**T2* measurement of the pituitary with susceptibility artifact compensation at 3T**

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**Introduction:** Preclinical diagnosis of iron overload in the pituitary gland is important for chronically transfused patients with hemoglobinopathies such as thalassemia.1,2 T2* measurement is very sensitive for detecting iron deposition in several tissues but severe susceptibility artifact (due to sphenoid sinus) makes T2* measurement in the pituitary gland difficult. Instead, T2 measurement or T2*-weighted imaging have been used to assess iron deposition in the pituitary gland.1,3 In this study, we propose a T2* measurement method based on field map analysis and susceptibility artifact correction in the pituitary gland ultimately aimed at evaluating iron overload.

**Methods:** To investigate the distribution of the susceptibility induced gradients in the pituitary gland, isotropic 3D multi-echo gradient echo images (Fig. 1) were acquired at 3T clinical scanner (Siemens Tim Trio) with following parameters: TR=60ms, TE=3.1/3.3/11.5/17.9/24.1/32.4/32.6ms, voxel size=1x1x1mm³, matrix size=256x256x104, flip angle=12°. B0 field map was calculated from phase images of 1st echo (sagittal imaging) for T2* estimation (sagittal imaging) and can be obtained three high resolution (0.45x0.45x1.8mm³) images (left) and the averaged slice (right). Magnitude slices including the pituitary gland. (a) uncorrected and (b) corrected (using compensation gradient) magnitude images at different echo times.

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**Results:** Figs. 2 and 3 show that the ΔGx distribution is relatively homogeneous in the pituitary gland compared to those of ΔGy and ΔGz, particularly, in the mid sagittal slices (s127-s129). Therefore, sagittal imaging is advantageous to reduce susceptibility artifacts in 2D high-resolution imaging. While signal losses are prominent in the pituitary gland in the uncorrected magnitude images as TE increases, these signal losses are mostly recovered in the x-shim compensated corrected images (yellow arrow in Fig.5). The corrected T2* values in the pituitary gland (Fig. 6) show comparatively homogeneous distribution except in some parts of the inferior posterior regions (red arrow in Fig. 5) and the ROI T2* values (8x8 red box in Fig. 6) are agree well between the two scans.

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**Conclusion:** We present a method for T2* measurement in the pituitary gland. We analyzed field distribution using isotropic 3D GRE imaging data, and proposed T2* measurement method using high-resolution 2D GRE imaging with additional compensation gradients in the slice-selection direction. Our proposed method shows increased T2* measurement value which is due to the susceptibility correction in most pituitary gland regions and can be acquired within a reasonable scan time (5 min). To demonstrate applicability of our method, we will perform further scans and investigate the intra-subject reproducibility, inter-subject variation and head position dependency of the pituitary gland’s T2*.

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