

FREQUENCY SPECTRUM SHIFTS OF ULTRASOUND ECHOES
AS A FUNCTION OF DEPTH IN A FEMALE BREAST

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Knowledge of the changes in waveform characteristics as an ultrasound wave penetrates multiple layers of soft tissues within a breast can be important for both detection and diagnosis of breast pathologies by ultrasound mammography techniques. Using a spectrum analyzer system in combination with an automatic, bi-plane scanning, B-mode breast imaging unit, techniques were developed for recording the center frequency and bandwidth characteristics of signals received from the subcutaneous fat, mid-breast, retromammary, and pectoralis muscle regions of the breast of a post-menopausal subject. The same techniques were applied to a breast phantom that has internal architectural features and acoustic parameters (density, speed, attenuation coefficient) that are comparable to those of a normal breast. A single focus, 7.5-MHz transducer was used for most of the recorded data. Lower frequency transducers were also used. Spectral analysis data accompanied by relevant breast and phantom images will be presented. [Work supported by Indianapolis Center for Advanced Research and Labsonics, Inc.]

Results Presented

Input FREQUENCY 7.5 MHz

Depth of Breast	RETURN SIGNAL FREQUENCY
1.4 cm (5.2 FAT)	7.5 MHz
2.9 cm	5.0 MHz
3.4 cm	4.0 MHz
4.1 cm (MUSCLE)	3.0 MHz

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