



# Dynamic contrast enhanced MRI for the evaluation of lung perfusion in idiopathic pulmonary fibrosis

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DCE-MRI quantitative perfusion and semiquantitative transit time metrics identified regional deficits in IPF lung disease relative to healthy control subjects and in IPF progression <https://bit.ly/3swKH6r>

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## Abstract

**Background** The objective of this work was to apply quantitative and semiquantitative dynamic contrast enhanced magnetic resonance imaging (DCE-MRI) methods to evaluate lung perfusion in idiopathic pulmonary fibrosis (IPF).

**Methods** In this prospective trial 41 subjects, including healthy control and IPF subjects, were studied using DCE-MRI at baseline. IPF subjects were then followed for 1 year; progressive IPF (IPF<sub>prog</sub>) subjects were distinguished from stable IPF (IPF<sub>stable</sub>) subjects based on a decline in percent predicted forced vital capacity (FVC % pred) or diffusing capacity of the lung for carbon monoxide ( $D_{LCO}$  % pred) measured during follow-up visits. 35 out of 41 subjects were retained for final baseline analysis (control: n=15; IPF<sub>stable</sub>: n=14; IPF<sub>prog</sub>: n=6). Seven measures and their coefficients of variation (CV) were derived using temporally resolved DCE-MRI. Two sets of global and regional comparisons were made: control *versus* IPF groups and control *versus* IPF<sub>stable</sub> *versus* IPF<sub>prog</sub> groups, using linear regression analysis. Each measure was compared with FVC % pred,  $D_{LCO}$  % pred and the lung clearance index (LCI % pred) using a Spearman rank correlation.

**Results** DCE-MRI identified regional perfusion differences between control and IPF subjects using first moment transit time (FMTT), contrast uptake slope and pulmonary blood flow (PBF) ( $p \leq 0.05$ ), while global averages did not. FMTT was shorter for IPF<sub>prog</sub> compared with both IPF<sub>stable</sub> ( $p=0.004$ ) and control groups ( $p=0.023$ ). Correlations were observed between PBF CV and  $D_{LCO}$  % pred ( $r_s = -0.48$ ,  $p=0.022$ ) and LCI % pred ( $r_s = +0.47$ ,  $p=0.015$ ). Significant group differences were detected in age ( $p < 0.001$ ),  $D_{LCO}$  % pred ( $p < 0.001$ ), FVC % pred ( $p=0.001$ ) and LCI % pred ( $p=0.007$ ).

**Conclusions** Global analysis obscures regional changes in pulmonary haemodynamics in IPF using DCE-MRI in IPF. Decreased FMTT may be a candidate marker for IPF progression.