

# Biological Monitor

A QUARTERLY INFECTION CONTROL NEWSLETTER  
FOR DENTAL PROFESSIONALS  
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## Do You Know What's Running Through Your Dental Unit Water Lines?

The Center for Disease Control (CDC) released new guidelines for infection control practices in dentistry on December 19, 2003. The guidelines established a water quality standard of 500 colony forming units (CFU) per milliliter (ml) for routine dental treatment output water. "Thus, the number of bacteria in water used as a coolant/irrigant for nonsurgical dental procedures should be as low as reasonably achievable and at a minimum,  $\leq 500$  CFU/ml, the regulatory standard for safe drinking water established by the Environmental

*...the real problem of uncontrolled bacteria is seen once this water is introduced into DUWLs.*

Protection Agency (EPA) and American Public Health Association (APHA)/American Water Works Association (AWWA)."<sup>1</sup>

We have all heard that heterotrophic plate count (HPC) bacteria can reach 200,000 CFU/ml within 5 days after new dental unit waterlines (DUWLs) are installed, and levels as high as 1,000,000 CFU/ml have been documented. "These counts can occur because dental unit waterline factors (e.g., system design, flow rates, and materials) promote both bacterial growth and development of biofilm."<sup>1</sup>

A case study conducted at the University of Colorado's Dental Faculty Practice evaluated water quality in untreated and treated DUWLs. Conclusions of this study verify the above statements and demonstrate that dental water must be controlled to minimize HPC bacteria levels in DUWLs and to maintain levels below the new CDC standard.

The case study demonstrated that the source of dental water is very important. As seen in Table 1 below, samples were collected from municipal water, and from distilled water generated at the Faculty Practice, and purchased from an outside source.

**Table 1. Source Water (CFU/ml)**

	Low Level	High Level
Municipal Water	170	2,400
Distilled Water	1	33,200

(continued on page 2)

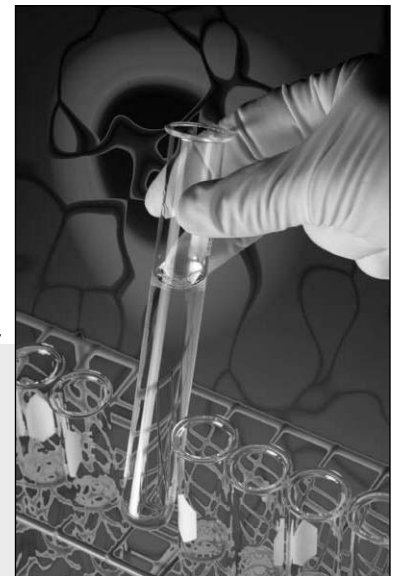
## CDC Releases New Guideline

The U.S. Centers for Disease Control and Prevention (CDC) has issued revised infection control recommendations, Guidelines for Infection Control in the Dental Health-Care Setting, 2003.

The document is published in the December 19, 2003 issue of Morbidity and Mortality Weekly Report (Vol. 52, No. RR-17) and is posted both on the CDC website at [www.cdc.gov/mmwr](http://www.cdc.gov/mmwr) and at [www.osap.org](http://www.osap.org).

In cooperation with the CDC, the Organization for Safety & Asepsis Procedures

(OSAP) is producing a workbook that helps interpret this new guideline for everyday dental practice. The workbook will be available in January. Call 1-800-819-3336 for more information on obtaining a copy.



## In this Issue

### Do You Know What's Running Through Your Dental Unit Water Lines?

A case study conducted by the University of Colorado's Dental Faculty Practice evaluating water quality in untreated and treated DWULs.

### DUWL Testing Service

New mail-in dental unit waterline testing service.

# What's Running Through Your Dental Unit Water Lines?

from page 1

In three of five samplings, dental units connected to the chlorinated municipal water supply provided water to dental units at a lower HPC level than dental units equipped with independent water bottles using distilled water. Distilled water used from an open container cannot be kept bacteria free for an extended time. Once bacteria are introduced, they multiply quickly without the presence of a residual disinfectant.

While the HPC levels of the source water exceed the CDC standard, the real problem of uncontrolled bacteria is seen once this water is introduced into DUWLs. Within these lines, bacterial biofilms form on the walls of the small-bore plastic tubing. Biofilm formation is enhanced with water stagnation, which occurs when the dental unit is not in use, and from laminar flow variations. Even when the water in the tubing is flowing, the flow rate is very low near the tubing's wall. Microbes continually enter the tubing from the water supply during handpiece and air-water syringe use. The bacteria that

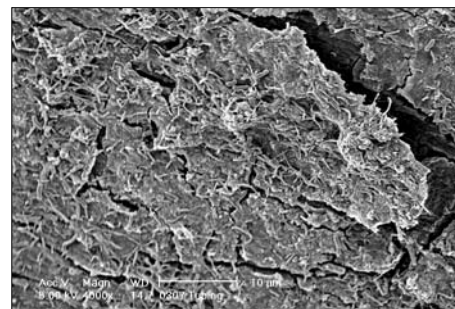
the proliferation of bacteria and biofilm. As seen by Table 3 below, the CDC standard for HPC bacteria may be achieved.

**Table 3. Treated Dental Unit Water Lines**

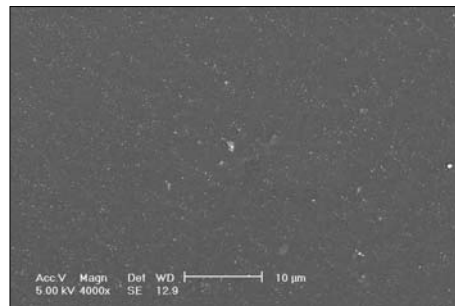
	Low Level	High Level
Baseline	68,000	1,704,00
Day 1	0	90
Week 2	0	110
Week 5	0	173
Week 8	0	3
Week 16	0	87

Figures 1 and 2 further document the efficacy of these systems using scanning electron microscopy. Figure 1 is from a tubing sample collected from an untreated DUWL used for one month. An extensive biofilm has formed on the tubing's wall and patients will be exposed to high levels of HPC bacteria. Figure 2 is a tubing sample collected from a treated dental unit with new BioFree tubing. The difference is obvious and

**Figure 1. New Tubing After One Month Without Treatment**



**Figure 2. BioFree Tubing After One Month With Treatment**



In conclusion, dental water may be maintained at levels below the new CDC standard. Systems are commercially available that are easy to use, provide continuous treatment, and with costs ranging from 10 to 15 cents per patient.

*This biofilm serves as a reservoir of bacteria that is continuously released into the flowing water emitted from the DUWL.*

enter the tubing are able to adhere to the lining of the tubing and then multiply. This biofilm then serves as a reservoir or source of bacteria that is continuously released into the flowing water emitted from the DUWL. Patients and clinical staff are then exposed to these planktonic microorganisms. Table 2 below documents the presence of biofilm within DUWLs as HPC concentrations emanating from the Air Water Syringe and High Speed Drill lines have much higher HPC bacteria levels than the source water.

**Table 2. Untreated Dental Unit Water Lines**

	Low Level	High Level
<b>Municipal Water Source</b>	170	2,400
Air Water Syringe	160	96,000
High Speed Drill	1,100	6,800
<b>Distilled Water Source</b>	1	33,200
Air Water Syringe	24,000	196,800
High Speed Drill	19,800	306,000

DUWL treatment products provided by Sterisil, Inc. installed on six dental units were also evaluated. Products included, Sterisil's PureTube, PureLine and BioFree bottles and tubing. With these products, Sterisil controls the water source throughout the dental unit and prevents

patients and clinicians will have less exposure to HPC bacteria than DUWLs without treatment.

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<sup>1</sup>CDC. Guidelines for Infection Control in Dental Health - Care Settings - 2003. MMWR

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## DUWL Testing Service Now Available

Regular testing of DUWLs is an important step toward ensuring compliance with the new CDC guidelines. In response to customer requests, Biological Monitoring Services (BMS) is now offering a mail-in dental unit waterline testing service. The service provides microbial counts up to 20,000 CFU/mL and a pass/fail result based on a standard of 500 CFU/mL. • You collect water from each dental unit in a separate test vial. You then pack the sample in the styrofoam mailer with a refrigerant pack and ship it via USPS Express Mail. • Upon receipt, BMS processes samples according to the *Standard Methods for the Examination of Water and Wastewater, 20th Edn., 1998*.

The DUWL testing kit includes refrigerant pack, collection vials, styrofoam mailer, and an optional pre-paid Express Mail postage. • A certificate, suitable for framing and display is provided. • Results are available seven days from receipt. • Test failures are immediately phoned to your office. • Complete test results are faxed to your office.

Item #	# of Test Kits	Vials Per Kit	Pricing	Description
90401	1	4	\$95	1 Styrofoam mailer, return postage paid
90404	4	4	\$ 370	4 Styrofoam mailers, return postage paid
90604	4	6	\$ 460	4 Styrofoam mailers, return postage paid
80401	1	4	\$65	1 Styrofoam mailer, return postage not paid
80404	4	4	\$ 250	4 Styrofoam mailers, return postage not paid
80604	4	6	\$ 350	4 Styrofoam mailers, return postage not paid