

ARFI ELASTOGRAPHY – HOW MANY MEASUREMENTS ARE NEEDED FOR THE BEST PERFORMANCE?

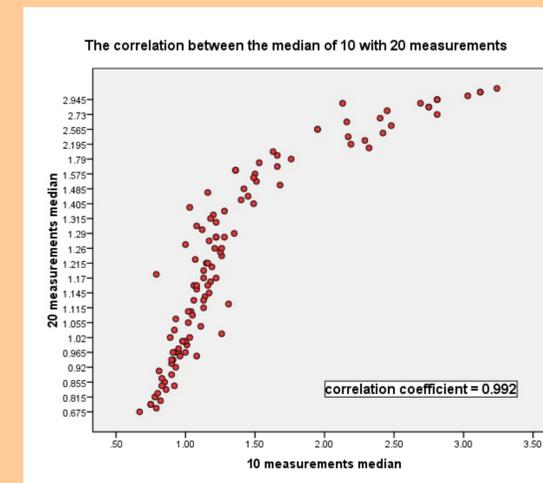
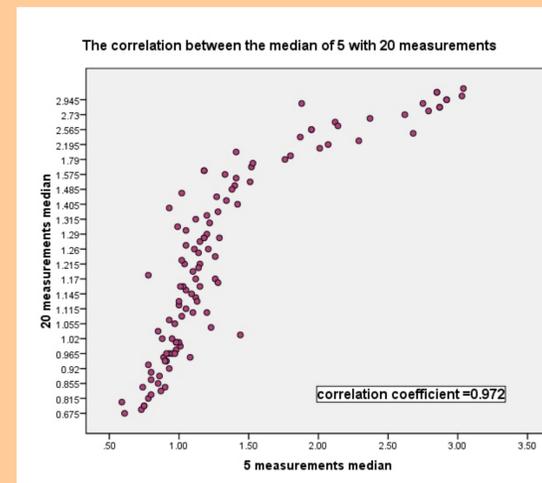
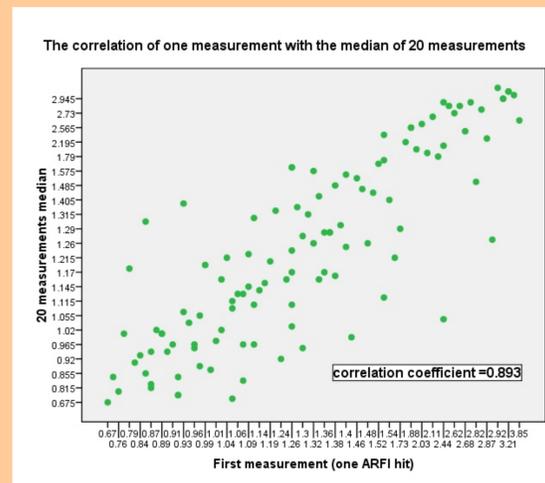
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Objectives: After 10 years of elastography in liver fibrosis evaluation, we learned that quality factors (criteria) are important. For Virtual Touch Tissue Quantification (VTTQ) / Acoustic Radiation Force Imaging (ARFI), these quality factors are not yet clearly established. When it comes to the number of measurements, the more, the better, but because of time limitations only a finite number can be performed. We aimed to establish the minimum number of ARFI measurements that guarantee the best performance.

Methods: 113 patients with liver diseases (chronic B or C hepatitis, nonalcoholic fatty liver) or with no hepatic pathology were included. All patients underwent ARFI examination. 20 consecutive measurements were performed at the same site in the right lobe.

We tried to establish the minimum number of measurements that has the same performance as 20 measurements. We calculated the median values for 2 to 10 measurements and for 20 measurements and verified their correlations. For staging purposes we used cut-offs of 1.31 m/s for significant fibrosis and 1.8 m/s for cirrhosis.

Results: 20 measurements were feasible in all 113 patients, but 12 patients (10.6%) had IQR<30% of liver stiffness value. For median values, if only one measurement would be performed, the correlation coefficient with the median of 20 measurements would be 0.893; for 5 measurements, 0.972; for 10, 0.992, all with p<0.0001.



With only one measurement we misidentified significant/insignificant fibrosis as compared to the median of 20 measurements in 22 patients (19.4%), with 5 measurements in 10 (8.8%) and with 10 measurements in only 3 patients (2.6%). In the identification/exclusion of cirrhosis the disagreement between 1 and 20 measurements occurred in 5 patients (4.4%), between 5 and 20 measurement in 2 (1.7%) and for 10 measurements in the same 2 (1.7%) patients. For cirrhosis identification, if a median of over 1.8 m/s is obtained we can stop at 5 measurements, because making more measurements is statistically unlikely to change the result.

Conclusions: In our group, ARFI/VTTQ was feasible in all patients, but the rate of unreliable results based on IQR (> than 1/3 of final value) was of 10.6%.

Based on the presented data, for an optimal evaluation of the stage of fibrosis, we recommend to perform 10 consecutive measurements, as the final results are in this case almost similar with the median of 20 measurements.

If a median of over 1.8 m/s is obtained out of 5 measurements, the result can be considered as conclusive for F4 and no further measurements are required.

