

AbstractID: 10221 Title: Evaluation of superficial dose for helical tomotherapy with GAFCHROMIC® EBT film

**Purpose:** To measure the surface dose using EBT films for helical tomotherapy. **Materials and methods:** A cylindrical solid water phantom was scanned on a Siemens Somatom CT scanner with 3mm slice thickness. Four types of tomotherapy plans were studied: 1. The PTV touching the surface, planned and treated with different thicknesses of bolus (0,3,5,8 and 10mm), 2. Same as first, but treated without the bolus, 3. The PTV extended by 5mm outside the surface, planned and treated with and without a 10mm bolus, and 4. The PTV withdrawn from the surface by 3mm to 5mm, planned and treated without bolus. For each case, a plan was created to deliver 2Gy to 95% of the PTV per fraction. Gafchromic EBT films were used to measure the surface and the target doses. We also measured the surface doses of five clinical patients to verify the phantom study results. **Results:** For type 1 cases, when planned and treated without the bolus, the surface dose was about 65% of the prescribed dose; when different thicknesses of bolus were used, the surface doses were slightly higher than the prescribed dose. For type 2 cases, the surface dose decreased by about 40% to 45% of the prescribed dose, whereas the dose to the rest of PTV only increased by less than 3%. For type 3 cases, the surface doses were similar to the other cases with and without the bolus. For type 4 cases, the surface dose decreased by about 40% relative to the prescribed dose. **Conclusion:** When the PTV touches the surface, using bolus to ensure sufficient dose coverage of the tumor volume is recommended. Conversely, when the target volume is withdrawn from the surface, adequate tumor coverage can be achieved without bolus while reducing the surface dose by about 40% to 45%.