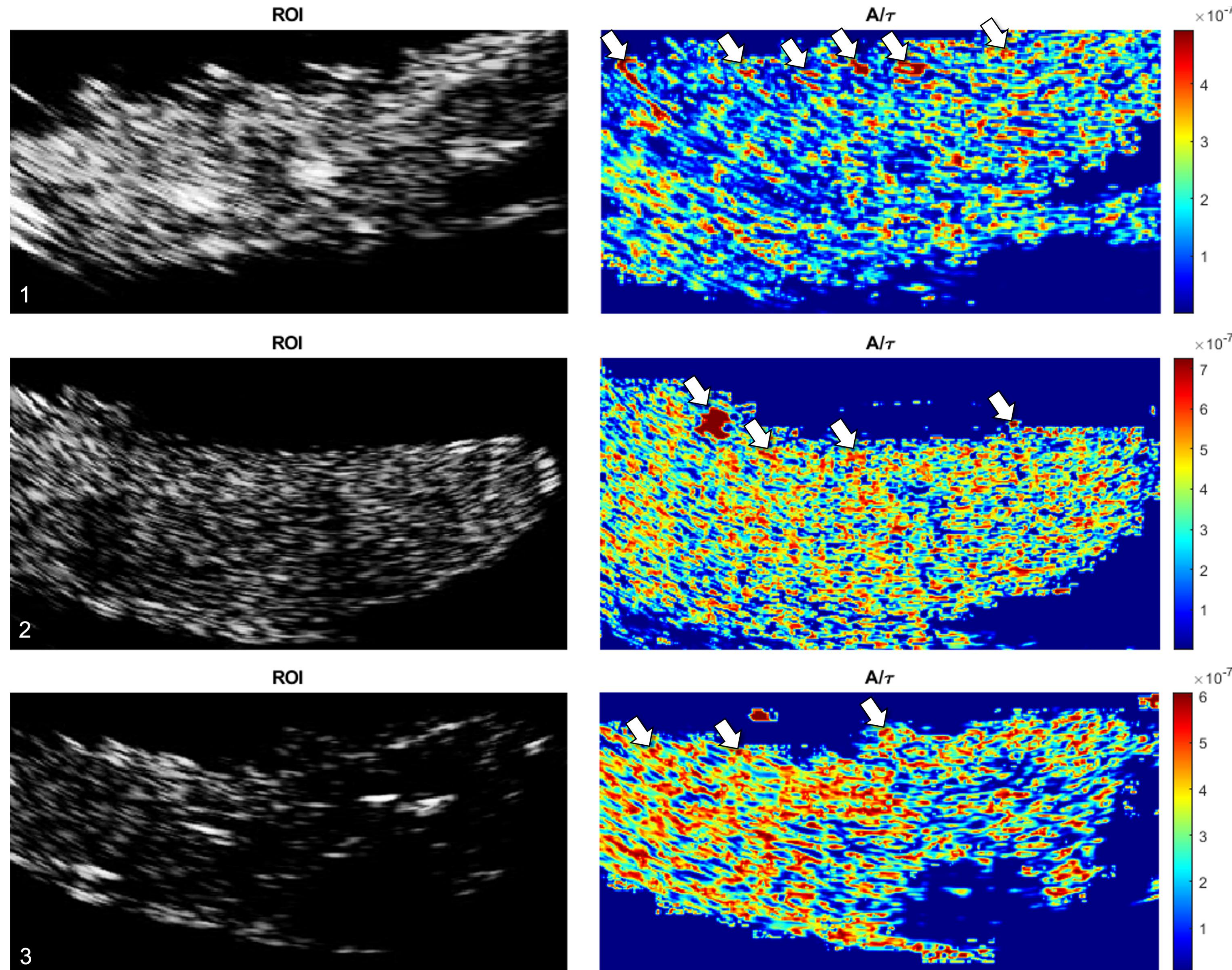


Quantitative contrast-enhanced ultrasound perfusion assessment of the ex-vivo full-term human feto-placental compartment (EP14.50)

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Introduction

Assessment of feto-placental perfusion can uncover vascular problems, related to fetal complications, e.g., malperfusion & abnormal microvascular (MV) development. For perfusion quantification, contrast-enhanced ultrasound (CEUS) is employed, avoiding the clinical and technical limitations of Doppler ultrasound.

Methods

In this pilot, 3 full-term healthy ex-vivo placentas were cannulated (umbilical vein), flushed with NaCl-heparin-MgSO₄, submerged and perfused with diluted (1:100) SonoVue™ (Bracco Suisse SA) at 30mL/min. Flash-replenishment was measured using an Epiq 7 (Philips) scanner with a V9-2 probe in 2D CEUS mode. After clutter filtering, the extracted time-intensity curves were pixel-wise fit by a mono-exponential replenishment model. From here, the ratio A/τ (plateau intensity over replenishment time) was extracted and represented as parametric maps, reflecting local perfusion.

Results

The placentas showed mostly homogenous perfusion, with chorionic veins (indicated by white arrows) distinguishable from villous MV on the A/τ parametric maps.

Conclusions

The feasibility of quantifying ex-vivo feto-placental perfusion using 2D CEUS was demonstrated in healthy placentas, providing a foundation for future studies of placental pathology.