

## 1. Introduction

Intensity modulated radiation therapy (IMRT) and volumetric modulated arc therapy (VMAT) are in use to deliver conformal dose with the use of multileaf collimators (MLCs). Dose is delivered by the complex motion of the MLC. The magnitude of the complexity of the dynamic MLC motion depends on the location of the target and the organs at risk. The Eclipse treatment planning system (TPS) (Varian Medical Systems, Palo Alto, CA) must model complex motions of the MLC to deliver the intended dose according to the prescribed dose constraints. It is important to model accurately the MLC characteristics defined in the TPS, such as the dosimetric leaf gap (DLG), in order to deliver the correct dose to patients (Figure 1).

Varian linear accelerators have rounded MLC leaf ends to achieve better off-axis dosimetric properties. Some radiation passes between the leaves, even through completely closed leaf pairs. The TPS approximates the MLC as straight edged and takes into account the actual rounded leaf tip transmission by pulling the leaf tip back by half the value of the DLG during optimization and dose calculation so the modeled gap between the fully closed leaf pair equals the DLG.

The aim of this study was to compare dosimetric leaf gap (DLG) for two Varian TrueBeam linear accelerators.

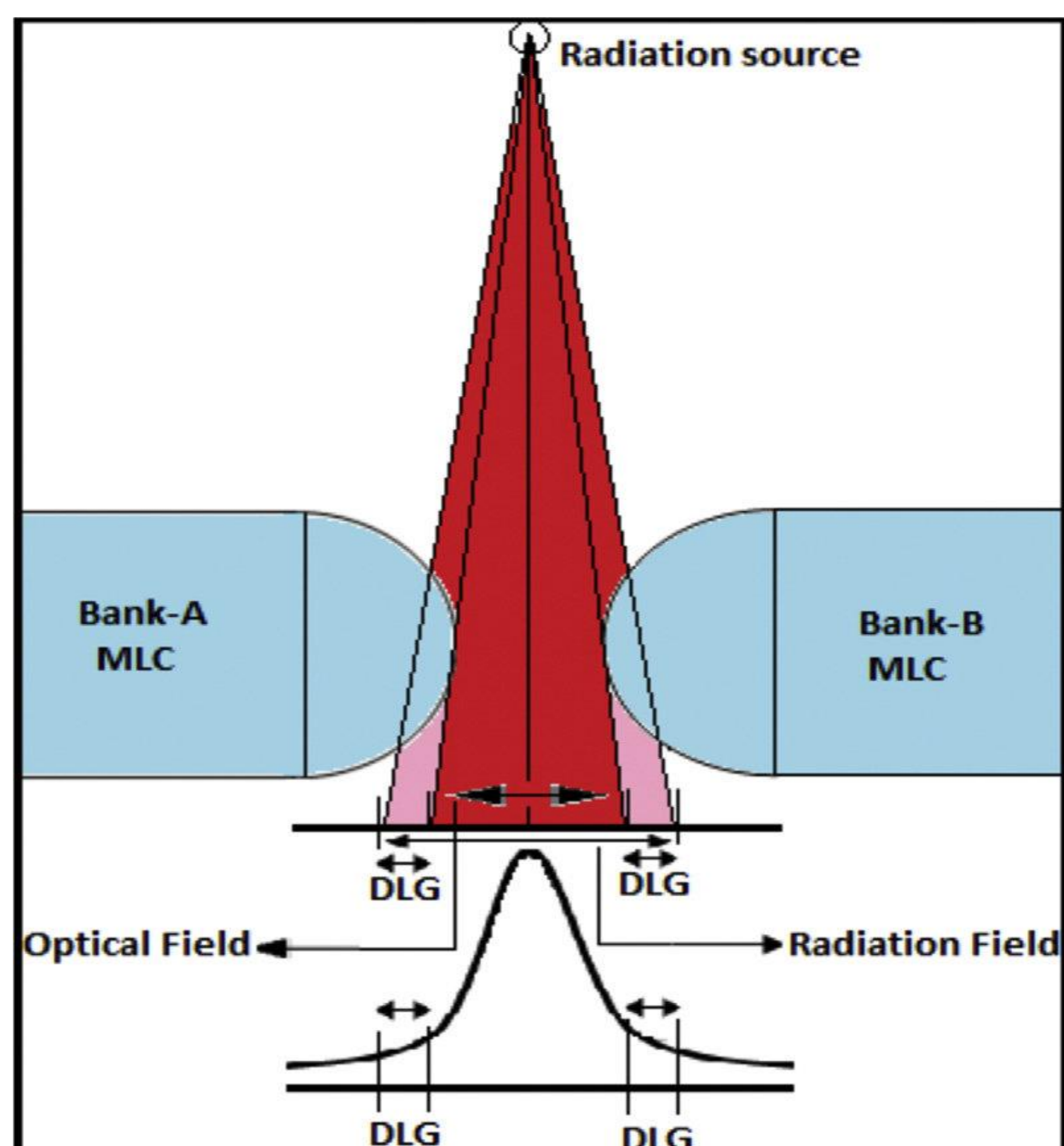


Figure 1 Transmission through the rounded end of MLC leaf illustrating that both the optical field size and DLG constitute a radiation field.

## 2. Material and Methods

The DLG values for 6 MV photon beam were measured on two Varian TrueBeam linear accelerators (Varian Medical Systems, Palo Alto, CA) equipped with Millennium 120 MLC. Measurements were performed with a Farmer-type ion chamber.

## 3. Results

DLG parameters for TrueBeam 1 and TrueBeam 2 are presented in the table 1.

Table 1. Dosimetric leaf gap (DLG) for two TrueBeam linear accelerators

	DLG [cm]				
Beam energy	6MV	10MV	16MV	6FFF	10FFF
TrueBeam 1	1.45	1.61	1.62	1.33	1.57
TrueBeam 2	1.5	1.64	1.61	1.366	1.56

## 4. Conclusion

The DLG is used in the Varian Eclipse treatment planning system as an approximation factor to reduce the dosimetric calculation uncertainty arising from the use of a simple MLC model with straight leaf ends. Results of the DLG in this study are showing that the difference in the calculation uncertainty will be less than 3% for two machines.

## References

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