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Tactile breast imaging to increase the sensitivity of breast examination.

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Abstract: **Background:** Most breast cancers in the US are detected by palpation. We evaluated a Tactile Breast Imager (TBI) in the detection of breast nodules in phantoms. The TBI is a hand-held electronic palpation device developed at Artann Laboratories that translates tissue elastic properties into a digital 3-D map of the tissue. **Methods:** Ten breast phantoms in various sizes containing a total of 36 solid nodules were constructed out of a specially designed silicon compound with elasticity moduli typical for breast tissues. The nodules varied in size from 6 to 30 mm. The depth of placement varied from 10 to 50 mm. Eight of the phantoms contained 4 to 5 nodules. Two phantoms contained no nodules. The breast phantoms were manually examined for nodules. Then the examiner repeated the examination with the device after about 30 minutes training with the TBI. Examiners included skilled medical professionals (3 surgical oncologist, 3 advanced practice nurses) and unskilled lay persons (3 secretaries and 4 engineers). The four engineers were additionally trained in four additional sessions and repeated the phantom exams. The ability to detect the nodules with and without the TBI by skilled and unskilled examiners was compared. The effect of repeat training was also evaluated. **Results:** Results of the study are summarized in the table:

			Skilled	Skilled	Unskilled	Unskilled	Unskilled Training x 4
			Manual	TBI	Manual	TBI	TBI
SENSITIVITY			0.85	0.83	0.67	0.83	0.99
SPECIFICITY			0.99	0.94	0.98	0.9	1
Positive Predictive Value			1	0.98	0.99	0.97	1
Negative Predictive Value			0.73	0.61	0.43	0.61	0.91

Conclusion: The use of the tactile breast imager increases the sensitivity of breast palpation when used by lay persons in breast models. The sensitivity increases to the level exceeding that of a trained medical professional, particularly with training. The TBI has the potential to increase the detection of palpable breast models if the phantom findings can be duplicated in vivo.