Stellingen behorende bij het proefschrift

Evaluation and Application of Automated Treatment Planning in Radiation Therapy

Abdul Wahab Sharfo, 23 maart 2021

1. Automated planning can be used for filling patient-specific plan libraries with high-quality plans for plan-of-the-day ART to avoid excessive planning workload. (Chapter 2)

2. Automated planning using Erasmus-iCycle is superior to manual planning, both inside (Chapters 2 and 6) and outside (Chapters 3, 4, 5, 10, and 11) Erasmus MC.

3. In whole-pelvic treatment for prostate cancer, automated planning may largely reduce bladder doses compared to manual planning, while also improving rectum sparing. (Chapter 4)

4. For locally-advanced cervical cancer, IMRT with static beams can outperform dynamic VMAT. (Chapter 6)

5. A few well-selected non-coplanar IMRT beams supplemented to VMAT can largely enhance plan quality with minimal increase in treatment time. (Chapters 7 and 8)

6. Knowledge-based treatment planning mainly reproduces existing plan quality; automated multi-criterial optimization can improve it.

7. The future of radiotherapy planning is in real-time planning with deep neural networks, trained with large numbers of plans generated with automated multi-criterial optimization.

8. Improvement of auto-segmentation of planning CT-scans with deep learning is limited by lack of ground truth.

9. Computer optimized, selective irradiation of tissues with possible involvement of microscopic disease, balanced with risks of severe radiation-induced toxicity, might importantly enhance the therapeutic ratio in radiotherapy.

10. Dose-painting is only viable in combination with fully automated, TCP based treatment planning.

11. Thousands of candles can be lighted from a single candle, and the life of the candle will not be shortened. Happiness never decreases by being shared. (Buddha)