Difference Between Planning Target Volume (PTV) Based Slow-Ct and Internal Target Volume (ITV) Based 4DCT Imaging Techniques in Stereotactic Body Radiotherapy for Lung Cancer: A Comparative Study

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Abstract : The Radiotherapy of Carcinoma Lung has always been difficult and a matter of great concern. The significant movement due to fractional motion caused due to non-rhythmic respiratory motion poses a great challenge for the treatment of Lung cancer using Ionizing Radiation. The present study compares the accuracy in the measurement of Target Volume using Slow-CT and 4DCT Imaging in SBRT for Lung Tumor. The experimental samples were extracted from patients with Lung Cancer who underwent SBRT. Slow-CT and 4DCT images were acquired under free breathing for each patient. PTV were delineated on Slow CT images. Similarly, ITV was also delineated on each of the 4DCT volumes. Volumetric and Statistical analysis were performed for each patient by measuring corresponding PTV and ITV volumes. The study showed (1) The Maximum Deviation observed between Slow-CT-based PTV and 4DCT imaging-based ITV is 248.58 cc. (2) The Minimum Deviation observed between Slow-CT-based PTV and 4DCT imaging-based ITV is 5.22 cc. (3) The Mean Deviation observed between Slow-CT-based PTV and 4DCT imaging-based ITV is 63.21 cc. The present study concludes that irradiated volume ITV with 4DCT is less as compared to the PTV with Slow-CT. A better and more precise treatment could be given more accurately with 4DCT Imaging by sparing 63.21 CC of mean body volume.

Keywords : CT imaging, 4DCT imaging, lung cancer, statistical analysis
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