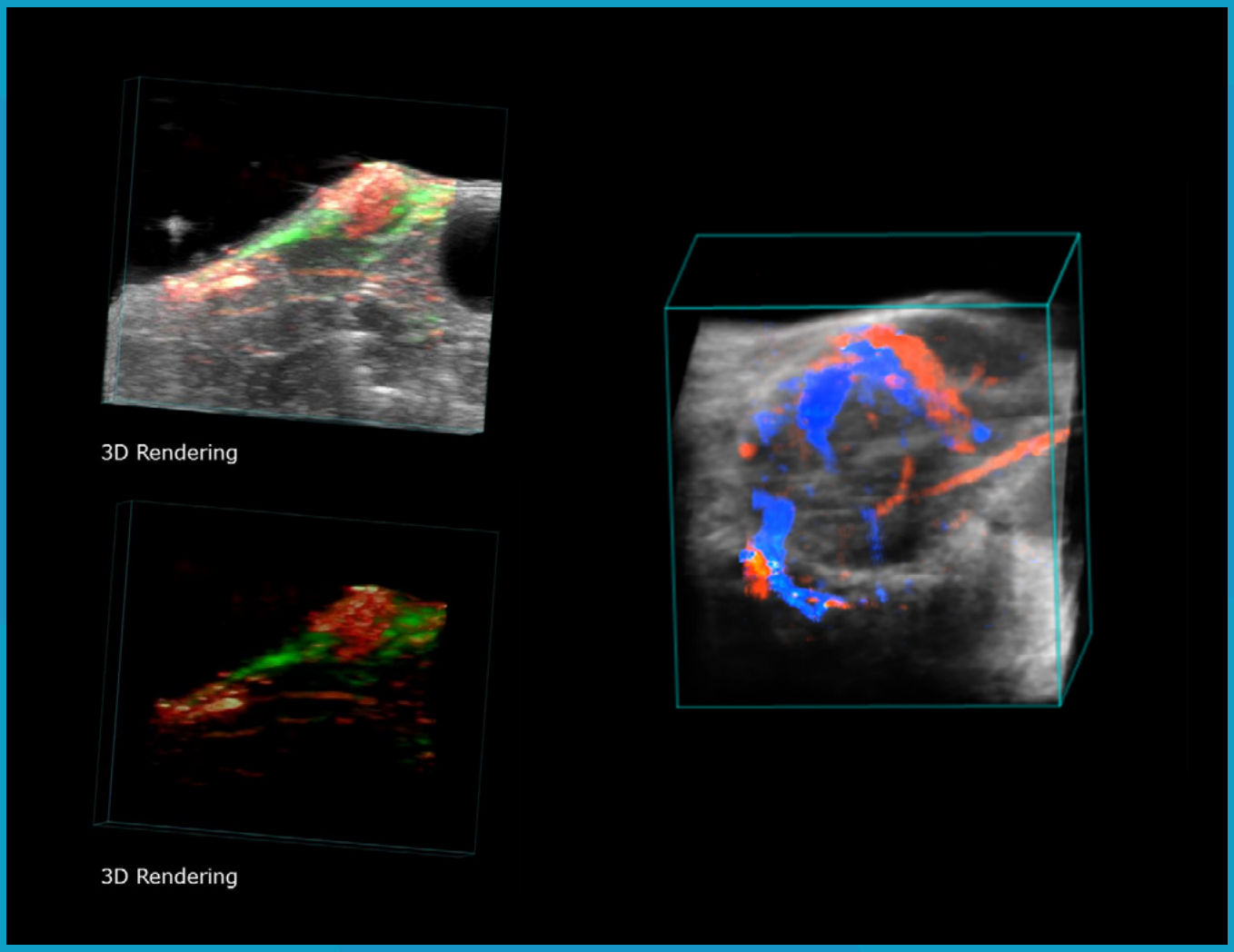
FUJIFILM | VISUALSONICS



Ultrasound and Photoacoustics for Breast Cancer Research

Key Publications

BREAST CANCER

Niu, S. *et al.* Hollow Mesoporous Silica Nanoparticles Gated by Chitosan-Copper Sulfide Composites as Theranostic Agents for the Treatment of Breast Cancer. *Acta Biomater*. **126**, 408–420 (2021).

Abou-Elkacem, L. *et al.* Ultrasound Molecular Imaging of the Breast Cancer Neovasculature using Engineered Fibronectin Scaffold Ligands: A Novel Class of Targeted Contrast Ultrasound Agent. *Theranostics* **6**, 1740–1752 (2016).

Bachawal S V., Jensen KC, Wilson KE, Tian L, Lutz AM, Willmann JK. Breast cancer detection by B7-H3-targeted ultrasound molecular imaging. *Cancer Res*. 2015;75(12):2501-2509.

Zhu, Y. *et al.* Magnetic black phosphorus microbubbles for targeted tumor theranostics. *Nanophotonics* (2021).

FEATURED PUBLICATION SUMMARY

Bachawal, S., Bean, G. R., Krings, G. & Wilson, K. E. Evaluation of ductal carcinoma in situ grade via triple-modal molecular imaging of B7-H3 expression. n*pj Breast Cancer* **6**, 14 (2020).

Research Question: *Can B7-H3-targeted contrast ultrasound and photoacoustics be used to evaluate aggressiveness of ductal carcinoma in situ (DCIS)?*

- Increased expression of B7-H3 was shown through immunohistochemical staining to be associated with more invasive grades of DCIS
- A transgenic mouse model of breast cancer development was used
- Molecule ultrasound (US) imaging using targeted microbubbles was used to determine normal vs DCIS tissue for screening purposes
- Photoacoustic and fluorescence imaging using anti-B7-H3 antibody conjugated ICG dye was used to detect DCIS margins intraoperatively
- Contrast ultrasound differentiated DCIS from normal tissue with an AUC of 0.89.
- Photoacoustic (PA) imaging with targeted contrast agent showed high specificity and was able to differentiate small foci of DCIS (< 1mm) from normal tissue

Targeted B7-H3 imaging with US, PA and fluorescence was able to sensitively detect DCIS, posing strategies for potential clinical use.

BREAST CANCER CONT.

Zhao, L., Zhan, Y. & Rutkowski, J. L. Correlation between 2- and 3- dimensional assessment of Tumor Volume and Vascular Density by Ultrasonography in a Transgenic mouse model of Mammary carcinoma. *J Ultrasound Med* **29**, 587–595 (2010).

Wirtzfeld L a., Ghoshal G, Rosado-Mendez IM, *et al*. Quantitative Ultrasound Comparison of MAT and 4T1 Mammary Tumors in Mice and Rats Across Multiple Imaging Systems. *J Ultrasound Med*. 2015;34(8):1373-1383.

Fang, K. *et al*. Construction of Nucleolin-Targeted Lipid Nanobubbles and Contrast-Enhanced Ultrasound Molecular Imaging in Triple-Negative Breast Cancer. *Pharm. Res*. **37**, 1–13 (2020).

Messerli, S. M. *et al*. Use of Antimetastatic SOD3-Mimetic Albumin as a Primer in Triple Negative Breast Cancer. *J. Oncol*. **2019**, 1–11 (2019).

Pham, E. *et al*. Preclinical efficacy of bevacizumab with CRLX101, an investigational nanoparticle-drug conjugate, in treatment of metastatic triple-negative breast cancer. *Cancer Res*. **53**, 1689–1699 (2016).

Tilli, M. T. *et al*. Comparison of mouse mammary gland imaging techniques and applications: Reflectance confocal microscopy, GFP Imaging, and ultrasound. *BMC Cancer* **8**, 21 (2008).