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Jacinta Browne

Technological University Dublin, jacinta.browne@tudublin.ie

Des Hickey

Technological University Dublin

Ashling McNabb

Technological University Dublin

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A Comparison of three commercially available Contrast-Detail phantoms and evaluation of the Contrast-Detail performance under a Range of Instrument Settings

Jacinta E Browne¹, Des Hickey¹ and Ashling Mc Nabb¹

¹School of Physics and FOCAS Institute, Dublin Institute of Technology, Dublin.

Contrast detail is an important characteristic of an ultrasound imaging system. Contrast detail is the measure of a systems ability to distinguish between different intensities or gray levels within an image. A range of Contrast-Detail phantoms are currently commercially available from a variety of manufacturers although no comparison of the usefulness of these phantoms for contrast-detail performance has been carried out. The aim of this study was to compare three such commercial available phantoms two produced by Dansk Phantoms Inc. and one by Gammex-RMI. In this study a range of instrument settings were investigated to determine which had the greatest impact on contrast-detail performance. The effect of damaged crystals was also investigated by simulating dropped elements on one of the transducers. The ultrasound machines used in this project were the Philips HDI 3000 and the Siemens Sonoline Antares. The two machines each had a linear array, curvilinear array and phased array transducer. The default settings on each machine were only used initially to acquire the baseline images of the phantoms. The data collection method involved optimising the conventional image of the appropriate targets and storing the image for off-line analysis on a PC using a contrast-details image analysis program which evaluated the Contrast_to_Noise Ratio, the Lesion-Signal_to_Noise Ratio and the Contrast Ratio. The results obtained from each of the phantoms will be presented with a recommendation to the contrast detail measurement which is most sensitive to changes in contrast detail performance.