FDG PET/CT for Recurrent Breast Cancer

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A patient with a sternal mass from recurrent breast cancer and a small lung nodule (4mm) was referred for FDG PET/CT scan. The mass showed markedly increased metabolic activity. Metastatic disease in an enlarged internal mammary node was also demonstrated (fig. 1). There was unexpected disease in a posterior paravertebral node (fig. 2). However, the small lung nodule was not visibly FDG-avid.

This case illustrates both the strengths and shortcomings of FDG PET/CT for breast cancer. In a study of 56 patients with locoregional recurrence, PET/CT showed more sites of metastatic disease than conventional imaging in 57% and changed management from extensive surgery to palliative treatment in 36%. However, PET/CT is less sensitive for small lesions (<10mm) because of tracer/detector limits and partial-volume effect.

FDG PET/CT is useful in evaluating larger tumours, advanced and metastatic breast cancer. In a study of patient with primary tumours >2cm diameter, 21% were upstaged and 16% downstaged by PET/CT. Progression-free survival was more strongly associated with staging by PET/CT than conventional imaging. Lobular carcinoma shows less FDG uptake than other types, with reduction in sensitivity. High grade, oestrogen receptor negative and triple negative tumours show greater FDG uptake. Cerebral, skin, soft tissue, peritoneal and bowel metastases may be demonstrated. Extranodal metastases are associated with poor prognosis. FDG PET/CT is superior to bone scan for detecting lytic bone metastases and comparable for osteoblastic lesions. It is also useful in evaluating response to treatment after just 1 cycle of chemotherapy, avoiding futile chemotherapy in non-responders.

PET/CT with Fluorine-18 estradiol has been used to study tumour expression of oestrogen receptors in-vivo. The response rate of ER+ tumours (based on immunohistochemistry) to endocrine therapy is 55-60%. There is evidence that metastases are less likely to be ER+/PR+ and more likely HER2+ than the primary tumour.