



Does maternal exposure to magnesium sulfate affect fetal heart-rate patterns?

Yes. Maternal exposure is associated with a lower fetal heart-rate baseline (within the accepted normal range), decreased variability, and fewer prolonged decelerations—but there is no evidence of adverse effects on neonatal outcomes, according to this 4-year retrospective cohort study.

Duffy CR, Odibo AO, Roehl KA, Macones GA, Cahill AG. Effect of magnesium sulfate on fetal heart rate patterns in the second stage of labor. Obstet Gynecol. 2012;119(6):1129–1136.

► EXPERT COMMENTARY

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In contemporary obstetrics, electronic fetal monitoring (EFM) is used almost universally, and magnesium sulfate often is administered for seizure prophylaxis, tocolysis, or preterm neuroprotection. Given that magnesium crosses the placenta and is known to have both neurologic and cardiac effects and toxicities, it has been speculated that magnesium sulfate may change various characteristics of the fetal heart rate (FHR). Previous studies in small animals have failed to answer this common clinical question.

Details of the study

In this retrospective study from Washington University in St. Louis, Duffy and colleagues analyzed FHR tracings from 248 women who were exposed to magnesium sulfate, focusing on the 30 minutes just prior to delivery. These tracings were compared with those of 5,139 women who were not exposed to magnesium at all during the study.

All women in the study reached the second stage of labor, had at least 10 minutes of EFM recorded in the 30 minutes preceding delivery, and delivered at or beyond 37 weeks' gestation. The groups were similar in regard to maternal race, mode of delivery, and

tobacco and alcohol use. However, women exposed to magnesium were younger, had a higher body mass index and lower gravidity, and were more likely to be nulliparous and to have pregestational diabetes or gestational diabetes. In addition, women exposed to magnesium had a lower gestational age at delivery (38.4 [SD, 1.2] weeks vs 39.0 [SD, 1.2] weeks; $P < .01$), although no infants were born before 37 weeks.

Magnesium was given in accordance with the institution's treatment guidelines for severe preeclampsia: a 6-g loading dose followed by a maintenance infusion of 2 g/hr, with monitoring for signs and symptoms of magnesium toxicity. (Magnesium was not given to women with mild preeclampsia.)

Two research nurses blinded to all exposure and outcome data used National Institute of Child Health and Human Development (NICHD) nomenclature to categorize FHR tracings. Magnesium exposure was associated with:

- a mean 3-beat difference in baseline FHR
- an increased likelihood of baseline FHR

WHAT THIS EVIDENCE MEANS FOR PRACTICE

Be very cautious in attributing pathologic FHR changes (NICHD Category II or III) to magnesium sulfate exposure, and do not alter management decisions based on that attribution.

►► JOHN M. THORP, JR., MD

FAST TRACK

Although there were slight differences in FHR patterns between women exposed to magnesium and those who were not, no adverse effects on neonatal outcomes were noted

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below 120 bpm

- greater likelihood that FHR variability was reduced or diminished.

The presence or number of accelerations or decelerations did not differ significantly between groups, but magnesium exposure was associated with fewer prolonged decelerations. These associations remained after excluding women who had adverse neonatal outcomes.

Fetal tachycardia was strongly associated with fetal acidemia and adverse neonatal outcomes in both groups. And prolonged decelerations were associated with an increased risk of fetal acidemia in women not exposed to magnesium and were present in all cases of fetal acidemia in exposed women.

The authors concluded that magnesium may mask signs of fetal distress.

Findings have little clinical utility

Despite the large numbers of women in this study and the rigorous methods utilized, the findings will be of little help to clinicians

interpreting EFM tracings from fetuses whose mothers are receiving magnesium. The differences between groups were small, and the overwhelming majority of changes fell within the normal range.

More important than FHR changes is actual newborn condition. In a secondary analysis from the Beneficial Effects of Antenatal Magnesium trial from the Maternal-Fetal Medicine Units Network, Johnson and colleagues demonstrated that cord-blood magnesium levels did not predict the need for delivery room resuscitation.¹ In this trial, pediatricians were blinded as to whether the mother was receiving magnesium or placebo. These results cast real doubt on the hypothesis that maternal magnesium exposure alters the condition of the fetus or newborn in a clinically meaningful way. 📌

Reference

1. Johnson LH, Mapp DC, Rouse DJ, et al; Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Association of cord blood magnesium concentration and neonatal resuscitation [published online ahead of print

FAST TRACK

Most of the differences between women exposed to magnesium and unexposed women fell within the normal range

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