Purpose:Through kinetic modeling, both dynamic FLT-PET and dynamic contrast-enhanced CT (DCE-CT) measure perfusion. However, the set of parameters used by the kinetic models to describe perfusion differs between the two imaging modalities. The purpose of this study was to investigate the correlations between corresponding FLT-PET and DCE-CT kinetic ROI and voxel parameters.

Methods:Canine patients with sinonasal tumors underwent FLT-PET and DCE-CT on the same day. FLT-PET uptake was modeled with a two-compartment four-parameter kinetic model. The DCE-CT kinetic analysis was done by Kety, deconvolution (Decon) and distributed parameter (DP) models. All models were implemented in-house using MATLAB. FLT K1 and k2 parameters were correlated with equivalent K1 and k2 DCE-CT values. FLT vb was correlated with the DCE-CT parameter blood volume ratio (BVR). ROI analysis was performed over the entire tumor volume, while voxel analysis was calculated on the largest tumor slice. Correlations were done using the population correlation coefficient (p).

Results:DCE-CT and FLT K1 displayed strong ROI correlations (DP: p=0.91, Deconvolution: p=0.87, Kety: p=0.60). The kinetic parameter vb also had high ROI correlations (p=0.82, p=0.89, p=0.89). FLT k2 correlated only marginally with the DCE-CT models (p ~ +/-0.50). There were no significant voxel correlations. However, increasing voxel size 128×128 to 32×32 lead to minor improvements in correlation with the most notable being K1, which increased in the distributed parameter and deconvolution models from (p=0.16, p=0.29) to (p=0.52, p=0.42).

Conclusions:Significant ROI correlations were found between FLT and DCE-CT kinetic analysis. The kinetic parameters K1 and vb had relatively high correlations between the DCE-CT and FLT kinetic models. Even though there were no significant voxel correlations, an increase in K1 correlations with voxel size may indicate kinetic model sensitivity to noise as an important factor in kinetic parameter correlations.