

Purpose To evaluate the effect of respiratory motion on the GTV contoured with PET image, using a 2D respiratory motion phantom system.

Methods Twenty-eight kinds of respiratory motions were simulated using a respiratory motion phantom system. The phantom was scanned by PET-CT machine under different motion conditions, then the PET images were obtained. The GTV was contoured using PET images.

Results The GTV under static condition (GTV_0) was $7.90 \pm 0.21 \text{cm}^3$. The GTV with motion frequencies of 16 per minute, 18 per minute and 20 per minute were $11.56 \pm 2.62 \text{cm}^3$ (GTV_{16}), $12.51 \pm 3.57 \text{cm}^3$ (GTV_{18}) and $11.86 \pm 3.27 \text{cm}^3$ (GTV_{20}), respectively. The differences among GTV_0 , GTV_{16} , GTV_{18} and GTV_{20} were significant (all $P < 0.01$). The GTV with motion amplitudes of 1.0cm, 1.5cm and 2.0cm on z axis were $11.44 \pm 3.68 \text{cm}^3$ ($GTV_{z-1.0}$), $11.64 \pm 3.47 \text{cm}^3$ ($GTV_{z-1.5}$) and $12.83 \pm 2.02 \text{cm}^3$ ($GTV_{z-2.0}$), respectively. The GTV with motion amplitudes of 0.5cm, 1.0cm and 1.5cm on x axis were $9.68 \pm 2.32 \text{cm}^3$ ($GTV_{x-0.5}$), $14.41 \pm 3.19 \text{cm}^3$ ($GTV_{x-1.0}$) and $11.83 \pm 1.92 \text{cm}^3$ ($GTV_{x-1.5}$) respectively. The differences of GTV on z axis and x axis were significant ($p < 0.01$).

Conclusions The GTV contoured with PET image will be severely effected by respiratory motion which will impact on radiation treatment planning. The gating technique should be used in order to decrease this kind of effect when the GTV was contoured with PET image.

AbstractID: 6750 Title: The effect of respiratory motion on the GTV contoured with PET image