AbstractID: 9255 Title: Validation of a one-click spine segmentation approach for online planning of palliative radiation treatment

Purpose: To develop an efficient automated method for spine segmentation in cone-beam CT for online planning of spinal metastases radiotherapy. **Methods and Materials:** A semi-automated spine segmentation and labeling approach has been developed and validated. The user provides the position and label for an arbitrary vertebra center, and the algorithm automatically identifies the outlines and labels of all visible vertebrae in the field on view. The method is based on adapting 3-D deformable vertebrae models, placed according to the relative positions derived from a spine atlas. Using the segmentation results, ellipsoid ROIs can be superposed automatically to the vertebrae using co-registration of the segmented vertebrae with the vertebrae models in the atlas. Ellipsoid ROIs can be used for margin design and avoid excessive expansion due to vertebra processes. **Results:** The method has been validated on 29 CBCT spine datasets, representing all treatment areas: cervical, thoracic and lumbar. The total number of visible vertebrae was 234. For every dataset, segmentation was started from every visible vertebra. The deviations between the automatically detected position of the vertebra centers and their manual estimations were computed. For about 59% of all vertebrae, the median deviation was less than 5 mm, in approx. 33% of the cases was between 5 and 10 mm, and in approx. 8% of the cases was over 10 mm, which is an indication for a segmentation failure. The running time was a few seconds on a 3.4 GHz PC. **Conclusion:** Validation study of a one-click semi-automated approach to spine segmentation and labeling in cone-beam CT has been performed. The method has the potential to significantly reduce the time required to identify clinically relevant areas in online planning. A fully automated version of the algorithm is currently under investigation. **Conflict of interest:** This research is supported in part by Philips Healthcare.