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Is it necessary to change treatment plans of NSCLC during radiotherapy?

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Background: Local control rate of NSCLC can be increased by irradiation dose boost, but pulmonary irradiation damage is another challenge. Target position and volume may change in different grade during radiotherapy inter-fraction, so target may be irradiated more exactly if radiotherapy plan modified in proper occasion, and irradiation dose of pulmonary may be decreased. So we designed to analyze the change of target volume during radiotherapy inter-fraction and the inference of plan change for pulmonary DVH parameters.
Materials and Method: 124 patients with I-III state NSCLC treated by 3D-CRT were retrospectively analyzed. The irradiation dose was 56−66 Gy/28−33 fractions, treatment plans were changed 1−2 times during the course of radiotherapy. The target of primary cancer and mediastinal lymph node with short dimension> 1 cm was contoured repeatedly by 2 radiotherapy oncologists. In Pinnacle^3 treatment plan system, the change of GTV and lung DVH parameters was recalculated in changed plan as primary prescribed dose. Target volumes and pulmonary DVH parameters of the primary and modified plan were compared by paired T-test.
Results: The time of plans change was 21.0±6.2 fraction of radiotherapy. GTV decreased 46.3%±37.9%(t = 4.31, p < 0.01), and the grade of target volume shrinkage was correlated with irradiation fractions before treatment plan change (r = 0.434, P = 0.005). Compared to the primary plan, total mean lung dose decreased 3.9%±9.6%(t = 2.40, p = 0.02), ipsilateral mean lung dose decreased 4.1%±11.0%(t = 2.57, p = 0.01) of the modified plan.
Conclusion: GTV of NSCLC reduced during the course of radiotherapy and pulmonary DVH parameters could be decreased by treatment plan change, which may contribute to protect pulmonary from severe irradiation damage and to boost irradiation dose.

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Concurrent chemoradiotherapy for locally advanced non-small cell lung cancer: community hospital experience

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Purpose: To evaluate efficacy and toxicity of concurrent chemoradiotherapy (CCRT) for unselected patients (pts) with locally advanced non-small cell lung cancer (LANSCLC) treated in community hospital.
Patients and Methods: Forty one pts (32 males and 9 females) received CCRT for LANSCLC. The mean age was 57 years. Thirteen pts presented with stage IIIA disease, 27 pts had stage IIIB disease, and 1 patient had a recurrence after lobectomy. Thirty one pts got 2−4 cycles of induction chemotherapy (CT), which consisted of either gemcitabine 1250 mg/m^2 on days 1 and 8 and cisplatin 80 mg/m^2 on day 1 every 3 weeks (9 pts), or vinorelbine 30 mg/m^2 on days 1 and 8 and cisplatin 75 mg/m^2 on day 1 every 3 weeks (10 pts), or paclitaxel 200 mg/m^2 and carboplatin according to AUC = 6 every 3 weeks (12 pts). CCRT consisted of radiotherapy (RT) 60−64 Gy (2 Gy ×5 daily fractions per week) to visible lung tumor and involved mediastinal lymph nodes, and weekly CT with either paclitaxel 45 mg/m^2 and carboplatin according to AUC = 2, or vinorelbine 15 mg/m^2 and cisplatin 20 mg/m^2.
Results: Thirty nine pts (95%) completed RT as planned. Mean cycle number of concurrent CT was 5 with average relative dose intensity 0.8. Grade III-IV toxicity rates were as follows: esophagitis 7.3%, pneumonitis 2.4%, neutropenia 7.3%, anemia 9.7%, thrombocytopenia 2.4% and peripheral neuropathy 2.4%. All toxicity events were well manageable and did not present threat to pts life. Complete response was demonstrated in 4 pts (10%), partial response was reported in 15 (37%) pts and the disease remained stable in 16 (39%) pts. Ten pts (25%) subsequently underwent radical surgery, 2 of them (20%) had no residual tumor by pathologic study. At the mean follow up of 33 months, the mean survival was 37 months and the mean progression free survival was 13 months. An estimated 2-year relapse free survival after radical surgery was 76%.
Conclusions: In our series CCRT for LANSCLC was well tolerated. Response and survival rates were similar to reported in the literature.

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Patient willingness to undergo chemotherapy and thoracic radiotherapy for locally advanced non-small cell lung cancer

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Background: To determine how Japanese patients with lung cancer weigh the chance of cure and potential survival against the potential toxicity of different treatment strategies for locally advanced non-small cell lung cancer (NSCLC).
Material and Methods: We used a questionnaire describing a hypothetical situation involving locally advanced NSCLC. Seventy-three patients with lung cancer who had received chemotherapy and a control group of 120 patients without cancer were asked to state the minimal benefit that would make two hypothetical treatments acceptable.
Results: Patients with lung cancer were significantly more likely than were patients without cancer to accept either intensive or less-intensive chemoradiotherapy for a potentially small benefit for “chance of cure” and “response but not cure.” The percentages of patients who would accept intensive or less-intensive chemoradiotherapy to prolong survival did not differ significantly between two groups. When the chance of cure was 20%, 56% and 64% of patients with lung cancer were willing to receive intensive and less-intensive chemoradiotherapy, respectively. If their lives were prolonged 6 months, 20% and 30% of patients with lung cancer would choose to receive intensive and less-intensive chemoradiotherapy, respectively. The chance of cure and the survival advantage that patients require for accepting chemoradiotherapy varied widely. No factors were associated with the choice of chemoradiotherapy in patients with lung cancer.
Conclusions: Physicians must consider the substantial range of attitudes to chemoradiotherapy among patients when selecting treatment and give patients opportunities to be included in the treatment-selection process.

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A predictive model for lung fibrosis after irradiation

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Background: Radiation in amounts over the threshold dose produces lung fibrosis, resulting in reduction of lung function. Lung fibrosis volume can be predicted from a dose volume histogram (DVH), and the long-term change in lung function after radiation therapy can be correlated with lung fibrosis volume. The purpose of this study was to create a predictive model for lung fibrosis using DVH.
Materials and Methods: From January 2003 to January 2007, we enrolled 98 patients with non-small cell lung carcinoma who received postoperative radiation therapy. We excluded patients with recurrent cancer and those treated with chemotherapy. Forty-eight patients were enrolled for fibrosis volume measurement, and all patients were treated with 3D treatment planning. The V5-V50 percentages at 5 Gy intervals and mean lung dose (MLD) were calculated from DVH, and lung fibrosis volumes were measured from the most recent follow-up CT scans taken at least 6 months after completion of radiation therapy. Simple linear regression analysis was performed to estimate the association between the V5-V50 statistics and fibrosis volume.
Result: Fibrosis volume was correlated significantly with DVH between 30 Gy and 50 Gy as assessed by simple linear regression analysis. The correlation coefficients (r values) for V30, V35, V40, V45 and V50 were respectively 0.733, 0.741, 0.717, 0.775 and 0.710 (p < 0.0001). Below 25 Gy, the correlation was weak and less significant. Fibrosis volume (ml) was found to fit with V30, V40 and V50 according to the following rules: 0.4× (V30−80); 0.5× (V40−70); and 0.9× (V50−10). MLD correlated with fibrosis volume according to the Boltzmann model. The coefficient of determination (r^2 value) was 0.617 for the equation $Vf = 211.5 - 218.2/(1+e^{(MLD-24.5)/5.34})$. Patient factors such as sex, age, tobacco use, comorbid lung disease, tumor site, pre-radiation forced expiratory volume in one second(FEV1) or symptomatic radiation pneumonitis were not significantly correlated with fibrosis volume by the t-test. Although the association between fibrosis volume and reduction of lung function did not achieve statistical significance, there was a tendency toward a decrease in function with increasing fibrosis.
Conclusion: Lung fibrosis volume after radiation therapy is predictable using V30-V50 measurements from DVH or MLD.