Proton therapy and concurrent chemotherapy may reduce bone marrow toxicity in advanced lung cancer

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Patients treated for locally advanced non-small cell lung cancer who receive chemotherapy and proton beam therapy have fewer instances of bone marrow toxicity than patients who receive the standard treatment of intensity-modulated radiation (IMRT) and concurrent chemotherapy, according to researchers from The University of Texas M. D. Anderson Cancer Center.

The findings were reported today at the 2008 Chicago Multidisciplinary Symposium in Thoracic Oncology. It is the first study to examine the benefits of proton beam therapy and concurrent chemotherapy in advanced lung cancer patients.

The conventional treatment for locally advanced non-small cell lung cancer is intensity-modulated radiation with concurrent chemotherapy. The majority of lung cancer patients who receive this therapy are at risk of bone marrow toxicity, a debilitating side effect of treatment that further weakens a patient's already vulnerable immune system. The occurrence of bone marrow toxicity - the reduction of hemoglobin, neutrophils, lymphocytes and white blood cells - results in a patient's inability to withstand aggressive treatment, rendering it less effective. This condition often leads to infection, bleeding, fatigue and even death.

Researchers compared bone marrow toxicity levels in 142 patients treated for lung cancer between January 2003 and June 2008. All of the

patients received chemotherapy; IMRT was administered to 75, while 67 were treated with proton beam therapy. After 17 months, patients treated with concurrent chemotherapy and proton beam therapy experienced significantly less reduction in hemoglobin (0% vs. 4%), neutrophils (4% vs. 17%) and lymphocytes (54% vs. 87%) when compared to those treated with CT and IMRT. These differences remained when the gross tumor volume was considered.

"Our goal is to find the best way to treat the cancer without further weakening the patient," said Ritsuko Komaki, M.D., professor in M. D. Anderson's Division of Radiation Oncology and lead author on the study. "Standard care currently provides a 25 percent five-year survival rate. But as a physician, I have seen how treatment affects patients' overall health: they are tired, suffer from night sweats, are prone to infection and have to compromise their treatment. With proton therapy, we may now have an option that lessens this toxicity so that treatment dosage can be maximized."

Lung cancer is the leading cause of cancer death in the United States, according to the American Cancer Society. In 2008, approximately 215,000 people will be diagnosed with lung cancer and approximately 114,000 people will die from the disease.

Proton beam therapy ionizes cancer cells by stripping away their electrons, consequently mutating the cells' DNA so that they cannot divide and proliferate. Protons are significantly heavier than X-rays, allowing them to travel in a straight path through the body without being deflected. While radiation therapy destroys both the tumor and the healthy tissue surrounding it, proton therapy can target a tumor precisely with little damage to normal tissue.

"This study suggests that proton beam therapy may benefit patients who are extremely vulnerable to bone marrow toxicity," said James Cox,

M.D., professor and head of the Division of Radiation Oncology and the study's senior author. "Proton therapy may promise safer and more effective treatment for children, whose bone marrow is still developing, and elderly patients who are more prone to complications and cannot withstand aggressive treatment."

M. D. Anderson is currently working with Massachusetts General Hospital to enroll patients in an NCI-approved randomized prospective clinical trial to confirm these initial findings.

Source: University of Texas M. D. Anderson Cancer Center