AbstractID: 8849 Title: When the Oxygen Level Matters mostly during Radiation Therapy of Cervical Cancer?

**Purpose:** To investigate, at what time point in therapy the patient hemoglobin (Hgb) levels and the blood perfusion in cervical cancer have the greatest impact on outcome prediction of radiation/chemotherapy (RT/CT).

**Method and Materials:** Eighty-eight patients with cervical cancer stages IB2-IVA were treated with standard RT/CT. Serial weekly blood tests, including Hgb levels, were collected and all patients underwent 4 serial DCE-MRI: pre-RT, at 2-2.5 weeks, at 4-5 weeks during RT and 1-2 months post-RT. Mean follow-up was 4.7 (range 0.1-9.0) years. Hgb level, representing systemic oxygenation, and the lowest 10th percentile of signal intensity within tumor (SI10), representing local tumor blood supply, were combined and evaluated for various time points to predict the effectiveness of RT/CT. Outcome analyses were carried out with Mann-Whitney rank-sum test and Kaplan-Meier method.

**Results:** In separate analyses, the best time for outcome prediction for either Hgb or SI10 was at 2-2.5 weeks into treatment and a dose of 20-25 Gy. The p-value for local tumor control was <0.001 and 0.013 for Hgb<sub>2wk</sub> and SI10<sub>2wk</sub> respectively, significantly better than at the other time points, ranging 0.02-0.4 for Hgb and 0.06-0.95 for SI10. Low tumor oxygenation, reflected by simultaneously low Hgb and low SI10, significantly correlated with local tumor recurrence. The 5-year local recurrence rates are 45% vs. 7% at 2-2.5 weeks (p<0.001) respectively, compared to 36% vs. 9% at pre-therapy (p=0.003), and 37% vs. 9% at 4-5 weeks (p=0.003).

**Conclusion:** Combining information of patient Hgb levels and tumor perfusion provides a good indirect measure of the tumor oxygenation in cervical cancer. This study indicated that examinations performed early in therapy at a dose of 20-25 Gy, significantly correlated with therapy outcome, and could be used to identify early those patients at risk of local tumor recurrence.

**Conflict of Interest (only if applicable):** N/A