

Purpose: This study investigates whether changes in dynamic contrast enhanced (DCE) MR imaging during the early course of radiation therapy (RT) are correlated with local tumor control in patients with advanced head and neck (H/N) cancer. We hypothesize that an early decrease in tumor perfusion or vascular permeability would be an indicator of early tumor response to RT. **Methods:** Patients who had newly diagnosed extracranial head and neck cancer and underwent a 7-week course of definitive chemo-RT participated in an IRB approved pilot study. Patients had three DCE MRI scans prior to RT, after 2 weeks of RT, and 3 months after the completion of RT. Perfusion parameters of the Gd-DTPA transfer constant (K represents a combination of blood flow and vascular permeability) and the fractional blood volume (V_p) were estimated using the modified Toft model. Local tumor response was assessed clinically. The association between the changes in perfusion parameters of the tumor during the early course of RT and local tumor responses was analyzed. **Results:** For the patients in whom complete response was achieved, K in the tumor had the largest reduction, approximately 30%, after 2 weeks of RT compared to prior to RT. However, for the patients whose tumors failed to respond to or partially responded to RT, K in the tumor either increased by ~80%, or decreased slightly. In contrast, changes in tumor V_p after 2 weeks of radiation were less specific for non-responders compared to the changes in the tumor K . **Conclusion:** Preliminary data of this on-going study suggest that DCE might have potential for early assessment of tumor response to radiation and chemo therapy in advanced head and neck cancers.