**INTRODUCTION**

- Vaginal brachytherapy is commonly used for the treatment of cervical and endometrial cancers. It is a type of radiation therapy that delivers a high dose of radiation directly to the cancerous area while minimizing the amount of radiation exposure to surrounding healthy tissues. The Axxent X-ray Source, developed by Xoft, Inc., is a miniature X-ray source that provides high-dose rate (HDR) treatment with low energy X-rays. This system is designed to be used in the treatment of early stage endometrial cancer following hysterectomy.

**METHODS**

- A simulated treatment planning was performed using the Varian BrachyVision software. The simulated treatment was planned with the Axxent X-ray Source, which has been cleared by the FDA. Four sizes of applicators were used: 10 mm, 30 mm, 40 mm, and 50 mm. The rigid cylinders are made of medical-grade polymers with near-water-equivalent characteristics and were designed to have a 94 ± 5% homogeneity.

- During 100 cycles of simulated patient treatment, X-ray transmission was shown to be constant to within ±5%. The applicator and a 5" square of GAFChromic EBT film were used to deliver the simulated treatment in a water phantom. The simulated isodose contours were compared to the planned isodose contours to evaluate the agreement between the planned and delivered treatments.

- Further image processing quantified the agreement by extracting dose values along each isodose curve.

**RESULTS**

- The 30 mm applicator was used to deliver the simulated treatment to a water phantom. The isodose mask was multiplied by the calibrated film image, resulting in a new image with dose exposure values only. The isodose-line plot was transformed into an image matching the 5" spatial extent and 150 pixels per inch of the scanned film.

- The treatment consisted of a series of dwell times along the central axis of the applicator. Treatment time was under 7 minutes.

- The delivered doses as measured by radiochromic film exposure in a plane parallel to the applicator axis were found to be constant along plan isodose contours with standard deviations of about 5 to 6% (2 sigma). The error budget for the system allows up to 20% 2 sigma error.

- Ionization chamber data showed that absolute dose values in three runs with each applicator were within 3% (2 sigma) of each other.

- Similar results were seen with the 35 mm applicator. Visual comparison of isodose contours from the BrachyVision treatment plan showed qualitative very good agreement of the delivered treatment with the plan.

**CONCLUSION**

- The Axxent X-ray Source is a non-radioactive source that can be used for high-dose rate brachytherapy treatment. It provides a flexible and convenient solution for brachytherapy treatment, particularly in the treatment of early stage endometrial cancer following hysterectomy.