AbstractID: 1530 Title: CT based Monte Carlo (PENELOPE) treatment plan verification system for Leksell Gamma Knife stereotactic radiosurgery

Radiosurgery with Leksell Gamma Knife has emerged as an alternative treatment modality for cranial base tumors in patients with surgically high risk lesions. The Leksell Gamma Knife is accompanied by GammaPlan treatment planning system. The treatment planning algorithm implemented in GammaPlan is designed with the underlying assumption of dose being deposited in homogeneous media. The clinical data indicate that efficacy of radiosurgery remains problematic in cases when lesions are close to the area of air filled cavities in the head (nasal cavity, frontal, sphenoid, ethmoid and maxillary sinuses, auditory canal, eustachian tube or surgical cavities). It has been shown recently that air-tissue heterogeneity may have significant impact on dose distribution[1] of Leksell Gamma Knife treatments. Monte Carlo simulation of treatment plans for heterogeneous geometries defined from Computerized Tomography data of patient head constitute attractive alternative to planning limited to homogeneous media assumption that is offered by the GammaPlan. This presentation describes current status of the design and commissioning of Gamma Knife treatment planning verification system based on CT voxelized and parallelized PENELOPE Monte Carlo code.

1. Moskvin V. *et. al*. 2003 *Med. Phys.* **30** 1362 -1362