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**DOSIMETRIC AND CLINICAL CHARACTERISTICS
OF MULTI-LEAF COLLIMATOR IN RADIATION THERAPY**

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ABSTRACT

DOSIMETRIC AND CLINICAL CHARACTERISTICS OF MULTI-LEAF COLLIMATOR IN RADIATION THERAPY

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The role of Multi Leaf Collimator (MLC) has changed rapidly in recent year for the treatment techniques of Three Dimensional Conformal Radiation Therapy (3D-CRT) and Intensity Modulated Radiation Therapy (IMRT) since its entry was to replace the customized alloy shielding blocks. In some clinical cases, large area of extended leaves are used without jaws and also MLCs are used instead of jaws. However, most of the beam characteristics of MLCs are not similar to jaws. Therefore, the dosimetric and clinical analysis was carried out for three field defining methods of MLC only, JAW only and JAW+MLC. The parameters such as percentage surface dose, buildup region, penumbra width, dosimetric field width, quality index, absolute output, total scatter factor, percentage of transmission were measured for 2300C/D Varian linear accelerator with millennium 80 leaves MLC using radiation field analyser, 0.125cc/0.6cc ionization chamber with electrometer and compared with varying field sizes of 6 MV and 15 MV photon beams. The variation of surface dose with MLC only field for 6 MV is 15.1% and 20.6% for 15 MV from small to large field sizes. Penumbra for MLC only field is about 1mm higher than the other two fields. Inline Collimator 90° setup shows an overall increase in the penumbra widths compared to cross line Collimator 0° setup for each field defining methods. The percentage of transmission through carriages is <1.5%. however, there is no significant difference in the above discussed parameters between JAW and JAW+MLC fields. With improving radiotherapy techniques, the function of the MLC is critical and complex. Therefore, it is necessary to verify the parameters of MLC periodically by following the quality assurance surveillance protocols. Mechanical and dosimetric dynamic MLC (dMLC) quality assurance tests carried out for this machine is well within

the tolerance limits. Pre-treatment clinical evaluation was done for a dMLC IMRT plan using independent dose verification and Gamma analysis which gives the details of comparative profile analysis of planned and delivered dose and Distance To Agreement (DTA) for dMLC.