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Titel des Beitrags:
Scanned ion beam therapy for prostate carcinoma: Comparison of single plan treatment and daily plan-adapted treatment.

Abstract:
Intensity-modulated particle therapy (IMPT) for tumors showing interfraction motion is a topic of current research. The purpose of this work is to compare three treatment strategies for IMPT to determine potential advantages and disadvantages of ion prostate cancer therapy. Simulations for three treatment strategies, conventional one-plan radiotherapy (ConvRT), image-guided radiotherapy (IGRT), and online adaptive radiotherapy (ART) were performed employing a dataset of 10 prostate cancer patients with six CT scans taken at one week intervals. The simulation results, using a geometric margin concept (7-2 mm) as well as patient-specific internal target volume definitions for IMPT were analyzed by target coverage and exposure of critical structures on single fraction dose distributions. All strategies led to clinically acceptable target coverage in patients exhibiting small prostate motion (mean displacement<4 mm), but IGRT and especially ART led to significant sparing of the rectum. In 20% of the patients, prostate motion exceeded 4 mm causing insufficient target coverage for ConvRT (V95mean = 0.86, range 0.63-0.99) and IGRT (V95mean = 0.91, range 0.68-1.00), while ART maintained acceptable target coverage. IMPT of prostate cancer demands consideration of rectal sparing and adaptive treatment.
replanning for patients exhibiting large prostate motion.