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Investigating possible significant differences between rejected and non-rejected allografts using diffusion-weighted MRI

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The aim of this study is to determine which parameters are correlated with a more accurate diagnosis of rejection in patient who has undergone kidney transplantation. The study included 16 patients with stable renal allograft function (Group 1) and 37 patients with rejected allografts, determined by renal biopsy (Group 2), post transplantation. All patients' kidneys were evaluated using diffusion weighted MRI coupled with a computer aided diagnostic (CAD) system. Statistical analysis was performed to investigate possible correlations between allograft biomarkers and the biopsy diagnosis. The statistical analysis examined four categories of parameters: (1) Clinical biomarkers (i.e., plasma creatinine and creatinine clearness) alone, (2) The mean apparent diffusion coefficient (ADC) at 11 different individual b-values (b50 to b1000) s/mm², (3) The mean ADCs of certain groups of individual b-value (sub-model) and, (4) The fusion of the clinical biomarkers with the mean ADC of fused b-values (the full model). Continuing the analysis of the mean ADC at 11 different individual b-values (b50 to b1000) s/mm² of rejected and non-rejected patients, were significantly different at b-values of 500 s/mm², 600 s/mm², 700 s/mm² and 900 s/mm². The statistical analysis of certain fused groups of individual b-values yielded that the fusion of b=100 s/mm² and b=700 s/mm² provided an Akaike Information Criterion (AIC) of 58.6. The statistical analysis for the full model AIC was 65.0. It was concluded that the least accurate parameters were the full model while the most accurate parameters were the sub model which fused b=100 s/mm² and b=700 s/mm².

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