Reviewer's report

Title: Parallel Imaging: Is GRAPPA a useful acquisition tool for MR imaging intended for volumetric brain analysis?

Version: 1 Date: 18 November 2008

Reviewer: Jaroslav Tintera

Reviewer's report:

1. Is the question posed by the authors well defined? yes
2. Are the methods appropriate and well described? yes
3. Are the data sound? yes
4. Does the manuscript adhere to the relevant standards for reporting and data deposition? yes
5. Are the discussion and conclusions well balanced and adequately supported by the data? yes
6. Are limitations of the work clearly stated? An additional issue is recommended below.
7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished? yes
8. Do the title and abstract accurately convey what has been found? yes
9. Is the writing acceptable? yes

Authors nicely demonstrated that the result of tissue volume quantification is almost unaffected when using parallel imaging (PI) even with high acceleration factor (AF) of four and proper segmentation algorithm. This can make the examination protocol for AD patients more robust and less sensitive to motion artifacts.

I have only some minor remarks and comments - Discretionary Revisions:

1) Increasing AF leads to the increase of SNR but higher noise (and artifacts) level is not uniformly distributed over images (as also stated in discussion). This can potentially lead to various results when calculating volumes in pre-selected regions because different noise level (speculatively this can lead to differences in affecting GM and WM volumes). Since the middle parts of images are the most affected by PI, in these regions the volumetry can have higher degree of inaccuracy and moreover the distribution of such problematic regions is hardly predictable. This fact should be perhaps more commented during discussion.

2) Authors use relatively low spatial resolution (1.3 x 1.3 x 1.3 mm3) but many others often voxel size of at least 1 x 1 x 1 mm3 which means less than half of SNR (voxel size of 2.2 against 1 mm3). Using AF of four in such higher resolution
data would lead to more then four times lower SNR compared to author’s data without PI. I really doubt that in this case the quantification of the GM volume would be still acceptable. Therefore this context and potential limitation should be discussed.

3) I can’t fully agree with the statement that also during longitudinal study the protocol can be changed to one with PI. Authors show that the use of PI and BET/Sienax leads to systematic decrease of GM and increase of WM volumes (table 1). However, just these changes could be highly interesting when studying progressive diseases as AD. On the contrary, changes in BPF can reflect the process of global brain atrophy with aging.

4) It seems that results are very dependant to algorithm used and according of table 1,2 the BMAP/Volstat gives much more stable results of GM/WM volumes when increasing AF. Is this fact specifically linked with PI or the algorithm is generally more robust for lower SNR data? Do you know whether also for higher resolution data this algorithm would be more stable?

Despite the fact that the paper was published in Japanese language, authors should refer the following publication with similar results:

Title;Clinical Usage of Parallel Imaging of Head Three-dimensional MR Image for Analysis of VSRAD: A Comparison of Imaging Statistical Analytic Results in SENSE Acquisition Method Shortening Acquisition Time Versus Conventional Acquisition Method

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Journal Title;Japanese Journal of Radiological Technology

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Figure&Table&Reference;FIG.4, TBL.2, REF.14

Pub. Country;Japan

Language;Japanese

Abstract;Voxel-based Specific Regional Analysis System for Alzheimer’s Disease (VSRAD) has developed recently as an adjunctive diagnostic tool for early Alzheimer-type dementia (ATD), using three-dimensional (3D) MRI with statistical parametric mapping (SPM), and for the objective evaluation of brain atrophy. However, it takes more than five minutes to acquire MRI data by the 3D gradient echo method (3D FFE), resulting in low-throughput performance and motion artifact. These problems interrupt the application of daily MRI study. In this study, we recruited 20 patients suspected of having ATD who then underwent continuous 3D FFE MRI studies with and without the SENSE method. It was
found that the VSRAD results of MRI data with SENSE were nearly to equal to those without SENSE, in spite of the prediction of a decline in source-to-noise ratio due to the reduction factor in the SENSE method. (author abst.)

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

**Quality of written English:** Acceptable

**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