

#### Purpose:

Image guidance (IG) with MV-CBCT can be used not only to increase the patient setup verification accuracy but also to acquire useful information that will assist and improve the treatment planning process. One common problem encountered in the treatment planning of H&N tumors is the introduction of image artifacts introduced by high-Z heterogeneities (e.g., prosthetic mandible) in the kV CT images.

#### Methods:

Five H&N patients with high-Z prosthesis were immobilized for CT simulation. A standard kV, 3mm slice-thickness scan was performed first, and a limited length MV-CBCT scan, in the same position, was acquired on a Siemens-Oncor with a first order scatter correction applied for window and level. Both image data sets were registered within a Pinnacle3 system (beta v8.1y) based on bony landmarks in the H&N area. The prosthesis was well visualized in MVCT dataset without artifacts which allowed the target volume and some organ definitions (were soft-tissue contrast allowed it). Then, these volumes were propagated and adapted to the kVCT dataset, for treatment planning. Due to the artifacts in the kVCT, only bone, prosthesis and air cavities were assigned densities for dose optimization and computation. Beam entrance through the prosthesis was avoided.

#### Results:

MV-CBCT allowed the visualization of clear borders of the prosthesis and assisted the delineation of other structures when combined with kVCT. Organ segmentation can also be performed when there is change in organ shape. Volume propagation between the MV and kV datasets allowed for more accurate planning.

#### Conclusions:

MV-CBCT in the treatment planning position provides anatomical information in the H&N area, even in the presence of high-Z prosthesis. Registration of MV datasets with planning CT can supplement information and facilitate segmentation during treatment planning with dense heterogeneities. Adaptive treatment based on subsequent MV-CBCT data will be presented.