

AbstractID: 1979 Title: PENELOPE Monte Carlo simulation of dose distribution for Stereotactic Body Radiation Therapy in anthropomorphic heterogeneous Thorax Phantom

Stereotactic body radiation therapy reproduces physical and biological aspects of the intra-cranial stereotactic radiosurgery. It features high dose per fraction prescription and minimizes volume of tissue exposed<sup>1</sup>. The proper conduct of high dose per fraction, extracranial stereotactic body radiation therapy (SBRT) requires isotropic and rapid dose fall-off to normal surrounding tissues. The shape of the iso-surface defined by the dose prescribed conforms to the outline of the target and highest doses delivered outside of the tumor are confined to regions that spread uniformly on the outer boundary of the targeted volume. To accurately evaluate the quality of the SBRT treatment plan Monte Carlo method can be applied. Monte Carlo simulation is an attractive alternative to current treatment planning algorithms<sup>2</sup> as it can avoid many limitations of traditional, semiempirical treatment planning codes<sup>2</sup>. In this paper, the Monte Carlo simulation of non co-planar irradiation of MD Anderson Anthropomorphic Heterogeneous Thorax Phantom with PENELOPE code is presented and discussed. Some limitations of source modeling that are not critical for conventional (convolution based) treatment calculations are shown to be critical for Monte Carlo approach

1. Papiez L. *et al.* 2003 *Acta Oncologica* **42** 882-894.
2. Lewis R. D. *et al.* 2000 *Phys. Med. Biol.* **45** 1755-1764