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# Estimation of model parameters used to predict treatment response in breast cancer from dynamic contrast-enhanced MRI data using novel mathematical software

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Specific biomarkers can be identified in dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) breast scans and quantified using pharmacokinetic models that return estimates of parameters related to tissue physiology including vessel perfusion and permeability ($K^{trans}$), the extravascular-extracellular volume fraction ($v_e$), the plasma volume fraction ($v_p$), and the efflux constant ($k_{ep}$). In particular, $K^{trans}$ and $k_{ep}$ have been shown to be effective at predicting the response of cancer patients to treatment. Two fundamental issues in the field of DCE-MRI is the lack of standardization of the analysis and characterizing the time rate of change of the concentration of contrast agent in the vascular (the so-called "arterial input function" or AIF). We have recently developed a method for estimating accurate AIFs for the individual patients and associated software to automate the estimation of model parameters from DCE-MRI data taken from breast cancer patients using data that can be acquired routinely in community-based imaging centres.

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