



**Comparison between the breath hold and the
inspiratory phase of free breathing in left breast
cancer radiotherapy regarding the target volume
coverage and sparing of lungs, heart and
coronary arteries.**

Thesis

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English summary

This prospective phase II feasibility study was conducted at Kasr Al-Aini Center of Clinical Oncology & Nuclear Medicine (NEMROCK), for patients with left breast cancer who were receiving adjuvant locoregional radiotherapy with IMRT technique following breast conservative surgery (BCS) or modified radical mastectomy (MRM) and who had been deemed cognitively and physically fit to receive radiotherapy using (RPM) technique comparing dosimetric outcome between DIBH and inspiratory phase of free breathing (FB) plans in the same patient including target volume coverage & sparing of vital risk organs (lung & heart & coronary arteries). 75 patients were screened between February 2020 and May 2022, 15 patients were excluded because they couldn't perform DIBH technique for different reasons; 5 had cardiac comorbidities, 3 weren't compliant to the instructions, 7 couldn't hold their breath. So, 60 patients were included in the final analysis.

Planning CT scan was performed with the patient in the supine position. Each patient underwent two CT simulations: using the RPM Varian system a simulation with DIBH & FB-CT simulation where MIP was constructed from the inspiratory phases on CT.

The RTOG Breast Atlas consensus recommendations were used to delineate the target volumes and organs at risk (OAR). The plans for both CT were accepted after a thorough examination of the Beam eye view, verification of an acceptable dose distribution, and evaluation of the cumulative Dose Volume Histogram (DVH) to check the dose constraints. Set up verification was done both online during the session through checking the reference markers and laser lines at the treatment field & checking the KV & CBCT matching with DRR, & offline review was also done checking the imaging matching with the DRR.

Both plans were compared regarding target coverage & the sparing of the heart & lungs & LAD.

We found that while there was a small but statistically significant difference in target coverage between the two strategies, both were well within the parameters of acceptable practice.

Both plans did not exceed the tolerance dose, however the DIBH method spared the heart and LAD more effectively. Both strategies were equivalent in their ability to spare lung on both sides. The beam on time was similar in both plans.

Patients who are unable to perform the DIBH procedure are nevertheless given this option.