

AbstractID: 13165 Title: Feasibility study and clinical application of the 100 degree limited-angle CBCT for sarcoma treatments in RT

Purpose: 100° Limited-Angle (LA) CBCT is developed and applied clinically to treat sarcoma patients without moving the table during treatment in radiation therapy, and investigate its efficacy in routine clinics.

Method and Materials: Elekta Synergy Linear accelerator and XVI (v. 3.5) are used to develop 100° LA CBCT to take the CBCT images without any special software. The CBCT images of the scanning angles ranging from 200° to 60° are investigated with S20 option, H&N construction, 10mA/frame, and 10ms. The field-of-view (FOV) with S20 option is about 26cm in each plane, large enough to cover most treatment volume of the sarcoma patients. The image quality such as the soft-tissue contrast is not sensitive to mA (10 – 40mA). 120KVp is used (In XVI, we have only two options: 100 or 120KVp).

Several phantoms are fabricated to investigate the geometrical distortions: humanoid phantom, geometry phantom, “deer leg” phantom. The distortion is dependent upon the scanning angles as well as the geometry of the scanned object. The deer’s leg phantom was used to see how the bone artifacts affect the image quality, specially, the distortion of the skin.

Results: The CBCT images with the use of CT wires on the skin are used for sarcoma treatment. The setup uncertainties of the extremities (arm and thigh) are less than “5mm” over the treatment volume. This accuracy is estimated using the CT wires, the bone structures, and surgical clips if used.

Conclusion: The limited angle CBCT is implemented for the treatment of extremities like proximal upper and lower extremities. The advantage of the LA CBCT is faster scan, and image quality when motion is an issue, while the disadvantage is the geometrical distortion of the skin regions. This procedure is modified and be used for prostate, lung, and H&N with titanium supporters.