Radiation Monitoring by Mail (UWRMM) program, a division of the University of Wisconsin Medical Radiation Research Center (UWMRRC) has developed a simple service based upon thermoluminescent dosimeters (TLD) for determination of in-vivo exit dose from APBI treatments.

**BACKGROUND**

APBI has become an increasingly popular post-lumpectomy radiotherapy option for a number of reasons. Typical whole-breast fractionated radiotherapy delivers 45 – 50 Gy over the course of 5-6 weeks, whereas APBI delivers 32-34 Gy over the course of 5 days (CA Cancer J. Clin., 52, 277-300, 2002). Clinical data indicate that disease recurrence may be limited to a 1-2 cm margin surrounding the lumpectomy cavity. Thus, APBI targets only breast tissue with the greatest risk of recurrence. Several types of applicators have been developed which utilize different numbers of source channels in a variety of geometries to provide dose-shaping capabilities.

A number of post-radiation effects have been reported for APBI. These include erythema, hyperpigmentation, dry desquamation, moist desquamation, edema, blisters, telangiectasia, ulceration and cellulitis. While most of these effects are temporary, reduction or elimination of any adverse skin effects is preferred. Monitoring of the exit dose for APBI is important to correlate radiation-induced effects with the skin dose.

TPS-based dosimetry estimates associated with APBI generally assume a homogeneous water environment surrounding the breast. This is not the case in clinical practice and may result in an overestimation of exit skin dose. A recent study by the UWMRRC indicates that TPS overestimates skin dose by an average of 16%.

**METHOD**

The UW Radiation Monitoring by Mail (RMM) program has instituted a new service using TLDs, to monitor exit skin dose for $^{192}$Ir APBI. For each treatment fraction, TLDs are placed on the breast at the estimated point of maximum skin dose. During the treatment cycle, calibration TLDs are exposed at the UWMRRC to the prescription dose with either $^{137}$Cs or $^{60}$Co. Once returned to RMM, the patient TLDs are analyzed and dose to water at the center of the TLD is determined with an uncertainty of +/- 4.8% at the k=2 level.

Investigation is ongoing for additional treatment modalities including the Xoft Axxent(R) APBI system.