

AbstractID: 8386 Title: Which patients benefit from prospective gating in treatment for loco-regional breast irradiation - a radiobiological assessment.

Purpose:

To determine a selection procedure based on radiobiological parameters to triage patients that benefit maximally from the use of free breathing gating in inspiration during treatment of the breast, internal mammary and medial supraclavicular lymph nodes.

Methodology:

Twenty patients undergoing external treatment to the breast were prospectively selected in this study, 10 patients with involvement in the right breast, and 10 in the left-hand side.

All patients underwent a classical non-gated CT scan, followed by a CT scan using prospective gating with coached breathing. To perform prospective gating a large bore Siemens Sensation OpenTM was utilized, adapted to work with the Varian RPMTM gating system, which is also installed on our Varian Linacs.

For each patient, dose distributions for the same field setup were calculated on each CT-scan. Differential DVH's for heart and lung, were analyzed providing an NTCP using a serial model with parameters: $s=1$, $\gamma=1.28$, and $D_{50}=52.3$ for the heart (predicting an increased risk of late cardiac mortality), and $s=0.06$, $\gamma=0.90$, and $D_{50}=34.0$ for the lung respectively (predicting clinical radiation pneumonitis).

Results:

The mean NTCP for the heart for all patients was 0.80% for a non-gated treatment and was reduced to 0.26% in gated treatments. This improvement was significant ($p=0.0008$). Five patients had a reduction of NTCP of 1% or more for heart complications. All of these patients were treated to the left breast, but not all left breast patients seemed to benefit. For lung NTCP overall improvement ($p=0.0006$) could be shown, reducing mean NTCP from 2.1% to 1.4%.

Conclusions:

We have shown that it is possible to have an objective criterium to apply free breathing gating for breast cancer patients resulting in an effective and economically acceptable use of machine time for gating.