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PRE-TREATMENT QUALITY ASSURANCE OF 220 RAPIDARC PLANS ANALYZED WITH EPIQA SOFTWARE

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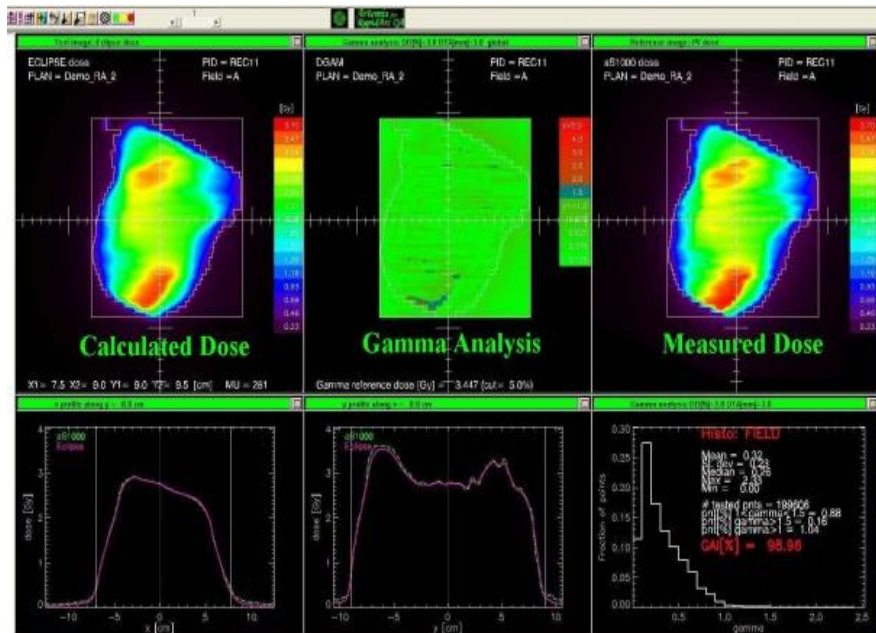
PURPOSE

This work is a retrospective analysis of a large dataset of RapidArc routine pre-treatment QA.

We report results and analysis of our procedure that combines EPID images and EpiQA commercial software for dose distribution reconstruction.

METHODS

Dose distribution of 220 patients treated with a VMAT technique on Varian DHX-2100 were analyzed.

The detector reading, for each arc, is converted to a dose map and compared with the TPS (Eclipse) dose distribution (calculation grid of 0,25cm) and analysis with EpiQA

γ - index evaluation is used for data analysis (criteria: 3%-3mm, 4%-3mm, 4%-4mm) .

METHODS

Tumor sites	N° PZ	N° arc / plan	SIB	Dmax/fraction
Esophagus	**70**	2	NO	2,00 Gy/fr (32% pz) 1,80 Gy/fr (68% pz)
Head&neck	**100**	2 (50% PZ) 3 (50% PZ)	Yes (50% PZ) No (50% PZ)	1,8 Gy/fr (4% pz) 2,0-2,3 Gy/fr (93% pz) 2,5-3,2 Gy/fr (3% pz)
Lung	**50**	2	Yes (20% PZ) No (80% PZ)	1,8-2,3 Gy/fr (60% pz) 2,5-3,5 Gy/fr (25% pz) 4,0-7,5 Gy/fr (15% pz)

RESULTS

Good result were found for all districts.

The average values of γ-index<1 for 3%-3mm criteria are 98% for lung and esophagus and 97% for head-neck district.

Head-neck district present a larger number of arcs with γ-index >1,5, probably due to the higher modulation.

RESULTS

ESOPHAGUS: reported in the table analysis results

	3 % - 3 mm	4 % - 3 mm	4 % - 4 mm
γ > 1 [%] mean (min-max)	**98,96** (95,32- 100,00)	**99,68** (97,29- 100,00)	**99,78** (97,87- 100,00)
γ mean [%] mean (min-max)	**99,71** (99,62-99,80)	**99,75** (99,67-99,83)	**99,78** (99,71-99,85)
γ > 1,5 [%] mean (min-max)	**0,11** (0,00-1,60)	**0,02** (0,00-0,78)	**0,01** (0,00-0,57)

RESULTS

LUNG: reported in the table analysis results

	3 % - 3 mm	4 % - 3 mm	4 % - 4 mm
γ > 1 [%] mean (min-max)	**99,25** (96,20- 100,00)	**99,65** (98,41- 100,00)	**99,85** (98,96- 100,00)
γ mean [%] mean (min-max)	**99,73** (99,60-99,80)	**99,75** (99,76-99,82)	**99,80** (99,70-99,85)
γ > 1,5 [%] mean (min-max)	**0,07** (0,00-0,62)	**0,05** (0,00-0,37)	**0,01** (0,00-0,08)

RESULTS

Head&Neck: reported in the table analysis results

	3 % - 3 mm	4 % - 3 mm	4 % - 4 mm
γ > 1 [%] mean (min-max)	**98,82** (86,91- 100,00)	**99,1** (91,03- 100,00)	**99,71** (94,49- 100,00)
γ mean [%] mean (min-max)	**99,70** (99,48-99,78)	**99,75** (99,58-99,82)	**99,78** (99,61-99,83)
γ > 1,5 [%] mean (min-max)	**0,17** (0,00-3,77)	**0,07** (0,00-1,09)	**0,03** (0,00-0,99)

CONCLUSIONS

EPID images and EpiQA software use for pre-clinical verification show a very good agreement between calculated and measured dose. This QA procedure is easy also in complex treatments such as VMAT. Furthermore we would like to compare results obtained with EpiQA software with other systems for pre-treatment QA