

# The Comparison of Arterial Spin Labeling Perfusion MRI and DCE-MRI in Patients with Prostate Cancer

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## Introduction

Arterial spin labeling (ASL) MRI has the advantage of no administration of the extrinsic tracer which are capable of absolutely quantitatively measuring the microvascular perfusion characteristics of tissue through tagging arterial water to obtain the blood flow (BF) value[1-3]. Dynamic contrast-enhanced MRI (DCE-MRI) kinetic perfusion parameters, such as  $K^{trans}$ (volume transfer coefficient),  $K_{ep}$ (rate contrast) and  $V_e$  (extravascular extracellular volume fraction), have been shown to be useful in discriminating prostate cancer from normal glandular tissue[4-6]. The purpose of this study is to explore the correlation between the BF from ASL and kinetic parameters from DCE-MRI in patients with prostate cancer.

## Methods

Six patients (mean 78±3years; range 74-82 years) with pathologically confirmed prostate cancer were recruited in this study. All patients had elevated serum prostate-specific antigen (PSA) level (mean 117.9±106.8ng/mL; range 11.41-294.8ng/mL). The PASL pulse sequence and DCE MR examinations were performed on a clinical 3.0T GE scanner. The PASL protocol used a single shot fast spin echo (SSFSE) sequence with four different inversion time (TI=1000, 1200, 1400 and 1600msec). ASL post-processing was conducted in the Matlab to acquire the BF mappings. The DCE-MRI used a 3D spoiled gradient echo pulse sequence with a flip angle of 15°, 15 phases and a temporal resolution of 12s. On the second dynamic timepoint, 0.1 mmol/kg of body weight of 0.5 mmol/ml Omniscan (GE Healthcare) was administered through a Spectris power injector (Medrad Inc.) at a rate of 3 ml/s followed by an equal volume of saline flush also at 3 ml/s. The regions of interest (ROIs) were placed in prostate peripheral zone. The mean BF,  $K^{trans}$ ,  $K_{ep}$  and  $V_e$  in cancerous and noncancerous regions for each patient were computed.

## Results

Significant positive correlations between BF value and  $K^{trans}$ ,  $K_{ep}$  were observed in all four TI ( $p < 0.05$ , Spearman's correlation analysis). (Table 1, Fig. 1). However, no significant correlation between BF and  $V_e$  was found.

## Discussion

Our results show that there is significant correlation between BF values determined by ASL and  $K^{trans}$ ,  $K_{ep}$  obtained with bolus-tracking DCE-MRI in prostate. It seems the arterial spin labeling sequence with no contrast

medium allows extraction of blood flow information specific to the angiogenic process of prostate, which can only be evaluated with the administration of extrinsic tracer in most previous MR studies. Further studies in a larger population are needed before these results can be generalized to the population at large.

TI(msec)		1000	1200	1400	1600
BF- $K^{trans}$	r	0.837	0.869	0.810	0.886
	P	<0.001	<0.001	0.0014	<0.001
BF- $K_{ep}$	r	0.732	0.744	0.710	0.781
	P	0.0068	0.0055	0.0096	0.0027
BF- $V_e$	r	0.341	0.464	0.468	0.388
	P	0.278	0.129	0.125	0.213

Table 1. Results of correlation between perfusion parameter (BF) and  $K^{trans}$ ,  $K_{ep}$ ,  $V_e$  in prostate.

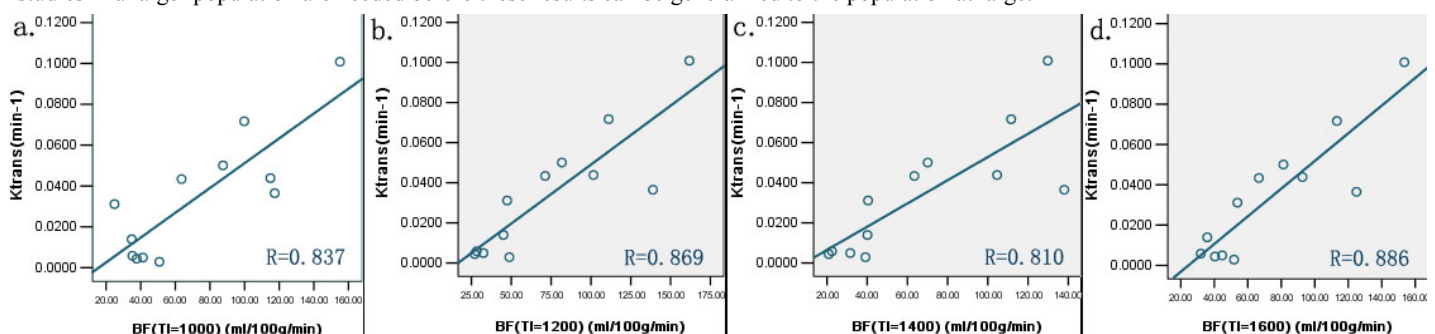


Figure 1. (a-d) Scatter plots show correlations between BF in different TI(1000, 1200, 1400, 1600msec) and the vessel permeability parameters ( $K^{trans}$ ).

## References

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