

AbstractID: 10473 Title: A prototype fiducial marker composed of gold nanoparticles and bone cement for proton therapy of prostate cancers

Purpose:

The feasibility of using mixtures of gold nanoparticles and bone cement as fiducial markers was examined to solve the problems of conventional gold markers for proton therapy of prostate cancers.

Method and Materials:

To investigate the feasibility of replacement of a conventional gold fiducial marker by a mixture of gold nanoparticles and bone cement, two kinds of interactions were examined: one is the interactions of them with kV and MV X-rays, and the other is their interactions with a therapeutic proton beam. We qualitatively and quantitatively compared radiographic visibility, CT artifacts, and dose reduction of each material.

Results:

The gold nanoparticle-bone cement mixtures could extremely reduce the distortions of depth-dose distribution behind them as well as the artifacts around them, in comparison with the conventional gold fiducial. The gold nanoparticle-bone cement mixtures could also be easily distinguished from high density organs, such as pelvic bone in kV and MV X-rays, while it was nearly transparent to a proton beam.

Conclusion:

We fabricated prototype fiducial markers composed of gold nanoparticle and bone cement, and examined their excellent potential, such as good radiographic visibility, low distortion of depth-dose distribution, and few CT artifacts, for serving as fiducial markers for proton therapy of prostate cancer.

Conflict of Interest (only if applicable):