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Modification of existing Doppler Ultrasound Test Devices for the evaluation of Colour Doppler Spatial Resolution

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Background: Colour and power Doppler have become integral parts of many clinical ultrasound investigations and due to this; refinements are made to the current technology to ensure accurate results for clinical perception of image quality.

Method: The aim of this study was to modify and evaluate existing Doppler Ultrasound devices for the assessment of Colour Doppler spatial resolution. In this study a convention flow phantom design was modified to have a set of line pairs of varying separation; the smallest separation was defined by the vessel wall thickness, which was 0.8 mm in this study. The second device used was a string phantom and the type of filament used in this study was a fishing wire and the diameter of the filament was 0.1 mm. Two ultrasound scanners were used in this study a Philips ATL HDI 3000 and a Siemens Sonoline Antares each with three transducers, linear, curvilinear and phased array.

Results and Discussion: It was found that the flow phantom device was not challenging enough as the curvilinear transducer could separate all line pairs very easily; therefore this test was not continued. The string phantom was found to produce a more challenging test and the point spread function of the colour Doppler mode was assessed using this device. The initial results using subjective analysis were found to differentiate the different types of transducer very well with the linear transducer demonstrating the best resolution of 0.7mm compared to the phased array transducer with 1.2 mm. The results for the different transducers and the effect of controls will be presented in the poster.

Conclusion: From the preliminary results it was found that the Antares ultrasound scanner displayed superior colour Doppler spatial resolution, ranging from 0.7mm to 1mm compared to the HDI scanner, ranging from 1.2 mm to 2.9mm.