

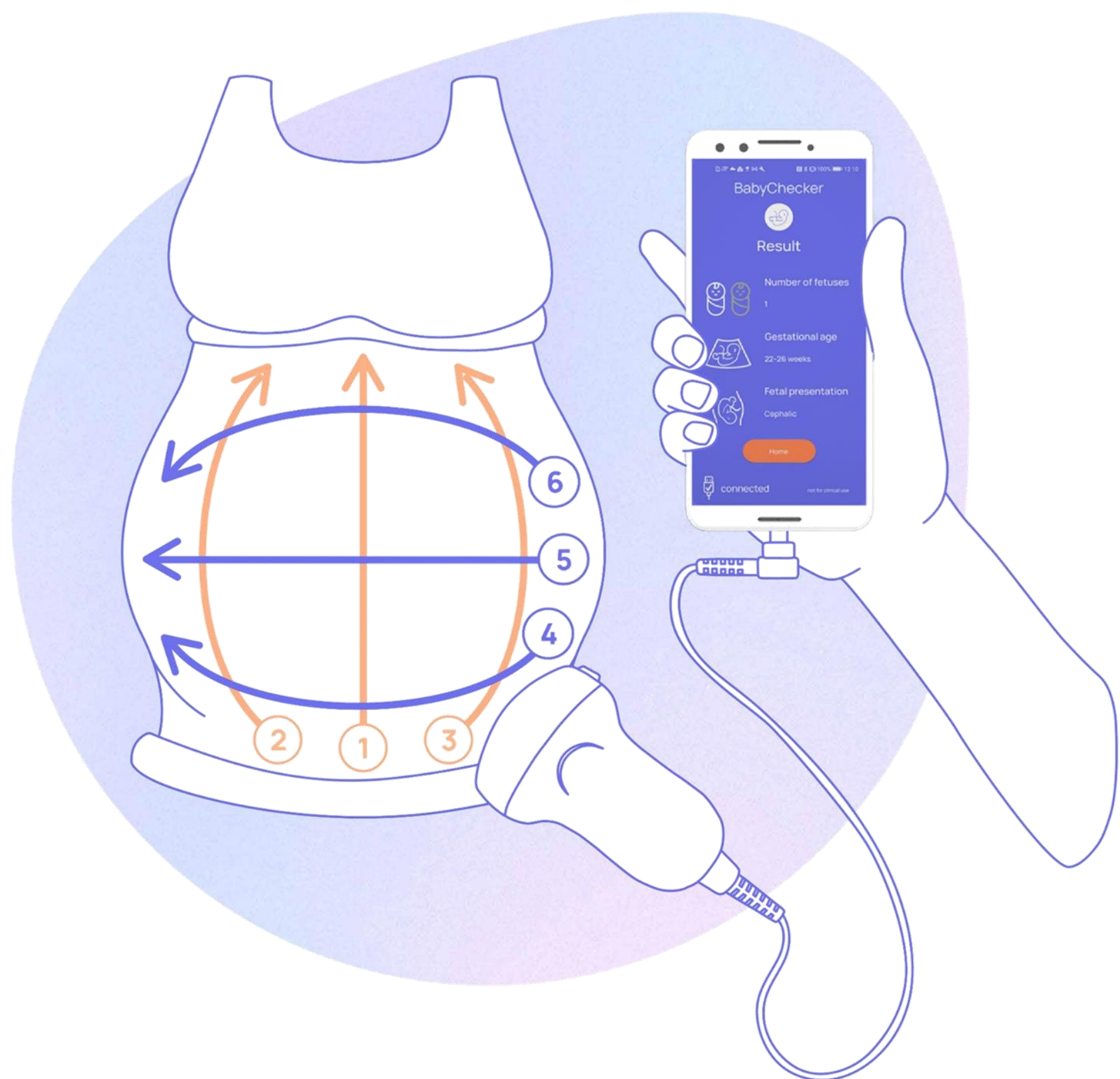
Improved automated prenatal diagnosis using a modified sweep protocol



MOTIVATION

MATERNAL MORTALITY is extremely high in low-income countries, with **70% of deaths** occurring in Sub-Saharan Africa. There is a **lack of trained sonographers** in these countries.

OBSTETRIC SWEEP PROTOCOL (OSP) USING LOW-COST ULTRASOUND



CURRENT SOLUTION: BLIND SWEEP PROTOCOL

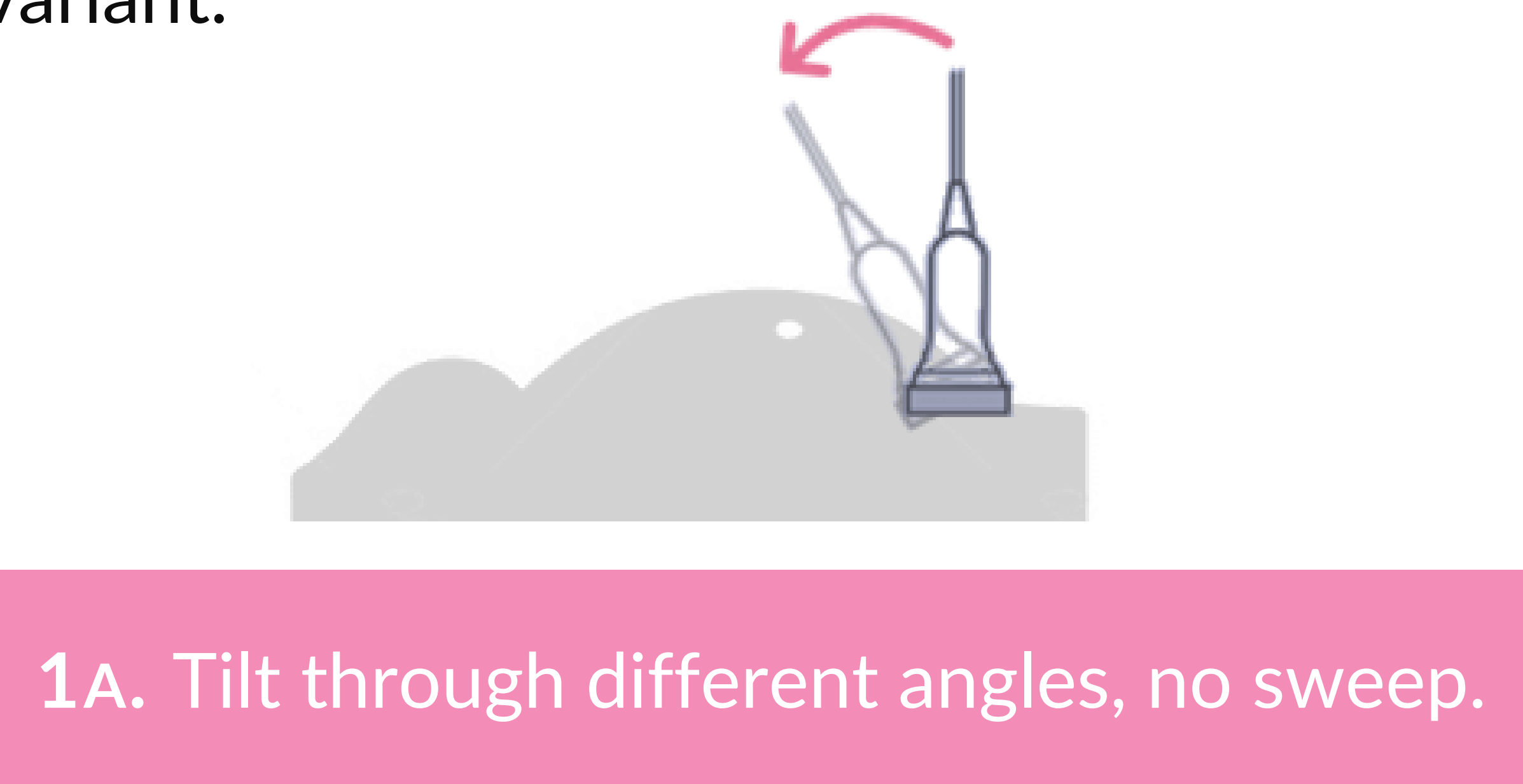
- Sufficient for automated analysis and state of the art for blind sweep acquisition*
- Suitable for novice users

CHALLENGE: SCANS FREQUENTLY ACQUIRED TOO HIGH

- Insufficient imaging of the lower uterus:
- Inaccurate estimation of gestational age
 - Inability to identify low-lying placenta

OSP SWEEP 1 VARIANTS

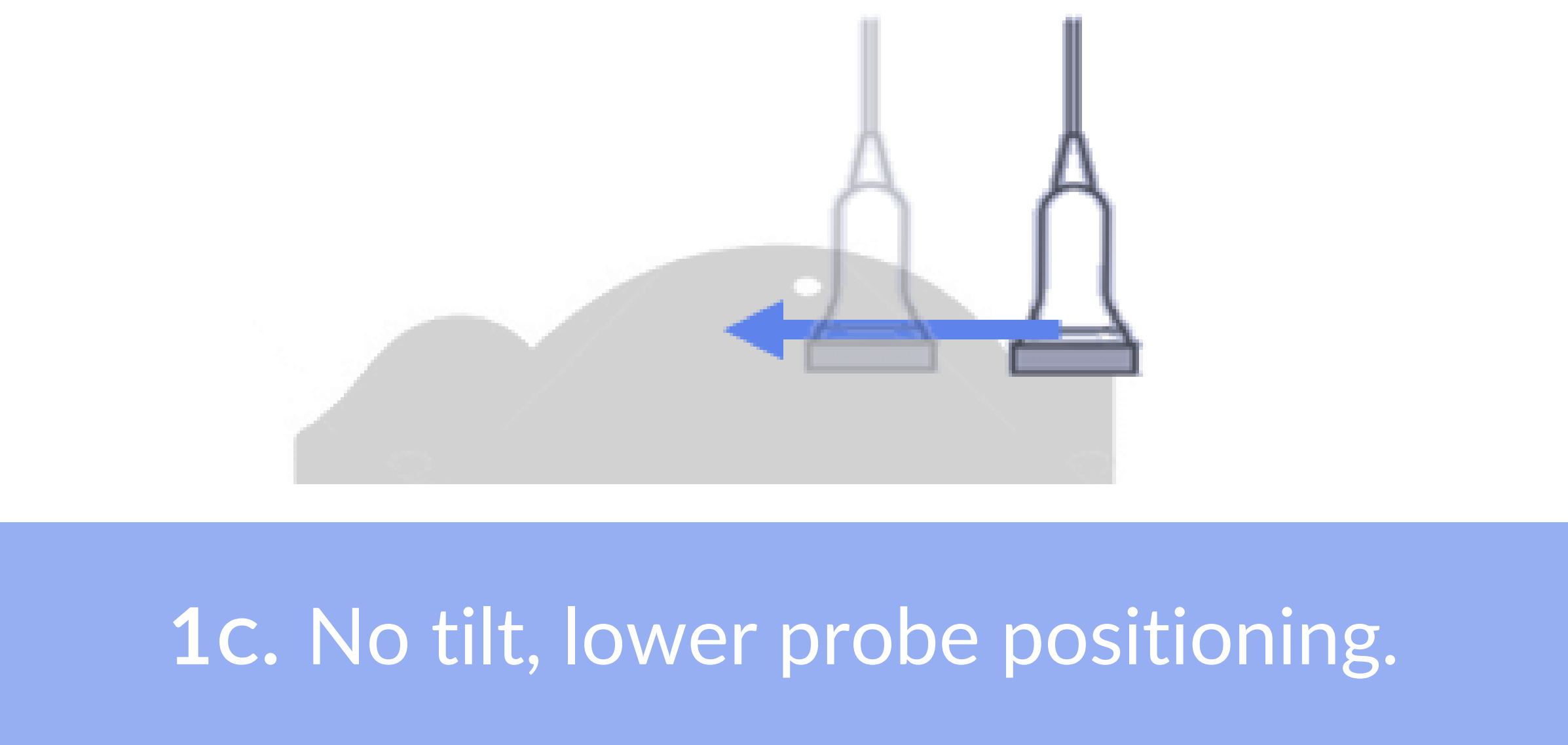
We investigated three variants of OSP sweep 1 (a central sweep in caudo-cranial direction). These variants introduce a tilting motion and lower probe placement. We assessed the visibility of the fetal head in cephalic cases using sweeps 1-3 OSP and each variant.



1A. Tilt through different angles, no sweep.



1B. Sweep downwards at a fixed 60° angle.



1C. No tilt, lower probe positioning.

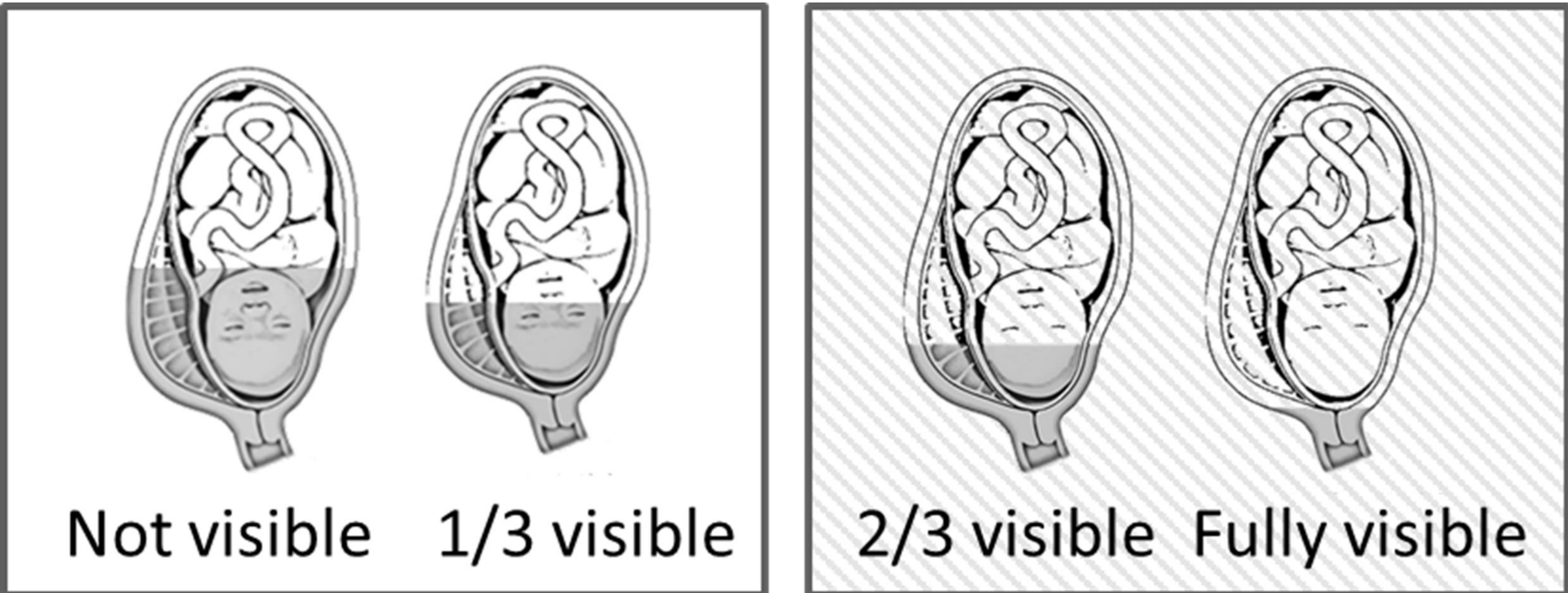
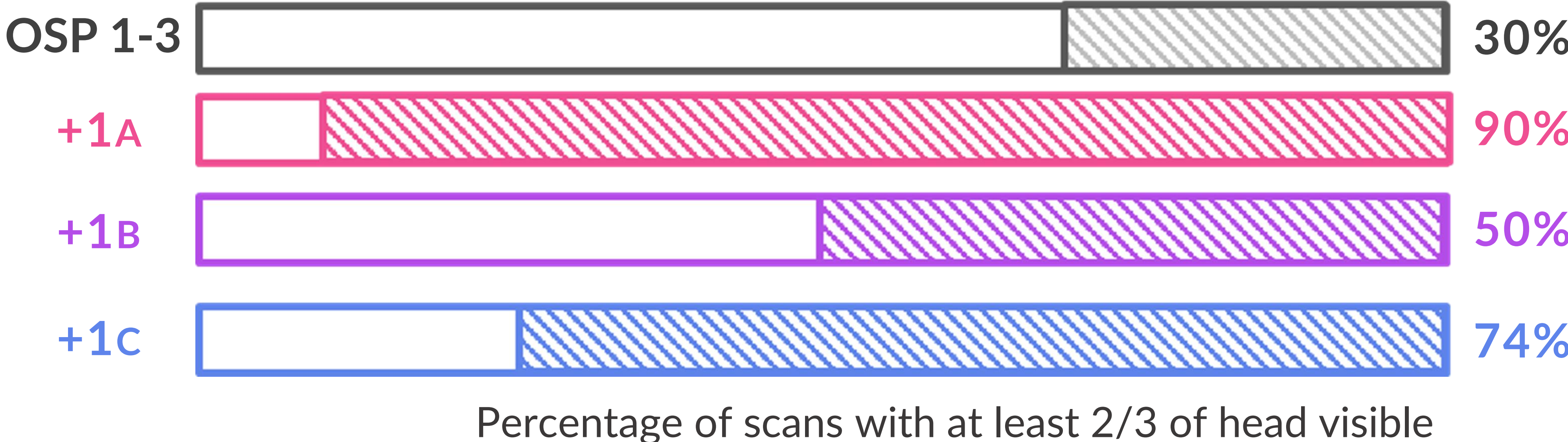
Data: 62 scans from 62 participants prospectively acquired at Radboudumc.

Sappia, Perugini, van Sluisveld, van Ginneken, de Korte, van Dillen, Murphy

FETAL HEAD VISIBILITY

Fetal head visibility improved by **60%** when introducing a **tilting motion**, and by **44%** when placing the **probe lower in the abdomen** with respect to OSP 1 – 3 alone.

Insufficient for GA estimation Sufficient for GA estimation



CONCLUSION

Introducing a **tilting movement** without sweeping motion results in substantially enhanced imaging of the lower uterus.

* Gomes et al. (2022), Pokaprakarn et al. (2023), Arroyo et al (2022), Maraci et al. (2020), van den Heuvel et al (2019), DeStigter et al (2011)