

Accurate measurement of strain ratio in quasi-static elastography

To the Editor We read an article by Adamczewski et al.¹ with great interest. Quasi-static elastography has been shown to be useful in differentiating between benign and malignant lesions of the thyroid, breast, and prostate lesions.²⁻⁴ However, the accuracy of this technique is hampered by the intra- and interobserver variability.² Therefore, quantitative analysis such as the strain ratio has attracted considerable scientific interest and several studies have attempted to determine the cut-off value of the strain ratio for identifying malignant thyroid lesions.^{5,6} Thus, the accurate measurement of the strain ratio in quasi-static elastography is mandatory.

In the paper by Adamczewski et al.,¹ the strain ratio measurement presented in Figure 1B¹ is incorrect. We have recently shown the effect of an incorrect placement of the line representing the strain ratio using the same ultrasound machine (Aplio XG, Toshiba Medical Systems, Japan) in a patient with fibroadenoma.⁷ For a correct measurement, the line representing the strain ratio value must be present at the endpoint of the cinememory of the elastographic system. If the line is in an incorrect place, the values will be quite different. Figure 1B¹ shows an incorrectly placed line; therefore, we believe that the real strain ratio will be different from 3.06 and that there may be significant variations in the measurements between patients.

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Authors' reply We would like to respond to a concern raised by Ozkan et al.¹ about a supposedly incorrect measurement of the strain ratio between the reference tissue and malignant lesion. According to Ozkan et al.,¹ in order to perform a correct measurement of the strain ratio (using Aplio XG, Toshiba Medical Systems, Japan), the endpoint of the cinememory of the elastographic system should be selected.

Quasi-static elastography is a method which evaluates tissue stiffness (elasticity) by measuring the degree of tissue deformation in response to mechanical compression. The measurement principle used in this ultrasound system is based on the use of tissue Doppler imaging and offline analysis of tissue strain imaging. In this study, manual external compression, using an ultrasound probe, is necessary to measure the strain ratio.

For a reliable and reproducible measurement of tissue stiffness, it is necessary to perform an assessment in the range of the linear deformation of the examined tissues. Too strong pressure can cause artifacts by exceeding the yield strength of the examined tissue. Evidence for the linear deformation of both tissues (reference vs. malignant) is the flat pattern of the graph, indicating the difference of stiffness between the control and target lesions on the cinememory.

In Figure 1B in our clinical image,² the graph has a flat pattern; therefore, the strain ratio value of the target does not seem to be markedly different from the value measured at the endpoint of the cinememory.¹ The value of the strain ratio at the endpoint of the cinememory in our report is

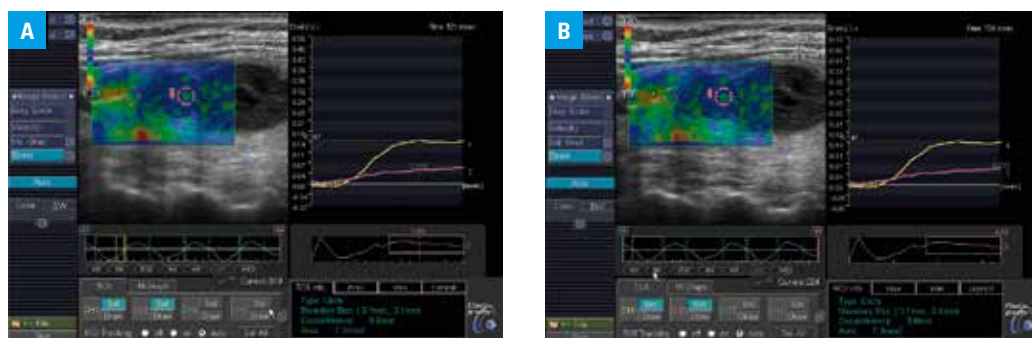


FIGURE 1 Demonstration of the cinememory of the elastographic system for metastasis of renal clear-cell carcinoma to the thyroid in a 65-year-old woman; the graph indicating the difference of stiffness between the reference tissue and the malignant lesion has a flat pattern on the cinememory in the second half of its course (portion visible inside the white square); the strain ratio value presented in our case was 3.08 (A), while the value was 2.62 at the end of the graph (B); in this examination, the difference of strain ratio values is slight and it does not affect clinical management

2.62, which means it is closer to the result measured by shear-wave elastography (FIGURE 1).

The images included in a letter to the editor cited by Ozkan et al.,³ in which one can observe an increasing pattern of the graph indicating the difference of stiffness between fat and breast fibroadenoma, might suggest inaccuracy of the applied technique.

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