# The Role of Ultrasound Elastography in Evaluation Of Breast Lesions

**Thesis**

Submitted in Partial Fulfillment of

The Master Degree of

**Radiodiagnosis**

By

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**Thesis submitted in partial fulfillment of the master degree in Radiodiagnosis**

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# Summary

Breast masses are common. The most common screening test for breast masses is mammography and ultrasonography (US) that have some limitations in differentiating benign from malignant lesions; so biopsy is required to obtain histopathologic diagnosis, 60-95% of which is diagnosed as benign. That is why, noninvasive methods that can increase the sensitivity and specificity of mammography and ultrasound, thereby reduce unnecessary biopsies of benign lesions are required.

Sonoelastography is a technique that applies compression to detect stiffness variation within the scanned tissues. Cancerous lesions are stiffer than non-cancerous ones. Ultrasound elastography (USE) uses this principle to differentiate malignant breast lesions from benign lesions. The elasticity of the breast lesion is compared with that of the normal surrounding tissue for breast sonoelastography, and is scored from 1 to 5. Since this scoring is a subjective method, an index known as the "strain ratio" (SR) is defined for semi-quantitative determination of tissue stiffness.

This study aimed to evaluate the role of ultrasound elastography in differentiating benign from malignant breast lesions and to provide additional information on tissue elasticity in the event of equivocal mammographic and/or sonographic findings in order to guide the diagnostic workup towards biopsy or follow-up.

Thirty patients presented with breast mass were examined by ultrasound and sonoelastography (strain elastography). Initially; conventional ultrasound was performed for all patients; lesions were classified according to the ultrasound 'breast imaging, report and data systems' (BI-RADS) categories. According to BI-RADS categorization, the threshold for benign and malignant distinction was considered as BI-RADS 3-4.Then

sonoelastography was performed, elasticity score was calculated. Lesions were categorized based on Tsukuba strain scoring system where score 1 to 3 are considered benign and score 4 and 5 malignant. Strain ratio (SR) was then calculated for all lesions. The sensitivity, specificity, PPV, NPV and accuracy were calculated for both the elasticity score and strain ratio. We used fine needle aspiration cytology (FNAC) or excision biopsy for histological analysis which was the standard reference.

In our study, at a cutoff point = 4 for ES, the sensitivity was (91.7%); specificity (88.9%), positive predictive value (84.6%) and negative predictive value (94.1%). At a cutoff point = 3.6 for SR, the sensitivity was (91.7%), specificity (77.8%), positive predictive value (73.3%) and negative predictive value (93.3%).

***Conclusion:***

Breast elastography was found to be of high sensitivity and specificity in detecting and differentiating between benign and malignant breast lesions. It is simple, fast and non-invasive technique that adds more to the total accuracy of the conventional breast US exam increasing the confidence of the diagnosis, reducing rate of unnecessary biopsies and thus alleviating the stress of the patient.

***Recommendation:***

It is my recommendation to add elastography as a part of routine breast ultrasound exam using both elasticity score and strain ratio to increase confidence of diagnosis.