Summary

Assessment of Noninvasive Therapy in Lung Cancer Using Lung Perfusion Images

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The purpose of this prospective study was to follow the changes in functional parameters of radionuclide lung perfusion scans and their role in prognostication of lung cancer cases after noninvasive therapy. We studied 91 patients of lung cancer treated with chemotherapy and/or radiotherapy during 1993 to 1997 in our hospital. Lung perfusion scans were acquired pre and post-therapy. An index of lung perfusion, called Improvement Ratio (IR) was defined as a change in the perfusion of diseased lung as a result of treatment. IR was calculated by the following equation under the assumption that perfusion of contralateral lung remained unaffected.

$$IR = qQ'/pQ = (1-p)q/p(1-q),$$

where Q and Q′ are pulmonary arterial blood flow pre and post therapy respectively, p is prefusion ratio of diseased lung before therapy and q is that after therapy. We further studied the relationship between IR and change in tumor size. The influence of tumor location, histopathological diagnosis and prognosis of lung cancer were correlated with this newly defined index. IR in the group of patients with complete response or partial response was significantly higher than in those with poor response (2.72 ± 0.78 versus 0.99 ± 0.09, $p < 0.05$). There was no statistical difference between the group with and without radiotherapy. The score was significantly higher for patients with hilar disease compared to those with peripheral lesions (2.80 ± 0.83 versus 1.02 ± 0.03, $p < 0.05$). Similarly, patients with small cell lung cancer depicted higher values of IR than non-small cell lung cancer (3.36 ± 1.10 versus 1.06 ± 0.07, $p < 0.05$). All those subjects who showed $IR > 1$ had longer survival time than those with $IR < 1$ ($p < 0.05$). It is suggested that improvement in the perfusion of diseased lung predicted better prognosis.

We conclude that the evaluation of physiological parameters during therapy using lung perfusion scanning, in addition to lesion size assessment will contribute to the comprehensive follow-up of lung cancer.

Key words: Lung cancer, Physiological parameters, Lung perfusion images, Improvement Ratio (IR), Patient prognosis.