FDG PET shows tumor DNA levels in blood are linked to NSCLC aggressiveness

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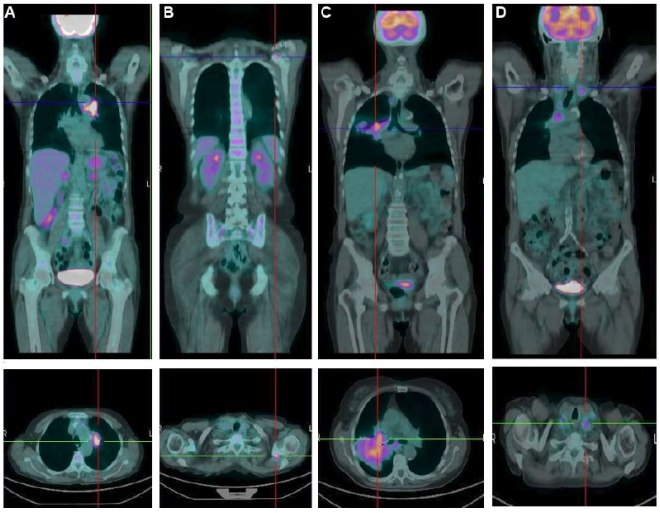

(A and B) Two coronal and transaxial sections of 18F-FDG PET/CT scan of 73-y-old woman with stage IV NSCLC (adenocarcinoma; free circulating tumor DNA [cfDNA] level, 462 hTERT copy numbers; 3 CTCs/3 mL). (A) Primary lesion that highly concentrated 18F-FDG in left lung (maximum diameter [dmax], 49 mm; SUVmax, 7.2; MTV, 82.4 mL). (B) Small bone lesion in left scapula (dmax, 10 mm; SUVmax, 5.7; MTV, 5 mL). (C and D) 18F-FDG PET/CT scan of 70-y-old man with stage IV NSCLC (adenocarcinoma; cfDNA level, 113 hTERT copy numbers; 3 CTCs/3 mL). (C) Primary lesion that moderately concentrated 18F-FDG in right lung (dmax, 83 mm; SUVmax, 4.9; MTV, 193.2 mL). (D) Multiple mediastinal and cervical lymph nodes (dmax of largest lymph node, 30 mm; SUVmax, 3.2; MTV, 65 mL). Patient shown in A and B had lower tumor burden (as expressed by MTV) but higher SUVmax and cfDNA levels than patient shown in C and D. Credit: Silvia Morbelli, et al., San Martino Hospital, University of Genoa, Italy.

Italian researches have demonstrated a better way of determining the aggressiveness of tumors in patients with advanced non-small cell lung cancer (NSCLC). In a study presented in the featured clinical investigation article of the November issue of *The Journal of Nuclear Medicine*, they used ^{18}F-fluorodeoxyglucose (FDG) PET/CT imaging to show that the amount of cell-free tumor DNA circulating in the bloodstream correlates with tumor metabolism (linked to cancer aggressiveness), not tumor burden (amount of cancer in the body).

According to the American Cancer Society, lung cancer is the leading cause of cancer death among both men and women, causing roughly 1 out of 4 cancer deaths. NSCLC represents approximately 85 percent of lung cancer cases. More than 22,000 new cases are expected this year in the United States, and the disease is expected to claim more than 155,000 lives.

"Despite the identification of circulating tumor cells (CTCs) and cell-free DNA (cfDNA) as biomarkers capable of providing clinically relevant information in cancer patients, at present their identification is not routinely used in clinical practice," explains Silvia Morbelli, MD, PhD, of the IRCCS San Martino - IST National Cancer Research Institute and University of Genoa in Genoa, Italy.

This study of 37 patients (24 men and 13 women, ages 51 to 80) who have never been treated with chemotherapy found direct correlation of the amount of cfDNA with tumor metabolism (based on PET-derived parameters), but not with metabolic tumor volume. These results suggest that cfDNA might better reflect tumors' biological behavior and aggressiveness than tumor burden in metastatic NSCLC.

The researchers noted that a subgroup of 13 patients had metabolically active bone lesions and also higher levels of cfDNA. In addition, while cfDNA correlated with tumor metabolism, no association was found with circulating tumor cells (CTCs). Previous investigations have suggested that cfDNA and CTCs might provide complementary information about tumor biology. The small size of this study means that no definitive conclusions could be made regarding the role of

CTCs in NSCLC metabolism.

Morbelli points out, "Our findings illustrate the prognostic value of ^{18}F-FDG and provide a deeper understanding of clinically reliable, noninvasive biomarkers that may help identify potential unresponsive NSCLC patients before treatment and limit unnecessary toxicity."

More information: Silvia Morbelli et al, Circulating Tumor DNA Reflects Tumor Metabolism Rather Than Tumor Burden in Chemotherapy-Naive Patients with Advanced Non–Small Cell Lung Cancer:18F-FDG PET/CT Study, *Journal of Nuclear Medicine* (2017). DOI: 10.2967/jnumed.117.193201

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