

METACHRONOUS STAGE I NON-SMALL CELL LUNG CARCINOMA



**Georgetown University Hospital
CyberKnife Team:**

Radiation Oncologist: Brian T. Collins, MD
Medical Physicist: Sonja Dieterich, PhD
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CyberKnife Center:
Georgetown University Hospital
Washington, DC

METACHRONOUS STAGE I NSCLC

DEMOGRAPHICS:

Sex: F
Age: 64
Histology: Pulmonary adenocarcinoma, bronchoalveolar type.
Treat Date(s): 10/25/04 – 11/02/04

CLINICAL HISTORY:

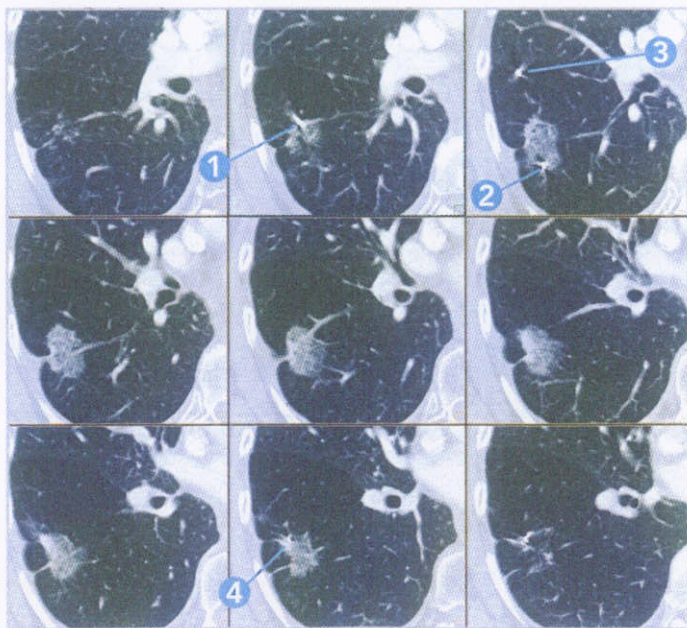
Referred by: Pulmonologist
Past Medical History: Stage III non-small cell lung cancer (NSCLC) of the left upper lobe diagnosed in 1999, Chronic Obstructive Pulmonary Disease (COPD), smoker

Case History:

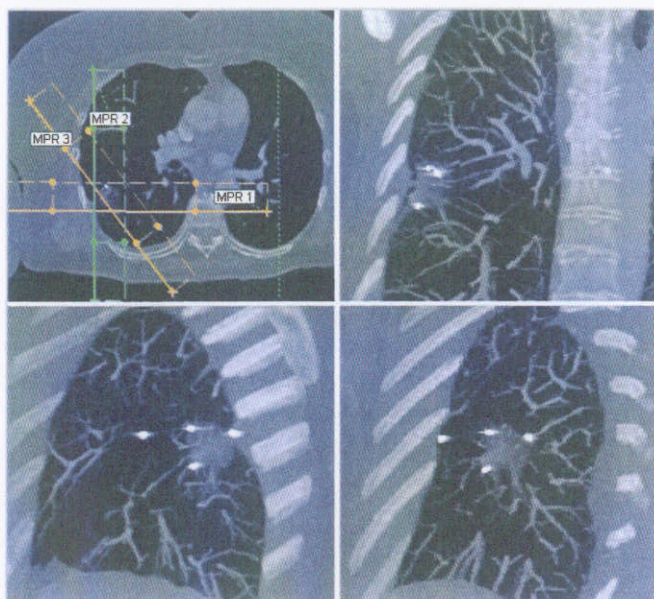
A 64-year-old female ex-heavy smoker with severe COPD and a history of Stage III NSCLC in the left upper lobe, treated with conventional radiation and chemotherapy in 1999, presented with a new 3-cm right lower lobe (RLL) ground glass opacity. CT-guided needle biopsy completed in July 2004 confirmed well-differentiated pulmonary adenocarcinoma of the bronchoalveolar type. Given this patient's complete response to treatment for her poorly differentiated adenocarcinoma five years prior, this new RLL adenocarcinoma was classified as a metachronous Stage I lung cancer. The patient's COPD had progressed since her prior radical conventional chemoradiation treatment in 1999, with a current forced expiratory volume in one second (FEV1) of 1.13 liters.

CyberKnife Treatment Rationale:

Stage I NSCLC is typically treated by primary surgical resection (lobectomy or more limited resections, such as wedge resections).^{1,2} Conventional radiation has been reserved for patients who refuse surgery or are deemed medically inoperable because of associated co-morbidities.³ This patient's severe COPD made her a poor surgical candidate.² Her significant pulmonary disease and prior conventional radiation increased the risks of treatment by conventional radiation.³ Furthermore, pretreatment fluoroscopic exam revealed substantial tumor excursion with respiration (longitudinal motion with an amplitude of 3 cm). Accounting for this degree of tumor motion would require large margins of normal tissue to be irradiated, further increasing the risks of radiation pneumonitis.³ To minimize morbidity for this high-risk patient, a viable treatment would have to target the tumor precisely and maximally spare normal lung tissue. The CyberKnife[®] equipped with the Synchrony[®] Respiratory Tracking System allows the accurate delivery of high-dose radiation to moving lung tumors, thereby minimizing harmful effects to normal surrounding tissue.⁴



Pretreatment diagnostic 3.0-mm CT sections showing the tumor and 4 implanted fiducials.



Coronal, sagittal and oblique multiplanar reformations taken from 1.0-mm planning CT showing placement of fiducials near the tumor.