

Multileaf collimator (MLC) is widely used dose delivery device for intensity-modulated radiation therapy (IMRT). The MLC is convenient to use and to adjust the field shape and beam fluence. However, there are some limitations to improve. One of them is longer beam-on time. As beam-on time is longer, patient's integrated dose is unnecessarily increased because of inter-leaf leakage. In this study, a new concept of MLC (dual-layer MLC) was proposed to solve this limitation in the aspects of total delivery intensity or monitor unit. The dual MLC consists of independently movable two MLC layers; upper and lower. Their thicknesses are 1 half value layer (HVL) for upper MLC and 5 HVL for lower. The initial intensity (I) of photon beam is attenuated half intensity ($0.5I$) if the beam is passing through the upper MLC only. Therefore the intensities are able to be delivered three steps; 0, 0.5, and 1. The sequencing algorithm was modified to dual-layer MLC in step and shot technique. To evaluate the usefulness of a new concept, the total delivery intensity and number of segments were compared with conventional MLC with by three field sizes (5x5, 10x10, 15x15, and 20x20) and four intensity levels (5, 8, 10, and 16). 10000 intensity maps were randomly created for each field size and intensity level. As a result, the total delivery intensity was reduced by 9% to 22% in all field size and number of segment was reduced by 25% to 45%. The unnecessary patient's dose is reduced effectively with dual-layer MLC because the required total delivery intensity was successfully reduced. The treatment time is also reduced.