

# Whole-body diffusion-weighted imaging for staging lymphoma: are apparent diffusion coefficient derived histogram parameters useful for lesion characterisation?

K De Paepe\*, F De Keyzer, P Wolter, O Bechter, A Janssens, D Dierickx, R Oyen, G Verhoef, V Vandecaveye

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## Aim

To evaluate apparent diffusion coefficient (ADC) derived histogram parameters for lesion characterization in whole-body diffusion-weighted imaging (WB-DWI) of lymphoma.

## Methods

Fifteen patients with histopathology proven lymphoma (11 Non-Hodgkin; 4 Hodgkin lymphomas) underwent WB-DWI using 2 b-values (0-1000 s/mm<sup>2</sup>). On coronal reformatted b1000 WB-DWI images, regions of interest (ROI) were drawn semi-automatically on lymph nodes in all nodal stations (n=267) and in axial and appendicular bone regions (n=53). For each ROI, a histogram was constructed from which volume, mean<sub>(ADC)</sub>, median<sub>(ADC)</sub>, skewness<sub>(ADC)</sub>, and kurtosis<sub>(ADC)</sub> were calculated. Mann-Whitney-U tests were performed to detect significant differences between malignant and benign ROIs per tissue type. Receiver-operating-characteristic curves (ROC) were constructed from which an optimal threshold was determined as well as sensitivity, specificity and accuracy. PET/CT plus bone marrow biopsy (BMB) served as reference standard.

## Results

All parameters were significantly different between malignant and benign lymph nodes (p<0.001) with skewness<sub>(ADC)</sub> being the most accurate. A positive skewness exceeding 0.3041 mm<sup>2</sup>/s allowed for detection of malignant lymph nodes with 88% accuracy, 88%

sensitivity and 87% specificity compared to 63% accuracy, 61% sensitivity and 64% specificity for mean<sub>(ADC)</sub>. Only kurtosis<sub>(ADC)</sub> (p<0.001) and skewness<sub>(ADC)</sub> (p=0.003) were significantly different between malignant bone marrow infiltration and normal bone marrow. Kurtosis<sub>(ADC)</sub> showed highest accuracy and a threshold exceeding 5.26 allowed for detection of malignant bone marrow infiltration with 89% accuracy, 86% sensitivity and 90% specificity.

## Conclusions

ADC histogram analysis is feasible for lesion characterization in WB-DWI of lymphoma. Lymph nodes were most accurately characterized using skewness<sub>(ADC)</sub> and bone tissue using kurtosis<sub>(ADC)</sub>.

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\* Correspondence: katja.depaepe@uzleuven.be  
University Hospitals Leuven, Leuven, Belgium