The effect of insonation angles on left and right ventricular global longitudinal strain in fetal speckle tracking echocardiography

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Objective
Two-dimensional speckle tracking echocardiography has been considered as an angle-independent modality. However, current literature is limited and disagrees on the actual effect of angle of insonation (AoI) on strain parameters. Therefore, the aim of this study was to quantify the effect of AoI on left and right ventricular global longitudinal strain (GLS).

Methods
A prospective cohort of 116 healthy subjects who participated in a previously conducted study to obtain reference values for fetal GLS were included for this study. The analysis of AoI was based on ultrasound clips taken during the second trimester anomaly scan (between 18\textsuperscript{th} and 19\textsuperscript{th} weeks gestational age). AoI were categorized into three different groups: up/down, perpendicular and oblique. The values corresponding to these three groups were compared by means of an ANOVA test corrected for heteroscedasticity.

Results
Left and right ventricular fetal GLS values did not differ statistically significant between AoI. However, a subgroup analysis, using only the highest quality ultrasound clips, revealed a significant difference in left ventricular GLS values between the oblique and perpendicular AoI compared to the up/down AoI. No differences were found for the right ventricle. A sensitivity analysis, using different definitions for AoI, showed similar results. A significant difference between the oblique and perpendicular AoI compared to the up/down AoI was found.

Conclusion
A significant effect of angle of insonation on fetal GLS values can be demonstrated when using only high quality ultrasound images. Future research should focus on clinical relevance of AoI effect on fetal GLS.