On-line Table: DCE-MRI studies in HNC with quantitative analysis

Study	Sequence/TR	T1 Mapping	Quantitative Model	Assessed	Outcome
Van Cann et al, 2008[49]	2D T1 FLASH/2 sec	No	Larrson model	Preoperative assessment of mandibular invasion in 25 patients with SCC adjacent or fixed to mandible	SCC with medullary invasion has higher mean K_{ep} and K^{trans} compared with SCC without medullary invasion
Newbold et al, 2009[46]	3D T1/6.4 sec	No	Tofts model	Pretreatment assessment of tumor hypoxia in 7 patients with HNC	Positive correlation of K^{trans}, K_{ep}, and negative correlation of V_e with tumor hypoxia (detected by pimonidazole staining of tumor specimen)
Kim S et al, 2010[65]	3D T1 FSPGR/2.5 sec	Yes	Shutter-speed model	Predicting treatment response by measuring K^{trans}, V_e, and Ti in 33 patients with HNC before CRT	K^{trans} was significantly higher in responders compared with nonresponders; V_e and Ti were not significantly different between the 2 groups
Jansen et al, 2010[61]	2D T1 FSPGR/3.75–7.5 sec	No	Tofts model	Relationship between pretreatment K^{trans} and V_e in 13 patients with newly diagnosed HNC with tumor hypoxia in metastatic nodes measured by ^{18}F FMISO PET	Significantly lower K^{trans} and K_{ep} (poor perfusion) correlate with FMISO uptake in metastatic lymph nodes, suggesting moderate-to-severe tumor hypoxia
Chawla et al, 2011[27]	3D T1 SPGR/2.5 sec	No	Shutter-speed model	Predicting disease-free survival in 57 patients with HNC using pretreatment K^{trans} of the largest metastatic lymph node	Patients with prolonged disease-free survival have higher median K^{trans} ($\geq$0.41/min) compared with patients with low K^{trans} values
Chikui et al, 2011[28]	3D T1 FFE/3.5 sec	No	Brix model	Predicting and monitoring treatment response in 20 patients with oral cancer by measuring TA, AH, K_{ep}, and K_{el} both pre- and post-CRT	Low AH before CRT suggests high possibility of good treatment response, and large increase in AH posttreatment correlates with good response
Chikui et al, 2012[45]	3D T1 FFE/3.5 sec	Yes	Tofts model	Predicting and monitoring treatment response in 29 patients with oral cancer by measuring K^{trans}, K_{ep}, V_e, and AUGC both pre- and post-CRT	**Pre-CRT:** no significant difference between the responders and nonresponders **Post-CRT:** V_e and AUGC were significantly lower in low-grade tumors (grade I/IIa) compared with higher grade (grade IIb/III/IV). **Pre and post-CRT:** comparison: significant elevation of K^{trans} and V_e in responders compared with nonresponders
Agrawal et al, 2012[41]	3D T1 SPGR/5.25 sec	Yes	Tofts model	Pretreatment assessment of BV and BF in 21 patients with HNC for predicting treatment response	BV and BF were significantly higher in responders versus partial responders
Shukla-Dave et al, 2012[29]	3D T1 SPGR/3.75–7.5 sec	No	Tofts model	Predicting progression-free survival and overall survival in 74 patients with HNC	Skewness of K^{trans} is the strongest predictor of progression-free and overall survival in patients with stage IV HNC with nodal disease
Wang et al, 2012[30]	3D T1 gradient-echo pulse sequence/7.6 sec	No	Tofts model	Predicting treatment response in 32 patients with HNC by measuring BV and BF before and at 2 weeks after CRT	Large poorly perfused subvolumes of primary or nodal HNC before treatment and persisting during the early course (at 2 weeks) of CRT have the potential for prediction of local or regional failure

On-line Table: Continued

Study	Sequence/TR	T1 Mapping	Quantitative Model	Assessed	Outcome
Jansen et al, 2012[60]	2D T1 FSPGR/4–5.9 sec	No	Tofts model	Correlate ^{1}H-MRS, DCE-MRI, and FDG PET of 16 patients with HNC with nodal metastasis for assessment of tumor biology and in predicting short-term response to treatment	Significant positive correlation between Cho/W and TLG; negative correlation between Cho/W and SD of V_e and K_{ep}; SUV_{max} correlated with MRI tumor volume; SD of K^{trans} and SUV_{mean} correlated with short-term (3–4 month) response of HNC
Jansen et al, 2012[75]	2D T1 FSPGR/3.75–7.5 sec	No	Tofts model	Correlate ^{1}H-MRS and DCE-MRI in 12 patients with nodal metastasis from HNC with specific molecular marker	Significant correlation between SD of K_{ep} with VEGF IHC expression (endogenous marker for tumor vessel growth) and SD of K^{trans} and SD of V_e inversely correlated with Ki-67 IHC expression (reflecting cellular proliferation)
Chawla et al, 2013[26]	3D T1 SPGR/2.5 sec	No	Generalized kinetic model	Predicting treatment response in 24 patients with HNSCC using K^{trans}, V_e, V_p, and ADC of both primary tumor and metastatic lymph node	Primary tumor: no significant difference of K^{trans}, V_p, ADC, and V_e between the responders and nonresponders Metastatic node: significantly higher K^{trans} in responders compared with nonresponders; V_p, ADC, and V_e were not significantly different between the 2 groups

Note:—TR indicates temporal resolution; TA, contrast arrival time; BV, blood volume; BF, blood flow; CRT, chemoradiation treatment; ^{18}F FMISO PET, ^{18}F fluromisonidazole PET; Cho/W, choline to water ratio; TLG, total lesion glycolysis; SUV, standard uptake value; VEGF, vascular endothelial growth factor; IHC, immunohistochemical; Ti, intracellular water lifetime; SCC, squamous cell carcinoma; AUGC, area under the gadolinium dynamic curve; SPGR, spoiled gradient-recalled echo; HNSCC, head and neck squamous cell carcinoma; FSPGR, fast-spoiled gradient recalled; FFE, fast-field echo; AH, amplitude of the normalized dynamic curve; K_{el}, elimination rate constant.