Assessing the effect of inter-fractional motion in Esophageal sparing plans

Seven thoracic patients were used. From each patient, a standard and sparing plan was used. The treatment planning system used was Pinnacle. These plans were generated using an in-house autoplanning system.

We used a python method to sample a normal distribution using two different standard deviations. Simulations consisted of a single selection of this distribution carried throughout treatment as well as a random selection for each of the 37 fractions. Dose was accumulated and statistics calculated on a binary mask of the ROI structure. Translation did not favor any direction, yet the data showed that dose statistics were reduced in the simulated treatments.

Maximum dose to esophagus generated from the simulated treatment courses distributed normally about a mean value. Length of esophagus treated to greater than 60 Gy for the total circumference was distributed abnormally with a long tail favoring the shorter lengths.

We hope this simulation tool may clarify the benefit to the patient in realized dose.

Figure 1: Example Distributions using standard plan on single patient. Plan reported values for maximum dose and LETT60 are identified by the vertical red line.