

## Points

- PET/CT is the primary modality in oncology today
- Apart from its role in diagnosis, staging, etc, it helps to guide biopsy and therapy
- It helps in identifying the appropriate part of a lesion to be biopsied and in the presence of multiple lesions, tell us which of the lesions to biopsy.

## Role of PET/CT in Guiding Biopsies

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PET (Positron Emission Tomography) is a state of the art nuclear medicine technique, which is useful for imaging human biochemical and physiological processes in vivo. These processes are altered in the earliest stages of virtually all diseases. PET detects these changes, often before anatomical or structural changes have occurred or are evident on MRI or CT. PET/CT offers the dual benefits of PET's metabolic information and the anatomical precision of CT.

PET/CT has become the primary modality in oncology investigations. It yields information throughout the spectrum of oncologic issues; diagnosis, staging, restaging, post-treatment evaluation, differentiation of residual/recurrent tumor from fibrosis, etc.

PET/CT also helps in guiding biopsies and therapy. In the presence of a single lesion, it helps in selecting the region of a lesion most likely to yield diagnostic information for biopsy (Case 1). In the presence of multiple lesions, it helps in determining the lesion most likely to yield diagnostic material (Cases 2, 3).

Why is this important? Image-guided (CT or USG) biopsies are often difficult to perform. In this setting, it is necessary to have a 90-95% diagnostic success rate and a 100% technical success rate. To achieve this, it is important to know which areas or lesions to target. PET/CT helps by telling us which lesion(s) is/are active and which part of a lesion is most active and likely to yield the best material for biopsy. It allows us to avoid areas of necrosis and to concentrate on the solid active areas.

*The following cases illustrate this.*

**Case 1:** This is a 47-year old man, a known case of chondrosarcoma of the pelvis, operated one year ago. A follow-up PET/CT scan showed multiple lung lesions (Fig. 1) most likely representing metastases. The PET/CT showed that only the medial aspect of the lesion chosen for biopsy was active and the biopsy was attempted from this area only. This showed chondrosarcoma. Biopsy material was also obtained from the non-active, lateral portion. This showed only necrotic, myxoid material, confirming the PET/CT findings.

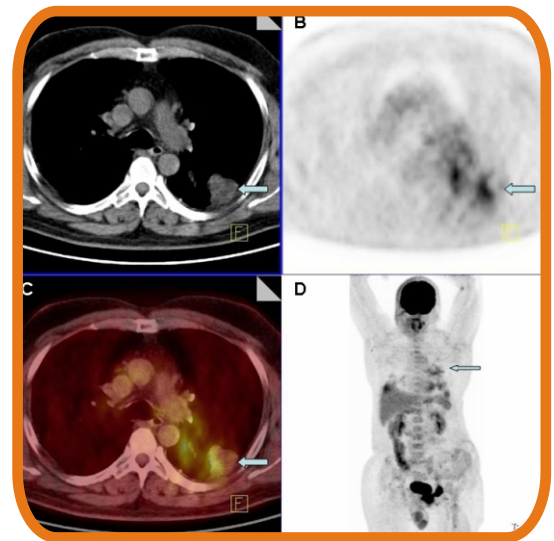


Fig. 1

Fig. 1: Case 1. The metastatic chondrosarcoma nodule shows uptake only on the medial aspect, which was the area targeted during the CT-guided biopsy.

### Legends:

All figures follow the following protocol. Upper left (A) axial CT scan, upper right (B) PET image, lower left (C) fused PET/CT image, lower right (D) MIP coronal PET image

The online version is up at <http://www.jankharia.com/innerspaces/current.htm>

**Case 2:** This is a 42-year old lady who had fever of unknown origin and pain in the ribs and dorsal spine. CT scan of the chest showed multiple subcentimeter nodules in both lungs with a conspicuous subpleural and lower lobe distribution. It was difficult to decide on which nodule to biopsy. PET/CT was done. It showed mild increased uptake of FDG in only one nodule in the left lung. Other nodules did not pick up FDG. This made it easy to decide the site of biopsy. A CT-guided biopsy was performed from the FDG avid nodule in the left lung. The biopsy showed a non-caseating granuloma [Fig. 2]

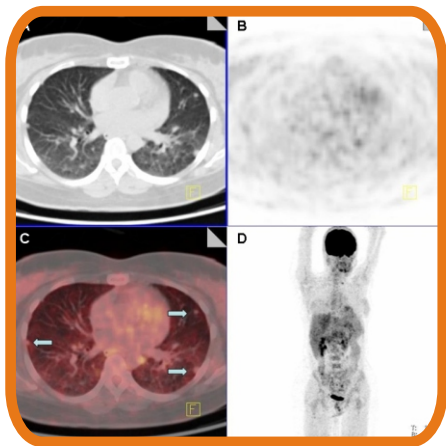


Fig. 2A

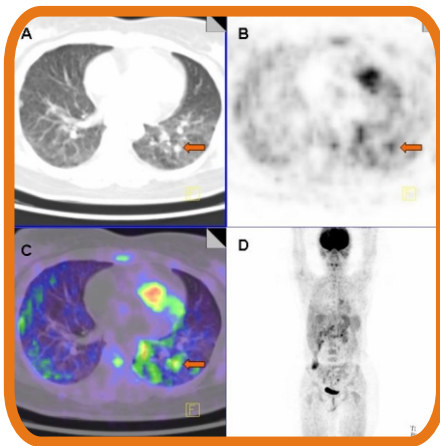


Fig. 2B

Fig. 2 (A, B): Case 2. Multiple lung nodules are seen (A), of which only one nodule in the left lower lobe (B) showed uptake. This was biopsied and showed a non-caseating granuloma.

**Case 3:** This is a 28-year old man who underwent a CT scan, which showed a lung nodule and hilar and subcarinal lymphadenopathy. The left lung nodule was the most easily accessible, but the subcarinal and left infrahilar nodes were much larger, though more difficult to biopsy. A PET/CT showed all lesions to be FDG-avid. As a result, the lung nodule was biopsied and showed an aggressive neuro-endocrine neoplasm. [Fig. 3]

Fig. 3: Case 3. A large left infrahilar enlarged node is seen (A), along with an FDG-avid left lower lobe lung nodule as well (B). It was easier to biopsy the lung nodule than the infrahilar node and this showed a neuro-endocrine neoplasm.

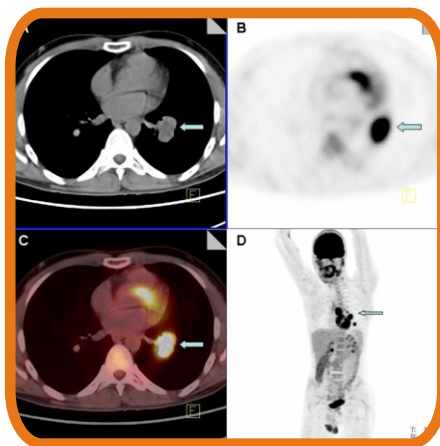


Fig. 3A

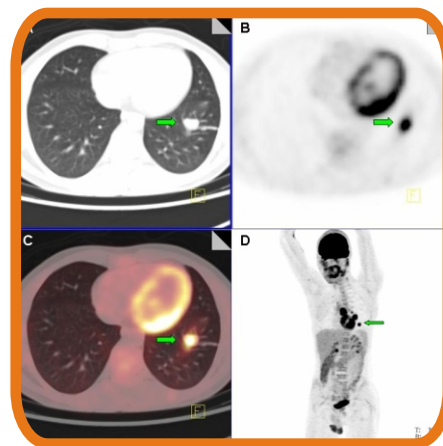


Fig. 3B

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