Reviewer's report

Title: Masked Volume Wise Principal Component Analysis Improves Signal Detection, Separation and Analysis of Small Adrenocortical Tumors in Dynamic [11C]-Metomidate Positron Emission Tomography

Version: 1 Date: 23 September 2008

Reviewer: Zsolt Szabo

Reviewer's report:

1) Title is too ambitious. There is no proof that this new method really improves signal detection and diagnosis of small adrenocortical tumors. It is more just description of application of this technique to the specific dynamic PET scan. Is the goal improved detection, localization or quantification? How can any of those goals be achieved with the new technique.

2) Statistics: what was the hypothesis? what was the outcome variable that was tested? what was the expected effect and significance level? Usually new image processing techniques are tested by ROC or LROC or at least by some figure of merit such as signal to noise.

3) The following sentence is ambiguous: "SUV value obtained from the normal adrenal from patient 7 surprisingly was higher when using this method compared with the other patients." Please compare method to method and not method to patient.

4) "the precision in defining ROIs for PET measurements in tumor and normal adrenal gland was compared for conventionally summed and MVW-PCA images, respectively.". Not clear how, no results provided.

5) Please show the derived pharmacokinetic patterns. Are they reproducible?

6) No clinical performance evaluation is described in the paper.

7) "there was no statistical significant difference between "hot-spot" ROIs of MVW-PCA and summed image measurements." What are these image measurements. Be precise to define a single parameter, a single statistical test and a clear significance level.

8) Figure 1b is probably figure 2. All other images mislabeled as well. Low level of noise is not apparent. Not clear why sophisticated method is better than simple smoothing.

9) Figure 5 per legend contradicts previous figure. No clear difference seen between two methods. SUVmax is better for quantification and would not be
affected by the way ROIs are placed.

10) Figure legend 6. Improvement not clear.

11) Table 1: No difference is significant. What is the purpose of these stat tests?

12) Table 2: Results with both methods comparable. No clear advantage of PC.

13) Table 3: This test is significant but it does not proof that PC is better than SUM.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

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

**Declaration of competing interests:**

I have no competing interests.