SUPPLEMENTARY MATERIALS

Predicting breast cancer response to neoadjuvant chemotherapy based on tumor vascular features in needle biopsies

Terisse A. Brocato, Ursa Brown-Glaberman, Zhihui Wang, Reed G. Selwyn, Colin M. Wilson, Edward F. Wyckoff, Lesley C. Lomo, Jennifer L. Saline, Anupama Hooda-Nehra, Renata Pasqualini, Wadih Arap, C. Jeffrey Brinker, Vittorio Cristini
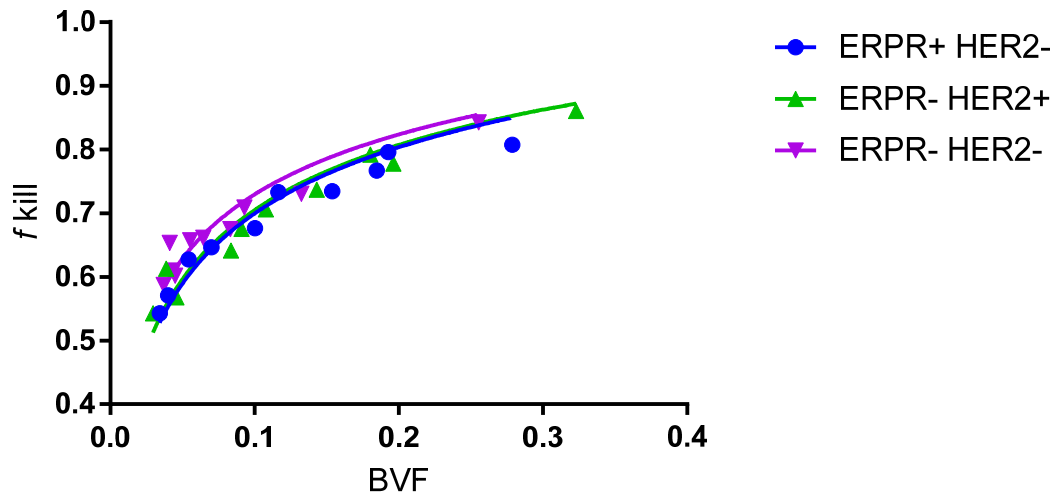
Fig. S1. Regression analysis of Cohort A (30 patients, 3 groups, 10 patients per group).

ANOVA $p = 0.8778$ indicating patient groups are not significantly different and can be grouped into one analysis as shown in **Fig. 2**.
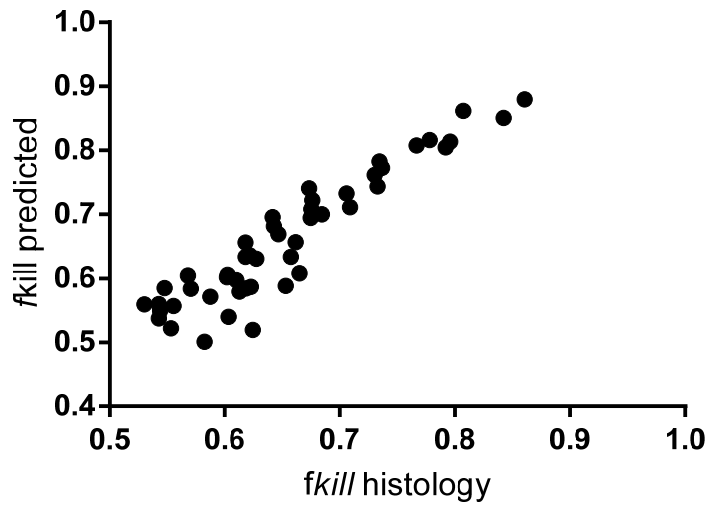
Figure S2.

Fig S2. Correlation analysis of $f_{kill, histology}$ and $f_{kill, predicted}$ of 48 patients. Analysis results: $r = 0.9374$ and $p < 0.0001$ (significance level $\alpha = 0.05$, two tail).
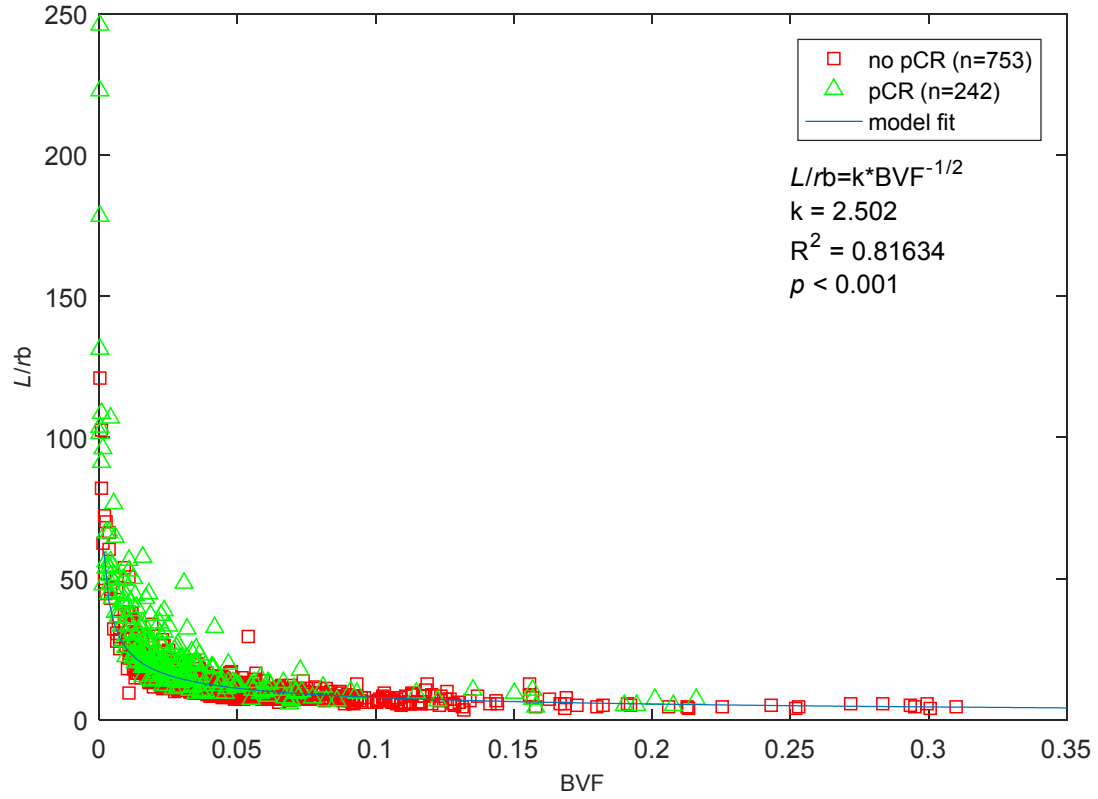
Figure S3.

Fig S3. Inverse square root correlation between BVF and L/r_b for patients in Cohort B.

Each point is an individual grid of analysis as seen in **Fig. 6**. Four outliers were removed using iterative Grubbs test ($\alpha = 0.05$).
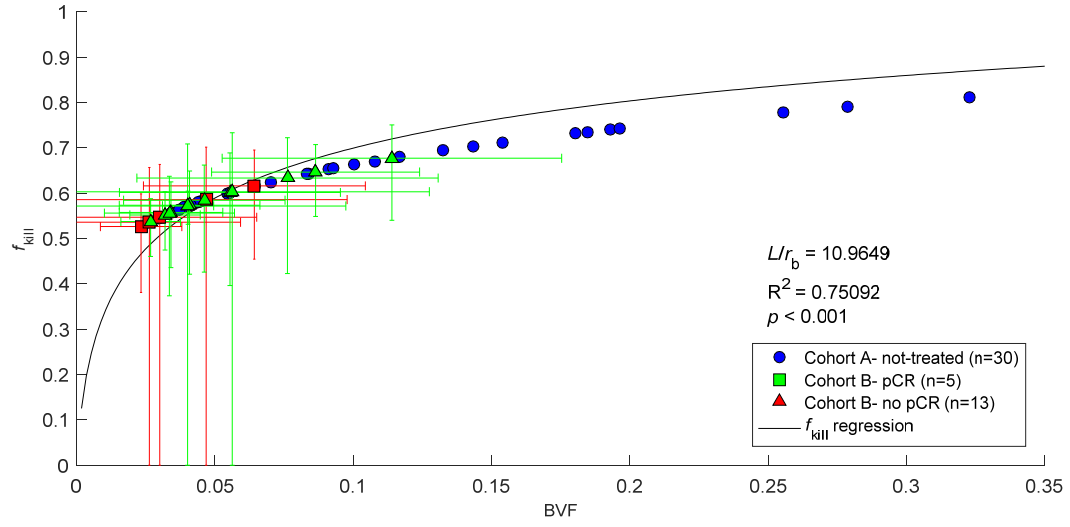
Figure S4.

Fig. S4. Prediction of f_{kill} based on BVF. Using BVF value for insertion into L/r_b (BVF) equation to predict f_{kill}, shown in **Fig. S3**, determined using Cohort A and Cohort B.
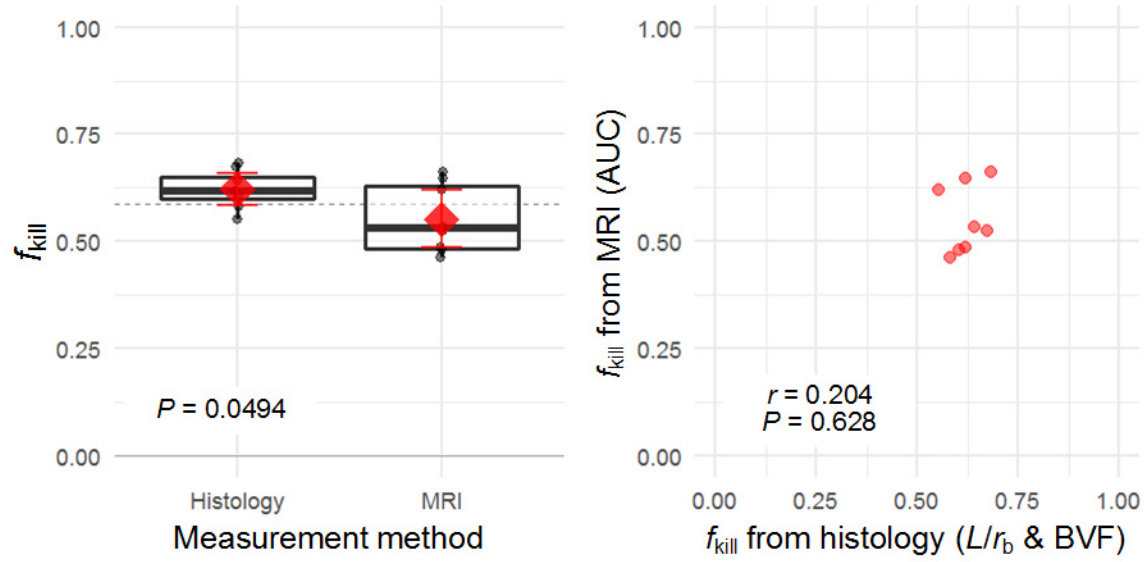
Figure S5.

Fig. S5. Comparisons of model predictions from histology and from MRI. Predictions of the f_{kill} model (Equation 1, main text) using histology data only (i.e., L/r_b and BVF) were compared with those obtained using only MRI data (i.e., AUC). Both paired *t*-test (*left*) and correlation analysis (*right*) with associated statistics are shown. Correlation analysis was calculated using the correlation from **Fig. 4** (main text) to obtain L/r_b from MRI data, as well as the correlation seen in **Fig. S3** to determine BVF. Two data points resulting in non-biological data ($f_{kill} > 1$ or $L/r_b < 0$) were taken out of the analysis.
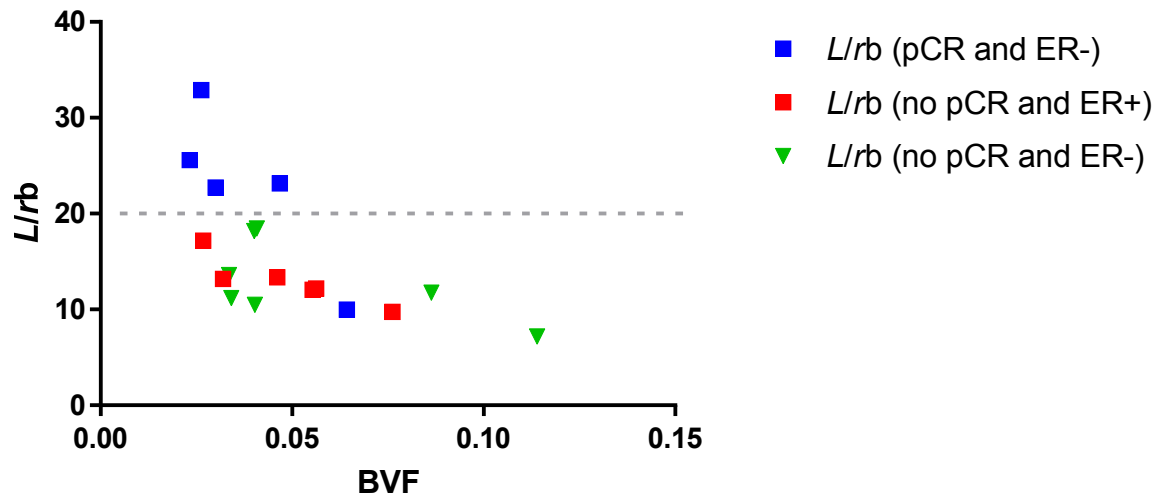
Figure S6.

Fig. S6. Histological parameters in relation to patient outcome (pCR) and hormone receptor status ER (estrogen receptor and progesterone status) in relation a patient's individual L/r_b value. Dashed grey line based on L/r_b (approximately 20) separates patient groups with 80% accuracy. This result is similar to **Fig. 3**, demonstrating no additional separation between ER-positive and ER-negative patients.
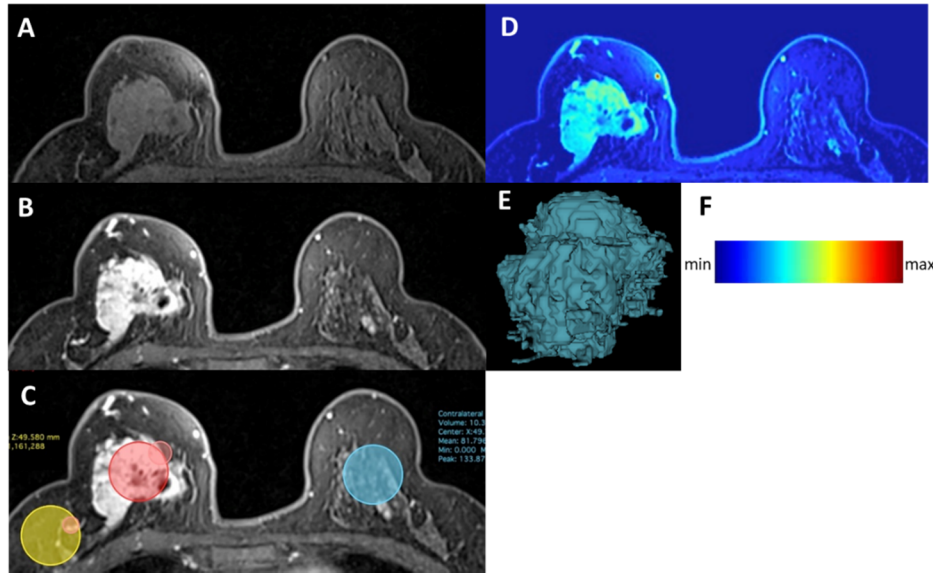
Fig. S7. Multiphase contrast-enhanced magnetic resonance imaging axial view. A) Before contrast agent was injected, **B)** 1.5 min post-contrast, **C)** 1.5 min post-contrast with regions of interest (ROI) colored in red (tumor), yellow (normal tissue on ipsilateral breast), blue (normal tissue on contralateral breast). Note the smaller orange ROIs associated with the red and yellow ROI, these are 1cm^3 "hot spots" (maximum signal given the original ROI), **D)** area under the curve map, analysis in **Fig. 4** (main text) was obtained from this map with the ROIs shown in C, **E)** Tumor ROI shown in 3D view, **F)** AUC map signal intensity scale.