

AbstractID: 8196 Title: Title: Performance optimization of the integrated acquisition mode (synchronised and not synchronised to beam pulses) of the Varian aS500-II, EPID.

Purpose: To better understand the image acquisition operation of an EPID and to evaluate the dosimeter properties in conformational radiotherapy and in treatments with enhanced dynamic wedges. **Method and Materials:** The Work presented rests on the study of the Varian EPID: aS500-II and the Image Acquisition system IAS3. We are interested in integrated image acquisition mode. From a functional point of view, in this mode, the frame acquisition either is synchronized, or not synchronized to the beam pulses of the accelerator. We investigated the influence of various parameters of acquisition: "NPF (Number of Pulse by Frame), NRP (Number of Rows per Pulse) and FCT (Frame Cycle Time)" on the gray level, the speed of acquisition and the noise in the image, according to the energy of the X-ray beams (6 and 15 MV) and the Clinac 2100 C/D dose rate. **Results:** In synchronized mode, the response of the EPID is dependent on the pulse frequency of the accelerator. The value of the pixel is proportional to the number of pulses per frame; the increase in the dose rate introduces a deceleration of the variation of gray level and instability of the response. The speed of acquisition is inversely proportional to the number of pulse per frame and the noise lies between 0.2% and 0.5%. A dysfunction and saturation are detected when the dose per frame exceeds 1.53 UM/frame. In the integrated mode not synchronized to beam pulses, only one parameter the "FCT" influences the pixel value. The pixel value is directly proportional to this parameter. We determined the rules to avoid saturation in the two acquisition modes. **Conclusion:** The choice of the acquisition parameters in the integrated mode is essential for the complete detection of radiations and especially to use this detector as a dosimeter.