Reviewer's report

Title: Diagnostic value of Diffusion-Weighted MR imaging in thyroid disease: application in differentiating benign from malignant disease

Version: 3 Date: 13 February 2013

Reviewer: Frederik De Keyzer

Reviewer's report:

Discretionary Revisions:
*/ Methods, Page 6, Image post processing: the acronym ADC is already defined earlier, so the "(apparent diffusion coefficient)"-mention can be left out.

*/ Results, Page 9, first paragraph: Although theoretically correct, it is a bit weird that you use sensitivity to indicate the detection of benign lesions. Usually the opposite choice is made (sensitivity to indicate detection of malignancy, specificity to indicate benign lesions). It might make it harder for others to compare these values later on, it might be best to either switch them, or clearly state it in the Methods section.

*/ Discussion, Page 9-10, MR technique: The entire discussion on the "modified SE EPI" DWI you have used is quite unnecessary. I have checked the reference you indicate, and Petra just used a typical SE EPI sequence and used several types of fat suppression, of which she found that STIR was the best one. This is just as described by Takahara et al in his so called DWIBS sequence. I suggest you just mention in the Methods that you used STIR fat suppression instead of SPAIR to minimize fat suppression artefacts.

*/ Discussion, Page 13, “we chose three different b factors all over 300 s/mm^2 since ADC value would be more accurate when b factor is larger”. It is probably more correct to say “since the ADC value would better reflect the true diffusion of the tissue”, or “since the ADC value would better approximate the extracellular extravascular mobility of the tissue protons”

Minor Essential Revisions:
*/ Abstract, Page 2, Results: “for ADC values obtained using a b-value of 300 mm^2/s”. The unit of b-values is s/mm^2, not mm^2/s. Also, mention that the ADC values were obtained using b-values 0 and 300 s/mm^2 (three times in the results section of the abstract).

*/ Methods, Page 5, first paragraph: “Mean age of those patients was 42.4 years”. This seems to be incompatible with the ages from the benign (28 patients, on average 41.7 years) and malignant (14 patients, on average 45.3 years) groups. Please check.

*/ Methods, Page 6, Image post processing: “by two experienced radiologists in a
double blinded manner”. I assume you mean “by two experienced radiologists blinded to each other’s delineations”, as “double blinded” means something completely different here.

*/ Methods, Page 7, first paragraph: unit of ADC data should be corrected here.

*/ Results, Page 7, bottom paragraph: “Mean major diameter of those lesions were 3.63cm”. according to Tables 1 and 2, the 3.63 is the mean of all benign lesions, not of all lesions. Check and correct.

*/ Results, Page 8, middle: “Highest sensitivity and AUC was observed at b-factor of 300mm^2”, should be “s/mm^2”.

*/ Results, Page 9, first paragraph: same comment as in the abstract, these values are inconsistent with Table 3.

*/ Discussion, Page 10, last paragraph: “Higher b-values produce more diffusion weighting and therefore higher contrast between thyroid lesions and normal tissue”. “therefore” should be “therefore”, “thyroids” should be “thyroid”.

*/ Table 1: “patient charicteristics” should be “patient characteristics”.

*/ Reference formatting is not consistent, especially with regard to the journal abbreviations; please correct. Also, Ref 4 should be corrected. (Mazzaferri EL (2006) An overview of the management of thyroid cancer. In: Mazzaferri EL, Harmer C, Mallick UK, Kendall-Taylor P (editors) Practical management of thyroid cancer: a multidisciplinary approach. Springer London.)

*/ Figure 1: The positioning of the ROI on the ADC map seems a bit off in comparison with the other images.

Major Compulsory Revisions:

*/ Abstract, Page 2, Results: “area under ROC curve was found to be 0.876 for an ADC cutoff value of 2.17x10^-3 mm^2/s that corresponded to an acquisition with b-value of 300 mm^2/s”. The newly added Table 3 provides other values; I’m assuming the new table is wrong, as it doesn’t seem to fit the ROC curve (Fig 3) either. Don’t forget to correct the unit here as well.

*/ Methods, page 6, Image post processing: “Circular ROIs (regions of interests) with an area of 15-35 mm^2 were carefully placed on the lesions”. It should be “regions of interest”, but much more important, why does the ROI area that you mention suddenly change from 1cm^2 in the previous version to 15-35mm^2 in this version, without change in the resulting ADC values, and without a mention of change or correction in the answers to the reviewer comments. At the same time, it is a bit contradictory that you state that lesions smaller than 1cm were left out as they can’t be reliably measured (in the comment to the reviewers), whereas your delineations are only 15-35mm^2, which is the equivalent of a lesion of 3-5 by 5 mm.

*/ Discussion: Please discuss the similarities and differences between this study
and the referenced papers in greater detail; compare your sensitivities and specificities with those of the previous papers and provide tentative explanations for the dissimilarities. Add in the paragraph on Abdel Razek’s study (Page 12, second paragraph) what the current work adds to the knowledge gained there.

Level of interest: An article of limited interest

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

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests