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## Tumor Vasculature Changes Before or During Treatment to Predict Response to Systemic Therapy

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## **Tumor Vasculature Changes Before or During Treatment to Predict Response to Systemic Therapy**

A diagnosis of non-small cell lung cancer (NSCLC) carries a grim prognosis, with 5-year survival rates of 25%. 25-30% of NSCLC patients have brain metastases at initial presentation, which carries an even worse prognosis. New systemic therapies such as targeted-therapies and immuno-therapies have potential to provide better outcomes, but are not without challenges. First, efficacy is limited to a subset of patients. Second, the blood-brain barrier limits penetration, which varies among patients. Third, toxicities can be considerable. Current practice involves waiting 3-6 months to follow-up and assess tumor response; however, by then, it is later than ideal to try other therapies, and too late to limit toxicity. Establishing a non-invasive early predictor of response will accelerate the use of new promising agents and could improve tumor response and outcomes.

Pre-clinical studies demonstrate changes in tumor vasculature hours after treatment are predictive of long-term treatment response. The aim of this study is to use dynamic-contrast enhanced magnetic resonance imaging (DCE-MRI) to evaluate both pre-treatment and post-treatment vascular measures (vascular volume, vascular permeability, interstitial tumor pressure) as predictors of long-term response.

This exploratory clinical study will enroll 20 patients to complete 3 DCE-MRI studies. The response variables will be modeled against the vascular measures at three timepoints (pre-treatment, immediate post-treatment, and standard follow-up interval (6-8 weeks)) to assess the predictive ability of tumor vascular characteristics on survival, tumor progression, and imaging response. The data acquired in this study will be used in planning larger and more comprehensive trials in the future.