

AbstractID: 7033 Title: The dose-volume differences by set-up error for prostate

Purpose: To simulate the dose-volume changes by set-up errors for prostate.

Method and Materials: Patient set-up errors consist of two parts, one for the systematic error, and one for random error. A prostate patient was treated with IMRT has 7.0mm margin in posterior and 9.0mm margin in others. To simplify analysis, the first numerical simulation was no random error present. The systematic errors had a shift of 1.0mm, 2.0mm, and 3.0mm along each axis. Next, the simulation had 1.0mm, 2.0mm, and 3.0mm standard deviation in random error only. We compared the receiving dose of the 95% volume of prostate (D95%), the volume of receiving dose more than 90% and 70% of the prescribed dose (V90% and V70%) for rectum and bladder in each numerical simulation cases.

Results: In our simulation cases, the receiving dose of prostate (D95%) is more than 99.95% prescribed dose. A systematic error within 3.0mm in Rt-Lt direction, the percent volume change of bladder and rectum (V90% and V70%) are less than 2.5%. In the Sup-Inf direction, no large percent volume change of rectum was found. There are more than 3% volume changes for bladder in the 3.0mm shift of Sup-Inf direction. The worse results are the percent volume change of rectum in the Ant-Post. More than 6% volume changes for rectum in 1.0mm shift to anterior.

No more than 2.5% volume changes for bladder and rectum within 3.0mm standard deviation (SD) in Rt-Lt and Sup-Inf direction. Up to 3.0mm SD in Ant-Post, rectum volume (V90%) had 5.6% changes apparently. Otherwise, random error has less volume changes than systematic error in our data.

Conclusions: The rectum volume change is sensitive to systematic error in Ant-Post direction. Set-up should be accuracy in Ant-Post direction than others. Also, accuracy is more important than precision.