

AbstractID: 3315 Title: Effectiveness of MVCBCT for Patients with Implanted High-Z Material

Purpose: To exploit the penetrability of high-energy photons of Megavoltage ConeBeam CT system (MVCBCT) to obtain 3D images of the anatomy in presence of “Non-compatible CT” objects made of high-Z material.

Methods and Material: A new MVCBCT system integrated onto a clinical Linac was used to acquire 3D images of different phantoms and patients. The grey levels of different electron density inserts (lung to dense bone) in a CT phantom were measured with and without the presence of a small Cerrobend rod (10x15mm) on a regular CT and with the MVCBCT. MVCBCT of a Rando phantom with implanted gold markers and tooth fillings as well as patients with dental implants or with gold markers implanted in prostate were also obtained.

Results: The presence of the Cerrobend object in the CT phantom scanned with a regular CT creates strong artifacts around the object and disturbs the quality of the entire image, modifying the Hounsfield numbers by an average of 10%, even 15 cm away from the rod. The grey levels of the density inserts in the CT phantom remain unchanged within 3% in presence of the Cerrobend rod for MVCBCT. Similarly, gold markers appear with the typical star pattern artifact on CT images where a well-defined dot is seen on MVCBCT. The tooth fillings in the MVCBCT Rando phantom do not disturb the soft tissue information around the teeth.

Conclusion: Compared to the kV energy range, the presence of high-Z material has relatively little impact on image quality of MVCBCT. Therefore, MVCBCT can complement missing information for planning or patient position verification purposes when high-Z materials such as gold markers, tooth fillings, dental implants or hip prostheses are present. Clinical examples of each of these items will be presented.

Conflict of Interest: Siemens supports this Research