

A combined whole body diffusion- and continuous table movement STIR-protocol for the assessment of fever of unknown origin (FUO): first results

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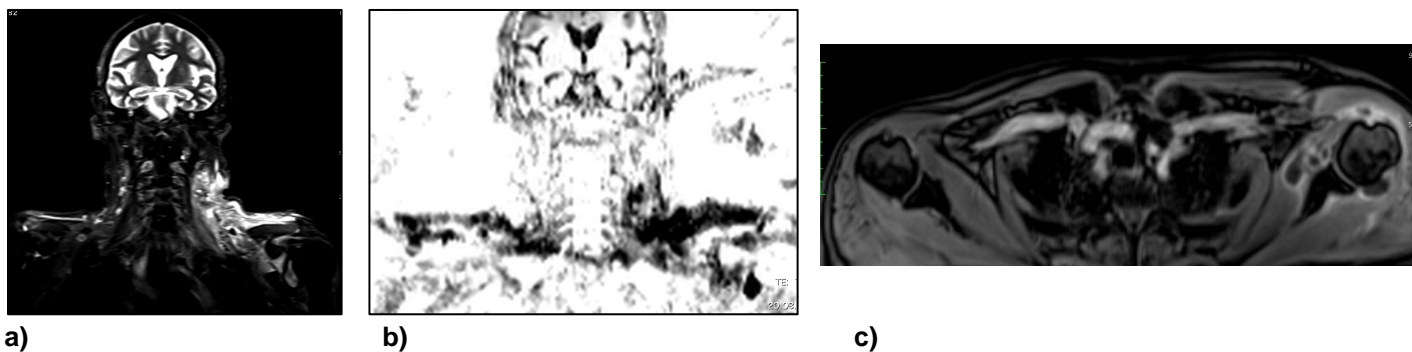
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Purpose: Patients with fever of unknown origin (FUO) [1] are usually examined with many different modalities, such as conventional radiography of the lungs, CT of the abdomen and scintigraphy, however, in more than 50% without detection of the fever generating focus. Leucocyte scintigraphy is considered as the diagnostic standard [2], however, it is unspecific. ¹⁸F-FDG-PET [3] has been evaluated in some studies, and also MRI of the lungs and vessel system has been performed in single studies to rule out pulmonary infection [4] and vasculitis [5], however, there are no data on whole body (WB)-MRI using diffusion weighted imaging (DWI) and STIR imaging so far.

Therefore the purpose of this study was to evaluate WB-MRI using DWI [6,7,8] and continuous table movement (CTM) [9] STIR sequences as a new specific modality for the etiologic workup of FUO without radiation exposure and with less technical effort compared to scintigraphy.

Material and Methods: 6 patients (4 males, 2 females, mean age 49years) with FUO (fever > 38.3° C for ≥ 3 weeks of which the cause is not found despite adequate diagnostics or fever during neutropenia < 3 weeks duration) were examined at 3 T (Siemens Magnetom Trio) using a combined protocol with coronal WB diffusion-weighted sequences (EPI-SpinEcho, 2.0 x 2.0 x 4.0 mm³, TR 3900ms, TE 78ms, PAT 2), coronal WB CTM STIR sequences (2.0 x 1.0 x 6.0mm³, TR 4960ms, TE 105ms, PAT2) and axial contrast-enhanced T1-weighted GRE (VIBE)-sequences as reference. Additionally, standard axial FLAIR- and T1-weighted sequences of the brain were performed before and after contrast administration. The DWI and CTM STIR-images were evaluated for image quality and evaluability (scale 1-4: excellent, good, moderate, poor image quality and evaluability). The presence and location of fever causing foci was assessed by two readers in consensus.

Results: Mean imaging time was 75 min. Image quality and evaluability were excellent for the CTM STIR-sequence in 3 patients, good in 3 patients; for the WB diffusion sequence image quality and evaluability were good in 3 patients and moderate in 3 patients. In 5 patients pyogenic foci as shown by the contrast-enhanced VIBE-sequence were detected by both, the DWI and the STIR-sequence, in 1 patient no pyogenic lesion was seen by all three sequences. Foci were 1 septic arthritis of the shoulder, 1 small thigh abscess, 1 soft tissue infection of the ankle, 1 pneumonia and 1 esophagitis. Diagnosis was assured by clinical follow up in 2 patients and biopsy in 3 patients.



a) DWI and b) CTM STIR-sequence showing septic arthritis with surrounding soft tissue infection in the left shoulder region which is confirmed in the c) contrast-enhanced axial VIBE-sequence

Conclusion: The presented first results using WB-DWI and CTM STIR-sequences are promising for the workup of FUO. The combined WB-DWI and CTM STIR protocol might replace leucocyte scintigraphy as diagnostic standard of reference in the future.

References:

- [1] Meller J, et al. J Nucl Med. 2007;48(1):35-45.
- [2] Seshadri N et al. Nucl Med Commun. 2008;29(3):277-82.
- [3] Cunha BA. Et al. Infect Dis Clin North Am. 2007; 21(4):867-915.
- [4] Rieger C et al. Ann Rheum Dis. 2005;64(1):105-10.
- [6] Kwee TC et al. Eur Radiol. 2008; 30. 18(9):1937-52
- [7] Mürtz P et al. Eur Radiol. 2007;17(12):3031-7.
- [8] Ohno Y et al. Radiology. 2008;248(2):643-54.
- [9] Brauck K et al. Radiology. 2008;246(3):910-6.