

James & Esther King Biomedical Research Program

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Radiation Oncology

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2008 Program

Team Science (2-year project)

Project Title: Incorporating 3-D Lung Dynamics into Lung Radiotherapy for Non-small Cell Lung Cancer

Project Summary: Smoking accounts for 87 percent of all lung cancer deaths and with an annual incidence of more than 160,000 cases, smoking-induced lung cancer represents our greatest oncologic challenge. Non-Small Cell Lung Cancers (NSCLC) account for approximately 75-80 percent of all lung carcinoma cases. In clinical radiology, it has been hypothesized that the local failure (the inability to ablate localized tumors) of radiotherapy may be a cause for subsequent development of metastases, the spread of cancer to distant parts of the body. One of the key sources of this local failure is related to the motion of the lung tumor and its surrounding tissues during breathing. Since tobacco inhalation also leads to tissue damages, which co-occur with NSCLC, this conjunction of disease states leads to variations in these motions. This TSP is supported by three subprojects with an integrated focus in the development of model-guided radiation therapy including:

- 1) Study of smoking-induced tissue damages inside the lung and the tracheobronchial tree (Project 2).
- 2) Prediction of tumor motion and its surrounding tissues (Project 1) during radiation therapy of individual patients. For the first time, oncologists will be able to see and quantify radiation doses depositing in the process of radiotherapy.
- 3) Understand the process of metastases formation as it relates to lung radiotherapy and work towards improving the radiation treatment effectiveness (Project 3) based on data from Subproject 1.