Docket #: S15-417

Breast Cancer Detection by B7-H3-Targeted Ultrasound Molecular Imaging.

Ultrasound complements mammography as an imaging modality for breast cancer detection, especially in patients with dense breast tissue, but its utility is limited by low diagnostic accuracy. One emerging molecular imaging tool to address this limitation involves contrast-enhanced ultrasound using microbubbles targeted to molecular signatures on tumor neovasculature. Stanford researchers have demonstrated how tumor vascular expression of B7-H3 (CD276), a member of the B7 family of ligands for T-cell coregulatory receptors, can be incorporated into an ultrasound method that can distinguish normal, benign, precursor, and malignant breast pathologies for diagnostic purposes. Through an IHC analysis of 248 human breast specimens, researchers have found that vascular expression of B7-H3 was selectively and significantly higher in breast cancer tissues compared to non-malignant breast lesions and normal breast tissue. B7-H3 immunostaining on blood vessels distinguished benign/precursors from malignant lesions with high diagnostic accuracy in human specimens (AUC up to 0.96). In a transgenic mouse model of cancer, the B7-H3–targeted ultrasound imaging signal was increased significantly in breast cancer tissues and highly correlated with ex vivo expression levels of B7-H3 on quantitative immunofluorescence. In addition to ultrasound, B7-H3 can be used as imaging target for other molecular imaging modalities as well.

Figure 1:

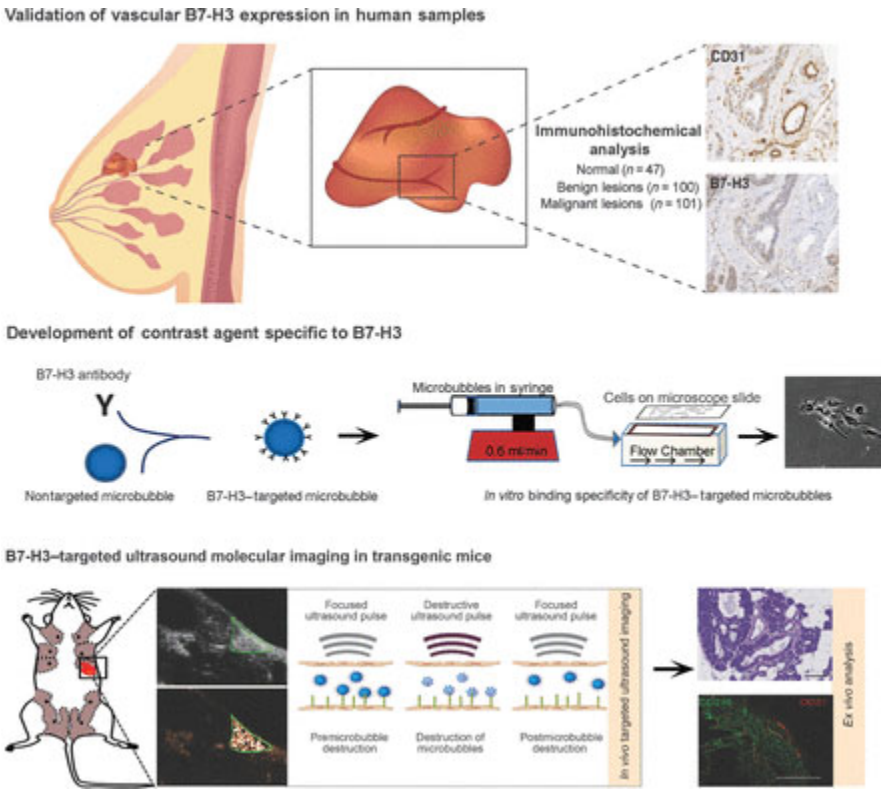


Figure 1 description: Summary of the overall study design. Differential expression of B7-H3 on breast cancer-associated neovasculature was first assessed on a panel of normal, benign, premalignant, and malignant breast lesions obtained from women undergoing biopsy or surgical resection. B7-H3-targeted contrast microbubbles were then generated, followed by testing both in cell culture and in vivo in a transgenic mouse model of breast cancer.

Applications

- Diagnostic imaging of breast cancer
- Targeted cancer therapy

Advantages

- Improvement of the diagnostic accuracy of ultrasound screening exams in detection and characterization of breast lesions in women with dense breast tissue.

Publications

- Bachawal SV et al. Breast Cancer Detection by B7-H3–Targeted Ultrasound Molecular Imaging. *Cancer Res* 2015; 75(12):2501-9.

Patents

- Published Application: WO2017096137
- Published Application: 20200254118

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