

AbstractID: 3728 Title: Respiratory-gated dual fluoroscopic imaging for positioning and verification

Purpose: To improve the setup and verification of respiratory-gated treatments that use an external surrogate to track tumor motion.

Method and Material: A system was designed to perform respiratory-gated dual fluoroscopic imaging either before or during treatment. The Varian RPM system is used to track the breathing signal, which is used to turn on and off two x-ray generators and acquire simultaneous fluoro from two directions. The operator can select between three operation modes: ungated fluoro controlled by the foot pedal, gated fluoro controlled by the foot pedal, and continuous acquisition of gated fluoro.

Results: We have built a working prototype of this system, and have conducted early tests on phantoms. We have found that a gated fluoro system should include radiographic or fluoro capture capabilities, automatic and manual control of imaging, and on-line monitoring tools. Dual imaging allows 3D verification of gated treatment when implanted fiducial markers are used.

Conclusions: Respiratory-gated radiation treatment has a great potential to increase the dose conformity for patients with large intrafractional tumor motion. When using an external surrogate to track the motion, the position of the internal anatomy relative to the surrogate can be verified using respiratory-gated fluoroscopy. For many applications, gated fluoro is superior to ungated fluoro because the imaging dose is reduced, data storage requirements are reduced, and on-line analysis is simplified.

Conflict of Interest: This research was supported by Varian Medical Systems.