

# Whole-body MRI, including diffusion-weighted imaging, for staging malignant lymphoma: direct comparison to CT

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## Introduction

The malignant lymphomas, Hodgkin lymphoma and non-Hodgkin lymphoma, comprise approximately 5.0% of all cancers and account for approximately 3.7% of all cancer deaths in the Western world [1]. Staging of malignant lymphoma is of major importance for appropriate treatment planning and determining prognosis [2, 3]. Computed tomography (CT) is currently the mainstay for staging malignant lymphoma, but employs ionizing radiation, which may cause secondary cancers [4]. Magnetic resonance imaging (MRI) may be a good radiation-free alternative. Furthermore, in addition to conventional (T1- and T2-weighted) MRI, diffusion-weighted imaging (DWI) may facilitate staging of malignant lymphoma because of its high lesion-to-background contrast [5]. This study aimed to assess the equivalence of whole-body MRI, including DWI, to CT for the initial staging of malignant lymphoma.

## Subjects and Methods

66 consecutive patients (40 males, 26 females; mean age, 49 years; age range, 12-82 years) with newly diagnosed malignant lymphoma prospectively underwent whole-body MRI (T1-weighted and short inversion time inversion recovery [STIR] [n=66], and DWI [n=62]) at 1.5T and CT. An experienced radiologist, blinded to CT and other imaging findings, assigned an Ann Arbor stage according to whole-body MRI findings without and with DWI. Another experienced radiologist, blinded to MRI and other imaging findings, assigned an Ann Arbor stage according to CT findings. Staging results according to whole-body MRI (without and with DWI) were compared to those of CT. Agreement and disagreement between whole-body MRI (without and with DWI) and CT regarding staging were calculated, along with binomial exact 95% confidence intervals (CIs).

## Results

Tables 1 and 2 show the staging results of whole-body MRI (without and with DWI) compared those of CT. Staging results of whole-body MRI without DWI were equal/higher/lower to those of CT in 66.7% (95% CI: 54.7-76.9%), 27.3% (95% CI: 18.0-39.0%), and 6.1% (95% CI: 2.4-14.6%) of patients, respectively. Staging results of whole-body MRI with DWI were equal/higher/lower to those of CT in 66.1% (95% CI: 53.7-76.7), 29.0% (95% CI: 19.2-41.3), and 4.8% (95% CI: 1.7-13.3) of patients, respectively. Figure 1 shows a representative whole-body MRI/DWI example.

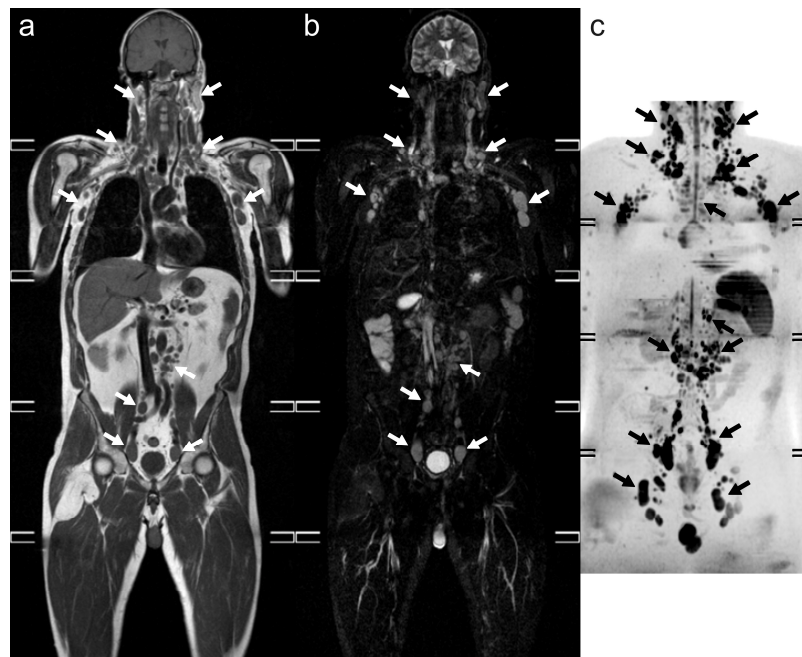
**Table 1.** Ann Arbor stage according to whole-body MRI (T1W and STIR) *without* DWI vs. Ann Arbor stage according to CT.

		CT			
		I	II	III	IV
MRI without DWI	I	10	1	-	1
	II	3	9	-	1
	III	-	2	13	1
	IV	5	2	5	13

**Table 2.** Ann Arbor stage according to whole-body MRI (T1W and STIR) *with* DWI vs. Ann Arbor stage according to CT.

		CT			
		I	II	III	IV
MRI with DWI	I	10	1	-	1
	II	3	8	-	-
	III	1	1	12	1
	IV	4	4	4	12

**Figure 1.** Whole-body MRI (T1-weighted [a], STIR [b], and DWI [c]) in a 47-year-old male with stage III follicular lymphoma shows widespread supra- and infradiaphragmatic lymph node involvement (arrows). Findings at CT (not shown) were identical.



## Conclusions

The results of this study indicate that staging using whole-body MRI (both with and without DWI) is equal to staging using CT in the majority of patients, while whole-body MRI overstaging occurs more frequently than whole-body MRI understaging (relative to CT). Follow-up studies should resolve and determine the possible consequences of discrepant staging relative to CT.

## References

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