AbstractID: 13697 Title: Indigenously developed Multipurpose Acrylic Head Phantom for verification of IMRT using film and Gel dosimetry

Purpose: To validate the newly designed Acrylic Phantom for routine dosimetric purpose in radiotherapy and also simultaneous utilize it to evaluate and compare the calculated dose and measured dose using film and gel dosimetric methods. **Method and Materials**: In this study, a doughnut shape planning target volume (8.54cm^3) and inner organ at risk (0.353cm^3) were delineated for an IMRT test planning using the X-Ray CT image of the phantom. The phantom consists of acrylic slabs which are integrated to form a human head shape with hole in the middle were several dosimetric inserts can be positioned for measurement. An inverse planning with nine coplanar intensity modulated fields was created using Pinnacle TPS. For the film analysis flabed scanner (Microtek 9800XL) and a free download 3cognition Film QA software was used. The 3D-dose distribution recorded in the MAGAT gel dosimeter was read using a 1.5T MRI scanner (Siemens Avanto). Scanning parameters were CPMG pulse sequence with 8 equidistant echoes, TR = 7210, echo step = 22ms, pixel size = 0.5 x 0.5, slice thickness = 3mm. Using a calibration relationship between absorbed dose and spin-spin relaxation rate (R2), we converted R2 images to dose images. The dose comparison was accomplished using in-house MATLAB base program and ImageJ software. For gel measurement dose grid from the TPS was extracted and compared with the measured dose grid of the gel. **Results:** The results of the film measured dose using Gafchromic EBT2 showed very good agreement between the Pinnacle TPS calculated dose. The preliminary analysis of the gel measurement showed reasonable agreement between the calculated and measured dose. **Conclusion:** The phantom designed is cost effective and the results are promising but further investigation is required to validate the phantom for dosimetric purpose. Research sponsored by AERB, India through Project no – N-964.