The Role of Biological MR Imaging in the Treatment of Head & Neck Cancer

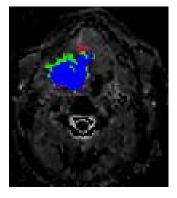
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Learning objectives:

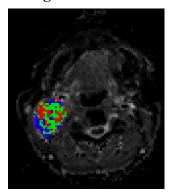
- 1. Review the Current Applications of MR Diffusion in evaluating Head and Neck Squamous Cell Carcinoma (HNSCCA)
- 2. Review the Current Applications of evolving techniques of MR diffusion in evaluating Squamous Cell Carcinoma (HNSCCA)
- 3. Present early results of MR perfusion in predicting response in HNSCCA

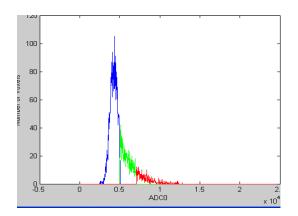
MR diffusion and perfusion are commonly used to detect infracts in patients presenting with acute neurological changes. More recently, the alterations in molecular motion have been used to predict response in patients with intracranial and head and neck tumors. The intent of this presentation will review the current applications of DWI and MR perfusion in the treatment of squamous cell carcinoma of the head and neck. Early results have suggested that DWI performed at 3T can help differentiate benign versus malignant lesions of the head and neck and help distinguish between recurrent tumor and post-treatment changes. In addition new techniques such as Parametric Response Maps and histogram analysis have shown promise in detecting early molecular changes that can predict early response and survival.

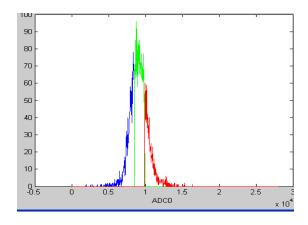
Malignant Tumor



Benign Tumor







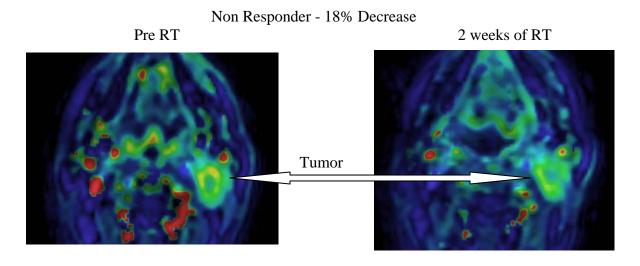
References

Srinivasan A, Dvorak R, Rohrer S, Mukherji SK. Differentiation of Benign and Malignant Pathology in the Head and Neck Using 3T Apparent Diffusion Coefficient Values: Early Experience. AJNR 2008;29: 40-44

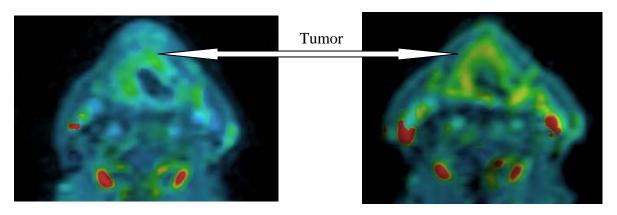
Kim S, Loevner L, Quon H, Sherman E, Weinstein G, Kilger A, Poptani H. Diffuion-Weighted Magnetic Imaging for Predicting and Detectine Early Response to Chemoradiation Therapy of Squamous Cell Carcinomas of the Head and Neck. Clin Cancer Res 2009;15:986-994

III. MR Perfusion

MR perfusion non-invasively measure the microvascular environment of tissue. Recent investigations suggest that dynamic contrast enhanced MR suggest that an elevation in BV during treatment is suggestive of local control. These findings were more predictive that changes in tumor volume. These findings suggest that an increase in local blood supply, potentially as a source of increased oxygenation, may be a positive indicator for therapeutic response at the primary tumor site.



Responder – 90% Increase



References:

Cao Y, Popovtzer A, Li D, Chepeha DB, Moyer JS, Prince ME, Worden F, Teknos T, Bradford C, **Mukherji SK**, Eisbruch A. Early prediction of outcome in advanced head-and-neck cancer based on tumor blood volume alterations during therapy: a prospective study.Int J Radiat Oncol Biol Phys. 2008:72:1287-90

Kim S, Quon H, Loevner L, Rosen MA, Dougherty L, Kliger AM, Glickstein JD, Poptani H. Transcytolemmal Water Exchange in Pharmacokinetic Analysis of Dynamic Contrast-Enhanced MRI Data in Squamous Cell Carcinoma of the Head & Neck. JMRI 2007;26:1607-1617