Squamous cell carcinoma of the head and neck: can 1H MRS pre-treatment and during early treatment with chemoradiation predict therapeutic response?

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Objectives: Over the past few years, the role of in vivo ^{1}H MR spectroscopy has been evaluated in the characterization of tumors. This technique has also been shown to be useful in the head and neck suggesting that the detection and measurement of choline peak may be useful to different between types of head and neck tumors (1-4). The aim of the study was to determine if ^{1}H MR spectroscopy performed pre-treatment and early during the course of chemoradiotherapy can be used to predict tumor response of head and neck squamous cell carcinoma (SCC).

Materials and Methods: Patients with newly diagnosed SCC of the head and neck selected for chemoradiation, with a primary tumor or metastatic cervical lymph node greater than 1cm^3, underwent ^{1}H-MR spectroscopy on a 1.5 T whole-body MRI system. ^{1}H MR spectroscopy was performed using a PRESS sequence with a TE of 136 msec. The choline (Cho) to creatine (Cr) and Cho to water ratios at (1) diagnosis and (2) change between diagnosis and two weeks after the start of treatment were correlated with tumor response. Tumor response was assessed 6 weeks after the end of treatment by MRI using tumor measurements expressed as a % change in tumor size and responders vs. non-responders. The presence of residual tumor, based on histology, endoscopy or serial increase in size on imaging, was assessed during clinical and radiological follow-up. Statistical analysis was performed using simple and logistic regression and a p-value of < 0.05 was considered statistically significant.

Results: 39 patients (37 males, 2 females, mean age 57, range 43-74 years) underwent ^{1}H MR spectroscopy. Patients were followed up for 2-24 months (mean 21 months), 11 patients were non-responders based on change in tumor size at 6 weeks and 10 were eventually proven to have residual disease at the site of ^{1}H MR spectroscopy. The p values for correlation of Cho:Cr and Cho:water ratios and tumor response are shown in the Table 1.

Conclusion: Cho:Cr and Cho:water ratios from ^{1}H- MRS of SCC pre treatment and the change in ratios early in the course of treatment do not predict tumour response.

References:

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	Tumor Response		
	% reduction in size on MRI 6 weeks after the end of treatment	Responders vs non – responders based on change in size on MRI 6 weeks after the end of treatment	Residual disease proven during follow up (histology, endoscopy or serial increase in size on imaging)
Pre treatment ^{1}H- MRS			
Cho:Cr	0.54	0.19	0.93
Cho:water	0.28	0.46	0.32
Change between pretreatment and 2 week ^{1}H-MRS			
Cho:Cr	0.72	0.70	0.29
Cho:water	0.37	0.64	0.66

Table 1. P values for correlation of Cho:Cr and Cho:water ratios and tumor response.