with stage IV metastatic non-small cell lung cancers. All patients have been prospectively registered with clinical TNM staging. Patients were found with N0-1 and N2-3 status in 34% and 66%, respectively. Two hundred and twenty patients (56%) were classified T1-2, while 172 were found T3-4 (44%). Interestingly 13% of the patients were found T1-2N0.

Conclusion: T and N descriptors by themselves seem to be bad predictors of metastatic disease in non-small cell lung cancer.

P1-064 Imaging and Staging Posters, Mon, Sept 3

Correlation with Dual time PET-CT and enhanced CT in evaluation of mediastinal metastatic nodes
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Objectives: The purpose of our study was to compare the diagnostic efficacies of helical dynamic CT and integrated PET/CT for the prediction of mediastinal nodal metastasis in stage below IIIB non-small cell lung cancer (NSCLC).

Patient and Methods: Sixty one patients (M: F = 48:13, age range 41-79 ) with NSCLC underwent lobectomy or pneumonectomy were included. In enhanced CT, the diagnostic criteria of metastatic mediastinal nodes were over 10mm (measured by short axis) lymph node without definite calcifications. In integrated PET/CT, nodes were regarded as positive for malignancy when they showed over 2.5 ( in 1 hr) in maximum standardized uptake value with a discrete margin and more 18F-FDG uptake than mediastinal structures. And the retention index was acquired by this equation RI (Retention Index) = (SUV of enhanced CT more 18F-FDG uptake than mediastinal structures).

Results: Of the 61 patients, 23 (37%) had positive mediastinal nodes. The sensitivity, specificity for mediastinal nodal metastasis prediction on enhanced CT by size criteria alone were 72%, 69%, respectively, whereas those on integrated PET/CT were 92 %, 97% by determined the initial SUV and retention index.

Conclusions: In NSCLC (operable cases, stage, I, II IIIA), preoperative nodal staging by contrast enhanced CT scan, but mediastinal nodal metastasis than PET/CT, whereas PET/CT shows excellent specificity and sensitivities.

P1-065 Imaging and Staging Posters, Mon, Sept 3

Prognostic significance of thin-section CT findings in small-sized lung adenocarcinoma
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Background: The purpose of this study is to evaluate the prognostic importance of thin-section CT (TS-CT) findings in small-sized lung adenocarcinomas.

Methods: We reviewed TS-CT findings and pathological specimens from 359 consecutive patients who underwent surgical resection for peripheral lung adenocarcinomas smaller than 20 mm in diameter during the period from July 1997 to May 2006. By using TS-CT images, tumors were defined as air-containing types if the maximum diameter of tumor opacity on mediastinal window images was less than or equal to half of that on lung window images, and as a solid-density type if the maximum diameter on mediastinal window images was more than half of that on lung window images. We compared TS-CT findings to pathological findings (lymph node metastasis, pleural invasion, vessel invasion, and lymphatic permeation) and prognosis. The following prognostic factors were analyzed by chi-square test and Cox proportional hazard model: age, gender, tumor size, pathological stage, TS-CT findings, histologic subtypes defined by Noguchi (Noguchi type), pleural involvement, lymphatic permeation, and vascular invasion.

Results: No pathological invasive findings or recurrence were found in patients with air-containing type tumors. Pathological invasive findings and recurrence were found in 10% to 30% of patients with solid-density type tumors. The air-containing type on TS-CT and Noguchi type A or B were demonstrated as prognostic factors for good outcome by chi-square test (p<0.001). Multivariate analyses revealed lymphatic permeation as a significant prognostic factor.

Conclusions: The TS-CT findings were important predictive factors for postsurgical outcome in patients with lung adenocarcinoma.

P1-066 Imaging and Staging Posters, Mon, Sept 3

Image acquisition protocol to optimize image registration of lung cancer hyperpolarized helium-3 MRI and CT
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Background: Pulmonary imaging with hyperpolarized helium-3 (3He-MRI) is emerging as an alternative to SPECT that has the potential to provide superior lung function information. In particular, ventilation and perfusion data from 3He-MRI may be used for functionally weighted intensity modulated radiotherapy (IMRT) lung planning [1]. The aim of this study was to develop and evaluate an improved protocol for image registration of 3He-MRI to treatment planning x-ray CT.

Methods: An initial six NSCLC patients underwent 3He-MRI with a radiofrequency coil that required the patients to be imaged supine with their arms down, and a free breathing single-slice CT protocol for treatment planning. The 3He gas was polarized on site to 30% and imaging was performed during a single 14s breath-hold of a 300ml 3He/700ml N2 mixture. Following the development of an elliptical birdcage 3He-MRI coil [2] and the installation of a 16-slice CT, a further six patients were scanned. A new protocol was devised that enabled 3He-MRI to be acquired in treatment position and a planning CT to be acquired during an inspiration breath-hold performed with a 1L bag filled with room air that simulated the 3He-MRI breathing maneuver. For all images, 3He-MRI to CT image fusion was performed using anatomical landmark based rigid registration which was assessed using the relative volume overlap [1].

Results: Over all slices, the original 3He-MRI and CT were registered with (mean±SD) overlap 73±11%. With the new equipment and modified imaging protocol, the overlap was significantly improved to 84±4% (p=0.05).
Conclusion: Statistically significant improvements to 3He-MRI to planning CT image registration can be achieved by using a dedicated imaging protocol that enables both 3He-MRI and planning CT to be acquired with similar breath holds and body position. Improved image registration accuracy will be beneficial when performing functionally-weighted IMRT planning.

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References:

P1-067 Prognosis of small adenocarcinoma of the lung based on thin-section CT and pathological preparations
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Background: We have previously reported that tumor opacity in the mediastinal window image in thin-section CT (TS-CT) is associated with prognosis of lung adenocarcinoma of 20 mm or smaller in diameter. However, pathological investigation of the tumor opacity in the mediastinal window has not been performed in detail. To investigate the relationship between imaging and pathological findings, the solid lesion in the pathological preparation observed under a magnifying glass (SLP) and tumor opacity in the mediastinal window image (TOM) in TS-CT were compared. The relationships of SLP and TOM with relapse were also investigated.

Methods: The subjects were 115 patients with a lung adenocarcinoma of 20 mm or smaller in diameter who underwent surgical resection at the Kanagawa Cancer Center between January 1997 and October 2003. Pathological and imaging findings for these patients were re-investigated in this study. Patients with bronchioalveolar carcinoma (BAC) that was undetectable in the mediastinal window image were excluded. SLP was defined as follows: 1) regions with alveolar collapse, 2) regions accompanied by destruction of the alveolar framework, and 3) regions described in 2) accompanied by collagen fibrotic foci. The maximum diameters of the tumor and SLP were measured in the pathological preparation, and the proportion of the maximum diameter of the SLP to the maximum tumor diameter was calculated as the pathological ratio. In TS-CT, the proportion of the reduction in the TOM maximum diameter to the maximum diameter of the tumor opacity in the lung window was calculated as the reduction percentage. Correlations between the maximum SLP and TOM diameters and between the pathological ratio and the reduction percentage were investigated, and the association of relapse with SLP, TOM, the pathological ratio, and reduction percentage was also examined.

Results: Strong Pearson correlations were noted between the maximum TOM and SLP diameters (correlation coefficient: 0.852, p<0.0001) and between the reduction percentage and pathological ratio (correlation coefficient: 0.895, p<0.0001). The maximum TOM and SLP diameters were not significantly associated with relapse. However, the incidence of relapse was significantly higher in patients with a reduction percentage of less than 50% by log-rank test; no relapse occurred in patients with a reduction percentage of 50% or higher. Similarly, the incidence of relapse was significantly higher in patients with a pathological ratio of less than 50% by log-rank test; no relapse occurred in patients with a pathological ratio of 50% or higher in the pathological preparation.

Conclusions: Use of the reduction percentage in TS-CT to classify lesions into two groups with different prognoses is valid based on the pathological investigation. Therefore, measurement of the reduction percentage and pathological ratio may allow prediction of cases of small adenocarcinoma of the lung with a good prognosis.

P1-068 Comparison of RECIST, WHO criteria, and serum CEA for evaluation of tumor response to chemotherapy in non-small cell lung cancer
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Background: Response evaluation criteria in solid tumor (RECIST) is widely used as a standard method for evaluation of tumor response in clinical oncology. RECIST is based on uni-dimensional measurement of target lesions and is simpler than WHO criteria which are based on bi-dimensional measurement. In clinical practice, we sometimes use serum tumor markers to estimate tumor response as well, particularly when measurement of tumor size is difficult. The aim of this study is to compare WHO criteria, RECIST, and serum carcinoembryonic antigen (CEA) level for evaluating tumor response to chemotherapy in non-small cell lung cancer (NSCLC).

Patients and Methods: During an 11-year period from 1995 through 2005, 24 NSCLC patients with high serum CEA level (> 5ng/ml) at presentation were retrospectively analyzed. They underwent pulmonary resection after induction chemotherapy. In each case, we compared histological response of tumor response of resected specimens.

Results: Using WHO criteria, nine and 15 patients achieved partial response (PR) and no change (NC), respectively. With RECIST, PR was seen in 11 patients, stable disease (SD) in 13. Concordance between WHO and RECIST was 83 %. When we compare CEA level before chemotherapy with that obtained after chemotherapy, CEA levels significantly decreased in PR group defined by WHO criteria ([26.3 (median) ng/ml to 4.3 ng/ml, P = 0.008, wilcoxon t test] or RECIST [17.3 ng/ml to 4.4 ng/ml, P = 0.004, wilcoxon t test ]). On the contrary, in patients whose responses were NC or SD, there was no significant difference [16.8 ng/ml to 9.9 ng/ml, P = 0.24, 16.8ng/ml to 19.6 ng/ml, P = 0.24, respectively]. In comparison of CEA level with histologic response, CEA decreased significantly in patients in whom less than one-third of tumor cells were viable [17.3 ng/ml to 4.4 ng/ml, P = 0.008, wilcoxon t test] but not in whom more than two thirds of tumor cells were viable [16.8 ng/ml to 7.9 ng/ml, P = 0.06, wilcoxon t test]. From