

## AbstractID: 12957 Title: Evaluation of RapidArc dose delivery using Radiological Physics Center phantoms

**Purpose:** Validation of dose calculation accuracy is essential for new radiotherapy techniques, such as volumetric modulated arc therapy (VMAT). The purpose of this project was to compare a VMAT system, Varian RapidArc, to the current standard of care, IMRT, using Radiological Physics Center (RPC) phantoms in terms of both treatment plan quality and dosimetric delivery accuracy.

**Method and Materials:** Treatment plans and dose delivery accuracy were evaluated following procedures defined by the RPC for credentialing institutions for Radiation Therapy Oncology Group (RTOG) clinical trials. Clinically relevant treatment plans were created for RPC prostate and head and neck phantoms from typical prescription and dose constraints for 6 MV IMRT and RapidArc. The treatment plans for head and neck radiotherapy were compared to determine if they were clinically comparable using several dosimetric criteria, including ability to meet dose objectives set by the RPC and conformity and homogeneity indices. The planned treatments were delivered to the phantoms and absolute doses and relative dose distributions were measured with thermoluminescent dosimeters and radiochromic film, respectively. The measured and calculated doses of each treatment plan were compared to determine if they were clinically acceptable based upon dose differences and distance-to-agreement.

**Results:** All treatment plans were able to meet the dosimetric objectives set by the RPC for treatment volume dose coverage and critical structure dose constraints for both the prostate and head and neck phantoms. The IMRT and RapidArc plans for the head and neck phantom had similar conformity and homogeneity. The RapidArc plan for the prostate phantom met the RPC delivery accuracy requirements. Preliminary results for the head and neck phantom indicated that the IMRT and RapidArc plans were delivered with similar accuracy.

**Conclusion:** Varian RapidArc is comparable to IMRT in treatment plan quality and the dose calculation accuracy is clinically acceptable.