

AbstractID: 14130 Title: On-line fluoroscopic image of a slice of interest using the X-ray images and a priori anatomical information

Purpose: On-line 4-D imaging is required for managing intra-treatment organ motion. A new method which enables fluoroscopic imaging of a slice of interest (SOI) is developed and tested. This new technique uses projection images from the on-board imaging system and does not use breathing surrogates.

Method and Materials: Tomographic image via background subtraction (TIBS) uses *a priori* anatomical information from a previous cone beam or fan beam CT scan to isolate a SOI from a planar kV image by factoring out the attenuations by tissues outside the SOI (background). This study extends TIBS to 1) allow an SOI be imaged at any beam angle rather than only from that perpendicular to the SOI and 2) generate a temporal sequence of the SOI. The background is generated by subtracting the SOI which is orthogonal to the desired viewing angle rather than to the gantry angle. Therefore, projection images taken during a gantry rotation can be used to generate images of the SOI of the same viewing angle but at different times, forming a fluoroscopic sequence of the SOI. A 14cm diameter cylindrical water phantom containing objects subject to one-dimensional cyclic motion is used to test the feasibility.

Results: The fluoroscopic image of the SOI containing moving objects was acquired by combining the SOI images from different gantry angles acquired at different times. Contrast of the objects is improved. Breathing surrogate or sorting process is not needed. Like tomosynthesis, a slice of interest can be clearly imaged. Unlike tomosynthesis, TIBS maintains the independence of each of the projections thereby reveals temporal variations within the SOI.

Conclusion: A new technique which directly generates the fluoroscopic images of a SOI with x-ray projections from the different angles is developed and proven feasible. This technique can be used for on-line imaging of moving targets.