unable to do, because drug use information was not available.

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Glutaraldehyde: Current Status and Uses

To the Editor:

The excellent review by Russell[1] invited us to report our own experiences with glutaraldehyde (GA) for disinfecting endoscopes. During the last 10 years, flexible endoscopes were disinfected at our hospital by using GA in a homemade all-channel perfusion system.[2] In 1993, the cleaning and disinfecting systems were replaced by full automatic cleaning and disinfecting machines (Wassenburg, Doodewaard, The Netherlands). These machines have been supplied with ventilation for the GA vapor and with flow-controlled channels. Each machine uses 10 L glutaraldehyde 2% (Cidex) for the disinfection process, which is carried out with a frequency of five to eight times per day. The GA is reused.

The manufacturer of Cidex guarantees that a freshly prepared activated solution can be used for 2 weeks; the manufacturer also advises to use concentrations of more than 1% GA. In the Wassenburg machines, the disinfection process always starts with ultraclean endoscopes. Air pulses remove most of the water out of the channels, so that dilution of the GA can be ignored.

In the Wassenburg machine, dilution and reuse of GA are the main factors that can influence the activity of GA.

Russell1 stated that several factors, such as concentration and the presence of soil, will influence the activity of GA. We studied the decrease in concentration of GA in a laboratory situation and in the Wassenburg machine. An activated Cidex solution was prepared freshly in a container normally used for disinfection of rigid endoscopes. The container was placed in a ventilated cupboard for 2 weeks. During working days, the lid of the box was lifted every hour. Twenty samples were taken immediatedly after preparation of the solution; 10 of these samples were kept at room temperature, and 10 samples were kept at 6°C . Every working day, one sample of each category was placed at −20°C. Also every working day, two fresh samples were taken; one was placed at 6°C and one at −20°C. All samples were analyzed in a gas chromatograph (Figure 1). The daily samples of the container showed a decrease in concentration of GA, hardly influenced by the storage temperature.

Samples of the activated Cidex were taken from two Wassenburg machines every working day during 2 weeks (one machine that was used most frequently and one that was used less frequently) at 8:30 am and 4:30 pm. The samples were kept at 6°C and analyzed on the same day. The decrease in concentration of GA is shown in Figure 2. We noticed a decrease in GA concentration of 25% in 3 days. The change of the Cidex container for a new one before the weekend was abandoned immediately. Instead, a new container was activated on the first working day of the week.

Comparing the results of our two experiments, we concluded that the decrease in GA concentration was caused by an interference in the vapor concentration of GA. This interference can be decomposition, oxidation, or vaporation of GA. We mentioned that, in the Wassenburg machine, the GA vapor was removed continuously by ventilation.

Another problem is the estab-

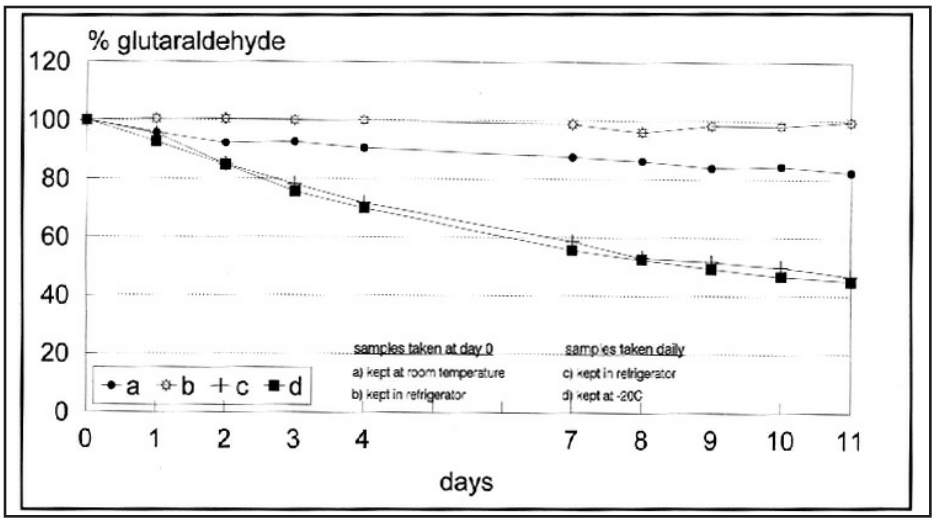

Figure 1. Decrease in glutaraldehyde concentration (CidexR) during 11 days.

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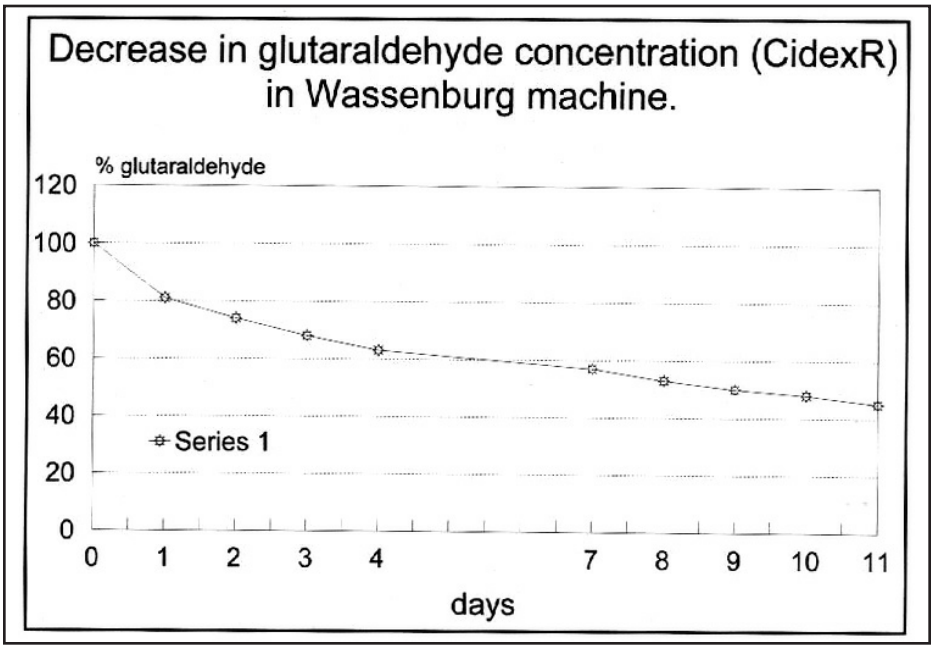

Figure 2. Decrease in glutaraldehyde concentration (CidexR) in Wassenburg machine.

lishment of a biofilm, which can be avoided by disinfection of the machine with a solution of chlorine (250 ppm). We apply chlorine disinfection in our systems every 2 weeks. The water filter is replaced weekly by a sterilized 0.2 µm membrane filter.

The literature mentioned in Russell's review, the results from our experiments, and the precautions for recontamination mentioned above made us decide to change the Cidex in the Wassenburg machines every 2 weeks, starting on the first day of the week.

Our investigations showed that every new disinfecting machine that uses glutaraldehyde must be tested and/or validated for daily use.

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Rifampin-Resistant, Isoniazid-Susceptible TB in HIV Patients

by Gina Pugliese, RN, MS
Medical News Editor

Dr. Charles Nolan and colleagues from the Seattle-King County Department of Health recently reported acquired rifampin resistance without preexisting isoniazid resistance in three patients with tuberculosis and HIV infection. The patients originally had *Mycobacterium tuberculosis* strains that were susceptible to isoniazid and rifampin. During treatment (two patients) or after completion of therapy (one patient), active, rifampin-resistant, isoniazid-susceptible tuberculosis developed. One patient's isolate subsequently developed isoniazid resistance, also. Studies on the isolates, using restriction fragment-length polymorphism typing and *rpoB* gene mutation sequencing, indicted that, in each instance, rifampin resistance arose during therapy by an *rpoB* gene mutation in the original *M tuberculosis* isolate.

Using DNA fingerprinting, the researchers established that the development of rifampin resistance in these three HIV-infected patients did not occur by reinfection with a new strain of *M tuberculosis,* as has been described previously.

From: Nolan CM, Williams DL, Cave MD, et. al. Evolution of rifampin resistance in HIV-associated tuberculosis. *Am J Respir Crit Care Med* 1995;152:1067-1071.