

Because of the advantages of rotational techniques, conventional IMRT will soon become obsolete

Richard Popple, Ph.D.

C. Yu, 1995

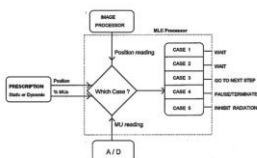


Figure 2. An illustration of the data processing system used by the MLC controller during dynamic beam delivery.

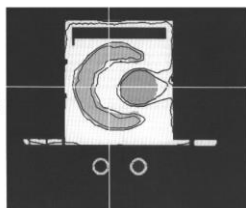


Figure 3. A treatment plan example used for the delivery of intensity modulated arc therapy. The isodose distribution is overlaid on the maximum dose receiving from the optimization as superimposed on one CT slice of the neck phantom. The lower and upper contour contours in the Cranial stage are 90% and 95% respectively. The lower and upper contour contours in the anterior critical structure are 95% and 50% respectively. The dark strip near the top of the phantom is a water spacer.

typical IMAT treatment can be delivered in 20 min or less with current technology.

K. Otto, 2008

In particular, the VMAT technique is designed so that optimized plans may be delivered:

- (1) Efficiently, in a single gantry arc
- (2) With high dose conformity, using a full 360 deg range of gantry directions
- (3) Accurately, with high-resolution sampling of beam directions during planning.

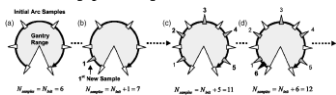


Fig. 1. Continuous source and MLC motion is initially modeled as a series of static source positions in (a). As the optimization progresses new samples are introduced with the first new sample placed between the first and second existing samples in (b). Further samples are added in (c) to open the full range of gantry motion. The next sample is added at the beginning of the gantry range in (d). Samples are continuously added in this way until a desired sampling frequency is reached.

Dynamic universal wedge

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Shaping of arbitrary dose distributions by dynamic multileaf collimation

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FusionArc optimization: A hybrid volumetric modulated arc therapy (VMAT) and intensity modulated radiation therapy (IMRT) planning strategy
 Martha M. Matuszak et al.

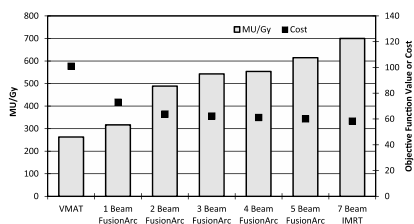


FIG. 7. Plan quality (cost) and efficiency (MU/Gy) for FusionArc plans of increasing modulation for the TG-119 prostate phantom.



Trajectory modulated arc therapy

Trajectory modulated prone breast irradiation: A LINAC-based technique combining intensity modulated delivery and motion of the couch

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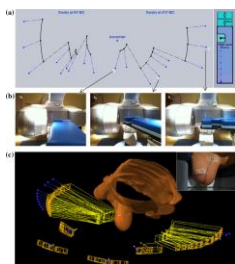


Fig. 3. (a) View of the treatment geometry (blue) overlaid from the top looking down (red) (blue lines indicate modulated trajectory as represented by the target position, dashed blue lines indicate respiratory control points, red/dark blue lines represent the couch trajectories); (b) Experimental implementation (c) 3D beam geometry overlaid from the isocenter to an obese patient in the setup.



Statistical process control analysis for patient-specific IMRT and VMAT QA

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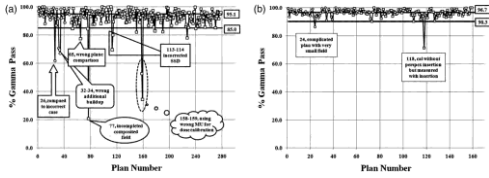


Fig. 3. Individual (X) control chart of % gamma pass of patient-specific (a) IMRT QA and (b) VMAT QA for nasopharyngeal carcinoma plans with center line (CL) and lower control limit (LCL). The open circle sign represents the calculated points of the control limits (without systematic error points), while the open square points are the data points of the remaining IMRT QA results.

