AbstractID: 7223 Title: CuATSM and FLT PET images stabilization assessment

Purpose: The level of correlation of a molecular imaging marker to the underlying biological information is critical, and depends on several factors, one of them being pharmacokinetics of the radioisotope uptake. The main aim of this work to assess the level of Cu-diacetyl-bis(N4-methylthiosemicarbazone) ([Cu-64]-CuATSM) and 3'-Deoxy-3'-fluorothymidine ([F-18]-FLT) uptake stability as a function of imaging time post-injection to find an acceptable time window for image acquisition.

Method and materials: Five canine patients (three nasal carcinomas, two sarcomas) with spontaneous tumors were scanned with CuATSM (hypoxia marker) and FLT (cell proliferation marker). The FLT scans were dynamic up to 70min. The CuATSM scans were dynamic for 3h and followed with a repeat scan at 24h. Correlation coefficients were calculated between individual frames of a dynamic scan and a reference PET image. For the CuATSM scan, the reference PET image was the CuATSM scan at 24h. For the FLT scan, the reference PET image was either the last frame (70min), or the image obtained with a three-compartment kinetic modeling. The correlation was calculated based on the volume of interest, defined as a CT-visible tumor with a small margin.

Results: Our results indicate relative stability of the CuATSM uptake after approximately 1h, when the correlation coefficient increases over 0.9. Relatively low level of inter-patient variability was observed. The FLT uptake analysis shows relatively fast stabilization, typically achieved within first 30min. The stability behavior was tumor-type dependant. Relatively high correlation between the SUV (60-70 min) and k_{FLT} was observed, warranting further investigation of true benefit of kinetic analysis.

Conclusions: This work investigates spatial and temporal stability of CuATSM and FLT uptake in several tumor types. Due to significant variation in observed time required for image stabilization, we have to be aware that spatial distribution in different tumors can last longer than the initial transient indicates.