# AbstractID: 4388 Title: Assessing influence of motion in non-gated and gated DMLC-IMRT delivery using measured fluence fields for dose reconstruction

**Purpose:** Recalculating dose distributions using measured IMRT fluence fields imported into the treatment planning system (TPS) to evaluate breathing synchronized irradiation.

**Method and Materials:** DMLC-IMRT fluence patterns acquired on radiographic film, generated in non-gated and gated mode, have been imported into the TPS. The effect of dose blurring and the efficacy of a breathing synchronized irradiation technique have been evaluated using radiographic film mounted to a phantom simulating a breathing pattern of 16 cycles/min and 4cm amplitude. Two situations have been investigated: (a) A spherical lesion located close to the diaphragm assessing the influence of motion on the dose to the target volume and the gastro-intestinal tract. (b) A mediastinal lesion requiring complicated fluence patterns.

**Results:** Disturbed dose reconstructions have been observed in case of the non-gated delivery with the phantom in motion (both orthogonal and parallel to the leaf direction), whereas the measurements from the static and gated deliveries showed good agreement with the theoretical dose distribution. These findings were confirmed by dose-volume histograms, tumor control probabilities (comparable for the original, static and gated measurements; reduced with a factor 2 for the in-motion-non-gated delivery), conformity index, and dose heterogeneity values (increased with a factor 3 to 6 when motion was induced; comparable values between the theoretical, static and gated situations). The normal tissue complication probability was affected to a lesser degree. The breathing synchronization technique introduced an increased treatment time by a factor 3 to 4.

**Conclusion:** The use of measured fluence fields, delivered in non-gated and gated mode, in the TPS is an interesting QA-tool to assess the clinical impact of dose blurring, as well as the potential of breathing synchronization to resolve this issue.

**Conflict of Interest:** Part of this work has been supported by BrainLAB AG