AbstractID: 10526 Title: 4D predictive patient-specific anatomical model based on 4D CT data: a feasibility study

4D predictive patient-specific anatomical model based on 4D CT data: a feasibility study

Purpose: To construct a patient-specific 4D predicting geometry model based on 4D CT data. **Material and methods:** Patient's contours were re-sampled and reconstructed using Non-Uniform Rational B-Spline (NURBS) surface. The breathing curve associated with the patient was predicted using Kalman filter and fitted using precise cosine functions. The 4D NURBS model was generated using 3D NURBS surface models in different phases. **Results:** The percent differences of the volume and the distances of the COM (center of mass) for all structures in phase P0 and P50 shows the model accurate within 5% for volume and 1 mm in three x, y, z directions. With the expense of sampling and reconstructing time, the percentage difference can be further improved. **Conclusion:** This study demonstrated the feasibility of constructing a patient-specific 4D predicting geometry model based on 4D CT data. The model was controlled by the patient's breathing curve. Since the breathing curve can be predicted using the Kalman filter and approximated using the cosine function, the model is predictive of patient's lung motion. NURBS control points can reconstruct the anatomical deformations precisely and quickly with affordable computing power and time, therefore, the model has the potential for real-time controlling and guiding of the radiation delivery.