Purpose:
To develop a software package that compares plan parameters to delivered parameters for each control point of any dynamic treatment with MLCs for VARIAN Linacs. When the resulting difference is above a pre-set threshold, the Linac is prompted to shut-off the beam.

Methods:
IMRT, RapidArc, and multi-control point sample patient plans were created and delivered using a Trilogy unit. During beam delivery MLC leaf positions, gantry angles, and MU information are recorded into a dynalog file after every control point. A software package was developed to read in these log files for each control point and compare with the original plan parameters which were transmitted through an independent path to the verification computer. In the event of a discrepancy beyond pre-set thresholds, a signal will be sent to the CLINAC to shut-off the beam. The delivery data is used to create a single control point DICOM plan. This plan is uploaded to the treatment planning system, and dose for that control point recalculated. The planned and delivered 3D isodose maps for each control point in near real time are created and 3D dosimetric difference plots and 3D gamma analysis plots are generated.

Results:
We have validated the effectiveness of our package by detecting a 5 mm shift of a single MLC leaf for a single control point corresponding only to a 1 cGy change. We also demonstrated the capability of setting beam off thresholds at multiple stages; based on mechanical parameter differences between planed and delivered (in approx. 5 sec.), 3D dose differences, and dosimetric 3D gamma values (approx. 10 sec. later).

Conclusions:
We have developed a software package that ensures patient safety in Radiation therapy delivery. Real time tools are given at the treatment console to shut-off the beam in the event of a possible mistreatment.

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None