AbstractID: 6458 Title: Significance of Artificial Critical Structure (ACS) in Inverse Planning for Partial Breast Irradiation Treatment

Purpose: The purpose of this study was to investigate influence of artificial critical structure (ACS) in sparing ipsilateral lung volume doses during partial breast IMRT treatment.

Introduction: In partial breast irradiation (PBI) techniques, the goal has been to limit dose around lumpectomy cavity, and sparing critical structures as ipsilateral lung and skin. Mammosite and 3-D treatment modalities have been used to achieve this goal. However, the role of inverse treatment planning was never investigated for reducing the doses to lung. Dosimetric plans were reviewed to justify IMRT role in PBI.

Methods and Materials In late 2006, we investigated role of IMRT for partial breast irradiation in patients found unsuitable for mammosite treatment.During the investigation our major concern was excessive dose to ipsilateral lung volume. The lung volume doses were significantly reduced by introducing artificial critical structure between lumpectomy cavity & lung volume. Total eight patient's dosimetry was reviewed retroactively to study influence of ACS. IMRT plans were compared for ipsilateral lung DVH with and without ACS, and these results were further compared with published DVH for lung using 3-D* treatment plans. Dose prescription in all the modalities was 34 Gy in 10 Fractions , prescribed at 10 mm from lumpectomy cavity volume.

Results: Dosimetry plans (Corvus V6.2, Nomos Inc.) for eight PBI patients were reviewed. Ipsilateral lung volumes were compared for 17 Gy dose volumes. IMRT plans without ACS indicated 17 Gy lung volumes of 6% to 14.5%, median 7.5 %, while plans with ACS indicated volumes of 0.5 to 6.5%, median 2.8%. The published data for 3-D* plans indicated 17 Gy dose volumes of 1% to 12%, median 5%.

Conclusions: The DVH analysis indicated improved DVH for ipsilateral lung with ACS using IMRT. The results were superior to established 3-D technique.

*Baglan, et.al Int.J.Rad.Onc.Biol.Phys, Vol.55, 302-311, 2003.