

## **Tumor Volume Regression during Therapy in Cervical Cancer: Does the Tumor Regress Faster with Combined Radiation/Chemotherapy than with Radiation Therapy Alone?**

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**PURPOSE** Concurrent chemotherapy and radiation therapy (CRT) have been proven to be more effective than radiation therapy (RT) alone in cervical cancer. Traditionally tumor regression during therapy has been used to assess tumor responsiveness. This study is to evaluate the volume regression rate (1) between CRT and RT groups and (2) between the responders and non-responders within the CRT and RT groups.

**METHOD AND MATERIALS** Tumor volume analysis using 3D volumetry was performed on 316 archived MRI studies in 79 patients with cervical cancer (Stages IB2-IVA), who had been enrolled on a prospective serial MR imaging protocol. Fifty-three patients were treated with RT alone (RT-group) and 25 with concurrent chemotherapy (CRT-group). MRI was obtained at RT-start, at 2-2.5 weeks of RT (20-25 Gy), at 4-5 weeks of RT (45-50 Gy), and 1-2 months post RT. Serial 3D tumor volume was analyzed by region-of-interest 3D volumetry, and a tumor volume regression curve was generated for each patient. Volume regression parameters, including slope of the regression curve, area under the curve (AUC), and residual tumor volume at 45-50 Gy were compared among the groups with RT vs. CRT, and were correlated with local tumor control and disease-free survival. Median follow-up was 6.2 (range: 0.2-9.4) years.

**RESULTS** There was no difference in the overall volume regression slope (2.30 +/- 0.61%/day vs. 2.34 +/- 0.46%/day, p=0.82), or in the AUC (20.2% +/- 6.1% vs. 19.5% +/- 4.6%, p=0.74) between the RT and the CRT groups. Within the RT group, patients with faster regression pattern (<20% residual tumor volume at 45-50 Gy) had significantly higher local control rate (93.5% vs. 31.7%, p<0.0001, log rank test) and disease-free survival (67.8% vs. 35.6%, p=0.0023) than those with slower regression. Within the CRT group, patients with faster regression also had higher local control (100% vs. 70%, p=0.0237); disease-free survival showed no statistically significant difference (86.2% vs. 70.0%, p=0.3740).

**CONCLUSIONS** Despite better outcome, the CRT group does not show overall steeper response pattern during therapy than the RT group. It is the individual regression rate that predicts outcome, regardless of CRT or RT.