

AbstractID: 5166 Title: The impact of gating on the reduction of heart doses for left sided breast cancer irradiation

**Purpose:** Because there are indications for an increased risk of cardiovascular diseases after radiotherapy of the left chest wall the dose to the heart should be reduced as far as possible. With respiratory gating technique irradiation can be restricted only to the inspiratory plateau phase. We investigated in all patients with left sided breast cancer dose reduction to the heart when treated only in the inspiration phase compared with not gated treatments.

**Materials and Methods:** Between Sept 2004 and Feb 2006 107 patients with left sided breast cancer were treated with respiratory gating technique based on a retrospective 4D CT scan. We performed for all of these patients a normal and a respiratory gated planning CT. Planning was done with the same treatment parameters in both CT. DVH for the entire heart and the anterior left ventricle wall were calculated. All patients were treated with 2 Gy single dose to a total dose of 50 Gy to the entire left breast/chest wall. 68 patients received an additional boost of 10 Gy.

**Results:** The mean dose to the entire heart was 0.7 Gy without and 0.6 Gy with respiratory gating ( $p=0.04$ ) whereas the mean maximal dose was 40.2 Gy without and 11.7 Gy with respiratory gating ( $p=0.0003$ ). The anterior heart wall receives 2.4 Gy without and 1.2 Gy with respiratory gating ( $p=0.0001$ ) with a mean maximal dose of 39.6 Gy without and 10.1 Gy with respiratory gating ( $p=0.0004$ ).

**Conclusion:** 4D analysis has shown that the distance between the PTV and the heart is influenced by two separate parameters. Besides the movements of the chest wall the heart is pushed into the irradiated volume also by the diaphragm. Respiratory gating and irradiation only in the inspiratory phase significantly reduces radiation doses to the heart and especially to the anterior heart wall.