

# AbstractID: 8371 Title: Modeling Contrast Agent Extravasation in Dynamic Susceptibility Contrast MRI of Very Leaky Brain Tumors

## **Purpose**

In dynamic susceptibility contrast MRI, when there is a disruption of the BBB, as is frequently the case with brain tumors, contrast agent leaks out of the vasculature and causes additional T1 and T2 effects. In slightly leaky conditions, previous studies successfully modeled the T1 effect and were able to correct it for better perfusion quantifications. However, in very leaky conditions, the T2 effect can be significant and needs to be taken into account. This study proposed a two-compartmental model that is able to describe the combined T1 and T2 effects in the measured signals.

## **Methods**

Our model considered different tracer residue functions for brain tissues and leaking tumors. They were then incorporated in both T1 and T2 changes in the MR signal equation. Three unknown variables were introduced: K1, K2 and K3, and the K2 directly related to the permeability. We used the model to fit measured  $\Delta R2^*$  curves and corrected the contrast leakage in the patient data with heavy T2 effect.

## **Results**

The proposed model was able to fit well the leaking  $\Delta R2^*$  curves and better correct them comparing to the previous model. The GM/WM CBV ratios were comparable before (1.26) and after (1.19) the correction. However, Tumor/WM CBV ratio was 42.6% decreased after the correction (2.25 v.s. 5.27). The K2 map was able to describe regions with significant contrast extravasation, whereas the previous model failed due to the additional T2 effect.

## **Conclusion**

The model proposed in this study was able to correct both T1 and T2 effects of contrast extravasation in DSC MRI. The T2 component significantly overestimated rCBV in very leaking brain tumors, which was not considered in the previous model with T1 effect only. In addition to better correct the rCBV maps, our model successfully extracted the regional permeability changes of the tumors.