

**AbstractID: 1756 Title: Respiratory correlated treatment delivery using feedback-guided breath hold**

The purpose of this study is to demonstrate the feasibility of Feedback Guided Breath Hold (FGBH) radiation delivery for treating patients. The FGBH technique was implemented by (1) evaluating different feedback display options, (2) assessing position and reproducibility of the breath-hold maneuver, (3) fabricating the hardware necessary to interface the treatment machine with the respiratory monitoring system, (4) establishing an effective training/screening program, and (5) integrating all these elements to treat patients. A commercial respiratory tracking system (RPM™, Varian Medical Systems, Palo Alto CA) generates and displays to the patient the breathing trace and specific positions in the breathing cycle where breath hold needs to occur. Both liquid crystal displays (LCD) and virtual reality goggles (VRG) were used to evaluate ways of displaying the respiratory trace as well as determining the most reproducible position for the breath hold. An initial volunteer study suggests that the maximum stability in the breath hold occurs when feedback is accomplished using VRG displaying a graph of the respiratory cycle. The use of FGBH is a viable tool when treating tumors that move as a result of the respiratory cycle. Incorporation of this technique will allow tighter margins around tumors and has the potential for treatment modalities involving longer radiation times such as IMRT or hypofractionated radiation therapy because the radiation is delivered only during the breath-hold period, which is sustained for as long as the patient feels comfortable.