Exposed dose analysis of hippocampus in T4 stage nasopharyngeal carcinoma patients treated with intensity modulated radiotherapy

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Conclusions
The exposed dose of HH, HB and HT was different in NPC patients treated with IMRT. The exposed dose of HH was the highest, which should be emphasized especially.

The mean dose of left and right HC was $(1353 \pm 823)$ cGy, $(1390 \pm 639)$ cGy $(P=0.846)$. The mean dose of left HH, HB and HT was $(2091 \pm 1188)$ cGy, $(984 \pm 799)$ cGy, $(521 \pm 493)$ cGy $(P=0.000)$; while the mean dose of right HH, HB and HT was $(2356 \pm 1105)$ cGy, $(999 \pm 529)$ cGy, $(477 \pm 369)$ cGy $(P=0.000)$. The exposed dose and the volume irradiated in different dose of HH were obviously higher than those of HB and HT. The dose parameters of HH, HB and HT decreased in turn. The volume irradiated with different irradiation dose $(Vn\%)$ of HH was much higher than that of HB and HT. $Vn\%$ of HH, HB and HT decreased steadily.

Introduction
Intensity modulated radiotherapy (IMRT) can provide the target with highly conformal radiotherapy, while the normal tissues surrounding the target that has not been concerned were irradiated with relatively more radiation dose. Hippocampus (HC) receives relatively a lot of exposed dose in the treatment of nasopharyngeal carcinoma (NPC) patients, and can be divided into three parts: head (HH), body (HB) and tail (HT).

Methods
The bilateral HCs were delineated and were divided into HH, HB and HT for 29 cases of NPC patients treated with IMRT. The dose parameters of HC were then analyzed.

Fig.1 The segmentation of HC
HC was segmented into three parts: HH, HB and HT by the ratio of 35%, 45% and 20% respectively
A, B The display of HC and the segmentation in three dimensional direction 
C, D The process of the segmentation

Fig.2 Dose line and Dose-volume Histogram schematic diagram
A The display of the dose line on the cross section 
B The display of the dose line on the sagittal plane 
C Dose-volume Histogram of HH, HB and HT

In future we will furtherly expand the sample size for the next step, and increase memory test for patients. Based on the conclusion of this study, we had already designed and registered a clinical trial (NCT03411954) for further research.