**Broadband Optical Mammography**

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**Instrument Optical Breast Imaging**

Using near-infrared light (600-1000 nm), breast maps can be created of deoxy-hemoglobin [Hb], oxy-hemoglobin [HbO], water [water], and lipid [lipid] concentrations based off of the absorption spectrum for these four chromophores. Hemoglobin saturation (SO₂) is an additional parameter that can be measured which is defined as the ratio of [HbO] to the total hemoglobin concentration [HbT].

**Clinical Data**

Optical mammograms of 26 cancer patients have been analyzed. The spectra through the breast are processed with a continuous-wave, diffusion based model and the scattering properties are fixed (scattering amplitude (@650 nm) = 10.8 cm⁻¹ and scattering power = 1.0) in order to obtain unique chromophore concentrations. Difference parameters were found for [HbT], [water], [lipid], and SO₂ by subtracting the average over the background pixels from the average over the tumor pixels. Shown below (figure 3) are maps of the distribution of the chromophores for a 72 year old cancer patient who had invasive ductal carcinoma with ductal carcinoma in situ also present, in two tumors located 1 cm apart in the breast. These tumors had diameters of 1.6 and 1.3 cm and a Nottingham Score of 8.

**Spectral Imaging Instrument**

The continuous-wave optical mammography instrument acquires data in transmission geometry every 2 mm in the x- and y- directions.

**Correlation with Histopathology**

The tumor grade, reported as the Nottingham Score (which is an integer value between 3 and 9), is a measure of the aggressiveness of the breast cancer. A linear relationship between the absolute concentrations of chromophores and the grade has been reported in [5] and a similar trend has been found with our difference parameters.

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**Main Message:** The key finding of this work is the significant reduction of SO₂ in breast cancer, a result that may be used to enhance the information content of optical mammograms to further aid in therapy monitoring capabilities.