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Quantitative PET imaging finds early determination of effectiveness of cancer treatment

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With positron emission tomography (PET) imaging, seeing is believing: Evaluating a patient's response to chemotherapy for non-Hodgkin lymphoma (NHL) typically involves visual interpretation of scans of cancer tumors. Researchers have found that measuring a quantitative index—one that reflects the reduction of metabolic activity after chemotherapy first begins—adds accurate information about patients' responses to first-line chemotherapy, according to a study in the October issue of the *Journal of Nuclear Medicine*.

"In our study, we demonstrated that a quantitative assessment of therapeutic response for patients with diffuse large B-cell lymphoma (DLBCL) is more accurate than visual analysis alone when using the radiotracer FDG (fluorodeoxyglucose) with PET scans," said Michel Meignan, professor of nuclear medicine at Henri Mondor Hospital in Creteil, France.

"The ability to predict tumor response early in the course of treatment is very valuable clinically, allowing intensification of treatment in those patients who are unlikely to response to first-line chemotherapy," he added. "Similarly, treatment could possibly be shortened in those patients who show a favorable response after one or two cycles of chemotherapy, and quantification also may help identify the disease's transformation from low-grade to aggressive stage," he explained. "However, visual interpretation of PET scans will always be the first step

of analysis and will prevail in case of difficulties to quantify images," added Meignan.

Diffuse large B-cell lymphoma is a fast-growing, aggressive form of non-Hodgkin lymphoma, a cancer of the body's lymphatic system. Although there are more than 20 types of NHL, DLBCL is the most common type, making up about 30 percent of all lymphomas. In the United States, about 63,190 people are expected to be diagnosed with non-Hodgkin lymphoma in 2007, according to recent statistics.

Ninety-two patients with DLBCL were studied before and after two cycles of chemotherapy, and tumor response was assessed visually and by various quantitative parameters, explained the co-author of "Early 18F-FDG PET for Prediction of Prognosis in Patients With Diffuse Large B-Cell Lymphoma: SUV-Based Assessment Versus Visual Analysis." Meignan said, "We found that quantification of tumor FDG uptake (the ratio of tissue radioactivity concentration) can markedly improve the accuracy of FDG PET for prediction of patient outcome." Additional studies need to be done, said Meignan, reiterating that the future monitoring of cancer tumor response will probably include a combination of quantitative analysis and visual assessment.

PET is a powerful molecular imaging procedure that uses very small amounts of radioactive materials that are targeted to specific organs, bones or tissues. When PET is used to image cancer, a radiopharmaceutical (such as FDG, which includes both a sugar and a radionuclide) is injected into a patient. Cancer cells metabolize sugar at higher rates than normal cells, and the radiopharmaceutical is drawn in higher amounts to cancerous areas. PET scans show where FDG is by tracking the gamma rays given off by the radionuclide tagging the drug and producing three-dimensional images of their distribution within the body. PET scanning provides information about the body's chemistry, metabolic activity and body function.

Source: Society of Nuclear Medicine