

Quick Guide

Breast Elastography

NTE

Natural Touch Elastography

STE

Sound Touch Elastography

STQ

Sound Touch Quantification

Natural Touch Elastography (NTE)

Strain Elastography (SE)

Natural touch

- No manual compression
- Compression by respiratory movements

Stable real-time visualization

- High quality B/Elasto image
- Relative strain in the tissue is displayed in color coded image

Pressure indicator

- Strain E Curve: Display the intensity and stability of the pressure for acquiring an adequate elastography image

Unique shell analysis

- Provide the stiffness of the surrounding tissue of malignant breast lesions
- A good tool for assessment of infiltrating breast tumor

Sound Touch Elastography(STE) & Sound Touch Quantification (STQ)

Shearwave Elastography(SWE)

Real time imaging

- More diagnostic information
- Immediate results in a real-time with good reproducibility
- Generate a real time quantitative map of tissue stiffness

High frame rate & Better penetration

- HFE (High frame rate Elastography): Shear wave imaging obtains high frame rate for real-time
- HQE (High quality Elastography): Improvement in the penetration of shear wave, Diagnosis for hard, deep and large tumors

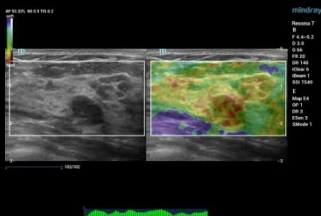
Quality control

- M-STB: Indicator for the stability of tissue motion
- RLB Map/Index: Indicator of the reliability of shear wave
- Elasto bar: Elasticity analysis in multiple frames to improve the accuracy and reliability

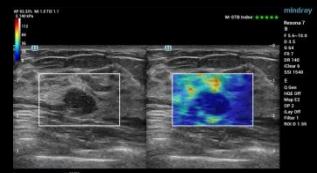
Quantification analysis

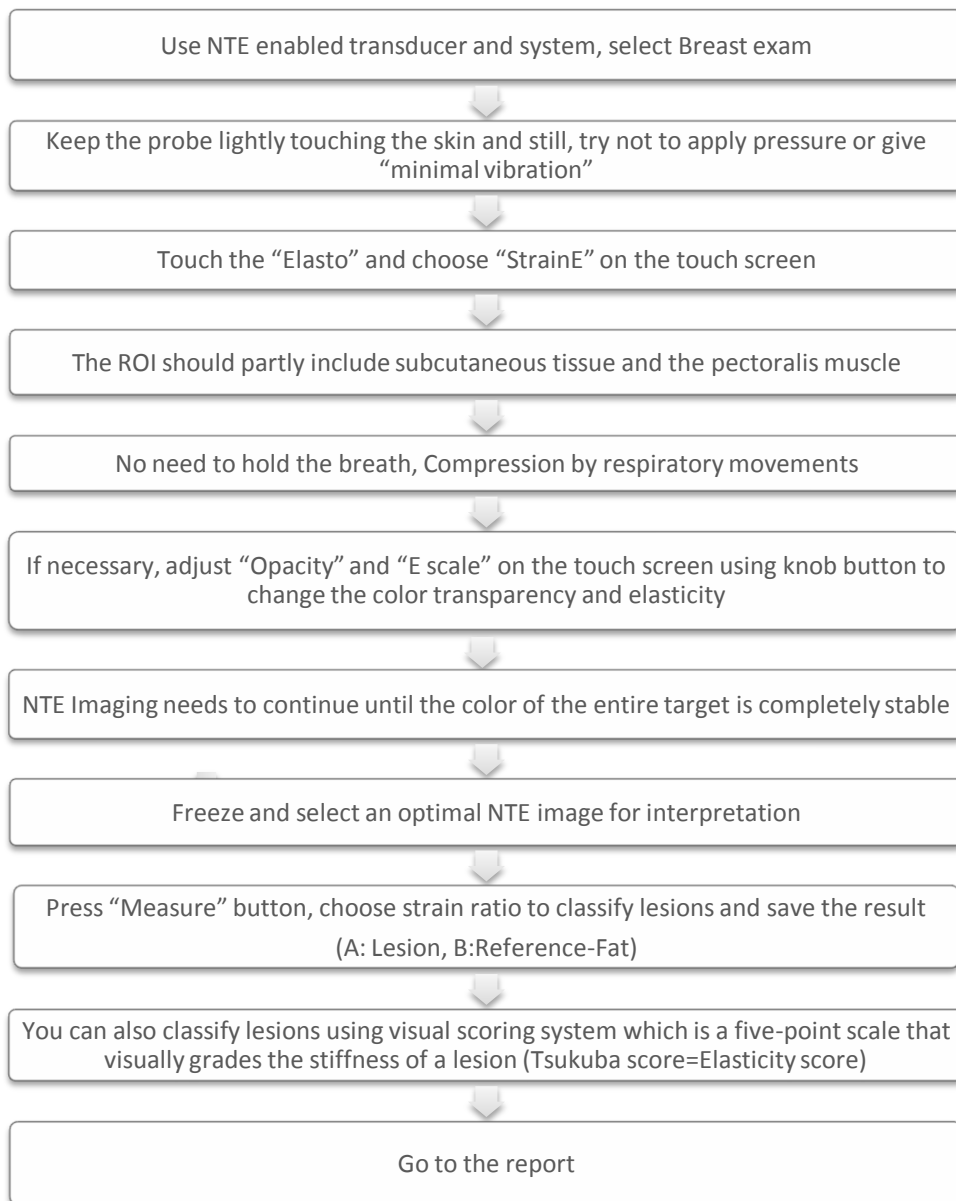
- E-Avg: Statistics of multiple measurements resulted from serial frames
- Measurement results: ROI depth, ROI size, E mean/max/min
- Overall statistics: Median, IQR, IQR/Median, Average, STD, STD/Average
- Shell quantification toolbox
- Report

Natural Touch Elastography



Sound Touch Elastography







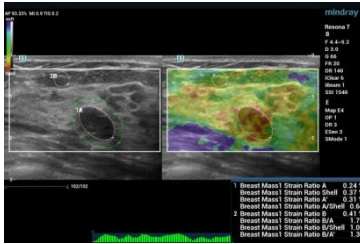
Recommended imaging techniques

- Elastography should be performed and interpreted along with standard B-mode imaging.
- Obtain a good B-mode image to get a good elastography image.
- Keep the angle of the probe perpendicular to the skin.
- **Strain Elastography**
 - Compression or vibration methods
 - No Manual Compression - Keep the probe lightly touching the skin and try not to apply pressure
 - “minimal vibration” is recommended for elastography imaging of minute lesions. In the case of deep lesions, however, “significant compression” may be better for acquiring an adequate elastography image.
 - ROI
 - The ROI should partly include subcutaneous tissue and the pectoral muscle for a more consistent scale range, and it should be expanded to its maximal width to express relative values more accurately. Ribs and lungs should not be included.
 - Imaging time
 - Imaging needs to continue until the color of the entire target is completely stable in order to acquire reliable results.
 - Classification by interpretation
 - Tsukuba score: five-point scale that visually grades the stiffness of a mass
 - EI/B ratio : the ratio of the lesion size on elastography to the B-mode size
 - Strain ratio: fat-lesion ratio (FLR), Numerical value to the stiffness
- **Shear Wave Elastography**
 - Multiple measurements within the lesion and surrounding tissue need to be obtained to acquire optimal measurements
 - The best performing SWE features were the quantified maximum stiffness of the lesions (inside or on the periphery) as E Max measurement
 - Shear waves do not propagate in low viscosity liquids; therefore, simple cysts will not be color-coded.
 - Quality measure tools will help in eliminating possible false negative cases .
 - Classification by interpretation: kPa (unit of stiffness), m/s (unit of shear wave speed)

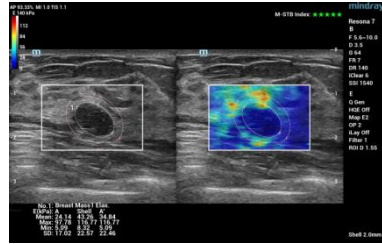
Cautions

- SE should not be used if the lesion is larger than the FOV box.
- Accuracy of the SE differs between shallow sites and deep sites due to problems associated with propagation of vibration energy.
- Elastography (SE or SWE) should not be used when a lesion is very superficial (<3 mm) from the skin surface.

NTE



STE & STQ



Interpretation 1) Elasticity score (Tsukuba score)

- A five-point scale that visually grades the stiffness of a mass.
- If a lesion is classified between 1 and 3, it is considered benign; if classified 4 or 5, it is considered to be malignant.

Score 1		Deformability of the entire lesion
Score 2		Deformability of most of the lesion with some small stiff areas
Score 3		Deformability of the peripheral portion of the lesion with stiff tissue in the center
Score 4		Stiffness of the entire lesion
Score 5		Stiffness of the entire lesion and surrounding tissue

Interpretation) Stiffness and Shear wave speed

- kPa (unit of stiffness), m/s (unit of SWS)
:Quantitative values calculated for the Shear wave speed determined by stiffness in Shear Wave Elastography system.
- The best performing SWE features are the quantified maximum stiffness of the lesions (inside or on the periphery)
- A : Mass area, Shell: Shell area,
A/Shell: A-Shell ratio, A' : Mass + Shell area

Interpretation 2) Strain ratio

- Relative numerical value to the stiffness (tissue elasticity)
- fat-lesion ratio (FLR)
- ROI A: Lesion, ROI B: Fat, B/A: fat-lesion ratio