



3rd ESTRO Physics workshop: Science in development 25-26 October 2019, Budapest, Hungary

Plan Quality assessment: dose distribution metrics and robustness

Chairs: Christian Rønn Hansen & Lamberto Widesott

Motivation

Treatment planning the corner stone of radiotherapy and is continually evolving. This presents a challenge to the medical physicist who needs to develop new knowledge and understanding. When looking at the dose distribution, we know that substantial reductions in doses to organs at risk have been made possible with new treatment planning techniques. However, these new techniques have substantially changed the dose distribution in the patient when compared to standard 3DCRT. In this regard, previous DVH metrics that were linked to clinical endpoints have to be reviewed, a clear example is the mean dose to the heart in breast radiotherapy. At the same time, conformation to the Planning Target Volume (PTV), has largely improved at the cost, in some cases, of making dose distributions less robust to anatomical changes or increasing dose heterogeneity within the PTV. Pushing the optimiser may also put extra-demands on the treatment units which may find it difficult to deliver the treatment as planned.

The need for the PTV is also challenged by robust optimisation. Within proton radiotherapy planning, robust optimisation is used clinically; however, it is still not trivial to interpret. In addition, comparing a robustly optimised proton plan to a PTV optimised photon plan is yet another level of complexity. Moreover, is still defensible, from a physicist point of view a DVH curve without any uncertainty/error bars around it?

This workshop will address the evolving understanding of treatment plan quality. Discussions on dose distribution, plan robustness, plan complexity metrics will be the foundation for a working group on developing potential recommendations and guidelines.

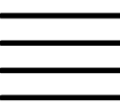
This being a workshop we want to encourage an active participation and interaction between the participants to foster collaboration and networking. For that reason, participants will be requested to prepare a short presentation (a pitch) to present their research in the field allowing identification of common points of interests and share experiences.

Outcome

Working group in metrics for plan quality evaluation (dose-omics), robustness, and deliverability.

Guidelines on how to assess plan quality from different perspectives and comparison between PTV and robust optimised plans.

Industrial partners: to include these metrics the plan optimisation and plan evaluation





Day 1	Friday 25 October
08:00	Registration opens
09:00-09:15	Introduction of the meeting: Núria Jornet , Overall Chair of workshop (All)
09:15-10:00	Opening lecture All participants <ul style="list-style-type: none">Robert Jeraj - <i>Medical physics got stuck in a box - how to get out</i>
10:00-10:30	Coffee
10:30-12:30	Workshops 5 topics
12:30-13:30	Lunch
13:30-15:30	Modern treatment plan quality - Christian Rønn Hansen (15 min)
15:30-16:00	Coffee
16:00-17:00	Wrap up of the different topic workshops (12 min per topic) All

Day 2	Saturday 26 October
08:00-10:00	Robust optimization and evaluation in photon and proton therapy - Lamberto Widesott (20 min)
10:00-10:30	Coffee
10:30-12:30	What do we mean by Plan Quality? Plan Analysis and the role of Complexity metrics in the evaluation of treatment plans - Victor Hernandez (15 min)
12:30-13:30	Lunch/commercial symposia
13:30-14:30	Workshops: Discussion on next steps; take home messages; identify open issues for further research
14:30-15:30	Wrap up: highlights of the different workshops (12 min per topic) All
15:30-15:45	Closure

