

In radiation therapy, the peripheral dose, or dose outside the field edges, is important when anatomical structures with very low dose tolerances, such as the fetus in a pregnant patient, might be involved. Two of the main sources of peripheral dose, leakage from the treatment head and scatter from secondary collimators and beam modifiers, depend on the configuration of the linac treatment head. This study investigates the effect of a multileaf collimator (MLC) on the peripheral dose.

Peripheral dose was measured for 6 and 18 MV photon beams from a Varian Clinac 2100C with retrofit MLC. The MLC was configured both with leaves fully retracted and with leaves positioned at the field edges ("leaves in"). Comparative measurements for 6 MV from a Varian Clinac 600C without MLC were also made. Measurements were made for two field sizes at two depths. Diode detectors in solid phantom material were placed on the central axis and at various distances from the field edge defined by the lower collimator jaw. Peripheral dose was determined as a percentage of the central axis dose. The measured peripheral doses for the 6 MV beams with MLC leaves retracted and with no MLC were similar and agreed well with published values. A large difference, however, was seen at both energies between the MLC leaves in and leaves retracted configurations. Bringing the MLC leaves in decreased the peripheral dose by 6-50%, most likely due to absorption by the leaves of scatter from the collimator jaws.