

AbstractID: 10437 Title: Dosimetry study on an amorphous silicon electronic portal imaging device(a-Si EPID)

**Purpose:** To present exploratory research on the dosimetry of an amorphous silicon electronic portal imaging device(a-Si EPID), and develop a software tool.

**Method and Materials:** Based on MATLAB language, over 30 special functions are programmed with more than 3000 lines' code, and an in-house software tool is developed to achieve the following functions: to read and write, process, analyze, show and chart the data. Varian 21EX Linac's PV aS500 a-Si EPID is studied, the dose images from treatment planning system (TPS) and EPID are exported and read in ASCII, and the data's characteristics are analyzed. Based on some hypothesis, the relations between EPID value (EV) and monitor unit (MU) or EPID dose (ED) are developed. The dose calibration curves of the EPID are established, and the errors of curves are analyzed. The images of the EPID and TPS are spatial registered and scaled. Distance to agreement (DTA) analysis is applied to the EPID's dosimetric verification. Based on the above study, comparing to MapCheck, the EPID is used to do clinical dosimetric verification. One prostate cancer patient and one nasopharyngeal carcinoma (NPC) patient are selected to design some plans using 3 dimension conformal radiation therapy (3DCRT) and intensity modulated radiation therapy (IMRT) techniques.

**Results:** The result of EPID is not as good as MapCheck. To get the similar pass rate, the DTA error criterion of MapCheck is better than EPID by one or two levels, which is possibly caused by EPID's narrow penumbra and the errors from the algorithms of spatial registration and DTA in this study.

**Conclusion:** Although the current preliminary result is not good as expected, the study lays the foundations for the next step to dosimetry research of the a-Si EPID.