conclusions based on them are questionable because of the flawed experimental design. In reality, the study demonstrates that exposed materials may acquire small numbers of organisms from the environment because of less-than-ideal handling techniques. Multiple-use containers of povidone–iodine should be handled in a fashion that minimizes potential contamination. If the clinical-use situation is such that adequate procedures cannot be adhered to, then single-use dosage products (including Betadine Gauze Pads, Betadine Swabsticks, Betadine Swabaids) may be used.

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In Reply:—We appreciate the interest of the Purdue Frederick Company in our study and thank Dr. Welch for her comments. We agree with Dr. Welch that a great number of variables can produce contamination of PI solution and bottle caps. Indeed, this was the basic premise of our article,[1] which demonstrated that multiple-use povidone–iodine (PI) bottles in normal use can become contaminated with bacteria. Because contamination of PI solution has previously been reported and because PI is a widely used disinfectant for skin preparation before initiation of epidural anesthesia, we undertook our study to assess the frequency with which bacterial contamination occurs, rather than to identify possible sources of contamination.

As noted by Dr. Welch, in our estimate of the prevalence of contamination (40% of bottles), we did not distinguish between microorganisms isolated from the inside of the bottle cap and those isolated from the solution itself because we considered both to be potential sources of patient infection. Unless the cap is completely removed, the PI solution must come into contact with the inside of the cap when the solution is being dispensed. Finding bacteria on the inside surface of the bottle cap is disturbing for two reasons. First, that the presence of bacteria on the inside of the cap offers the potential to introduce organisms into the PI solution, and eventually the patient's skin. Second, one would expect that during previous contact of the cap with the PI solution, these organisms would have been eradicated. Even if results for the four contaminated bottle caps (three contaminated with *Staphylococcus epidermidis*, one with *Stenotrophomonas (xanthomonas/pseudomonas)* are considered separately from the four contaminated PI solutions (two contaminated with *Staphylococcus haemolyticus*, one with *Staphylococcus epidermidis*, and one with *Bacillus*) the rate of contamination (10% of bottles in use) is still disturbingly high. Although Dr. Welch suggests that there is no adequate explanation for the presence of *Bacillus* in the setting we describe, *Bacillus* species are recognized members of the normal flora and can be found in specimens from many body areas, including the skin and respiratory, gastrointestinal, and genitourinary tracts. A brief observation of a woman in the midst of childbirth clearly illustrates just how easily contamination of the lower back can occur.

Dr. Welch states that our study did not demonstrate that microorganisms on the caps contaminate the PI solution. We remind her that the organisms we describe were isolated from the inside of the caps in question, and not the external surfaces. We contend that the potential for contamination is real. Slime-producing coagulase-negative staphylococci are well suited to growth on a plastic cap surface and could easily contaminate the solution. The potential for this risk was supported by our finding of a case in which *Staphylococcus haemolyticus* was isolated from the patient's back and the bottle cap.

Although Dr. Welch states that data on file at the Purdue Frederick Company demonstrates that the organisms that we isolated will not survive in PI solution for more than 15–30 s, our findings and those of several other researchers suggest otherwise. Certainly, the manufacturers of Betadine (Purdue Frederick Company) should be aware of the previous reports of contamination of PI solution with *Pseudomonas* species,[3] including the report of the *Morbidity and Mortality Weekly Reports* that described contamination of unopened bottles of PI solution that necessitated a voluntary recall.[4] Despite Dr. Welch's assurances that PI solution cannot support bacterial growth, there are numerous reports that trace clinical sequelae to contaminated antiseptic solutions.[5]

Dr. Welch indicates that there is confusion in our study between microbial contamination and support of growth. We agree that direct inoculation of bacteria into PI solution is a more definitive way to establish whether bacterial multiplication has occurred or whether the organisms are merely tolerant. We are in the process of just such an analysis. However, regardless of whether the bacteria we isolated from PI solution were undergoing active replication, the organisms isolated in our study were clearly viable and were able to multiply once plated. There are no data to indicate that bacterial growth would not occur if a patient's skin or other tissues were similarly inoculated.

Dr. Welch implies that bacterial contamination of the swabs is from environmental sources other than the bottle of PI solution used. She states that "the authors apparently did not test the new sponge sticks used to sample the patients' backs to see whether they may have already been contaminated." This is not the case. We tested 20 sponges

(10 were plated right out of the sterile kit, and 10 were transported to the microbiology laboratory to verify the integrity of our sterile transport system.) All 20 were found to be sterile.

Dr. Welch suggests that our findings are not clinically significant, as demonstrated by the paucity of infectious sequelae after skin disinfection with PI solution. Again, we cannot disagree more strongly. There are a growing number of case reports describing infection after the use of neuraxial analgesia. Optimum skin disinfection is not the only prevention, but it is a key step in decreasing the risk of infection associated with these techniques. Because many patients have epidural catheters that remain *in situ* for long periods of time, the initial disinfection becomes even more critical.

We agree totally that multiple-use bottles should be handled carefully. However, our results demonstrated that a significant number of multiple-use PI bottles become contaminated in normal use. We do not believe that this experience is limited to our hospital.

Single-use packets of PI solution are very inexpensive and convenient. Our findings suggest they may also be more effective than solution from multiple-use bottles for skin disinfection and eliminate concerns regarding possible contamination of multiple-use containers. We therefore recommend single-use preparations when effective skin disinfection is critical.

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Does Anesthesia Permanently Alter Brain Biochemistry?

To the Editor:—We read with great interest the Editorial View by Roizen[1] that accompanied the article by Kienbaum *et al.*[2] regarding rapid opiate detoxification under general anesthesia in the May 1998 issue of ANESTHESIOLOGY. We are concerned, however, that this editorial fosters an inaccurate notion of what this novel treatment achieves for opioid-addicted patients. To our knowledge, there exist no properties of general anesthesia that "break opioid addiction," and there is no indication "that the mechanism that produces the unconscious state during general anesthesia . . . may indeed permanently alter brain biochemistry." Furthermore, nothing of this sort is suggested by the results presented by Kienbaum *et al.*[2] As far as we understand, the effects of anesthesia on brain biochemistry are transitory, and they dissipate soon after emergence. The objective of administering a general anesthetic for the purpose of treating opioid dependence is merely to enable the patient to tolerate great doses of opioid receptor antagonist drugs and thus undergo complete detoxification in a matter of hours and while unconscious, rather than over several days or weeks while awake and suffering from severe withdrawal symptoms. When awakened from the anesthetic, the opioid receptors are occupied by antagonist drugs and withdrawal symptoms are minimal and they quickly abate. Ongoing treatment with naltrexone to maintain opioid-receptor blockade can then be initiated to prevent drug craving and decrease the likelihood of relapse. As with any form of drug detoxification treatment, rapid opiate detoxification during general anesthesia must be offered in the context of a comprehensive addiction treatment program that also provides supportive psychotherapy or counseling, or both, to address the underlying causes of addiction and to assist the former addict in developing effective relapse prevention strategies.

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