AbstractID: 2982 Title: Pixel-based dead time correction for aS500 EPID IMRT dosimetry

Purpose:
Recently, aS500 EPID has been increasingly used for IMRT dose verification.   However, due to its system design, aS500 EPID has a dead time problem when acquiring accumulated dose, which will yield an error close to 4%. The main purpose of this study is to develop a pixel based dead time correction method for aS500 EPID.

Method and Materials:
The correction is achieved by a Matlab program which first decodes a MLC DVA file to provide leaf sequence information; and then corrects the accumulated pixel value for individual pixel based on the correlation between the leaf sequence and the time of dead time occurrence. By geometrically matching leaf-end location and individual pixel position when dead time occurs, we can identify the impacted pixels and estimate the relative percentage of the 'missing' data. Measurements of film dosimetry, EPID dosimetry with and without dead time correction are used to evaluate its effect for IMRT fields.

Results: Applying this dead time correction, better agreement between EPID dosimetry and film dosimetry is obtained. However, the effect of dead time correction is different case by case, depends on the delivery time, MLC leaf sequence, and the total EPID signal of the IMRT field. In this study, the max correction is up to 4%.

Conclusion: Missing dose signal caused by dead time can be successfully corrected by pixel-base dead time correction method.

Conflict of Interest (only if applicable):