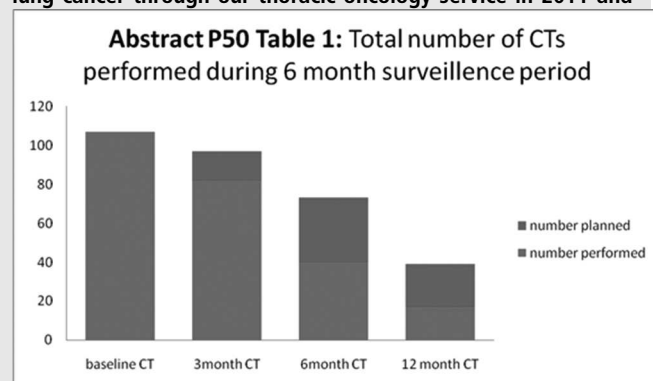


pathways: 2WW 37, inpatients 15, angiograms 6, PE service 5, respiratory OPD 17, other MDT 4, OPD 11, GP 3. Only 4/107 patients (3.7%) had high suspicion for lung cancer at outset, - 2 confirmed at surgery, 1 received radiotherapy (age 91yrs), 1 declined treatment. No further pathology was detected from surveillance. So far, a total of 246 CTs have been performed with 72 awaited (table 1). Fifteen patients had PET-CT (all low SUV). Fourteen underwent bronchoscopy (normal). Two had CT biopsy (benign), 2 declined biopsy, 2 were smaller at biopsy. One benign lesion was resected (patient choice). Only 28 patients have been discharged from surveillance; 10/28 resolved on 3month CT, 3/28 resolved on 6month CT, 15/28 stable on 12month CT. Fleischner guidance was accurately followed in 67%, most deviance due to delayed timing of 6month CT. Twenty-nine (27%) were discussed without documented nodule size.

**Conclusion** Nodule surveillance has put a significant burden on local Thoracic-Oncology services. No unexpected pathology was encountered during this surveillance period. Until clear clinical and/or radiological identifying factors for high risk patients are understood and rationalised, nodule surveillance will have to continue. There are cost implications not only for Radiology and Respiratory services, but also to patients' emotional and physical well-being. This highlights the continued need for clear surveillance protocols supported by service development.

**Abstract P50 Table 1. Comparison of patients diagnosed with lung cancer through our thoracic oncology service in 2011 and**



**P51 FOLLOW-UP OF THE INCIDENTAL PULMONARY NODULE-OUTCOMES AND COSTS**

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A retrospective study to analyse the outcomes and costs of follow-up of incidental nodules (solitary and multiple) referred to our Department from 2010–2011.

**Method** Consecutive nodule cases were identified by reviewing CT reports of 619 patients discussed at our Lung Cancer MDT from 2010–2011. Only clinically incidental nodules were included. Information was gathered using PACS and hospital records. In our department incidental nodules are seen once in clinic and then largely managed 'remotely' via correspondence. All nodules are managed to Fleischner guidelines.

Costs for investigations/procedures/appointments were calculated using local 2012–13 reference costs. Manpower costs for

MDTs and correspondence were calculated using a 'bottom-up' costing approach.

**Results** 62 patients were referred with a new incidental nodule (s). Mean age was 66(34–92) with a 1:1 male:female ratio. 56% (35/62) had PS 0–1 and 56%(35/62) were current/ex-smokers. 66%(41/62) had a SPN. Mean size of largest nodule was 9mm.

11%(7/62) were diagnosed with malignancy, 6%(4/62) of pulmonary origin. The 3 non-pulmonary malignancies were renal, breast and metastatic squamous cell. New clinically important diagnoses were made in a further 11%(7/62) including TB/amyloid/ILD, whilst 78%(48/62) were benign.

In the malignancy group, 71% (5/7) were current/ex-smokers, 86% (6/7) had a SPN with mean size 7.7mm and there was a higher likelihood of nodules enlarging on follow-up CTs (40% versus 2% at 2nd CT). 75%(3/4) of patients with lung malignancy underwent curative treatment. In the benign group (48), the mean number of follow-up CTs/patient (excluding baseline CT) was 1.8. 21 ultimately unnecessary investigations were performed, including 9 invasive procedures. (Table) The cost of screening to the NHS to identify a single malignancy was £5805. The cost to our service per patient screened was £655 resulting in a shortfall of £455/patient compared with the £200 charge to the PCT for an initial appointment.

**Conclusions** In our study, incidental nodule follow-up led to a clinically relevant diagnosis in 22% of patients, including identification of malignancy in 11%. Whilst the study had a high yield, those who received a benign diagnosis underwent a number of ultimately unnecessary investigations, some invasive, with no gain. Our 'remote management' model of care is efficient but requires an appropriate tariff.

**Abstract P51 Table 1. Additional Investigations Performed: Benign Group.**

| Investigation         | Number    |
|-----------------------|-----------|
| PET CT                | 9         |
| Bronchoscopy          | 4         |
| CT abdomen & pelvis   | 1         |
| MRI adrenals          | 2         |
| Colonoscopy           | 1         |
| Breast lump biopsy    | 1         |
| Lung biopsy (CT/VATS) | 3         |
| <b>TOTAL</b>          | <b>21</b> |

**P52 INCIDENTAL NON-CALCIFIED PULMONARY NODULES: RATIONALE FOR CT SCANNING AND COST ANALYSIS**

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**Introduction** The advent of CT scanning as a routine test in the work-up of pulmonary disease has brought with it the unexpected detection of large numbers of pulmonary nodules, most of which are of a benign aetiology, even in high risk groups. Previous lung cancer screening studies have shown that likelihood of malignancy in nodules < 7 mm in size is < 1% in patients. Current guidance for the follow-up of these patients bases repeat CT scanning on nodule size and the risk of malignancy (Fleischner Society 2005; figure 1). However, such surveillance comes with increased healthcare costs, patient anxiety and radiation exposure. To look at this further, we reviewed the burden of repeat scanning on the healthcare economy.

**Methods** Two trained readers independently reviewed 100 randomly selected CT thorax scans from individual patients (mean age 63 years [SD 15]) and noted the number, size and characteristics of any nodules present. Economic analysis was based on costs of CT scan (low dose CT = £115) and the number of additional follow-up CT scans required.

| Recommendations for Follow-up and Management of Nodules Smaller than 8 mm Detected Incidentally at Nonscreening CT |  |   |
|--|--|---|
| Nodule Size (mm)*  | Low-Risk Patient†  | High-Risk Patient‡  |
| ≤4   | No follow-up needed§   | Follow-up CT at 12 mo; if unchanged, no further follow-up¶          |
| >4–6   | Follow-up CT at 12 mo; if unchanged, no further follow-up¶                               | Initial follow-up CT at 6–12 mo then at 18–24 mo if no change¶      |
| >6–8   | Initial follow-up CT at 6–12 mo then at 18–24 mo if no change¶                           | Initial follow-up CT at 3–6 mo then at 9–12 and 24 mo if no change¶ |
| >8   | Follow-up CT at around 3, 9, and 24 mo, dynamic contrast-enhanced CT, PET, and/or biopsy | Same as for low-risk patient  |

Note.—Newly detected indeterminate nodule in persons 35 years of age or older.  
 \* Average of length and width.  
 † Minimal or absent history of smoking and of other known risk factors.  
 ‡ History of smoking or of other known risk factors.  
 § The risk of malignancy in this category (<1%) is substantially less than that in a baseline CT scan of an asymptomatic smoker.  
 ¶ Nonsolid (ground-glass) or partly solid nodules may require longer follow-up to exclude indolent adenocarcinoma.

**Abstract P52 Figure 1.**

**Results** Overall, 249 nodules were detected in 86 patients; 9 with a solitary calcified nodule were excluded. Of the remainder, 22 (28%) had nodule (s) < 4 mm, 28 (36%) 4–6 mm, 13 (17%) 6–8 mm and 21 (27%) >8mm. Assuming that all patients were high risk, based on Fleischner guidelines the total number of CT scans required over 2 years would be 15 (<4 mm), 56 (4–6 mm) and 39 (6–8 mm) at a cost of £1725, £6440 and £4485 respectively.

**Discussion** Over three quarters of our patients in this random sample had significant incidental pulmonary nodules, and their surveillance according to current guidelines would result in a significant burden to the healthcare system, not only in terms of cost but also through increased clinician time and patient anxiety. New protocols for the follow up of these low-risk patients are required if the healthcare economy is to cope with this increasing surveillance burden.

#### P53 THE UTILITY OF PET-CT IN DETECTING NON-NODAL EXTRATHORACIC METASTASES IN LUNG CANCER COMPARED TO THE STAGING CT

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**Background** NICE Lung Cancer Guidelines 2011 recommend performing a PET-CT in patients being considered for radical treatment after a staging CT of the neck, chest and liver has been performed. If mediastinal lymphadenopathy is detected by CT and the aetiology is determined by intervention, the true value of PET-CT is in the detection of non-nodal extrathoracic metastases. The yield of PET-CT in detecting non-nodal extrathoracic metastases has not previously been reported in comparison to that of reviewing the prior staging CT.

**Methods** 235 consecutive lung cancer patients with no known extrathoracic metastases referred for a staging PET-CT scan prior to radical therapy were included. All patients underwent a contrast-enhanced CT of the neck, chest and liver and a whole body PET-CT.

**Results** The median age at diagnosis was 72 years, 141 men (60%). Patients had stage Ia (16%), Ib (19%), IIa (6%), IIb (7%),

IIla (25%), IIlb (6%) and IV (20%) disease. The median interval between the CT and PET-CT scans was 25 days (IQR, 18–29). 21 (9%) patients had 25 extrathoracic and extra-cerebral metastases. 9 metastases were identified on the CT component of the PET-CT and review of the prior staging CT. 16 metastases were not visible on the staging CT scan; 4 (humeral and pelvic) bone metastases were outside the staging CT field of view, 6 metastases had developed since referral (median scan interval 28 days; IQR, 19–39), and 6 were only identified on PET-CT.

**Conclusion** The addition of pelvic CT in patients referred for PET-CT staging prior to radical therapy may allow for increased detection of extrathoracic metastases. PET-CT detects extrathoracic metastases which were missed or invisible on the staging CT. Lung cancer patients should be offered a contrast-enhanced CT of the neck, chest, abdomen and pelvis at staging. Potentially, an interval CT scan should be performed if a delay of greater than 30 days has occurred prior to the PET-CT scan being performed.

#### P54 IS F-18 FDG PET/CT ACCURATE IN DETECTING NODAL DISEASE IN PATIENTS WITH SUSPECTED LUNG CANCER?

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**Background** Accurate assessment of mediastinal lymph nodes is crucial in determining the management strategies in patients with lung cancer, particularly in those suitable for radical treatment. Positron emission tomography/computed tomography (PET-CT) is currently the best available imaging tool to assess nodal involvement and current guidelines recommend further sampling of PET positive lymph nodes to confirm the diagnosis using image-guided or surgical techniques to achieve the best treatment outcomes. We proceeded to look at the accuracy of (18) F-FDG PET/CT in detecting nodal metastasis in lung cancer.

**Methods** Retrospective study of 68 pathologically confirmed metastatic lymph nodes obtained using endobronchial ultrasound (EBUS) guided needle aspiration between Jan 2009 and Jan 2012. All pre-procedure PET/CT images were reviewed by a Consultant Radiologist who was blinded to the EBUS findings and the pathology results. PET standardised uptake value (SUVmax) of the primary lung lesion and suspected lymph nodes was measured. Data was collected from our EBUS database and analysed.

**Results** Of the 68 lymph nodes, 24 were subcarinal, 14 right lower paratracheal, 6 left lower paratracheal, 2 upper right paratracheal, 1 right inter-lobar, 10 right hilar and 11 were left hilar. EBUS lymph node size (mm) 18 mean, SD 6 (range 7–34). Mean PET SUVmax of the lymph nodes was 9.1, 6.7 SD (2–34); mean PET SUVmax of the primary tumour (n = 50) was 10.6 (7.6 SD). 23 nodes were squamous, 17 nodes adenocarcinoma, 9 small cell, 13 non-small cell (not otherwise specified), 5 extra-thoracic, and 1 neuroendocrine. 52 nodes were positive on PET, 9 were negative and 7 indeterminate.

**Conclusion** Our results show that out of the 68 pathologically confirmed lymph nodes 52 were positive on PET/CT with diagnostic accuracy of 76%. SUVmax may be used as a guide to characterise the nodes but not as a confirmatory tool. Despite limitations PET/CT is accurate and it is complemented by image-guided sampling in the lung cancer diagnostic pathway.