ULTRASOUND EXAMINATION FREQUENCIES APPROPRIATE
FOR BREAST TISSUE: EFFECTS OF FREQUENCY CHANGE ON
SCATTERING AND CONTRAST RESOLUTION

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In a current research study, patients previously identified
as having solid breast masses are examined by an automatic ultrasound
instrument that incorporates a transducer pulsed under conditions
which allow the operator to vary, without transducer replacement,
frequency of the examining beam. Frequencies of 3.5, 4.5, 6.5
and 8 MHz are currently available. Frequencies above 8 MHz are
scheduled for this investigation. An automatic, bi-plane scanning
technique allows multiple frequency examinations at scanning planes
of the mass that are mutually perpendicular.

The primary purposes of those approaches are to: (1) collect
image data on the variation in the scattering characteristics of
benign and malignant masses in order to further improve the diagnostic
accuracy of ultrasound imaging; (2) to evaluate the diagnostic
importance of the increased backscatter from breast fat at higher
frequencies. Our preliminary clinical studies, using separate
4 and 7.5 MHz transducers, indicated that as the frequency increases,
the backscatter from breast fat is significantly greater than that
from malignant and benign breast masses. (Also, Foster et al
Ultrasonic Imaging 6, 1984.) Differences between the frequency
dependent, backscatter value of fat and that of non-fatty breast
masses allows, by means of frequency manipulation, dynamic control
over some aspects of contrast resolution.


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