

Differentiating Tumor Progression from Radionecrosis using Fluid-Suppressed APTw Imaging

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INTRODUCTION:

This study investigates the efficacy of Fluid-Suppressed Amide Proton Transfer weighted (APT_w) imaging¹ compared to traditional Leakage-Corrected relative Cerebral Blood Volume (rCBV) imaging, addressing the need for improved accuracy in differentiating tumor progression from radionecrosis post-Stereotactic radiosurgery in brain metastases^{2,3}.

METHODS:

22 subjects with brain metastases post Gamma-Knife SRS were imaged using a 3T MRI Siemens scanner (Skyra). Fluid-Suppressed APT_w and DSC perfusion imaging protocols were employed to analyze lesion molecular and vascular related signal intensity, with assessments validated through histology and imaging follow-up. APT_w and DSC data were processed with Olea Sphere 3.0.

RESULTS:

Fluid-suppressed (F.S.) APT_w demonstrated significant differentiation between tumor progression and radionecrosis ($p=0.00000148$), showing higher diagnostic accuracy than leakage-corrected (L.C.) rCBV, which did not significantly differentiate the conditions ($p=0.1633$).

DISCUSSION

The superior performance of Fluid-Suppressed APT_w suggests its potential as a preferable MRI technique for post-therapeutic brain tumor assessments. This technique could reduce misdiagnoses linked with current imaging practices.

CONCLUSION:

Implementing Fluid-Suppressed APT_w imaging can enhance diagnostic accuracy in clinical settings, offering a reliable method for distinguishing between tumor recurrence and radionecrosis, thus guiding more appropriate patient management strategies.

REFERENCES:

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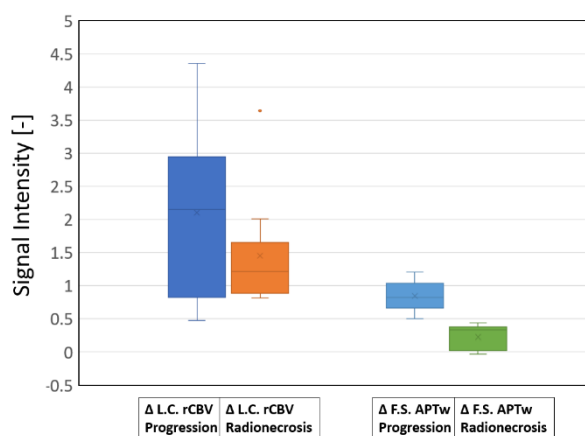


Figure 1. Boxplots of Δ F.S.APT_w and Δ L.C.rCBV for both tumor progression and radionecrosis lesions.

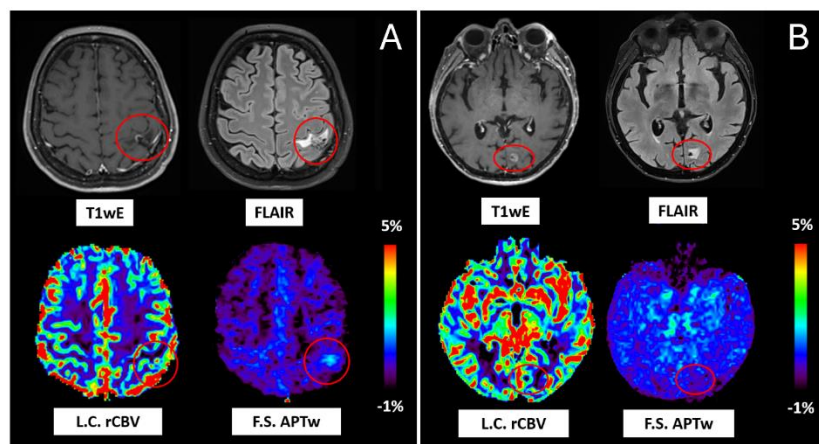


Figure 2. A) Clinical example of histological-proved tumor progression predicted by F.S.APT_w map and not by L.C.rCBV map. B) Clinical example of radionecrosis diagnosed by F.S.APT_w map and not by L.C.rCBV perfusion map.