OP04.05 - Compensating for ultrasound (US) machine settings: can a ‘sub-noise gain’ (SNG) preserve the appearance of power Doppler (PD) and computed indices?
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Introduction
Combining three-dimensional (3D) ultrasound with Power Doppler (PD) provides the way to evaluate entire organ vascularity and can be quantifying with volumetric indices. However, there has been limited clinical translation due to a lack of standardisation especially for the machine settings.

Objectives
We wished to show whether use of individualised SNG versus a fixed PD gain (FG) value will remove the influence of commonly adjusted and influential machine settings, Pulse Repetition Frequency (PRF) and Wall Motion Filter (WMF).

Methods
3D-PD US volumes each from 29 healthy singleton fetal kidneys; combining 4 PRF (0.3, 0.6, 0.9, 1.3kHz) and 3 WMF (low, mid, high1) values, acquired at a fixed PD gain based on the lowest PRF/WMF combination. A second set of these 12 acquisitions were repeated by using a SNG chosen by the best visual appearance of PD. The observer was blinded to the numerical gain value. Each volume was segmented in triplicate off-line and Vascularisation Flow Index (VFI) and Fractional Moving Blood Volume (FMBV) calculated and averaged. Repeatability was measured by Dice similarity coefficients (DSC), Hausdorff distance and intra-class correlation coefficients (ICCs).

Results
• ANOVA testing across all 12 settings showed for both indices a significant decrease as WMF and PRF changed, when using a PD fixed gain setting (p < 0.001).
• When a SNG setting was applied, mean FMBV was not significantly different (p =0.35) but VFI was (p <0.001).
• Repeatability was excellent for both FMBV (ICC = 0.95; 95% CI; 0.95-0.96) and VFI (ICC = 0.94; 95% CI; 0.93 – 0.95).

Conclusion
3D segmentation, FMBV and VFI were highly repeatable. Whilst alteration in WMF and PRF altered results for both sets of data using FG, this effect was negated by use of a SNG setting.
Though other machine settings should ideally be optimised, use of FMBV and SNG allows PD to be used to measure vascularity between different machine settings.