



P134

Validation of the SunNuclear ArcCheck diode array for the Patient specific Quality Assurance (PsQA) in Stereotactic Body Radiotherapy Treatment (SBRT) delivered with VMAT

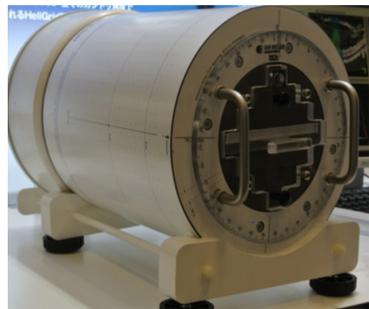
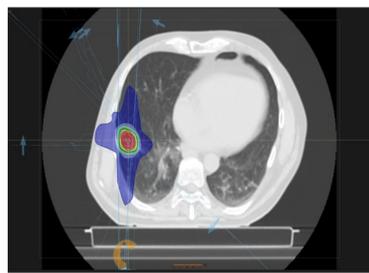
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BACKGROUND: the use of commercial 3D diode arrays for PsQA in SBRT remains debatable because of their low spatial resolution.

PURPOSE:

(*) to investigate the response of a commercial 3D diode array to SBRT treatments on lesions smaller than 3 cm in diameter and its suitability for QA;



CONCLUSIONS:

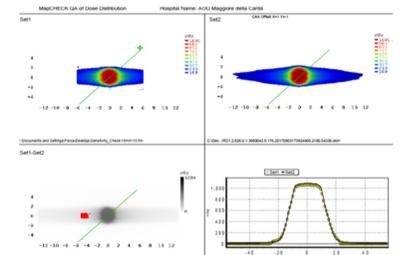
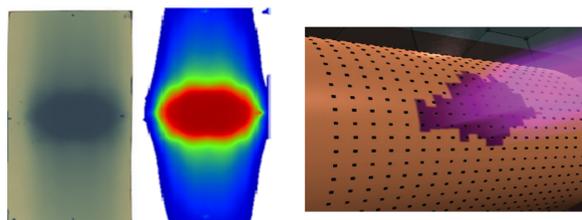
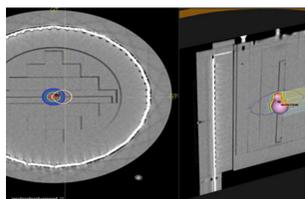
(*) the ArcCheck diode arrays resulted suitable for PsQA at the accuracy level required by SBRT treatments.

(*) optimal LOA < 5% between the ArcCheck and the EBT3 film PR.

(*) an action level of 75% (ArcCheck passing rates) with local gamma (4%, 1mm; TH=20%)

(*) to determine the better criteria for gamma analysis to make the ArcCheck an effective tool to detect the delivery errors in the high gradient, high focalised dose distributions generated by SBRT.

METHODS:



1. 12 spherical targets (r : 4mm - 15mm) were simulated in a phantom "ArcCheck" .

For each target a SBRT treatment was planned;

2. The delivered doses were measured by ArcCheck and gafchromic EBT3 films. The ArcCheck measurements, acquired in standard mode (Sm), were repeated in high density mode (HDm);

3. PsQAs were performed using a local gamma index analysis. Passing Rates (PR) of EBT3 films, ArcCheck Sm and HDm acquisitions were investigated as a function of DD%, DTA criteria and target dimensions.

RESULTS:

(*) the Passing Rates (PR) resulted significantly related to DTA (leading effect), DD% and target dimension;

(*) The EBT3 films assessed optimal dose delivery accuracy with maximum deviations below the limit of 3%;

(*) Optimal gamma analysis criteria for EBT3 film resulted by combination of DTA=1mm and $D\% \geq 3\%$, a PR threshold of 75% resulted predictive of clinical acceptable agreement in the target and dose falloff regions.

(*) ArcCheck standard (SD) VS high density (HDm) acquisition modes: not clinically relevant.

(*) The ArcCheck Sm and EBT3 film PR : significantly correlated.

An optimal LOA < 5% was found between ArcCheck and EBT3 film PR setting the local gamma analysis DTA criterion to 1mm and the DD% respectively to 4% and 3%.