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Objectives: To assess whether strain histograms are equal to strain ratios in predicting breast tumour malignancy and to see if either could be used to upgrade Breast Imaging Reporting and Data System (BI-RADS) 3 tumours for immediate biopsy. Methods: Ninety-nine breast tumours were examined using B-mode BI-RADS scorings and strain elastography. Strain histograms and ratios were assessed, and areas under the receiver-operating-characteristic-curve (AUROC) for each method calculated. In BI-RADS 3 tumours cut-offs for strain histogram and ratio values were calculated to see if some tumours could be upgraded for immediate biopsy. Linear regression was performed to evaluate the effect of tumour depth and size, and breast density on strain elastography. Results: Forty-four of 99 (44.4%) tumours were malignant. AUROC of BI-RADS, strain histograms and strain ratios were 0.949, 0.830 and 0.794 respectively. There was no significant difference between AUROCs of strain histograms and strain ratios (P = 0.405), while they were both inferior to BI-RADS scoring (P<0.001, P = 0.008). Four out of 26 BI-RADS 3 tumours were malignant. When cut-offs of 189 for strain histograms and 1.44 for strain ratios were used to upgrade BI-RADS 3 tumours, AUROCS were 0.961 (Strain histograms and BIRADS) and 0.941 (Strain ratios and BI-RADS). None of them was significantly different from BI-RADS scoring alone (P = 0.249 and P = 0.414). Tumour size and depth, and breast density influenced neither strain histograms (P = 0.196, P = 0.115 and P = 0.321) nor strain ratios (P = 0.411, P = 0.596 and P = 0.321). Conclusion: Strain histogram analyses are reliable and easy to do in breast cancer diagnosis and perform comparably to strain ratio analyses. No significant difference in AUROCs between BI-RADS scoring and elastography combined with BI-RADS scoring was found in this study.