

AbstractID: 5408 Title: Therapy Assessment Using a Full Time Point (fTP)  
Pharmacokinetic Analysis of Dynamic Contrast-Enhanced Magnetic Resonance Imaging  
(DCE-MRI): Role of Region of Interest (ROI) Selection in Three Tumor Sites

**Background:** DCE-MRI has great potential to provide routine assessment of cancer treatment response. The contrast agent preferentially accumulates in tumors due to increased tumor vascular permeability. The MR based parameters that can be used for treatment assessment (permeability and leakage space) can be averaged over the whole tumor or over a maximum enhancement ROI. The optimal method of analysis is controversial.

**Material and Methods:** DCE-MR images of selective head and neck, breast and extremity sarcoma patients were acquired on a 1.5T GE Signa Exite scanner before and after different therapy regimens (concurrent chemoradiation for head and neck, neoadjuvant and hyperthermia for breast, and radiation and hyperthermia for extremity sarcomas). The images were analyzed using an fTP pharmacokinetic analysis implemented by CAD Sciences® (White Plains, NY) that determines the tumor's permeability (PERM) and extracellular volume fraction (EVF). ROIs were defined over the entire extent of the tumor (Tumor ROI) and over areas that show maximum enhancement (MaxEnhROI). For head and neck cases, MaxEnhROI were carefully selected not to include fast enhancing arteries which can bias the averaging.

**Results:** For all three tumor types, the trends of PERM and EVF change are the same, but the absolute changes are not. Larger differences are seen in tumors that have peripheral enhancement and large necrotic areas (found often in head and neck and extremity sarcomas). As expected, for homogeneous enhancing tumors (rarely encountered), the differences are not significant.

**Conclusions:** Preliminary results show that ROI selection is important in MR parameter averaging, particularly if the quantitative analysis is used for therapy assessment. This statement is true for all the three sites considered. Although DCE-MRI has great potential to provide routine assessment of cancer treatment response, its widespread application should be standardized for clinical use. Supported in part by grant NCI CA42745.