

### **Quality assurance of dynamic arc multileaf collimator**

Dynamic arc intensity modulated radiation therapy (IMRT) is a variant of IMRT that delivers a sequence of continuously changing multileaf-collimator shaped fields during one or more arcs of the treatment gantry. Accurate and precise quality assurance of dynamic arc IMRT is important because of its inherently complex nature. If gantry angles and leaf positions are mismatched during the simultaneous changes in beam directions and leaf positions, the chances are significantly increased that high-dose volumes might miss the target and be placed in critical organs. Consequently quality control for dynamic arc IMRT should be more stringent than quality control for fixed gantry angle IMRT. The literature contains few reports on the development and investigation of quality control for dynamic arc IMRT. A dynamic multileaf collimator (DMLC, Varian Medical Systems, Palo Alto, CA) was used that has the capability both to generate IMRT fields for static gantry angle delivery and to deliver dynamic arcs. We have designed and tested a series of routine QA methods that are simple and practical. Two dynamic arc IMRT patterns were designed to verify the mechanical accuracy of treatment delivery, and to check the coincidence of gantry angle with delivered monitor units. A water equivalent plastic phantom, film, and a film dosimetry system were used to record the cumulative dose in a plane. The technique could detect leaf position errors of less than 2mm, gantry angle errors of less than  $2^\circ$ , and monitor unit errors of less than 5%.