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# MR imaging biomarker of cancer mitochondrial redox state

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Metastasis is the primary cause of death of cancer patients. Predicting tumor aggressiveness (metastatic potential) to assist treatment strategies is of high importance. Previously, mitochondrial redox scanning (cryogenic NADH/Fp (reduced nicotinamide adenine dinucleotide/oxidized flavoproteins) fluorescence imaging) of ex vivo tissues has been used to reveal tumor heterogeneity (core-rim pattern) which is found to be highly correlated to tumor aggressiveness in breast cancer mouse xenografts. A non-invasive MRI method could serve as a surrogate metabolic redox imaging biomarkers for clinical determination of tumor metastasis. The chemical exchange saturation transfer (CEST) effect from amide and hydroxyl protons have previously been exploited to measure pH, liver glycogen and cartilage glycosaminoglycans. CEST contrast using higher magnitude of saturating RF pulse has be reported to map fast exchanging free amino acids, including glutamate. Glutamate among other metabolites is known to be connected with mitochondrial redox reactions through α-ketoglutarate in the TCA cycle. CEST effect from those redox related metabolites may be used as a non-invasive redox biomarker. In our studies, CEST MRI technique has been investigated to characterize breast tumor heterogeneity and correlate with redox scanning of two types of breast tumors (MDA-MB-231 and MCF-7). Our results show a close correlation between CEST MRI and optical redox scanning indicating that CEST MR could be a novel imaging biomarker for mitochondrial redox state.

## Biography

Dr. Kejia Cai has completed his Ph.D in Biomedical Engineering from Washington University of St. Louis in 2008 and is current a research associate in University of Pennsylvania School of Medicine. He has published around 20 papers in reputed journal and serving as a reviewer for the top imaging journals.

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