

Mei Feng^{1,2}, Lu Yan³, Xiaoli Du¹, He Wang¹, Jing Ren¹, Min Wang¹, Qingping Yin¹, Xin Lai¹, Lu Li¹, Mei Lan¹, Shun Lu¹, Yecai Huang¹, Fang Li¹, Weidong Wang¹, Jinyi Lang¹
 1Sichuan Cancer Hospital and Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China. 2The Third People's Hospital of Sichuan Province, Department of Oncology. 3Chengdu Medical College.

The first author's Email : freda_fm@126.com



Purpose or Objective

Concurrent chemoradiotherapy (CCRT) is the main treatment model for locally advanced nasopharyngeal carcinoma (LANPC). Previous study found the apparent diffusion coefficient (ADC) value of primary tumor partly correlated to prognosis for NPC patients. Recent studies reported that the changes of ADC value at pre- and post-treatment was a more sensitive predictor for prognosis. The prognosis for LANPC patients who received the same treatment strategy varies greatly. The early predictor was urgently needed to help for adjusting the treatment strategy. Thus, we aimed to observe the dynamic changes of ADC of gross target volume (GTV) and metastatic lymph nodes (LN) for NPC patients during radiotherapy (RT), and explored the potential correlations between ADC changes and treatment response.

Materials and Methods

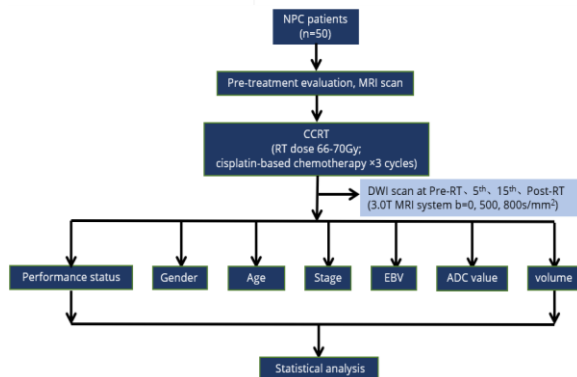


Figure 1. Study design

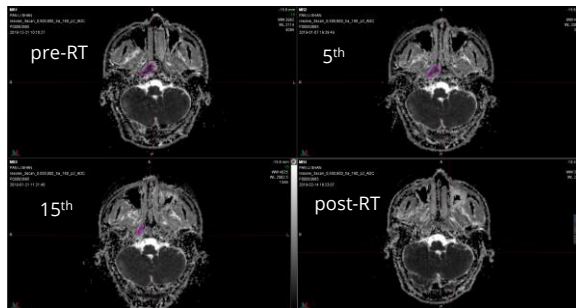


Figure 2. Mean 3D-ADC changes and mean volume changes of PT and LN during radiotherapy.

Results

Table 1. Patient's demographics

Item	Group	Number	Ratio(%)
Age(year)	>60	11	22%
	45-59	23	46%
	≤44	16	32%
Sex	male	29	58%
	female	21	42%
EBV	+	15	30%
	-	35	70%
T stage	T1	0	0
	T2	16	32%
	T3	16	32%
	T4	18	36%
N stage	N0	0	0
	N1	4	8%
	N2	31	62%
M stage	M0	50	100%
	M1	0	0
	M2	0	0
Clinical stage	I	0	0
	II	1	2%
	III	20	40%
	IV	29	58%

- After the completion of CCRT, ORR was 100% (CR 58%, PR 42%).
- For the first stage (from pre-RT to the 5th fraction), the mean ADC value of GTV and LN increased significantly by 20.78% and 22.96% respectively, while the volumes of GTV and LN had minimal changes (GTV:18.42cm³ vs 16.72cm³, LN:4.67cm³ vs 4.12cm³).

- As for the second stage (from the 5th fraction to post-RT), the mean ADC value of GTV and LN continued to increase by 45.58% and 41.2% respectively, while the volumes decreased by 86.07% (GTV) and 61.6% (LN).
- Multivariate analysis showed the mean ADC changes of GTV from pre-RT to the 5th fraction (ΔADC_5) was the only independent prognostic factor for treatment response of NPC.
- ROC showed that the cut-off value for ΔADC_5 was 158.82mm²/s (sensitivity:87%; specificity:65%).

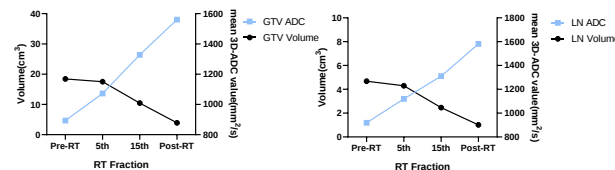


Figure 3. Average 3D-ADC values of gross target volume by MIM software during radiotherapy.

Conclusion

Mean ADC values of GTV and LN increased dramatically during RT for NPC patients treated with radiotherapy. The mean ADC began to increase at the 5th fraction, while the change of volume was minimal. Early ADC changes at the 5th fraction might be a new and sensitive biomarker to predict the prognosis for NPC patients independently of volume change.

Disclosures

The author reports no conflicts of interest in this work.

Reference

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