

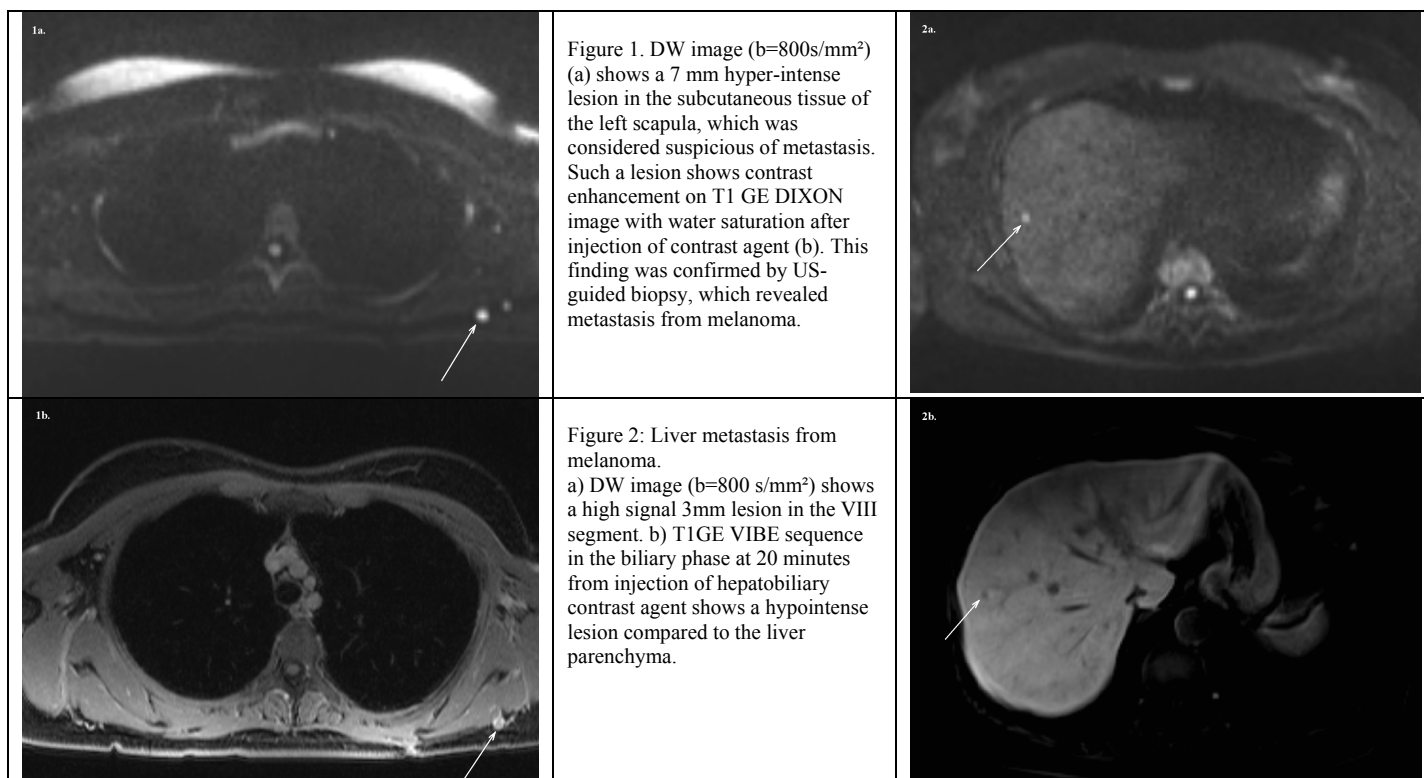
Whole-body MRI with diffusion-weighted sequences for the follow-up of stage III melanoma patients

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BACKGROUND: Up to date, the efficacy of chemotherapy in advanced melanoma is limited, since the response is poor and the disease free survival is limited [1]. Surgery still remains the best option, as it is the only treatment able to improve prognosis in metastatic patients [2], especially if they are detected when they are small [3,4]. However, there is no agreement on the best follow-up for advanced melanoma and several approaches are described. In light of this, whole-body magnetic resonance imaging (WB-MRI) is extremely interesting, as it is a radiation-free technique allowing the detection of small metastases in several body regions. Purpose of this study was to evaluate the feasibility and diagnostic potential of whole-body magnetic resonance imaging (WB-MRI) with diffusion weighted sequences for the follow-up of advanced melanoma patients.

METHODS AND MATERIALS: Seventy-one WB-MRI were performed for the follow-up of 19 patients (mean age, 51.2 years; range 27-76) with advanced melanoma (stage III) at baseline and every 3 months up to disease progression. All exams were performed on a 1.5T Siemens Avanto scanner (Siemens Medical Systems). WB-MRI protocol included conventional turbo spin echo (TSE) and gradient echo (GE) sequences, as well as TSE and GE sequences performed with continuous moving table technique, before and after administration of hepatobiliary contrast agent (Gd-EOB-DTPA). Diffusion-weighted (DW) sequences of all body regions were performed with b-values of 0 and 800 s/mm² and the apparent diffusion coefficient (ADC) maps were obtained. All patients underwent also low dose computed tomography (CT) of the chest, for better detection of eventual lung metastases. Four independent radiologists with experience in oncologic imaging analyzed WB-MRI exams on a commercial workstation (Leonardo, Siemens, Healthcare Sector, Erlangen, Germany), allowing for post-processing of DW images, including maximum intensity projection (MIP) and merged series of 0 and 800 s/mm² images. Findings were classified benign or suspicious for metastasis. Sensitivity (SE), specificity (SP), negative predictive value (NPV), positive predictive value (PPV) and diagnostic accuracy (DA) were calculated per single patient and body region.

RESULTS: The average duration of WB-MRI was 55 minutes (range, 53-72 minutes), however WB-MRI was completed in all patients. The average radiation dose per year according to our protocol was 4mSV, which is 30 fold small than that predictable for the same patients if followed-up with whole-body CT imaging every three months. For the 140 findings observed, the following overall values were calculated: SE (93%), SP (89%), NPV (99%), PPV (52%), DA (90%) and the DA per single body region was: brain (55%), neck (78%), thorax (85%), upper-abdomen (85%), liver (100%), pelvis (100%), soft tissues (97%) (Figure 1), bone (85%) and lymph nodes (60%). The smallest metastasis seen was 3 mm in the liver (Figure 2), whereas the largest not reported was 3 mm in the brain.



CONCLUSIONS: WB-MRI was feasible in the follow-up of patients with advanced melanoma. The diagnostic performance of WB-MRI are comparable to MRI or CT of the single body region, allowing whole-body radiation free imaging in a single session.

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