Reviewer's report

Title: Evaluation of the Middle Cerebral Artery Occlusion Techniques in the Rat by in-vitro 3-Dimensional Micro- and Nano Computed Tomography

Version: 1 Date: 4 January 2010

Reviewer: Melfort Boulton

Reviewer's report:

Langheinrich et al. report the novel use of 3D micro and nano CT for assessment of vascular occlusion in rodent stroke models using monofilaments, or macrospheres. Degree of MCA occlusion is dependent upon the chosen method of occlusion, as well as collateral flow. Collateral flow is derived from local collaterals at the site of occlusion, or from the anterior communicating artery in their report.

Imaging the cerebrovasculature in stroke models is paramount, and the group should be congratulated in their technological accomplishments thus far. The reviewer is concerned however that defining collaterals in an ex-vivo preparation is subject to artifact and over interpretation of the images obtained.

To minimize criticism, the studied brains should have been subjected to histological analysis of the suspected collaterals. The images provided in this report could be explained by vessels in close opposition to each other and not forming a true anastomosis. We routinely see such phenomena during open aneurysm surgery. Histological analysis would confirm or refute the findings in this study. The images also appear to have contrast in the veins and not just the arteries. This provides another source of confusion for image interpretation which histology could clarify. Finally, perfusion of the brain could induce non-physiological collaterals, and must be recognized as a limitation of the study.

The utility of this imaging would be of much greater benefit if it could be performed in the living animal with routine iodine based contrast reagents, rather than in the dead animal.

While I support this report in general, histological analysis should be provided to support the authors’ conclusions. Without the histological data, the report should be downgraded to a technical report that demonstrates the possibility of imaging the cerebrovasculature post brain perfusion.