amounts of fluid/fibrotic composition. Such differences may result in under-coverage of the US defined PTV in treatment plans where planned seed positions are based only on the CT defined PTV. Differences in seroma visualization between US and CT can also impact seed placement when adapting a CT-based plan to an US-guided procedure. Implementing US into the planning procedure may substantially reduce these uncertainties in planning and delivery.

PP18 Presentation Time: 4:45 PM
Long-Term Outcome of Accelerated Partial Breast Irradiation Using Multi-Lumen Applicators in the Setting of Breast Augmentation
Mani Akhtari, MD, Edgardo Rodriguez, PhD, Ramiro Pino, PhD, Bin S. Teh, MD; 3Radiation Oncology, University of Texas Medical Branch, Galveston, TX, USA; 3Radiation Oncology, The Methodist Hospital, Cancer Center and Research Institute, Houston, TX, USA.

Purpose: The aim of this study was to report the experience with accelerated partial breast irradiation (APBI) using multi-lumen applicators in the setting of augmentation breast implants.

Materials and Methods: We report the treatment and outcome of 7 consecutive patients with existing breast implants treated at our institution between 2009 to 2013 using APBI. Two patients were treated using the Contura® device and five using SAVI®. Their histology consisted of ductal carcinoma in situ or invasive ductal carcinoma, all women were estrogen and progesterone receptor positive, HER2-neu negative and status post lumpectomy. Pathologic staging ranged from T1N0M0 to T1cN0M0. All patients were treated over the course of five days twice daily to a dose of 34 Gy using a high-dose-rate Iridium192 source.

Results: The average volume of the planning target for evaluation (PTV_EVAL) amongst our patients was 55.9 cc. The mean percentage of the PTV_EVAL volume receiving 90%, 95%, and 100% of the prescribed dose was 97.7%, 95.9%, and 93.1% respectively. The average total breast implant volume was 279.3 cc and received an average mean dose of 12.1 Gy and a maximum dose of 79.56 Gy. The average percentage of breast implant volume receiving 50%, 75%, 100% and 200% of the prescribed dose was 15.6%, 7.03%, 4.6%, 1.58%, and 0.46% respectively. Maximum skin dose was 106.72% of the prescribed dose. With a mean follow-up of 27 months, all patients have been cancer free. Five patients had a Harvard/NSABB/RTOG breast cosmesis score of 1 or excellent, one patient had a score of 2 or good, and one had a score of 3 or fair for obvious difference in the size and shape of the treated breast. Based on the RTOG late radiation morbidity schema, three patients had a score of 0, three had a score of 1, and one had a score of 2. One of the patients had to undergo replacement of bilateral breast implants due to age-related leakage but the remainder of the implants remained intact.

Conclusions: APBI using a multi-lumen applicator in patients with existing breast implants can safely be performed with excellent long-term cosmetic outcomes. The dosimetric data reported based on our institutional experience can act as a baseline to be met in the treatment of future patients with breast implants who are undergoing APBI treatment.

PP19 Presentation Time: 4:00 PM
Dosimetric and Radiobiological Comparison of Plaque Brachytherapy and Gamma Knife Radiosurgery for Choroidal Melanoma
Daniel Gorovets, MD, Nolan Gagne, PhD, Christopher Melhus, PhD; Radiation Oncology, Tufts Medical Center, Boston, MA, USA.

Purpose: Plaque brachytherapy (BT) and Gamma Knife radiosurgery (GKRS) are common treatment options for choroidal melanoma. Though both modalities offer conformal therapy, vastly different source photon energies and delivery techniques give rise to distinct intra- and extra-ocular dose distributions. Variations in prescriptive paradigms also suggest unique radiobiological consequences of selecting either BT or GKRS. This study objectively compares physical dose and biologically effective dose (BED) distributions for these two modalities.

Materials and Methods: An identical CT DICOM-RT reference right eye geometry including organs-at-risk (OARs) such as the ciliary body, lacrimal gland, lens, and optic nerve was characterized in both the Pinnacle3 v8.0m and Leksell GammaPlan 10 (LGP) treatment planning systems. An ellipsoidal posteralotal tumor with 11 mm basal diameter and 6 mm apical height was contoured along the equator. The tumor and OAR physical dose distributions were compared between: a 16 mm 125I COMS plaque delivering 75 Gy plaque heterogeneity-corrected physical dose to the tumor apex via 120 h implant duration; and from a GKRS plan delivering 22 Gy to the 40% isodose line via five open 4 mm collimator shots. Tumor and OAR BEDVHs were generated using the Dale and Jones’ BED equation for BT and the linear-quadratic (LQ) model for GKRS; radiobiological parameters were taken from the current literature.

Results: Physical dose distributions for BT and GKRS are depicted in Figs. 1A and 1B, respectively. Both offer 100% tumor coverage, yet GKRS offers steeper relative dose falloff along the tumor central axis and improved selectivity (75%) versus BT (34%). The calculated Gradient Index, however, is more favorable for BT (2.24) than for GKRS (2.60) due to plaque collimation that shields extra-ocular tissue behind the plaque. In Fig. 1C, radiobiological analysis reveals a >1.5 times higher BED (92.4 Gy) covering the entire tumor volume via BT versus GKRS (58.3 Gy). Moreover, the actual BED for GKRS might be lower than determined here given that the LQ model may overestimate cell death with hypofractionation. There are also notable differences in the OAR BEDVHs depending on treatment modality. For this tumor size and position, BT yields higher BEDs to the ciliary body and lens, while GKRS delivers a higher BED to the lacrimal gland. The maximum BED to the optic nerve is higher with BT, however, approximately 85% of the optic nerve volume receives a higher BED with GKRS.

Conclusions: BT and GKRS for choroidal melanoma have distinct physical dose and BED distributions with potentially unique clinical consequences. For a melanoma of this size and position treated with modern prescriptive protocols, 16 mm 125I COMS plaque BT delivers a higher BED to the tumor, ciliary body, lens, and proximal optic nerve than GKRS. These results, though predicated upon potentially controversial radiobiological modeling, suggest that lowering the physical prescription dose for BT to more closely match the BED of GKRS might maintain equivalent tumor control with less potential morbidity. Further dosimetric comparisons are needed for a range of tumor sizes, positions and BT radionuclides typically encountered in clinical practice to comprehensively evaluate these treatment modalities.