

Purpose: To evaluate the x-ray output stability of the Xofig Axxent[®] Electronic Brachytherapy System while delivering simulated intraoperative radiation treatments to a phantom at a rate of four 50 minute treatments per day. **Method and Materials:** A balloon applicator was inflated in a 4.4 cm diameter spherical lumpectomy cavity within an acrylic 'breast' on a supine female torso phantom. Single fraction radiation treatments were delivered to 4 'patients' per day on each of 5 days using one x-ray source per day. Per standard procedure, air kerma strength was measured prior to each fraction with a calibrated well chamber then dose delivery time was automatically adjusted to account for this source strength. During each treatment, exposure rate was monitored using a calibrated Victoreen Model 451B ion chamber survey meter positioned below the phantom. Readings were downloaded at 1 second intervals to a spreadsheet. These data were analyzed to determine source stability. **Results:** Four simulated treatments were delivered each day with an average treatment of 50 minutes and an average of 40 minutes between treatments. One source per day was used so each had a cumulative operating time of approximately 205 minutes including turn-on and calibration time. A typical breast IORT treatment takes about 20 minutes (15 Gy to 1 cm in tissue) so this expanded treatment schedule was selected to challenge both the source and power supply. Exposure rates ranged from 0.04 to 1.85 R/h. Standard deviations were calculated from average exposure rates for each dwell position; the SD varied from 0.57% to 0.85% with an average of 0.72%. **Conclusions:** The Axxent[®] Electronic Brachytherapy System performed stably during simulated IORT treatments using worst-case conditions. X-ray source output stability was demonstrated to be better than 1% over treatment times of 50 minutes.

Research sponsored by Xofig, Inc.