AbstractID: 14380 Title: QA/QC in Diagnostic Ultrasound Imaging

A frequent source of fault in installed ultrasound systems is partial failure of regions on an array transducer, and quality control steps usually focus towards detection of these malfunctions. Electrically dead elements or delaminated regions can be detected using images of a uniform region of a tissue mimicking phantom. However, except for limited (i.e., 32) channel systems, dead regions on the transducer must be fairly extensive to visualize their effect on B-mode images. If an electronic probe tester is not available, averaging uncorrelated images of the phantom increases the detectability of subtle array element dropouts.

Phantom penetration tests also are useful for evaluating the integrity of the transducer and imaging system. Proper system setup for such tests includes correct placement of transmit foci and using the right settings for output and receiver gain. Penetration can be transferred from subjective assessments to objective measurements by measuring signal-to-noise ratios vs. depth. Comparisons of penetration results among systems are difficult because of a lack of standardization of phantom properties. Test object manufacturers could help by establishing data bases on typical penetration results for different transducer types and frequencies, and this would facilitate useful standardization.

The role of certain "classical" ultrasound quality control procedures involving features such as "dead zone," axial and lateral resolution, and distance measurements will be discussed.

Learning Objectives

1. Outline elements of a quality control program for ultrasound systems
2. Identify system components that require routine testing
3. Describe steps that the physicist should take to carry out QC on a regular basis