

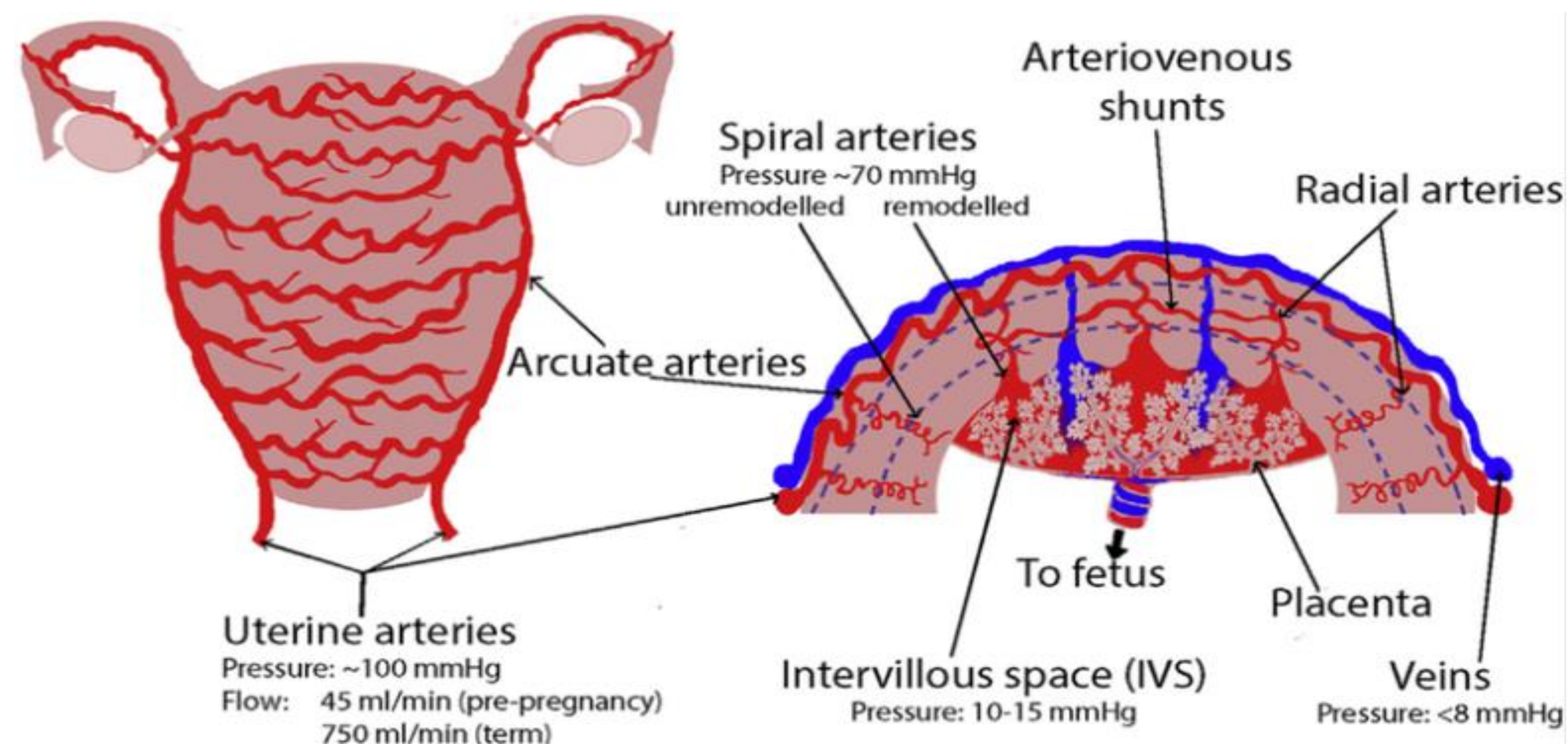
EP14.58. Quantification of **uteroplacental vascularization** in early pregnancy using 3D contrast-enhanced ultrasound with subharmonic-aided pressure estimation (SHAPE).

Bahareh Kian Pour¹, Trang Vu¹, Kavita Vinekar², Priscilla Machado¹, Vincenzo Berghella², Allison Goldberg³, Victoria Roberts⁴, Flemming Forsberg¹, Kibo Nam¹

¹Department of Radiology, ²Department of Obstetrics & Gynecology, ³Department of Pathology and Genomic Medicine, Thomas Jefferson University, Philadelphia, PA 19107, USA,

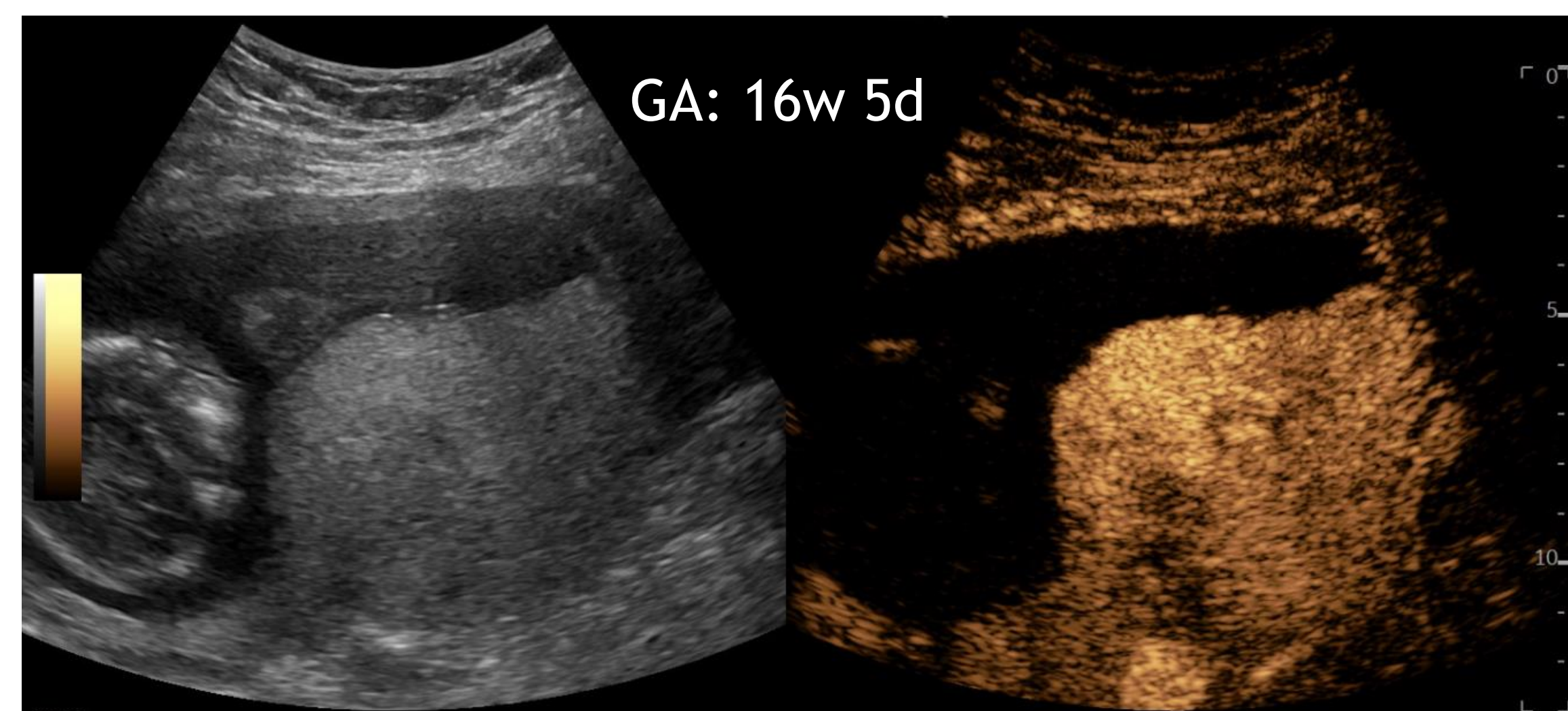
⁴Division of Developmental and Reproductive Sciences, Oregon Health and Science University, Portland, OR 97239, USA.

Uteroplacental vascularization



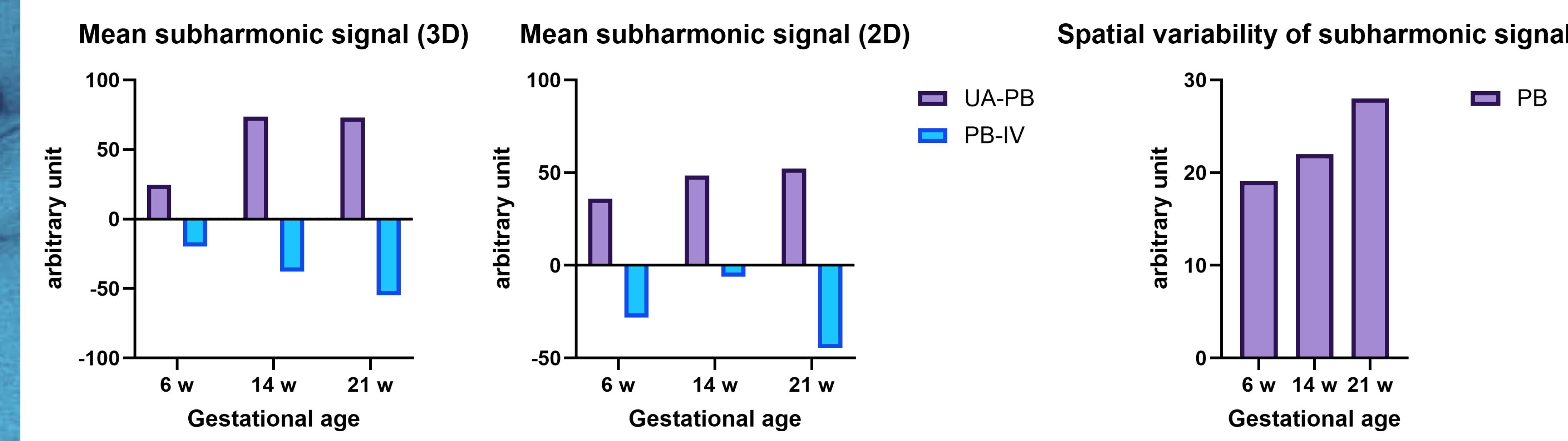
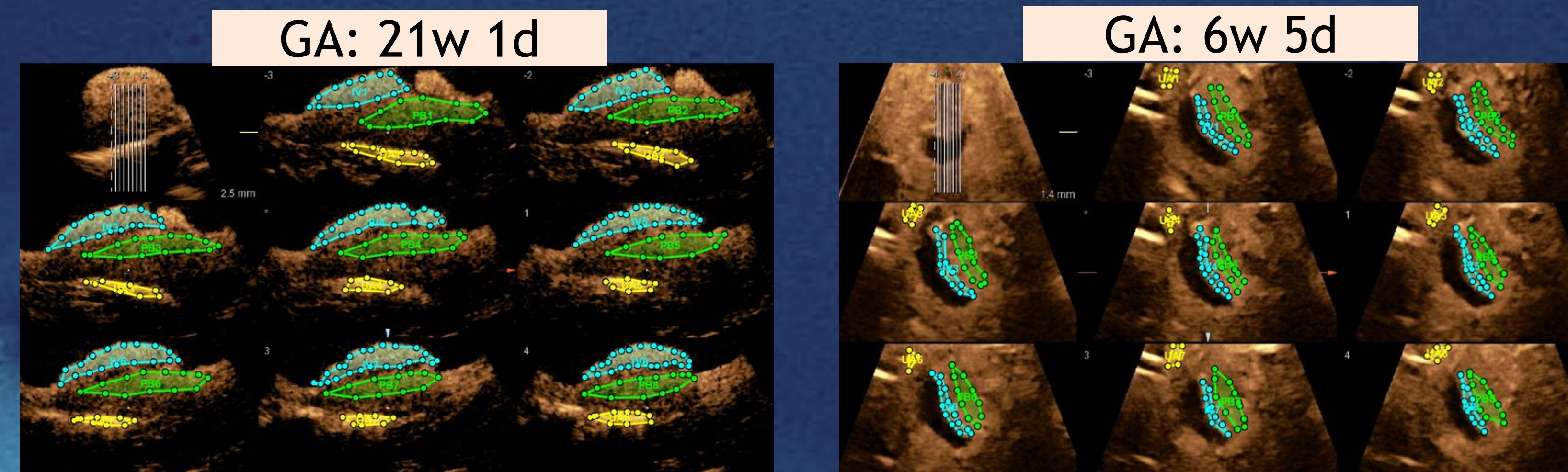
Clark AR et al. Placenta 2018;66:74-81

Contrast-enhanced ultrasound (CEUS)

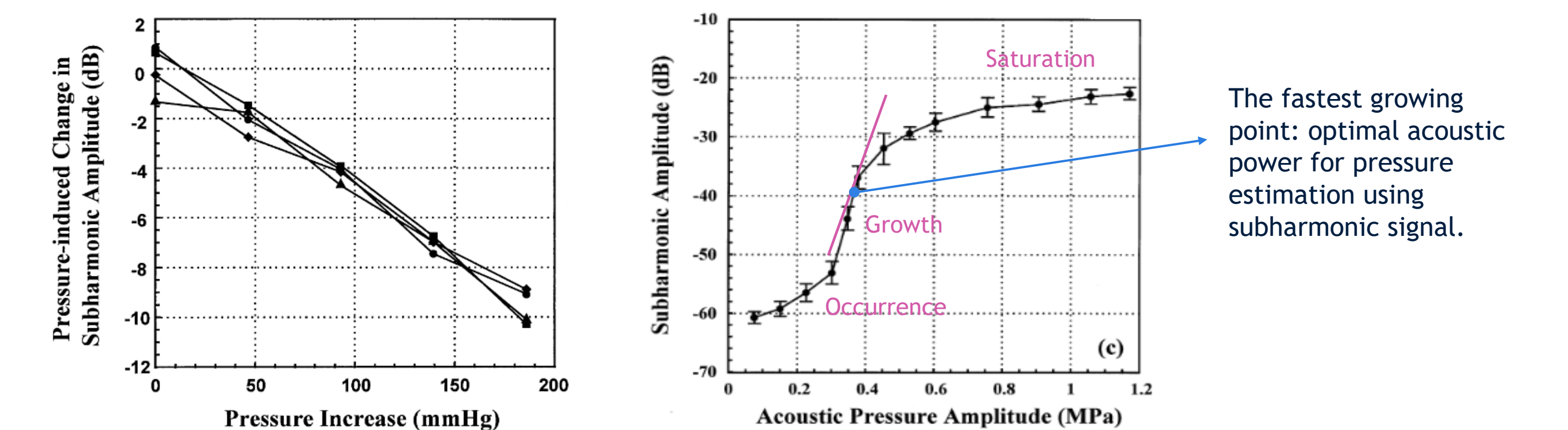


Ultrasound contrast agent (UCA) consists of gas-filled microspheres enhancing vascular visualization. UCA remains strictly intravascular and does not cross the placental barrier.

3D CEUS with SHAPE showed potential to detect gestational age-dependent pressure changes from progressive spiral artery remodeling.



Subharmonic-aided pressure estimation



Subharmonic-aided pressure estimation (SHAPE) uses a strong inverse linear relationship between subharmonic signal of contrast agent and ambient pressure.

Objective

To investigate whether SHAPE-derived signal gradients between the uterine artery (UA), placental bed (PB), and intervillous space (IV) vary with gestational age (GA), reflecting physiologic uteroplacental vascularization.

Methods

This ongoing study performed CEUS with SHAPE acquisition in three subjects between 6- and 21-weeks GA. A GE Logiq E10 with a 3D convex probe (GE HealthCare) was used. Regions of interest (ROIs) were selected in the UA, PB, and IV on both 2D (area) and 3D (volume) data. For 2D analysis, five independent 2D frames were used (i.e., 5 measurements for each ROI), while 3D analysis included one volume with eight 2D elevational frames (i.e., 8 measurements for each ROI). Mean subharmonic signal amplitudes were calculated from the ROIs and gradients determined between UA-PB and PB-IV. Trends across GA were assessed descriptively.