# AbstractID: 13584 Title: Dose painting by numbers based on SUV data for advanced lung tumors

Purpose: to develop a plugin with user interface for the Pinnacle TPS (Philips Medical Systems) to directly integrate SUV data obtained by PET-scanning into the optimization process for lung tumor IMRT plans.

Method and Materials: A plugin generating a grid with the prescribed dose per voxel was developed. The prescribed dose values are based on the underlying SUV data per voxel, not on contours. Various user-defined functions can be used to give the relation between SUV data and prescribed dose. New objective functions were generated to calculate a cost based on the voxel-by-voxel difference between the actual dose distribution and the prescribed dose distribution. During the IMRT optimization these (biological) objective functions are used in conjunction with conventional dose volume objectives process. Further tools were developed to create a SUV-Volume Histogram, showing the SUV distribution in any ROI, and to visualize the quality of the resulting plan by showing the distribution of the voxel-by-voxel differences between prescribed and actual dose distribution.

Results: With the plugin SUV-based dose prescriptions were made. After optimization with the plugin, which took only several minutes per plan, plans were evaluated with the newly devised tools. Optimization resulted in doses to regions with high SUV of typically 130% - 200% of the current clinical dose. Mean lung dose and other dose objectives, which were unaltered from standard IMRT optimization, were met for all plans.

Conclusion: A plugin was developed enabling us to steer the dose within the lung GTV based on the underlying SUV distribution. Using these tools we were able to boost voxels with high SUV up to a dose level of up to 200% of the current clinical dose with only very limited dose increase to the normal structures as lung and spine.

Conflict of Interest: Research sponsored by Philips Medical Systems