



Low-dose PET/CT Imaging Enabled by High Sensitivity of Discovery IQ

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Introduction

Istanbul Oncology Hospital is dedicated to providing low-dose PET/CT imaging to enhance patient safety. On average, 120 cancer patients receive care each day in our hospital.

All cancer patients receive PET/CT scans for diagnosis and treatment planning. However, many patients will continue to receive multiple PET/CT scans for several years post-treatment to detect any disease recurrence. Therefore, radiation and injected radiopharmaceutical dose are important considerations in our daily practice.

Our first aim is to reduce the injected dose to the patient. With our previous PET/CT system, we typically injected 0.134 mCi/kg per patient with 3-4 minute bed positions based on the patient's BMI. After implementing Discovery™ IQ PET/CT in June 2015, we initially started with 0.10 mCi/kg and 2 minute bed positions, then gradually reduced the dose to 0.09 and 0.08 mCi/kg. At this dose level, we also evaluated the impact of a 1.5 minute and 1 minute bed time and found that while

there was no loss in tumor detectability, there was inferior background in the images at the 1 minute bed position.

Case 1 Patient history

A 70-year-old male with stomach cancer referred to PET/CT for staging.

Acquisition

Scan time: 13.5 min, 9 beds – 1.5 min/bed

Injected total dose: 5 mCi ¹⁸F-FDG

Findings

At the abdomen and stomach pylor, the thickest axial diameter (up to 17 mm) hypermetabolic massive lesions are compatible with primary malignancy (SUV 8.90).

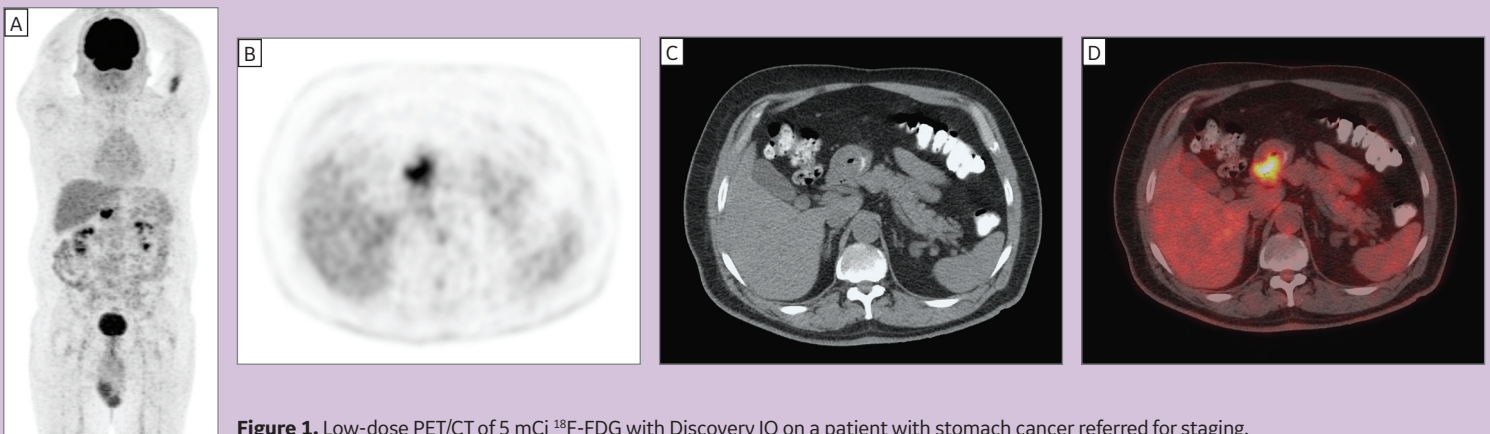


Figure 1. Low-dose PET/CT of 5 mCi ¹⁸F-FDG with Discovery IQ on a patient with stomach cancer referred for staging.

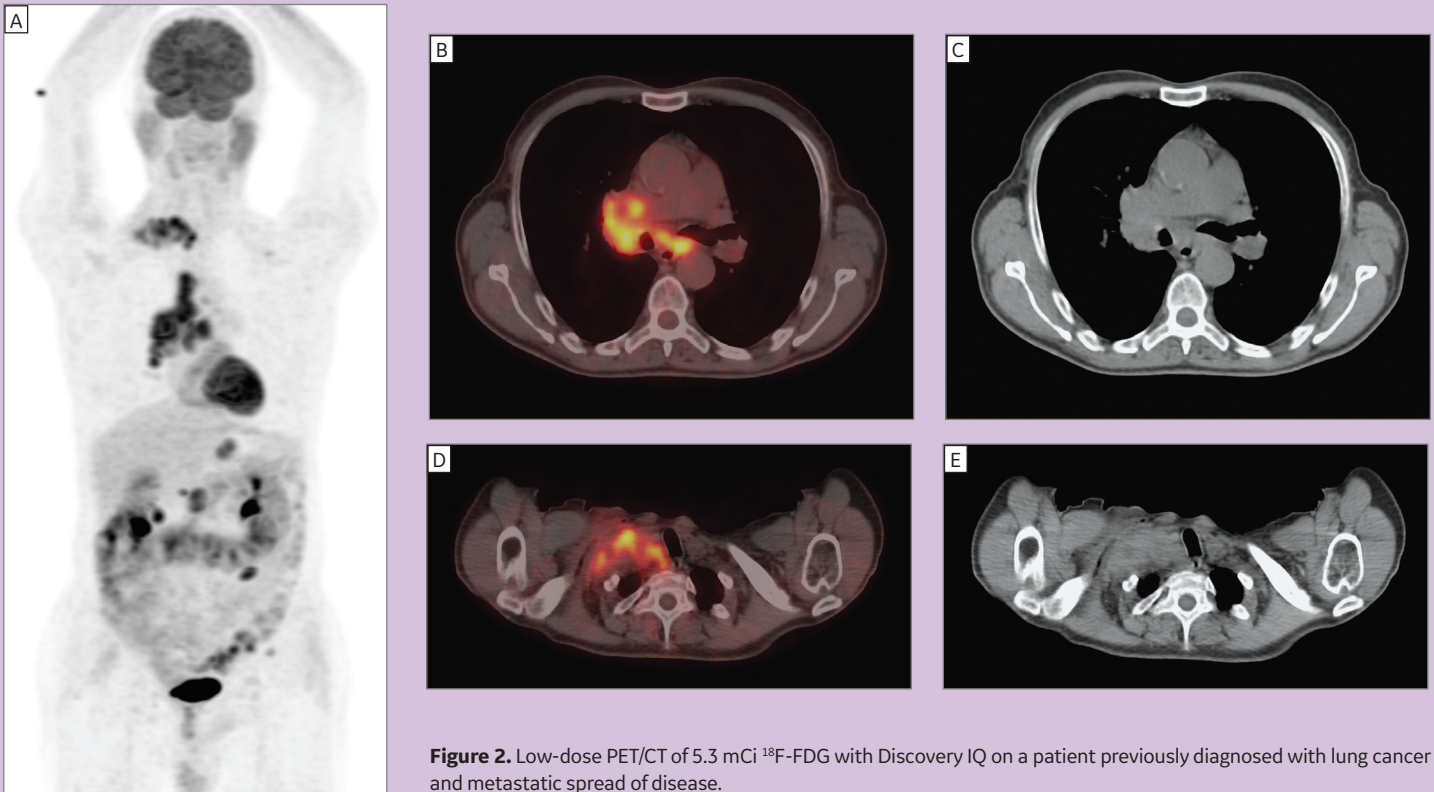


Figure 2. Low-dose PET/CT of 5.3 mCi ^{18}F -FDG with Discovery IQ on a patient previously diagnosed with lung cancer and metastatic spread of disease.

Case 2 Patient history

A 56-year-old male with a diagnosis of lung cancer.

Acquisition

Scan time: 12 min, 8 beds – 1.5 min/bed

Injected total dose: 5.3 mCi ^{18}F -FDG

Findings

Hypermetabolic massive form lesions, which invade the right pulmonary artery and fatty para-mediastinal areas compatible with malignancy, causing post-obstructive infiltration regions at distal parenchyma by obliterating the upper lobe bronchial at the right lung hilar region. Suspected nodular lesions due to low metabolic activity are noted at the right lung lower lobe posterior basal segment and lower lobe superior segment with the largest

lesion measuring 1 cm in diameter. Metastatic massive form lesion at left adrenal gland and metastatic lytic bone/marrow lesions localized in the skeletal system are defined in PET/CT.

Discussion

At Istanbul Oncology Hospital, we believe that dose reduction in PET imaging will be as important and as clinically impactful as dose reduction in CT. With Discovery IQ and a high sensitivity, we have the potential to reduce injected dose by up to 30% compared to our prior generation PET/CT system.

Prior to implementation of this new system, each PET/CT session was scheduled for 40 minutes. The fast scanning capabilities of Discovery IQ has enabled us to decrease each time slot to 20 minutes, resulting in an increase in our PET/CT volume from six to 15 patients each day. In addition, the fast scanning time increases patient comfort, which helps minimize patient movement on the table, especially when imaging oncology patients who are in pain. ■