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Title: Assessment of tumor size and movement trajectories using CT scans with different pitch settings

Paul Martin 9811 Putora paul.putora@kssg.ch MD ^{1,2}, Marciana Nona 9815 Duma Marciana.Duma@lrz.tu-muenchen.de MD ³, Florent 9812 Baty florent.baty@kssg.ch ¹, Michal 9816 Devecka mdevecka@yahoo.com MD ³, Martin 9814 Brutsche martin.brutsche@kssg.ch MD ¹ and Ludwig 9813 Plasswilm ludwig.plasswilm@kssg.ch MD ². ¹ Department of Pulmonary Medicine, Kantonsspital St. Gallen, St. Gallen, Switzerland ; ² Department of Radiation Oncology, Kantonsspital St. Gallen, St. Gallen, Switzerland and ³ Department of Radiation Oncology, Technical University, München, Germany .

Body: Introduction: Pitch Settings of CT scanners have an influence on the way moving lesions are reconstructed. These images have an impact on target definition in radiotherapy planning, therefore the Planning-CT settings are of central importance for correct tumor irradiation and normal tissue sparing. Method: A water filled 40mm table tennis ball serving as a tumor phantom was moved along an elipsoid trajectory by a custom-assembled Lego(c) based device with a cycle duration of 4.2 seconds. The pitch/slice settings tested were termed "fast" (2.5mm, standard pitch), "intermediate" (2.5mm, half pitch), and "slow" (0.625mm, half pitch). Results: The volume of the ball was overestimated with the volume of the tumor-phantom growing from 82% for the fast CT, 171% for the intermediate CT and 300% for the slow CT. The phantom trajectory could best be reconstructed in the slow CT. The different sizes can be seen here:

Conclusion: The custom lung phantom proved to work well for the specified task. The effect of CT settings during planning-CT acquisition on the resulting volumes was significant. Acquisition of slow-CT images for radiotherapy planning enables a better targeting of the moving tumor and sparing of normal lung tissue specifically when respiratory gating is not available.