



In Newly Diagnosed Diffuse Large B-Cell Lymphoma, Determination of Bone Marrow Involvement with ^{18}F -FDG PET/CT Provides Better Diagnostic Performance and Prognostic Stratification Than Does Biopsy

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Abstract

In newly diagnosed diffuse large B-cell lymphoma (DLBCL), the sensitivity of bone marrow biopsy (BMB) for the detection of bone marrow involvement (BMI) can be low because of sampling error if the BMI is focal and not diffuse. Although ^{18}F -FDG PET/CT is now recommended for initial staging of DLBCL, its role regarding BMI is not well defined. This study evaluated whether ^{18}F -FDG PET/CT, in comparison with BMB, is useful for the detection of BMI and predictive of outcome.

Methods: From the 142 patients who were referred to our institution for newly diagnosed DLBCL from June 2006 to October 2011, 133 were retrospectively enrolled in our study. All patients underwent whole-body ^{18}F -FDG PET/CT and a BMB from the iliac crest before any treatment. ^{18}F -FDG PET/CT was considered positive for BMI in cases of uni- or multifocal bone marrow ^{18}F -FDG uptake that could not be explained by benign findings on the underlying CT image or history. A final diagnosis of BMI was considered if the BMB was positive or if the positive ^{18}F -FDG PET/CT was confirmed by guided biopsy or targeted MR imaging or in cases of disappearance of focal bone marrow uptake concomitant with the disappearance of uptake in other lymphoma lesions on ^{18}F -FDG PET/CT monitoring. Progression-free survival and overall survival were analyzed using the Cox proportional hazards regression model.

Results: Thirty-three patients were considered to have BMI. Of these, 8 were positive according to the BMB and 32 were positive according to ^{18}F -FDG PET/CT. ^{18}F -FDG PET/CT was more sensitive (94% vs. 24%; $P < 0.001$), showed a higher negative predictive value (98% vs. 80%), and was more accurate (98% vs. 81%) than BMB. Median follow-up was 24 mo (range, 1–67 mo). Twenty-nine patients (22%) experienced recurrence or disease progression during follow-up, and 20 patients died (15%). In multivariate analysis, only the International Prognostic Index and the ^{18}F -FDG PET/CT bone marrow status were independent predictors of progression-free survival ($P = 0.005$ and 0.02 , respectively), whereas only the International Prognostic Index remained an independent predictor of overall survival ($P = 0.004$).

Conclusion: Assessment of BMI with ^{18}F -FDG PET/CT provides better diagnostic performance and prognostic stratification in newly diagnosed DLBCL than does BMB.



The PET Experts

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FDG PET/CT outperforms biopsy for detection of malignancy in lymphoma

The gold standard for the detection of bone marrow invasion of diffuse large B-cell lymphoma (DLBCL) is bone marrow biopsy (BMB). Researchers investigated a new approach with F-18 FDG PET/CT imaging to determine its efficacy and predictive value. The latter was found superior to biopsy in not only its sensitivity and accuracy, but also its ability to predict progression-free survival, according to a study published online May 14 in the *Journal of Nuclear Medicine*.

Louis Berthet, MD, a research scientist from the Centre Georges-Francois Leclerc in Dijon, France, and colleagues retrospectively compared F-18 FDG and bone marrow biopsy findings and performed a statistical analysis to evaluate best practice for DLBCL-related bone marrow cancer screening and restaging.

“[DLBCL] is the most frequent subtype of high-grade non-Hodgkin lymphoma, which is the sixth most common cause of malignant tumor incidence and mortality in Europe and the United States,” wrote the authors. “With a 150 percent increase in incidence in recent decades, non-Hodgkin lymphoma is a major public health problem.”

A total of 133 patients assessed for DLBCL between June 2006 and October 2011 were retrospectively evaluated for previous results of both F-18 FDG PET/CT and bone marrow biopsy. FDG scans were deemed positive for bone marrow involvement (BMI) if uni- or multifocal uptake of the agent by bone marrow could not be explained by some benign cause via CT or medical history. Quantitative analysis was conducted to predict progression-free and overall patient survival.

“A final diagnosis of BMI was considered if the BMB was positive or if the positive F-18 FDG PET/CT was confirmed by guided biopsy or targeted MR imaging or in cases of disappearance of focal bone marrow uptake concomitant with the disappearance of uptake in other lymphoma lesions on F-18 FDG PET/CT monitoring,” the authors wrote.

Results showed that 33 subjects had BMI. Biopsy found eight patients to have bone malignancy associated with DLBCL while FDG scans detected BMI in 32 patients. F-18 FDG PET/CT was 94 percent sensitive, whereas sensitivity of biopsy was 24 percent. In terms of predictive value, FDG imaging was more accurate than biopsy (98 percent vs. 81 percent) and was revealed to have a 98 percent negative predictive value compared to biopsy’s 80 percent.

At 24-month median follow-up, 15 percent, or 20 patients, were deceased, and 22 percent, or 29 patients, had recurrent DLBCL or progression of cancer. From multivariate analysis, researchers concluded that FDG PET/CT bone marrow results were independent predictors of progression free survival ($P = 0.005$), but not for overall survival. Biopsy was not an independent predictor for either.

“Our study suggests, in a series of 133 patients with newly diagnosed DLBCL, that the diagnostic performance of 18F-FDG PET/CT regarding bone marrow status is better than that achieved using the gold standard, BMB,” the researchers wrote. “Moreover, bone marrow status according to F-18 FDG PET/CT appears to be a better independent prognostic factor than bone marrow status according to BMB.”