

Impact of multiple placental maternal vascular malperfusion lesions on fetal growth, angiogenic biomarkers, and neonatal adverse outcomes

Manouk Hendrix, Jo-Anne Ewald, Judith Bons, Carmen Severens-Rijvers, Salwan Al-Nasiry

Background

Maternal vascular malperfusion (MVM) of the placenta is associated with fetal growth restriction (FGR) and adverse perinatal outcomes. However, the relationship between the number of MVM lesions, as defined by the Amsterdam placental pathology criteria¹, and fetal growth, angiogenic biomarkers, and perinatal outcomes remains incompletely quantified.

Objective

To assess whether multiple MVM lesions (≥2) are associated with:

- Impaired fetal growth and growth velocity
- Altered second-trimester angiogenic biomarkers (sFlt-1, PlGF, sFlt-1/PlGF ratio)
- Higher prevalence of composite adverse perinatal outcome (CAPO)

Methods

Design: Retrospective analysis (2015–2024)

Study population: 262 placentas from singleton pregnancies at a tertiary medical center

MVM lesions: 5 lesion types recorded according to Amsterdam criteria¹

Groups: Multiple MVM (≥2 lesions) vs. reference (0-1 lesions)

Outcome measures:

- Fetal biometry & growth velocity (abdominal circumference).
- Second-trimester serum sFlt-1 MoM, PlGF MoM, sFlt-1/PlGF ratio MoM.
- CAPO: stillbirth, neonatal mortality (<28 days), Apgar <7, umbilical artery pH <7.10, severe neonatal morbidity.

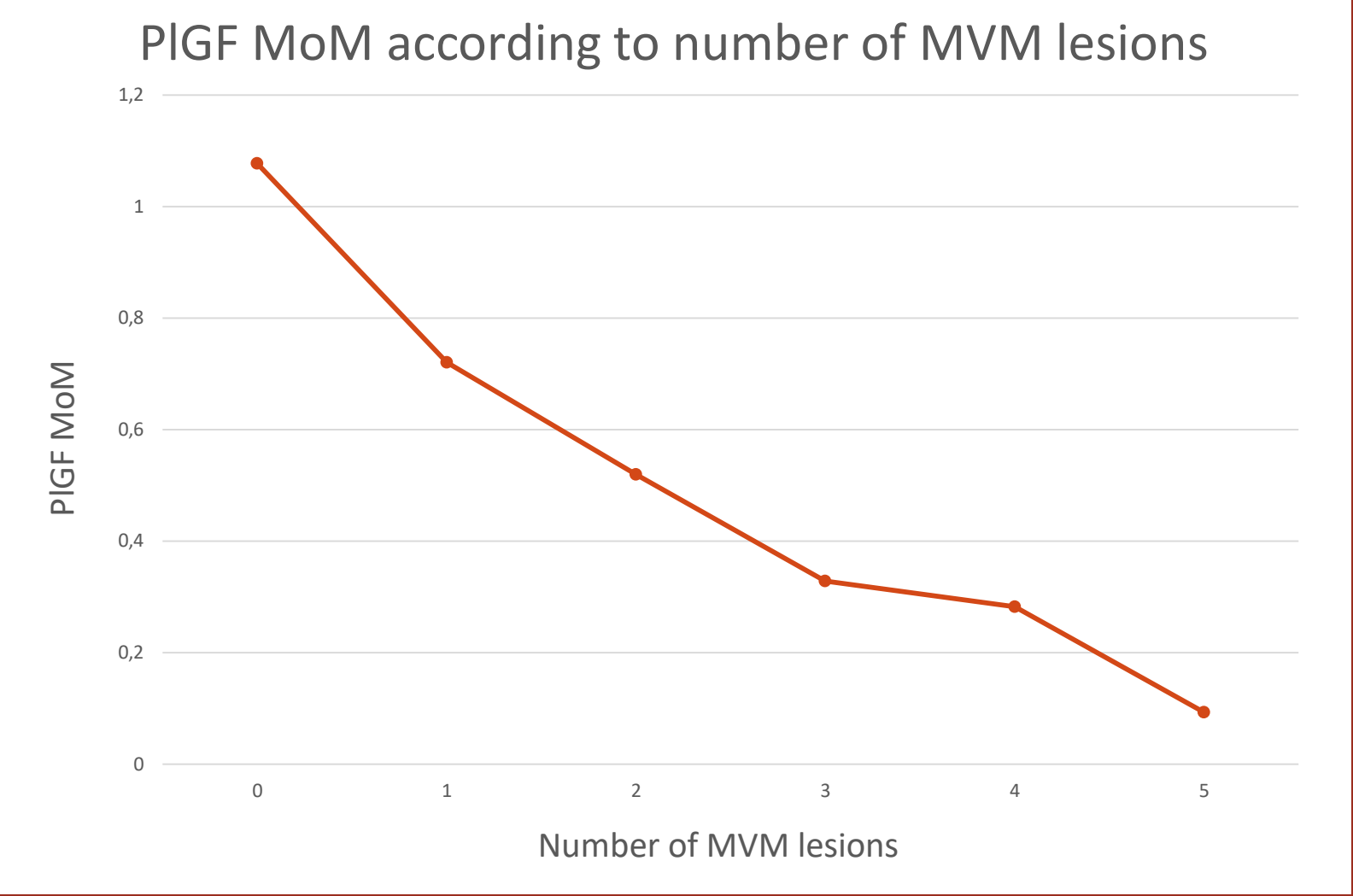
Interpretation: Who benefits?

- Clinicians (midwives, obstetricians): Early identification of high-risk FGR pregnancies via biomarkers.
- Pregnant women at FGR risk: Targeted surveillance and counseling for index and subsequent pregnancies.
- Pathologists: Structured MVM lesion scoring for better prognostic insights.

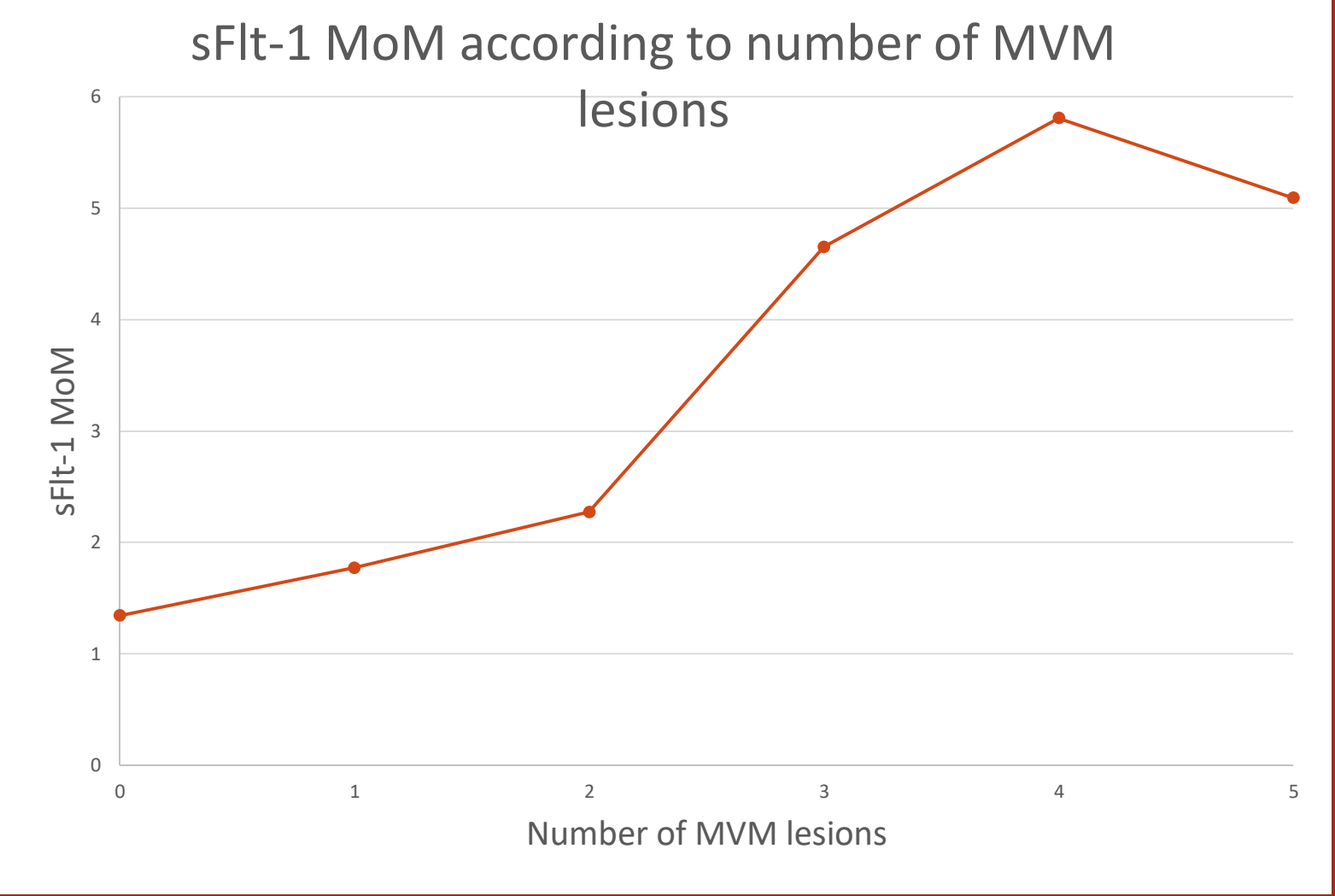
Conclusions

- **Dose-dependent effect:** PlGF MoM declined further with increasing lesions (0.91 with 0 lesions to 0.09 with 5 lesions, p<0.001)
- Multiple MVM lesions are strongly associated with impaired fetal growth, anti-angiogenic biomarker profile, and higher risk of CAPO.
- Abnormal second-trimester PlGF and sFlt-1 levels may serve as antenatal markers for underlying MVM.
- Scoring MVM lesions improves risk stratification for FGR pregnancies.

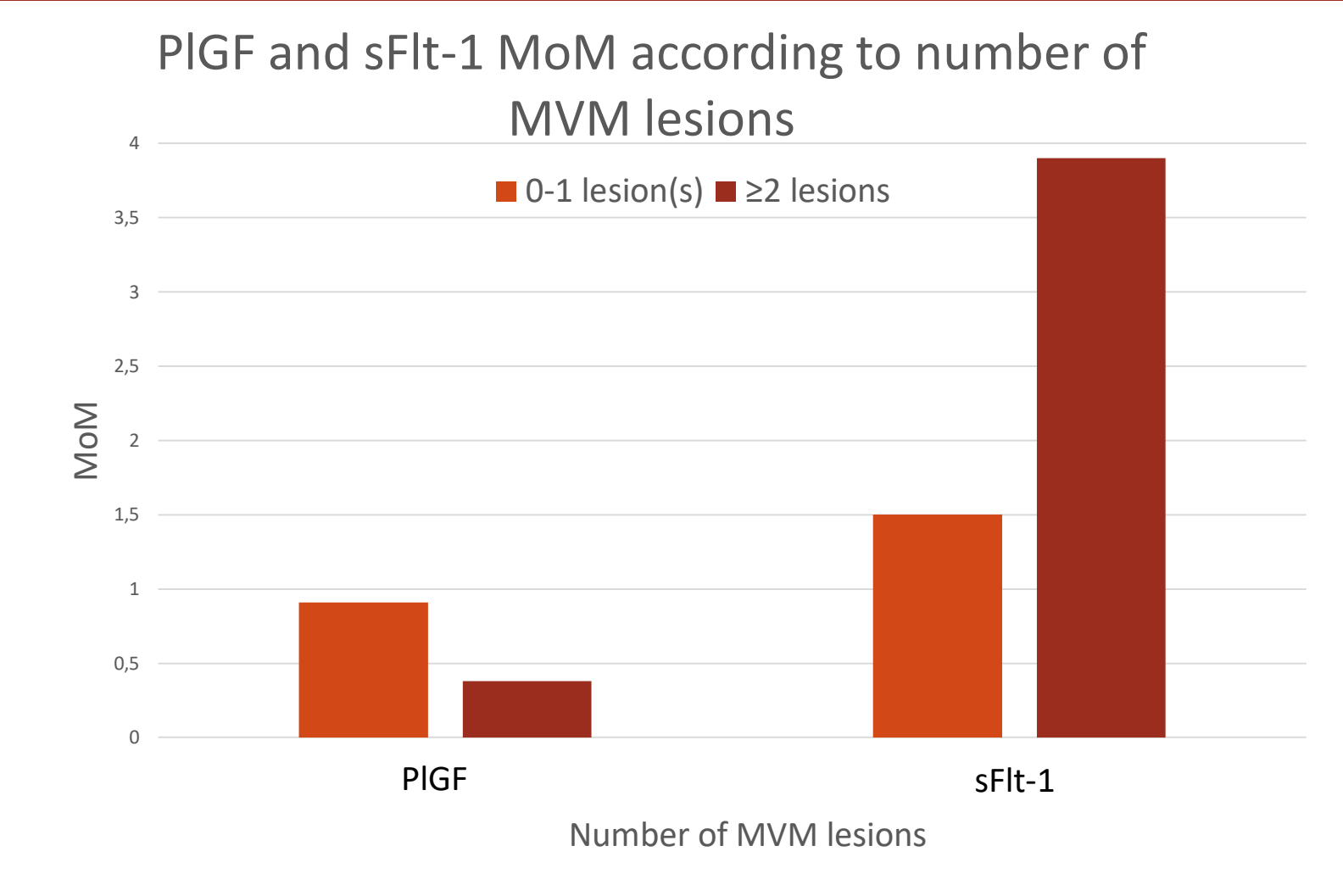
A



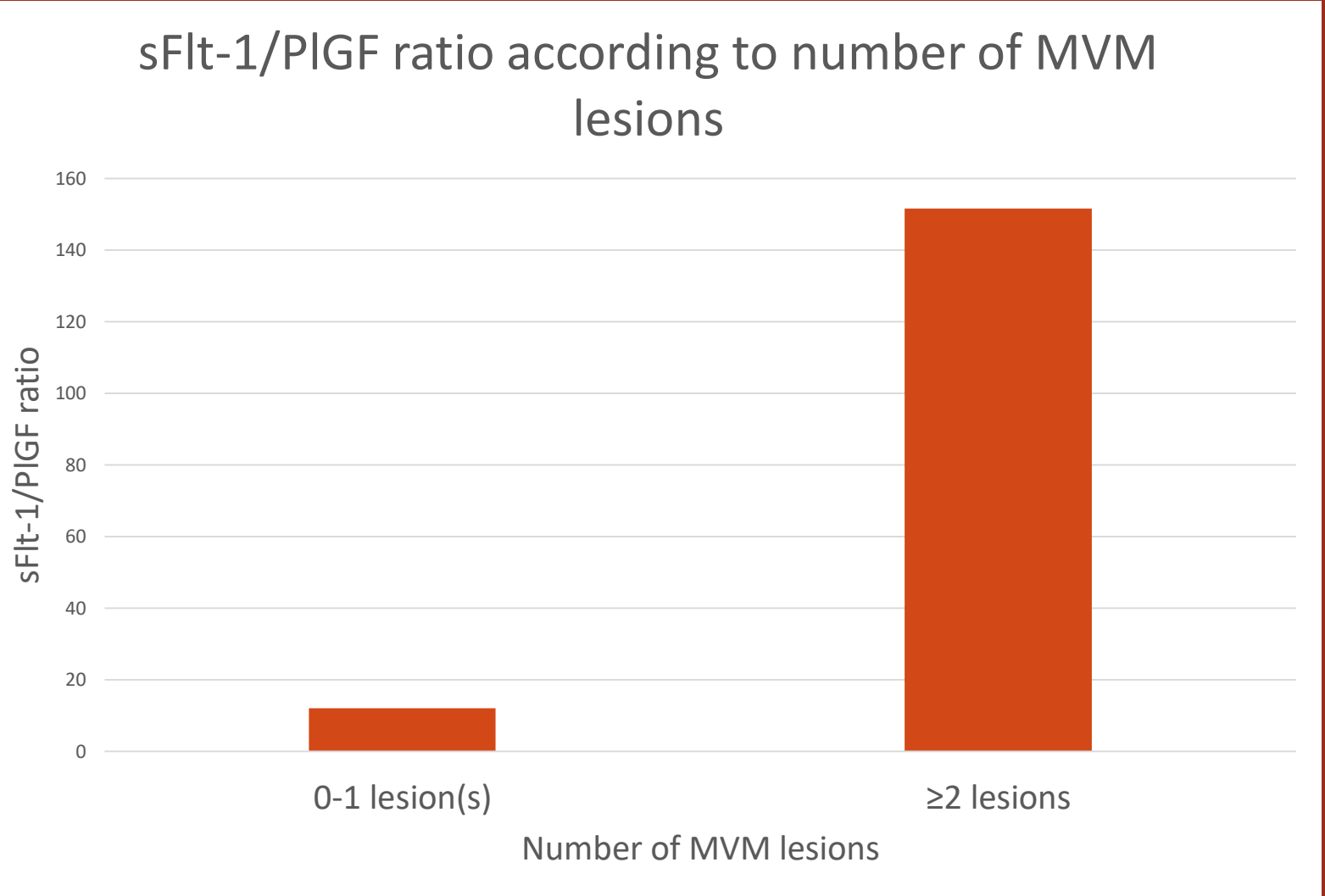
B



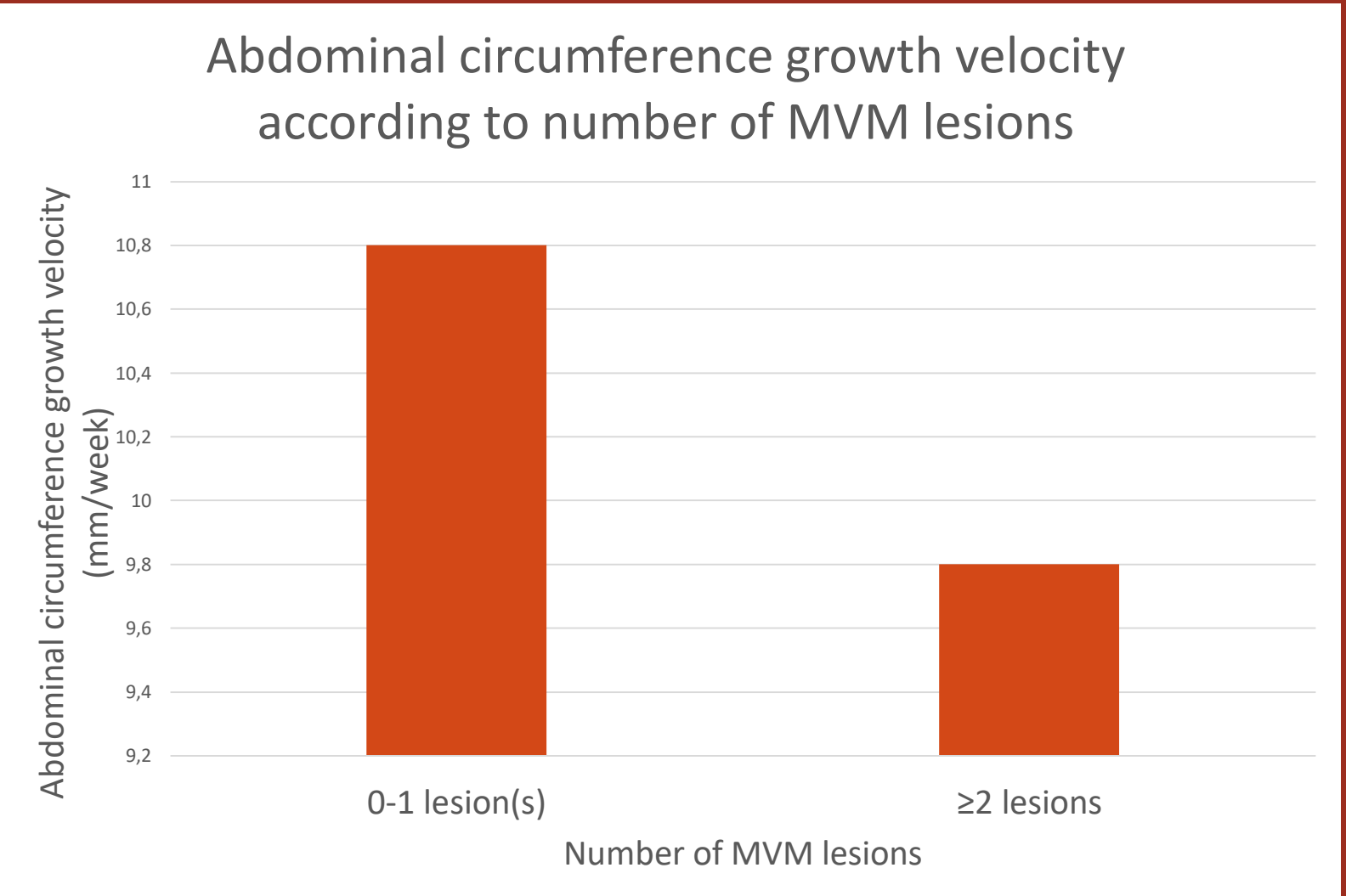
C



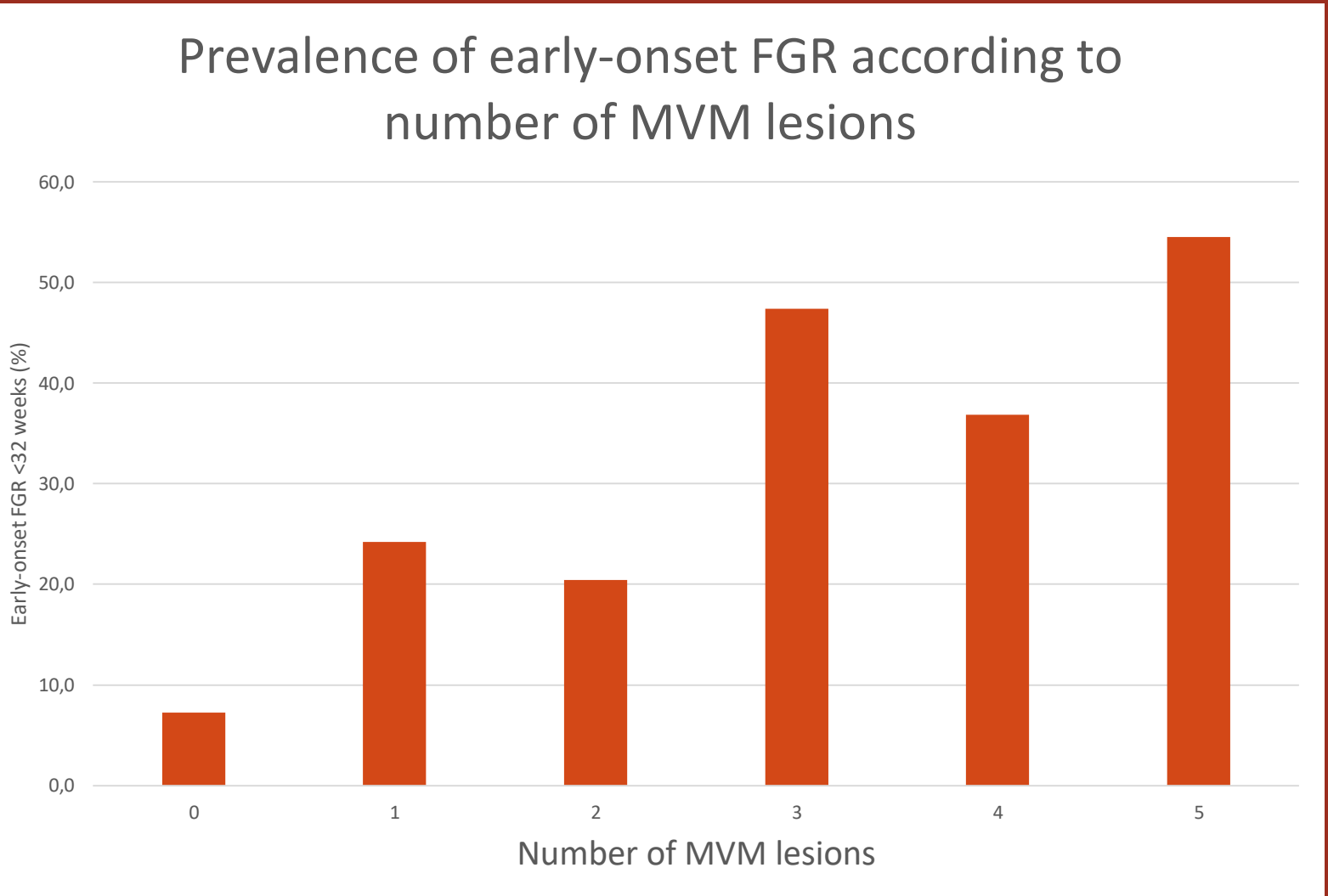
D



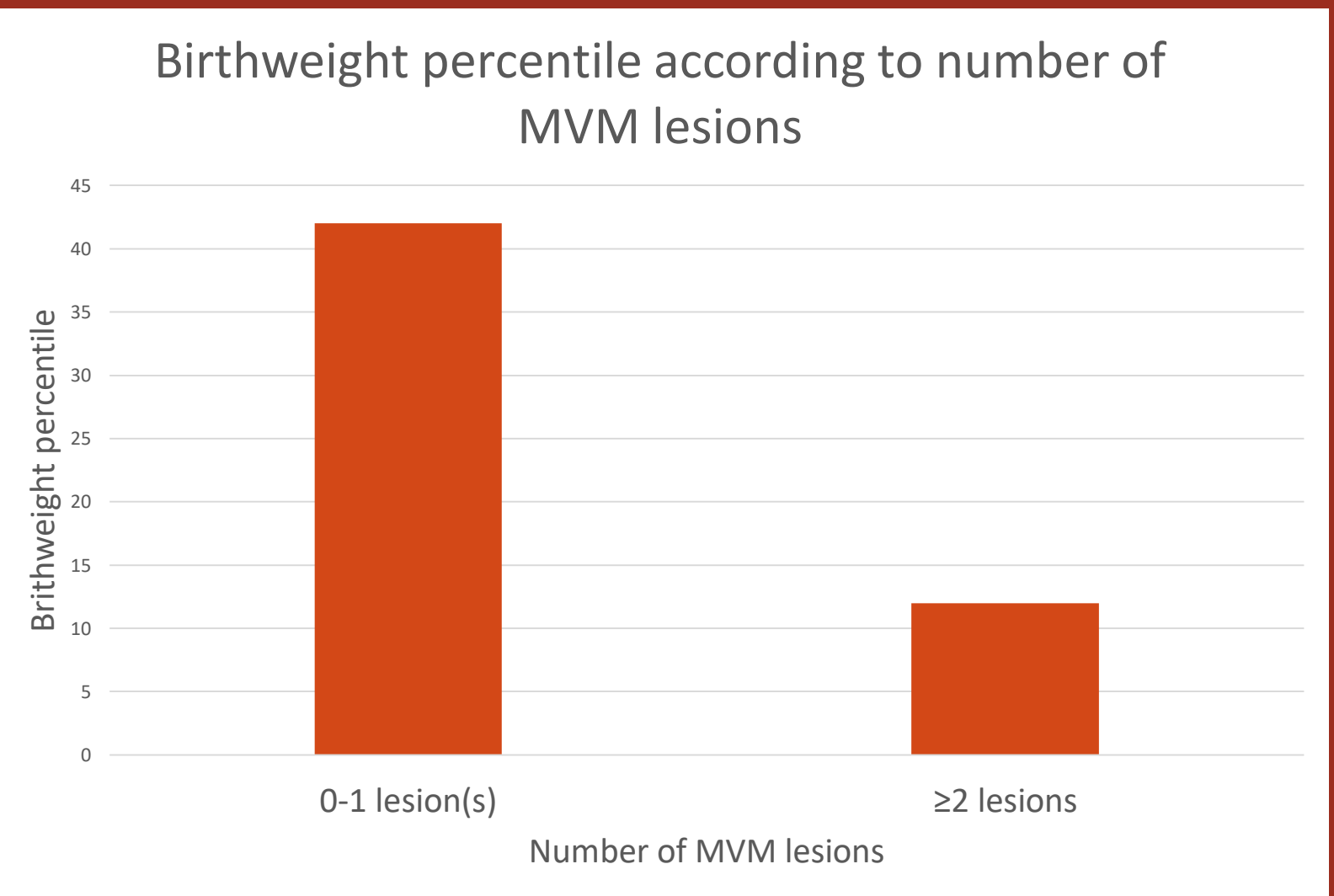
E



F



G



H

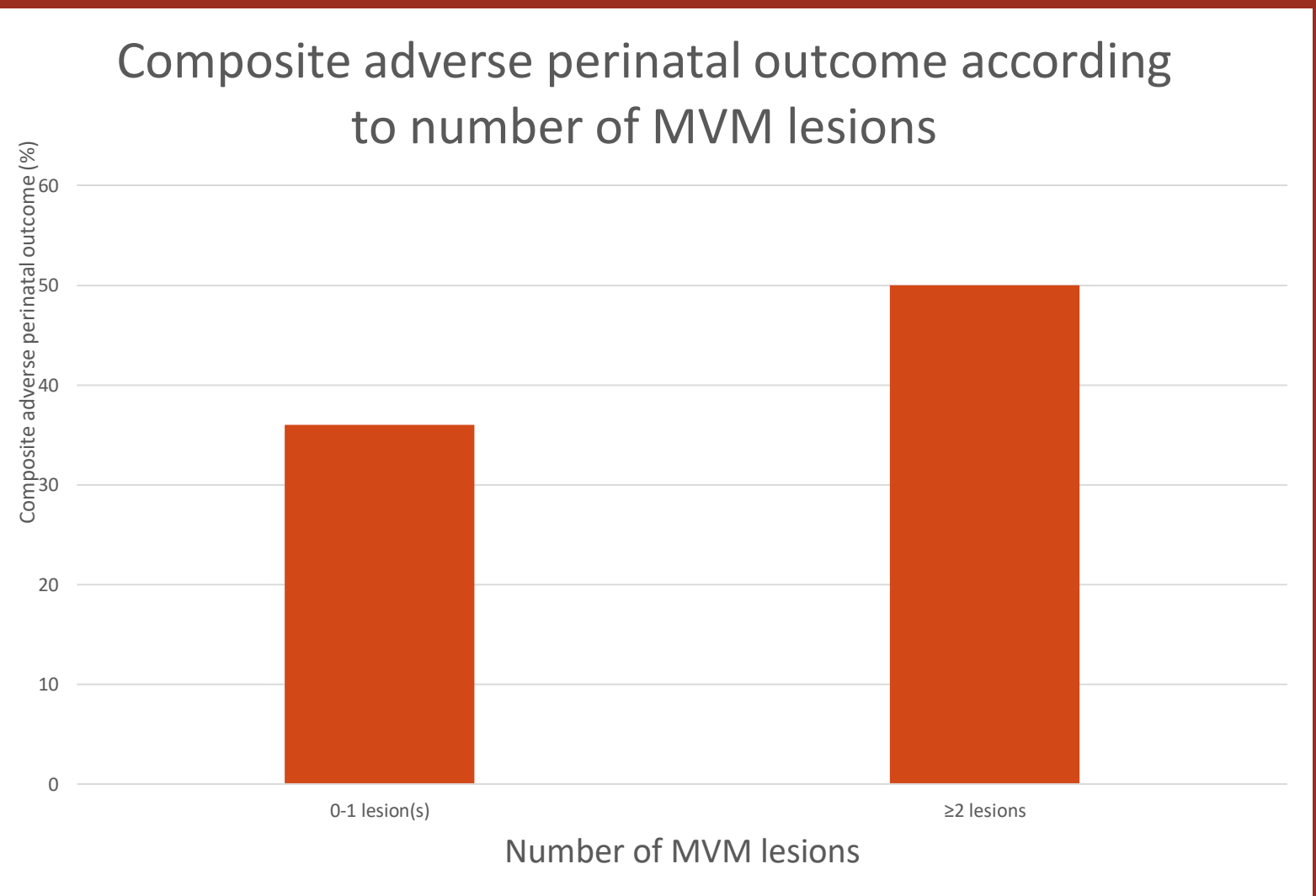


Figure 1: Maternal angiogenic factors in relation to MVM lesion burden and early-onset FGR prevalence.