

## Reply to comment on migraine and adverse pregnancy outcomes: the nuMoM2b study

We thank the reader for these thoughtful comments regarding our analysis of migraine and adverse pregnancy outcomes (APOs) in the Nulliparous Pregnancy Outcomes Study: monitoring mothers-to-be (nuMoM2b).<sup>1</sup> We agree that the underlying pathway linking migraine to APOs, including hypertensive disorders of pregnancy and preterm birth, is complex and incompletely understood. Migraine with aura is indeed linked to changes in cerebral vasoreactivity and an increased risk of thromboembolic events. However, no data regarding the presence or absence of aura were available in nuMoM2b. In response to the reader's comment, we investigated whether participants who reported migraine had early physiological evidence of placental dysfunction. We included all nuMoM2b participants in our analysis sample who had uterine artery Doppler (UAD) studies performed at the second study visit between 16 weeks 0 days and 22 weeks 6 days. UAD studies were collected and analyzed according to standardized protocols.<sup>2</sup> We considered the presence of an early diastolic notch in either uterine artery to be an abnormal result.<sup>3</sup> We found that of the 8193 participants in our analysis sample whose UAD data were available, 3127 (38.2%) had an early diastolic notch identified on 1 or both sides. The proportion of participants with early diastolic notch did not differ in participants who reported migraine headache history at the first study visit compared with those who did not ( $P=.8$ ). These preliminary results do not support the reader's hypothesis that migraine is associated with vascular placental pathology. However, additional biomarkers of early placental dysfunction should be explored, and it is possible that results could differ in participants with more frequent or more severe migraine attacks. We agree that this potential causal pathway deserves more investigation and thank the reader for bringing it to our attention. ■

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