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## Maternal Heart Rate Changes with a Plain Epidural Test Dose— Validity of Results Open to Question

*To the Editor:*—Cartwright *et al.* report an increased heart rate 3 ml of plain 0.5% bupivacaine injected through an epidural catheter at the rate of 1.0 ml/s.<sup>1</sup> They concluded: "Thus, the interpretation of the epinephrine test dose for obstetric anesthesia is difficult because of the poor specificity of the test." We question the validity of this study based on the stated rate of injection through the epidural catheter.

When administering a single-injection epidural block via a 19-gauge needle, a 3-ml test dose of a local anesthetic can be injected in 3 s.<sup>2</sup> On the other hand, doing so through standard length epidural catheters is impossible.\* When holding the catheter's connector in one hand, exerting maximum pressure on the syringe's plunger with the other, and timing the injections with a stop watch, a minimum of 4.5 s elapsed with a 3 ml syringe, 5 s with a 5 ml syringe, and 5.5 s with a 10 ml syringe. Furthermore, the "fire hose"-type stream exiting from the end of the catheter shot at least 3 m (10 ft) across the room. Evidently, Cartwright *et al.* exerted maximum pressure on the plungers of the syringes. Therefore, one wonders whether the effects of the jet stream in the epidural space was responsible for heart rate increases.

To avoid the "fire hose" effect when injecting through an epidural catheter, the rate of 0.2 ml/s should not be exceeded.<sup>3</sup> Nonetheless, we have found that injecting 3 ml of a local anesthetic containing 1:200,000 epinephrine (0.015 mg) at this rate will determine an intravascular injection into an epidural blood vessel. However, during its injection and for 45 s after it, the patient must not be stimulated by a uterine contraction, nor should anyone talk to, move, or examine the patient. Otherwise, a false positive may result; that is, a heart rate increase which,

on cessation of stimulation, immediately returns to the control level. Conversely, the heart rate increase from 0.015 mg of epinephrine as monitored by an electrocardioscope is sustained for 20 s or more and 30–60 s elapse from when it starts to decline until it returns to its control level.<sup>2</sup>

To conclude, in our hands, the test dose has been "foolproof." Since 1980,† no systemic toxic reactions have resulted in more than 8,500 surgical and 6000 obstetrical single- or intermittent-injection epidural blocks. Prior to then, one of us (DCM) treated three local anesthetic induced convulsions per year.

† Moore DC: Necessary ingredients of a test dose prior to epidural or caudal block. (Abstract) ANESTHESIOLOGY 53:S214, 1980

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## REFERENCES

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2. Moore DC, Batra MS: The components of an effect test dose prior to epidural block. ANESTHESIOLOGY 55:693–696, 1981
3. Moore DC: Regional Block, 4th edition. Springfield, Charles C. Thomas Publisher, 1965, p. 433

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\* Tubing tested was that which: 1) will pass through a 18-gauge thin-walled needle; 2) had a single opening at the end; and 3) was 90 cm (Deseret Medical, Inc., Abbott Laboratories, Inc., Tact Medical, Inc.) or 97.5 cm (Burr Medical, Inc.) in length.

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## Pregnancy and Oxygen Dissociation

*To the Editor:*—I read with interest the article "Effect of Normal and Preeclamptic Pregnancies on the Oxygen-hemoglobin Dissociation Curve."<sup>1</sup> The authors confirmed a stepwise decrease of oxygen hemoglobin affinity during

normal pregnancy, but did not provide an explanation for this finding.

Drs. Rorth and Brake found that the 2,3 DPG content of erythrocytes increased in the ninth month of pregnancy