

# PERFUSION IMAGING OF INFLAMMATORY THYROID DISEASES USING AN ARTERIAL SPIN LABELING TECHNIQUE

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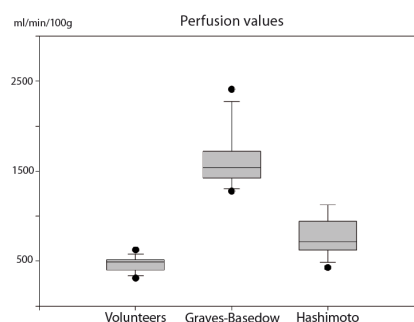
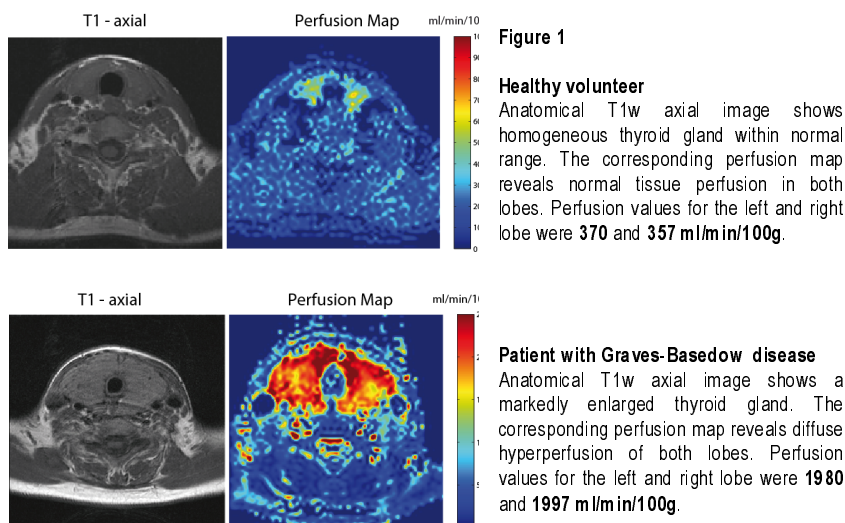
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## Purpose

Thyroid inflammation pathologies are related to changes in thyroid tissue perfusion which could be useful in their diagnosis and clinical management. Thyroid tissue perfusion, however, cannot be quantified absolutely by the established imaging modalities, such as ultrasound or scintigraphy [1, 2]. The aim of the present study was to investigate thyroid perfusion in inflammatory thyroid diseases by using an arterial spin-labeling (ASL) method working without the necessity of contrast media administration [3-6].

## Material and Methods

Anatomical and perfusion imaging of the thyroid gland was performed in 10 healthy volunteers, in 7 patients with Graves-Basedow disease and in 8 patients with Hashimoto's thyroiditis. An arterial spin labeling technique with flow-sensitive alternating inversion-recovery (FAIR) spin preparation and a true fast imaging in the steady state (TrueFISP) signal read out strategy was used for perfusion measurements on a 1.5 T whole body unit. Sequence parameters were: TR 4.02 ms, TE 2.01 ms, TI 1200 ms, bandwidth 605 Hz/pixel, SL 5 mm, excitation angle 70°. A matrix of 64 x 64 was chosen for a field of view of 160 x 160 mm<sup>2</sup>. Depending on the individual size of each thyroid, 3-10 slices were obtained. Quantitative perfusion maps were calculated on a pixel-by-pixel basis using the extended Bloch equations. Perfusion values of the right and left lobe in each slice were calculated by ROI analysis.



## Results

In all subjects perfusion images showed diagnostic image quality (**Figure 1**). Mean examination time was 18 minutes for multi-planar perfusion imaging of the entire thyroid gland. Mean MR perfusion values were  $470 \pm 90$  ml/min/100g in healthy volunteers,  $1625 \pm 273$  ml/min/100g in patients with Graves-Basedow disease and  $784 \pm 258$  ml/min/100g in patients with Hashimoto's thyroiditis (**Figure 2**). Mean perfusion values of both patient groups (Graves-Basedow and Hashimoto) were significantly higher than perfusion values assessed in healthy volunteers ( $p = 0.008$  and  $0.0097$ , respectively).

## Conclusion

Quantitative ASL perfusion imaging of the thyroid gland using a FAIR-TrueFISP sequence leads to perfusion maps of diagnostic image quality in thyroid pathologies. Different types of autoimmune thyroiditis showed significantly higher perfusion values in comparison to healthy volunteers. Perfusion maps may provide important information in the clinical assessment of thyroid gland pathologies and for monitoring of therapeutic treatment.

## References

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