SUPPLEMENTARY MATERIALS

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

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.
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 $f_{\text{kill}}$ based on BVF.** Using BVF value for insertion into $L/r_b$ (BVF) equation to predict $f_{\text{kill}}$, 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 $f_{\text{kill}}$ 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 ($f_{\text{kill}} > 1$ or $L/r_b < 0$) were taken out of the analysis.
Fig. S6. Histological parameters in relation to patient outcome (pCR) and hormone receptor status ER (estrogen receptor and progesterone status) in relation to 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 1 cm³ “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.