

AbstractID: 2690 Title: Reduction of computed tomography metal artifacts due to I-125 seeds for post implant analysis in prostate permanent brachytherapy

Purpose:

Postimplant analysis in I-125 permanent brachytherapy for prostate cancer plays important role in improving the techniques of implant. Although American Brachytherapy Society recommends CT based postimplant analysis, the identification of prostate bundle is quite difficult. In addition, metal artifacts from the I-125 seeds implanted make it more difficult to identify the prostate. Thus accuracy of the dosimetric parameters associated with volume of prostate such as D90 and V100 may be unclear. The purpose of this study is to mitigate CT metal artifacts due to I-125 seeds to provide more accurate postimplant analysis.

Method and Materials:

The prostate phantom that was implanted 3 to 10 seeds per a plane was scanned using 16-detector raw CT. The sinogram was modified by our algorithm that is similar to projection-interpolation method to CT images containing artifacts from I-125 seeds. The regions of projection data existing I-125 seeds were identified by observing differences of X-ray intensity between the phantom and the seeds. Then the regions were interpolated to remove the metal artifacts. The new images were reconstructed with the corrected sinogram. We compared these with the CT images that are corrected by commercially available metal artifact reduction method.

Results:

The metal artifacts caused by a small number of I-125 seeds were completely eliminated by our correcting method. On the other hand, the magnitude of the artifact with the commercially available method was insufficient. With regard to many seeds in the same plane, the metal artifact was mitigated by our method although the contrast of images was degraded.

Conclusion:

Our method would mitigate metal artifacts caused by I-125 seeds and be helpful to identify prostate. Although some problems have still remained to improve, our approaches would be adapted to clinical field

Conflict of Interest (only if applicable):