

## REPLY

Nuisance conditions experienced by Dr. Webster, such as "frozen" keyboards and unresponsive patient control buttons, have been associated with exposure of the pump to an electrostatic discharge (ESD). During extensive testing we found that the Bard PCA\* Pump is primarily susceptible to ESD through pump attachments, namely the patient control and printer interface. We also confirmed that ESD problems are most likely to occur in cold, dry climates. After identifying the cause of ESD effects on the pump, we have developed appropriate product enhancements. New cables have been designed to shield from ESD the patient control and printer interface cables to the pump. Shielded cables, as well as grounding improvements to the printer interface circuit board, will serve to further minimize the device experiencing a safe shut-down resulting from ESD exposure. These enhancements will be incorporated into the product during the month of November. At the time of this writing, Bard Canada has implemented a no charge cable replacement program for all present Bard PCA\* System users.

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## Epidural buprenorphine

To the Editor:

Ackerman *et al.*,<sup>1</sup> from the University of Cincinnati, Ohio, report a well-conducted study of pruritus associated with epidural opiates. The drugs studied were 5 mg morphine, 50 µg fentanyl, 0.3 mg buprenorphine, or 1 mg butorphanol in 10 ml. Two concerns emerge about the use of buprenorphine by this route of administration: (i) the absence of approval by the appropriate regulatory authorities, and (ii) whether this route of administration leads to any pharmacokinetic or pharmacodynamic advantage.

As a pharmaceutical physician at Norwich Eaton, the company responsible for Buprenex® in the USA, I am obliged to point out that this is not an approved route of administration for buprenorphine in this country. While the parenteral formulation may be attractive for epidural studies because it contains no organic preservatives, the anaesthetist should be informed that he or she uses this route of administration with the risks which attend unapproved usage.

Buprenorphine is a highly lipophilic, potent and parenterally long-acting analgesic,<sup>2,3</sup> and is an exception to the general rule that epidural doses of opioids are smaller than parenteral doses. Compare, for example, equianalgesic doses of buprenorphine and morphine by the two routes of administration. A standard parenteral dose of buprenorphine is 0.3 mg. Lanz *et al.*<sup>2</sup> directly compared epidural doses of 0.3 mg and 0.15 mg buprenorphine, and showed

that the former gave better analgesia; these data suggest that the parenteral/epidural (P/E) analgesic dose ratio for buprenorphine equals 1. This P/E ratio is confirmed by other, less rigorous, single epidural dose studies.<sup>1,4-8</sup>

The low P/E dose ratio, and the similarity of duration of action by the epidural and parenteral routes, suggest that there is no advantage to be gained by the administration of buprenorphine using the epidural route. Furthermore, these data are consistent with an analgesic effect which may be entirely due to systemic absorption. The profile of adverse effects dependent upon this route of administration is relatively unknown.<sup>6</sup> In the absence of any pharmacokinetic or pharmacodynamic advantage, the epidural route of administration must be considered to be redundant for buprenorphine.

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We would like to thank Dr. Fox for his interest in our article<sup>1</sup> and his discussion of the comparison of buprenorphine with morphine. We were aware that the lipophilic opioids used in our study were not FDA approved for epidural use. For this reason

we obtained Institutional Review Board approval requesting permission to "use an approved drug for a non-approved use" prior to initiating the study. The FD&C Act does not limit the way a physician uses an approved drug.<sup>2</sup> In our study we reported that the utilization of epidural buprenorphine reflected an approach to pain therapy that has been previously reported to be efficacious in postoperative patients.<sup>3,4</sup> After systemic administration, 0.3 mg of buprenorphine has been reported to result in a 6–8 h duration of analgesia.<sup>5,6</sup> However, after epidural administration 0.3 mg of buprenorphine was reported to give a mean duration of analgesia of 12–15 hours. We are unaware of any prospective randomized study that compares parenteral buprenorphine with epidural buprenorphine and we are uncertain how Dr. Fox concluded that the epidural administration of buprenorphine was redundant.

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## Succinylcholine and Duchenne's muscular dystrophy

To the Editor:

It is worth stressing that succinylcholine should be avoided in patients with Duchenne's muscular dystrophy (DMD) as mentioned by Larsen *et al.*<sup>1</sup> I believe that hyperkalaemia is responsible for some of the dysrhythmias seen in these patients following succinylcholine.<sup>2</sup> The following brief case history demonstrates this.

A 14-yr-old boy with DMD presented in respiratory failure due to viral pneumonia superimposed on his

TABLE

	Pre-intubation	Post-intubation	Next day
F <sub>I</sub> O <sub>2</sub>	0.4	0.4	0.4
pH	7.05	7.51	7.47
PCO <sub>2</sub> (mmHg)	154	51	46
HCO <sub>3</sub> (mmol·L <sup>-1</sup> )	41	40	34
K (mmol·L <sup>-1</sup> )	3.4	4.6	3.6

muscle disease. It was decided to ventilate his lungs. Thiopentone 100 mg, atropine 0.6 mg and succinylcholine 50 mg were given to facilitate intubation. Blood gases were taken prior to this, when he was breathing spontaneously and 20 min later during IPPV. There were no dysrhythmias, rise in body temperature or rigidity. The Table shows blood gas and electrolyte results at these times and the next day. The potassium concentration increased from 3.4 to 4.6 mmol·L<sup>-1</sup> and it is possible that had the pH not changed from 7.05 to 7.51, due to the decrease in PCO<sub>2</sub>, it could have been much higher.

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## Oxygénation par trachéostomie

To the Editor:

La préoxygénation de patient porteur d'une trachéostomie en ventilation spontanée peut comporter des problèmes d'adaptation inadéquate entre le circuit anesthésique (15 mm) et la canule trachéale métallique ainsi que des fuites autour de celle-ci.

Une méthode simple et pratique de contourner ces difficultés est l'utilisation d'un masque pédiatrique Rendell-Baker no. 2. En position inversée au niveau du cou (cf. illustration), un tel masque épouse convenablement le pourtour de la trachéostomie. Le contact hermétique qu'il procure permet un contrôle adéquat de la composition des gaz inspirés en respiration spontanée. Nous avons également constaté qu'il était possible de