

PRECLINICAL ULTRASOUND IMAGING

Preclinical ultrasound imaging, utilises high frequency (>20MHz) ultrasound waves to visualise the anatomy and physiology of preclinical models (mice, rats and zebrafish).

The high spatial (50-100micron) and temporal resolution of high frequency ultrasound imaging makes it a powerful technique for the non-invasive assessment of phenotypes and disease in embryonic, neonates and adult preclinical models.

Utilisation of the Doppler phenomenon enables measurement of real-time blood flow within vessels and cardiac chambers, whilst injection of contrast agents into the vascular space enables enhancement of leaky vasculature.

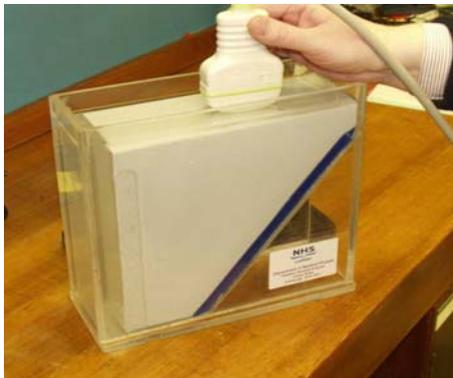


Figure 1: Image of the Edinburgh Pipe Phantom to assess clinical ultrasound scanners



Figure 2: Image of the modified Edinburgh Pipe Phantom to assess preclinical ultrasound scanners

In order to standardise the performance of preclinical ultrasound scanners, we propose the use of a tissue-mimicking test-object based upon the concept of the Edinburgh Pipe Phantom (Pye et al 2011, Figure 1)). This modified test phantom, developed in-house, has pipes embedded within it ranging in diameter from 45 micron to 1470 micron (Figure 2).

The test object was used initially as a technical pre-purchase evaluation tool and more recently as a tool to assess the continued performance of preclinical ultrasound scanners and transducers (Moran et al).

References

Moran C M, Ellis W, Janeczko A, Bell D, Pye S D. The Edinburgh Pipe Phantom: characterising ultrasound scanners beyond 50 MHz. J. Physics Conf Series 2011b:279; 012008.

Pye S D, Ellis W 2011 The resolution integral as a metric of performance for diagnostic grey-scale imaging. J. Physics Conf Series 2011; 279: 012009.