

AbstractID: 1063 Title: Magnetic field in radiation therapy: Effect of charged-particle disequilibrium on dose to the lung.

In conventional RT only the perturbation on photon fluence is considered when lung tissue is present. However when small beams are used, the dose to the lung is affected by the loss of CPE. This loss in dose increases when higher photon beam energies are used. Our Monte Carlo-based work proposes a solution to overcome the loss in dose to the lung when charged-particle disequilibrium exists. The depth dose curve shows a lower dose delivered to the lung region than the dose to tissue at the same depth when a 1x1 cm beam is used. The loss in dose for a point in the middle of the lung could be as high as 30% as compared to the dose in tissue. The dose improvement ratio for a point in the middle of the lung reaches as much as 1.18 when a longitudinal magnetic field is applied. The size of the build-up region under the magnetic field decreases, with 1.0 T the dose at the interface gets closer to the maximum dose, thus the state of equilibrium is reinstated. With a 1x1 cm 15 MV photon beam, the loss in dose to the lung and at the interface is larger. This loss is removed with a 1.0 T magnetic field. The use of beamlets in IMRT and lung treatment with Stereotactic radiosurgery may yield under-dosed regions in the lung and at the interface if the loss of CPE is not taken into account.