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: 11 December 2009

Reviewer: Roland Auer

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“Evaluation of the middle Cerebral Artery Occlusion Techniques in the Rat by in-vitro 3-Dimensional Micro- and Nano Computed Tomography”. Langheinrich et al.

This manuscript uses micro-CT and nano-CT to compare the vasculature, specifically the occlusion in the vasculature, in two models of cerebral ischemia: the suture model and the macrosphere model. The authors find that there is collateral blood flow, both distant and local, in both models. They provide beautiful pictures showing the nature of the collaterals. This is new data.

I will go straight to the critical comments that will help improve this manuscript:

Discretionary Revisions

1. Three metals are alluded to under the section on page six discussing nano-computed tomography. Just below the middle of the page the authors refer to the x-ray target of gold (Au) and then tungsten and then beryllium. The way this works could be explained in a small sentence for the incogniscenti of nano-CT.

2. The authors imply that cerebral edema accounts for the changes in figure 5 at four hours. They could provide a supporting citation for this, at this point in the manuscript.

Major Compulsory Revision

3. The authors show in figure 5 that there is a difference at the p<0.001 level, between the occluded and non-occluded hemispheres in the CT density, using both the macrosphere occlusion model and the suture occlusion model. However, the direction of the changes are different in the two models. Figure 5 shows clearly that the CT density is decreased after occlusion in the macrosphere model, but increased after occlusion in the suture model. The authors explain both changes (on page 8 of the manuscript, top and bottom, respectively) as edema. This is impossible! Edema cannot explain changes in both directions (increased density and decreased density) simultaneously. The authors must attend to this glaring inconsistency (in the text of their manuscript and in figure 5).

Minor Essential Revisions
a) Page 3 “hypothalamic infarct” rather than “hypothalamic infarctions”.
b) Page 3, same line as above, deleting the ‘s’ on “growths” and add a comma at the end of this line so that it reads “with effects on infarct growth, confounding treatment effects”.
c) Page 3, four lines down, change “TiO2” to “TiO2”.
d) Page 3, fourth line from the bottom, define micro-CT on first use within the body of the manuscript.
e) Page 4, change “bodyweight” to “body weight”.
f) Page 4, sixth line from the bottom, change “TiO2” to “TiO2” with a subscripted 2.
g) On page 5, the authors state that contrast perfusion was performed four hours after infarction. How do we know when infarction occurred? It is better to state that contrast perfusion was performed after four hours.
h) Page 5, line 9, change “pterygopalatin” to “pterygopalatine”.
i) Page 5, change “Subarachnoidal hemorrhage” to “Subarachnoid hemorrhage”.
j) Page 7, half way down the page, change “radiograpic” to “radiographic”.
k) Page 8, change “middle artery perfusion” to “middle cerebral artery perfusion”.
l) Page 9, change “high reliable” to “highly reliable”.
m) Page 10, change “deeper ischemia” to “denser ischemia”.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I have no competing interests to declare.