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## Use of a Nerve Stimulator for Peripheral Nerve Blocks. II.

*To the Editor:*—I believe that Goldberg *et al.*<sup>1</sup> have missed the point on the use of electrical stimulation in regional anesthesia.

The nerve stimulator should be approached as an ancillary tool to place the tip of the inserting needle in contact with the nerve(s) to be bathed with the local anesthetic. This maneuver eliminates inadequate placement as the cause of block failure. It does not eliminate choosing the wrong nerve(s) or segment (poor anatomical knowledge), or the wrong anesthetic drug, concentration, and/or volume as the causes of block failure. To correctly use electrolocation in regional anesthesia, you should use an instrument made with the correct electrophysiological principles and capable of reading the stimulating current in each pulse within 0.01 of a milliamp accuracy. With the use of "any" stimulator,

you will find, as you already did, that there is no difference with the "blind techniques." The type of stimulator that "dials current" uses the wrong approach to the technique of electrical location of nerves in regional anesthesia.

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### REFERENCE

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*In Reply:*—We would like to thank Drs. Galindo, Forte, and Lee for their constructive comments concerning our study of brachial plexus blockade. We feel, however, that a reply to certain points is in order.

The purpose of our study was to compare the results obtained with three different techniques of axillary blockade in a resident training program. Dr. Forte and colleagues are obviously experienced anesthesiologists, and we would assume that, as the level of experience increases, so would the success rate with nerve stimulators. Forte and Lee's retrospective review of results obtained with supplemented blocks in sedated patients cannot be compared to our prospective, blinded, randomized study of unsupplemented blocks in minimally sedated patients.<sup>1</sup>

We thank Dr. Galindo for his suggestions regarding use of nerve stimulators. The stimulator used throughout our study (Neuro-Trace®, HDC Corp, Mountain View, CA) is designed specifically for electrolocation. The battery lasts 400 use hours, and is sealed in plastic to eliminate current leak. Output varies between 0.4 and 3 mA released as a 100  $\mu$ sec rectangular pulse every second. The unit has a high internal resistance (330 K  $\Omega$ ) to minimize current fluctuations in response to variations in tissue resistance. In addition, we used the stimu-

lator in the manner suggested by Pither *et al.*\* We advanced the needle toward the nerve until muscle twitch occurred with a current below 1 mA. Subsequently, we confirmed correct electrolocation by noting the elimination of twitch response following injection of a small amount of local anesthetic.

In summary, we hold to our findings that, in the situation described, the nerve stimulator was no better than other techniques for achieving successful axillary blockade.

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\* Pither CE, Raj PP, Ford DJ: The use of peripheral nerve stimulators for regional anesthesia: A review of experimental characteristics, techniques and clinical applications. *Reg Anesth* 10:49-58, 1985

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Selective Block of the Nerves of the Brachial Plexus

To the Editor:—I read with interest the article by Partridge *et al.*<sup>1</sup> and the accompanying editorial<sup>2</sup> concerning axillary block.

Unfortunately, the article describing the anatomy of the brachial plexus in 18 cadavers does not mention the musculocutaneous nerve. Clinicians are aware that blockade of this nerve is frequently missed in single injection techniques. One way to make certain of anesthetizing the musculocutaneous nerve or any other nerve in the axilla is to selectively stimulate that nerve.<sup>3\*</sup> Although the editorial mentions the possibility of lesions to the nerves with paresthetic techniques,<sup>2</sup> we have used peripheral nerve stimulation with insulated pin-type point needles for many years,<sup>†</sup> and this may be an answer to this problem.

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In Reply:—We appreciate Dr. Martin's interest in our study.<sup>1</sup> Dr. Martin is, of course, correct in noting that we did not include the musculocutaneous nerve in our study. As he points out, the musculocutaneous nerve exits the neurovascular bundle prior to the point at which the brachial plexus sheath enters the axilla, so its distribution is not relevant to the questions of whether there are functional septa within the sheath, or whether single injections within the sheath contact all the nerves lying within it.

Efforts to anesthetize the musculocutaneous nerve have included separate injections outside the axillary sheath, into the coracobrachialis muscle,<sup>2</sup> and techniques to extend proximal flow of drug injected into the axillary sheath.<sup>3-5</sup> As we discussed in our article, we were not certain that proximal flow would be the same in cadavers as in living patients, and so did not examine this. In addition, as Dr. Martin suggests, a number of authors have previously suggested using nerve stimula-

tors to locate nerves for peripheral nerve blocks.<sup>6,7†</sup> As far as we are aware, however, no published study has demonstrated that success rates for axillary blocks are higher with this technique than with the others we discussed. We still believe that individual experience with a particular technique is probably the most important indicator of success with brachial plexus anesthesia.

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