AbstractID: 1640 Title: Robust inverse treatment planning considering organ motion

In current treatment planning systems the most widely accepted method to account for organ motion is to use margins. For instance, the clinical target volume (CTV) is expanded to a planning target volume (PTV). This method gives a good target coverage. The drawback is, however, that organs at risk (OAR) intersecting the PTV will also receive high doses. The presented method aims at creating a plan which delivers the prescribed total dose to a moving CTV, with better sparing of the OARs.
The organ motion is modelled by normal distributions, and the dose a moving ROI receives is the nominal dose convolved with a gaussian kernel. In order to achieve an IMRT plan that is robust with respect to organ motion we investigate simultaneous optimization of objectives on both nominal and convolved dose distributions.
We find that this method gives a good target coverage over a range of standard deviations for the organ motion, with better OAR sparing than one achieves when using a PTV. It is also shown that it is not sufficient to optimize based only on convolved dose since treatment quality will degrade, should the assumed motion not occur.
This study was performed at RaySearch Laboratories.