AbstractID: 12789 Title: Secondary doses for the treatment of lung and liver cancers: IMRT vs. Proton therapy

**Purpose:** To quantify and compare the **s**econdary doses induced by advanced radiotherapy modalities, intensity-modulated radiotherapy (IMRT) and proton beam therapy (PBT), for the treatment of lung and liver cancers. **Method and Materials:** IMRT with 6 MV photon and proton beam therapy were planned for 3 lung and 3 liver cancer patients. The treatment beams were delivered to phantom and corresponding secondary doses during irradiation were measured at various points from 20 cm to 50 cm apart from the beam isocenter using ion chamber and CR-39 detectors for IMRT and PBT, respectively. **Results:** The average secondary doses of proton therapy for lung and liver cancer patients, measured 20 to 50 cm from the isocenter, ranged from 1.73 mSv/Gy to 0.86 mSv/Gy. The average secondary doses of IMRT for lung patients, however, ranged between 5.8 mSv/Gy and 1.0 mSv/Gy, approximately three times higher than for proton therapy. The average internal neutron doses of proton therapy for lung and liver cancer patients, measured 20 to 50 cm from the isocenter, ranged from 0.21 mSv/Gy to 0.08 mSv/Gy. The result shows that internal neutron dose produced by proton interaction in the body is generally much less than external neutron dose produced by proton interactions in the scattering elements of the passively modulated beam line. **Conclusion:** By a comparison between passive proton beam therapy and IMRT for diseases of lung and liver cancer, it was shown that the secondary doses using scattering mode in proton beam therapy is either significantly lower than the cases in IMRT treatment or, at least, does not exceed the secondary doses induced by conventional IMRT treatment.