AbstractID: 84 Title: A comparison of head scatter factors for fields defined by MLC and head scatter factors defined by photon jaws, and their effect on MU calculations for IMRT

The delivery of IMRT beams may be accomplished by step-and-shoot or sliding window techniques, both of which use MLC. In either technique, the accuracy for IMRT planning and delivery critically depends on adequate accounting of the various effects associated with the MLC. One of these effects is that head scatter factors for fields defined by MLC, $S_{h,MLC}$, may be different from head scatter factors for fields defined by photon jaws (X and Y jaws), $S_{h,jaws}$, particularly for small fields.

We have measured two sets of head scatter factors, $S_{h,MLC}$ and $S_{h,jaws}$, for 6 and 10 MV beams from a Varian 2100CD machine. For small fields (≤ 5 cm^2), $S_{h,MLC}$ is 3 – 4 % larger than $S_{h,jaws}$ for the same field size. A Philips Pinnacle treatment planning system was used to calculate MUs for identical step-and-shoot IMRT plans using both sets of head scatter factors. Results indicate that the differences between MUs calculated using $S_{h,MLC}$ and those calculated using $S_{h,jaws}$ are about 3%. In point dose measurements with an ion chamber for IMRT-QA, the measured doses were systematically 3-4% higher than the doses calculated using $S_{h,jaws}$ factors. This systematic error was eliminated when $S_{h,MLC}$ factors were used.

We believe that, in order to increase the accuracy in IMRT planning and delivery, it will be necessary for treatment planning systems to use head scatter factors for fields defined by the MLC to calculate dose and dose distribution.