a 1% halothane concentration is given to a tube containing Hanks' buffer and blood both at 37° C, the respective volume/volume % concentration of halothane in the two tubes would be ~0.8 and 2.4. To achieve a higher concentration of halothane in Hanks' buffer, one that would be comparable to blood levels seen *in vivo* in patients given a therapeutic exposure of halothane, a higher concentration of vaporized halothane would have to be used. The blood thus serves as a "carrier" of the anesthetic. The solubility of the "carrier" for the particular anesthetic will profoundly effect the concentration of the anesthetic in the "carrier".

Dr. Eger states that the "increase in temperature decreased the solubility of the anesthetic and thereby increased the partial pressure of anesthetic." Thus, if the solubility of the anesthetic is less at higher temperatures (an increase from 4° C to 37° C in the experiments of Nakagawara *et al.*[1]), there would be *less* of the anesthetic (because of a decreased solubility at the elevated temperature) in the liquid reaction mixture (containing neutrophils and Hanks' buffer) and more in the atmosphere above the reaction mixture, resulting in a higher partial pressure of the anesthetic. What is more important, the concentration (partial pressure) of the anesthetic used to treat or expose the reaction mixture, or the actual concentration of the anesthetic *in the* reaction mixture? If one is trying to assess the effect of an anesthetic on neutrophil function in a liquid medium, it would appear that the concentration of the anesthetic in the particular experimental liquid medium is critical for such an evaluation.

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65:124–125, 1986

More Problems with the Arrow-Racz Epidural Catheter

To the Editor:—We have noted a number of problems with the Arrow-Racz Spring Wire reinforced Continuous Epidural Catheter, product no. EC-02220. We placed the catheter in three patients for administration of epidural local anesthetics and narcotics. We used 17-gauge Touhy needles to place the catheters, and we took care to follow the instructions contained in the package insert for placement and removal of the catheters. Two of our patients developed leaks at the catheter–skin interface, requiring replacement of the catheter after 3 days of use. At least one of these catheters appeared to have minute cracks in the fluoropolymer coat, which developed some time after catheter insertion.

In our third patient, the catheter worked well for 5 days. When we removed the catheter, a large amount of resistance was noted, and as we pulled with more force, the catheter began to unravel and the fluoropolymer coat fractured into pieces of various sizes (fig. 1). The metal portions of the catheter were retrieved intact, but we were unable to determine with certainty that we retrieved all of the fluoropolymer coat. Lingenfelter[1] described unraveling of the Racz epidural catheter, but his report was attributed to use of the lateral flexed position for removal. We used the lateral neutral position and grasped the catheter at skin level several times without any success in preventing or halting the unraveling process. One possible explanation for this phenomenon is that the open-spring coils of the catheter tip could allow tissue adherence or permit the catheter actually to "corkscrew" its way into soft tissues. Figure 2 shows the tip of our catheter. At the time of removal, a small amount of tissue was adherent to the catheter, but this tissue fell from the catheter prior to the taking of these photographs.

Other investigators have also reported similar problems with the Racz catheter concerning leakage at the catheter–skin interface.[2,*] We feel that nylon catheters, with good care, give good results for administration of epidural narcotics with less chance of catheter leakage and breakage and much less expense.

* Reigler R, Hammerle AF, Albright GA, Neumark J: The Racz epidural catheter: first clinical experiences. Regional Anesthesie 7:109–111, 1984.

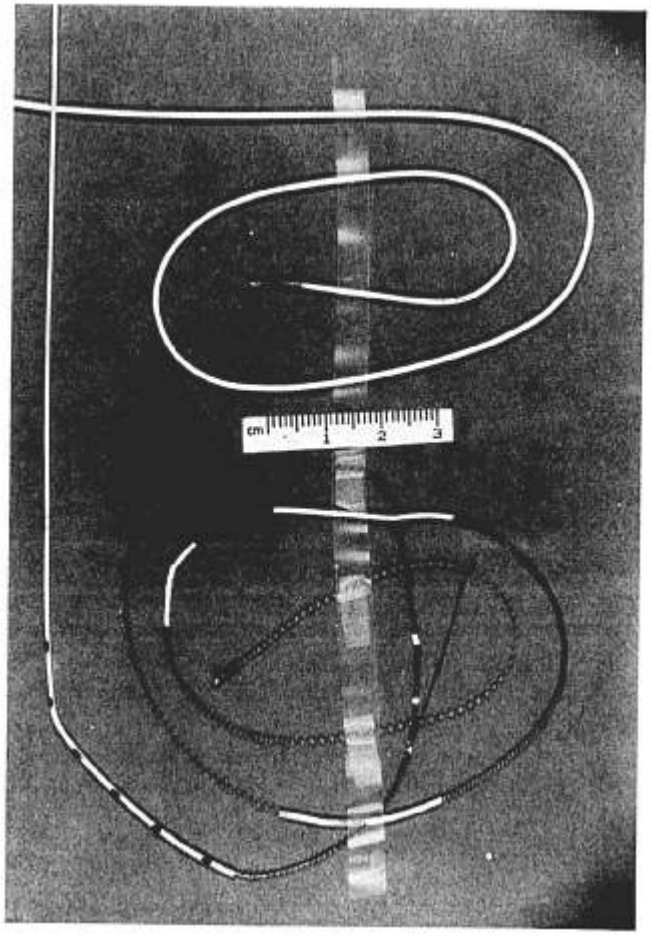

FIG. 1. Unraveled and normal (*upper*) Racz catheters.

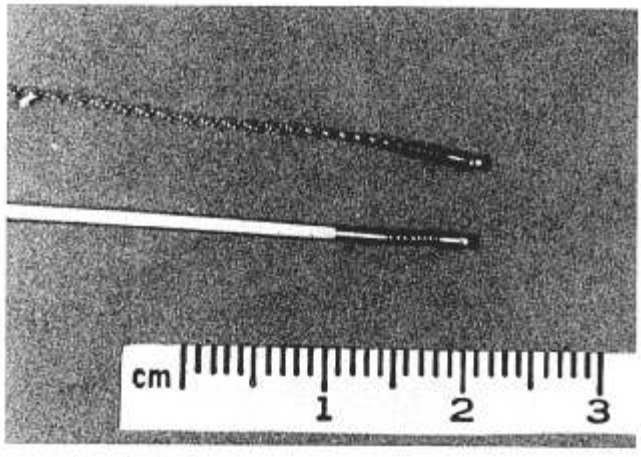

FIG. 2. Tip of unraveled (*upper*) and normal catheters.

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65:125–126, 1986

In reply:—It is unfortunate that the letter only described remote incidents associated with early production models of Arrow's Spring Wire Epidural Catheters. The Arrow Spring Wire Epidural Catheter has been in the marketplace now for nearly 5 years. The product has been outstandingly received by anesthesiologists all over the world for the important improvements to epidural catheterization relative to insertion reliability, prolonged utilization, and use for narcotic analgesia.[1,*,†]

As with all new product developments, it is possible for unforeseen problems to occur that are a result of a combination of underdesign and misuse in exceptional circumstances. The authors refer to problems with the fluoropolymer coating of the catheter developing minute cracks. They also describe a problem with the spring wire unraveling while attempting to remove it.

Arrow can only assure your readers that these incidents as reported are remote and associated only with the original "Racz Catheter" version of Arrow's Spring Wire

* Racz GB, Gintautas J, Fabian G: Technical advance: A new epidural catheter, Persistent Pain. Lubbock, Texas Tech University Health Sciences Center, ISBN 0-8089-1756-0.

† Racz GB, Heavner J, Haynsworth: Repeat epidural phenol injections in chronic pain and spasticity. Lubbock, Texas Tech University Health Sciences Center.