent brain

Purpose: To develop an *in vivo* imaging method with small animal computed tomography (CT) and clinical water soluble iodinated contrast agent for investigations of aneurysm formations in rat brain that could lead to hemorrhagic stroke.

Method and Materials: Small animal cone-beam CT (60 kVp/0.530 mA) was acquired for a normal Sprague-Dawley rat (300 g) anesthetized with isoflurane. The rat was positioned with a nonmetallic stereotaxic immobilization device to minimize the motion during CT acquisition. Noncontrast CT was immediately followed by contrast-enhanced CT with continuous administration of iopromide (300 mgI/ml) at the rate of 2.5 ml/min with 512 projections over approximately 2 min. Noncontrast CT was obtained a) to visualize the effect of contrast agent in contrast-enhanced CT, and b) to examine the effectiveness of the immobilization device between two time points of CT acquisitions. The accuracy of registration between the noncontrast and contrast-enhanced CT images with the immobilization device was compared against the images registered with normalized mutual information using FMRIB's Linear Image Registration Tool (FLIRT) using 12-parameter affine transformations. Translations and rotations were examined between the FLIRT coregistered noncontrast CT image and the uncoregistered noncontrast CT image.

Results: Continuous administration of iopromide during the CT acquisition provided consistent vascular contrast in the CT reconstructions. Carotid arteries and major cerebral blood vessels were visible with contrast-enhanced CT, but not with noncontrast CT. The translational and rotational differences between FLIRT-coregistered and uncoregistered images acquired with the stereotaxic immobilization were less than 0.5 voxel (~85 μm) and 0.5°, respectively.

Conclusion: A CT-compatible immobilization device was useful for microCT imaging vascular structures in and around rodent brain with continuous administration of a standard iodinated contrast agent (e.g., iopromide), which provides a small animal CT technique that does not require specialized small animal specific contrast agent that has comparatively long *in vivo* residence time.