

## AbstractID: 2020 Title: Feasibility Study of Breast Motion Compensation During Treatment Using Dynamic MRI

Organ motion and deformation due to patient breathing is currently handled with increased treatment planning margins around the tumor. However, increased margins lead to excessive dose to healthy tissues. In order to investigate organ motion and deformation due to respiratory motion, a combined use of CT and MRI in treatment planning is proposed. While CT plays a role in electron density estimation and dose calculation, dynamic MRI can be used to track motion with respect to respiration, without patient undergoing exposure to high radiation dose as in 4D-CT. Ultimately, co-registration of CT and MRI can provide a way of utilizing complementary information from both modalities to improve treatment planning. In this preliminary study, respiratory breast motion is explored using fiducial markers and 2D dynamic MRI at 0.8-sec/frame temporal resolution. Respiratory cycles are reproduced by tracking fiducial marker(s) on the chestwall. Vector map of markers on the breast was constructed, and periodicity was observed. It is also shown that the motion of breast markers is highly correlated with the respiratory cycle, therefore breast motion can be determined and corrected given the phase information of current respiratory cycle. Variation in displacement vectors of different fiducial markers suggests local deformation based registration techniques, such as diffeomorphisms, may be useful for accurate registration.

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