

DOSIMETRIC CORRELATES FOR ACUTE ESOPHAGITIS IN LUNG CANCER PATIENTS TREATED WITH CONCURRENT CHEMOTHERAPY AND THREE-DIMENSIONAL CONFORMAL RADIOOTHERAPY

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INTRODUCTION

Lung cancer is the most frequent cause of cancer death worldwide and its global incidence has been steadily increasing during recent decades. Acute esophageal toxicity (AET) is a common complication and dose-limiting toxicity in lung cancer patients treated with concurrent chemotherapy and three-dimensional conformal radiotherapy (3D-CRT). However the dose-volumetric parameters predictive for AET have not been clearly established.

PURPOSE

To evaluate the dosimetric factors associated with grade ≥ 2 AET in lung cancer patients treated with concurrent chemoradiotherapy.

MATERIAL AND METHODS

We examined 71 patients with non-small cell lung cancer (n=52) and small-cell lung cancer (n=19) treated with combined chemoradiotherapy, with a median dose of $61,92 \pm 4,8\text{Gy}$ (range 50 - 65Gy).

Every patient received prophylactic glutamine powder in doses of 10 g/8 hr, started on day 5 prior to radiotherapy initiation and continued for 15 days after radiotherapy was completed.

Contouring of target volumes and normal organs (esophagus, heart, spinal cord and lung) was carried out on each slice. External esophagus surface was contoured on each axial plane of the planning CT scan from the level of the lower end of the cricoid cartilage to the gastroesophageal junction. AET was scored by Radiation Therapy Oncology Group (RTOG) criteria. The parameters analyzed included the length (cm) and the volume (cc) of the esophagus irradiated and the percentages of organ volume receiving from 10 Gy (V10) to 65 Gy (V65).

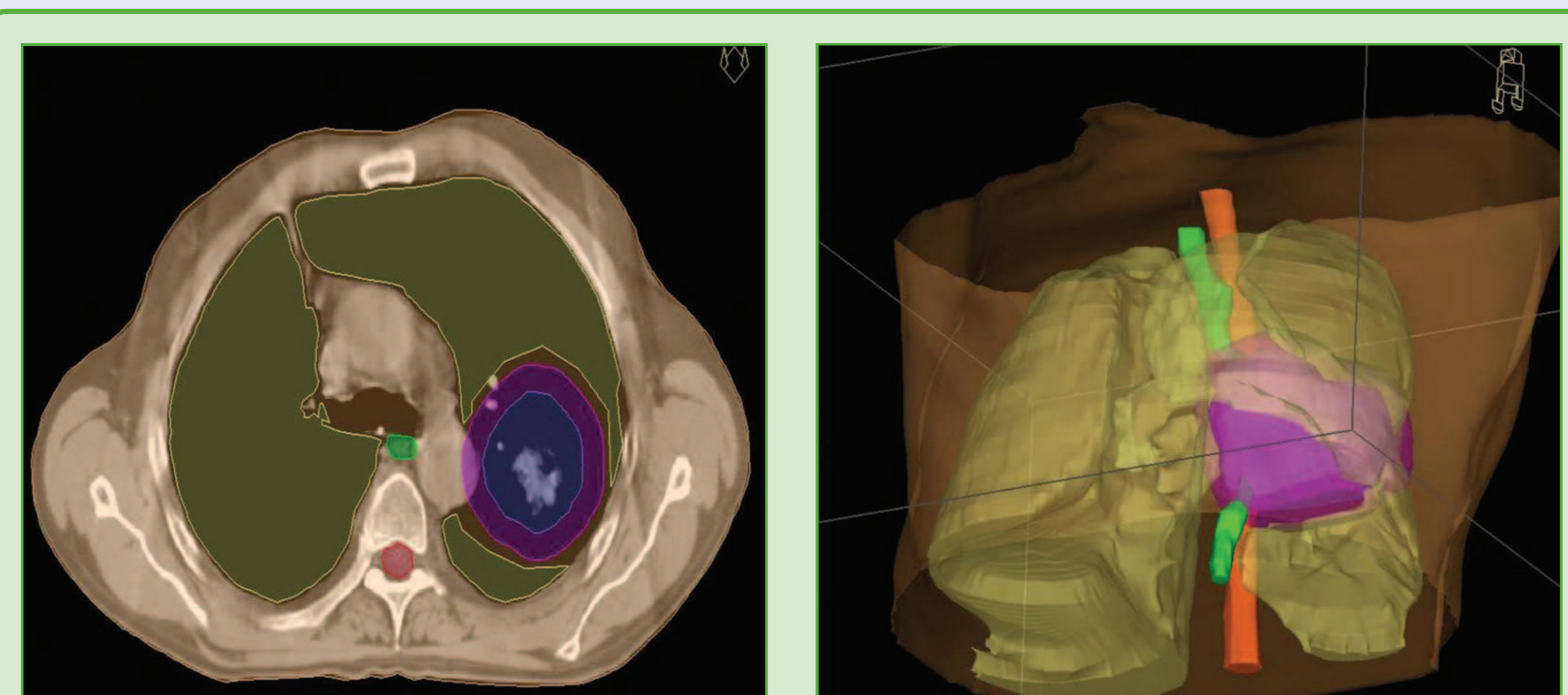


Fig 1 and 2: target volumes and risk organs

RESULTS

Thirty-seven (52.1%) patients developed acute esophagitis. Table 1 shows the correlation between different levels doses and grade of esophagitis and the analgesia used. So, the worst AET-RTOG grade experienced by the patients were: grade I, 10 patients (14.1%); grade II, 23 patients (32.4%) and grade III, 4 patients (5.6%).

	Grades of esophagitis according to RTOG/EORTC.				0: No analgesia; 1: Antiinflammatory Agents, 2: Opiates, 3: A combination of 1 and 2.			
	0	1	2	3	0	1	2	3
20 Gy	66 (93.0)	4 (5.6)	1(1.4)	0	65 (91.5)	4 (5.6)	2 (2.8)	0
40 Gy	43 (60.6)	13 (18.3)	13 (18.3)	2 (2.8)	43 (60.6)	18 (25.4)	6 (8.5)	4 (5.6)
60 Gy	36 (50.7)	12 (16.9)	20 (28.2)	3 (4.2)	36 (50.7)	19 (26.8)	7 (9.9)	9 (12.7)
End of RT	44 (62.0)	6 (8.5)	18 (25.4)	3 (4.2)	45 (63.4)	14 (19.7)	2 (2.8)	10 (14.1)
Highest grade	34 (47.9)	10 (14.1)	23 (32.4)	4 (5.6)	34 (47.9)	20 (29.2)	7 (9.9)	10 (14.1)

Table 1: radiation dose, grade of esophagitis, and analgesia

Mean esophageal length included in the PTV was 13.0 ± 3.2 cm and esophageal volume was 28.2 ± 9.6 cc, The statistical analysis of the possible predictors for grade 2 or worse esophagitis and maximum analgesia needed is summarized in tables 2 and 3. Only the percentage of esophagus volume treated to > 50 Gy (V50) was significantly associated with AET (p 0.037) and with maximum analgesia (p 0.058) on Spearman rank correlation analysis. Grade ≥ 2 AET was observed in 10 of 42 (23.81%) patients with $V50 \leq 30\%$ and in 17 of 29 (58.62%) patients with $V50 \geq 30\%$ (p 0.003) (Fig 3)

	Correlation coefficient	p
V10	0.050	0.681
V20	0.050	0.681
V30	0.076	0.531
V35	0.092	0.447
V40	0.117	0.333
V45	0.175	0.144
V50	0.248	0.037
V55	0.257	0.031
V60	0.086	0.475
V70	-0.117	0.332
Esophageal length	0.044	0.717
Esophageal volume	0.048	0.692
Total doses	-0.089	0.462

Table 2: Spearman's correlation between highest grade of AET and dose to the esophagus

	Correlation coefficient	p
V10	0.077	0.521
V20	0.080	0.507
V30	0.101	0.400
V35	0.118	0.325
V40	0.144	0.231
V45	0.174	0.147
V50	0.226	0.058
V55	0.130	0.279
V60	-0.039	0.750
V70	-0.116	0.335
Esophageal length	0.109	0.365
Esophageal volume	0.056	0.640
Total doses	-0.143	0.233

Table 3: Spearman's correlation between maximum analgesia and dose to the esophagus

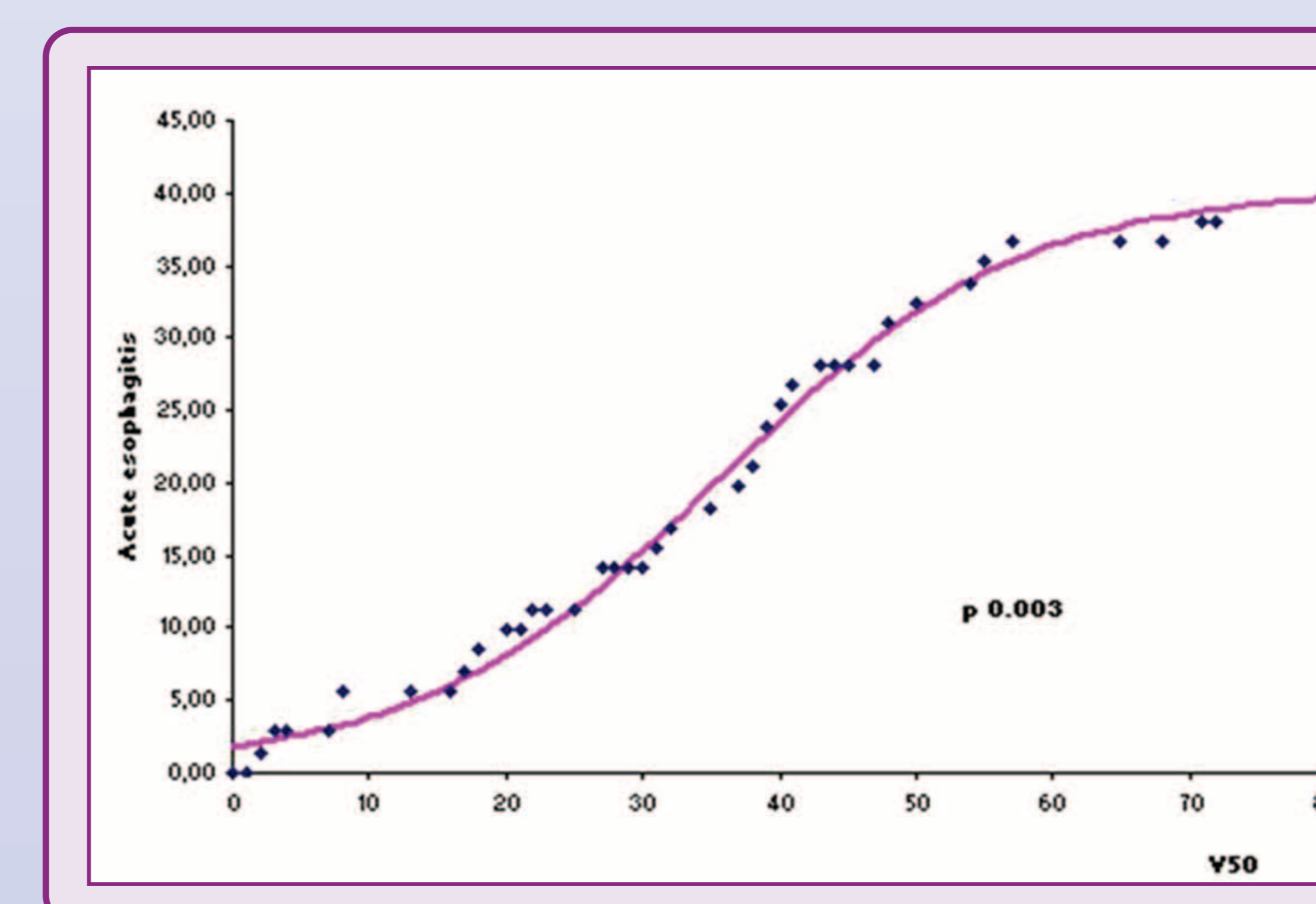


Fig 3: Correlation between V50 and grade ≥ 2 acute esophagitis

CONCLUSION

In patients undergoing concurrent radiochemotherapy, V50 demonstrated a statistically significant correlation with acute grade 2 or worse esophagitis and analgesia needed. This finding might be useful in designing a treatment plan to prevent severe esophageal toxicity.