X-ray Transmission of Vaginal Cylinders for Use with the AxXent® Electronic Brachytherapy System

H. Hausen, L. Kelley, T. Lovoi, L. Mantese, T. Rusch, Xoft, Inc., Sunnyvale, CA

INTRODUCTION

Vaginal cylinders are commonly used for irradiation of the vagina following radical hysterectomy. During an extended time period, this treatment modality is associated with normal vaginal cylinder use; consequently, a component of the test protocol involved an environmental exposure.

METHODS

• The X-ray source was a miniature X-ray source, shown in Figure 2, operating at 50 kVp is used to deliver accelerated partial breast irradiation (APBI) for breast cancer patients. The X-ray transmission measurement was performed at the prescription point 5 mm from the applicator surface using Varian BrachyVision™.

The average dose was determined from measurements taken at 500 microsecond intervals for 30 seconds using a PTW Unidos radiation measurement system. Measurements were made with the applicator in place; then, with the fixture remaining in the water bath, the applicator was removed, and a dose in water measurement was performed for direct comparison.

RESULTS

• The average x-ray transmission values and standard deviations for each applicator diameter are shown in Figure 3.

The error bars represent one standard deviation from the mean. As can be seen, the average x-ray transmission values are in the range of 94.3% to 95.0% through 10 extended cycles of environmental challenge with standard deviations less than 1%.

• The average x-ray transmission values and standard deviations for each applicator diameter are shown in Figure 4.

In a separate study the delivered doses from the AxXent applicator using the Xoft Axxent Electronic Brachytherapy System (Axxent, Sunnyvale, CA) were found to be equivalent to those of the Axxent balloon applicators associated with normal vaginal cylinder use.

CONCLUSION

• The average x-ray transmission values and standard deviations for each applicator diameter are shown in Figure 4.

These values are well within the design requirement of 94±5% and indicate the suitability of this vaginal cylinder design for use with the AxXent Electronic Brachytherapy System.

Funding provided by Xoft, Inc., Sunnyvale, CA