

DentaPure Dental Waterlines Study

Objectives:

The objectives of this investigation were to:

1. investigate the ability of the **DP365B** (*DentaPure*) iodine-based waterline treatment system to remove microorganisms from dental waterlines in outpatient practices; and
2. determine the efficiency of **DP365B** cartridges in maintaining concentrations of bacteria in dental waterlines below minimum recommended levels.

Materials and Methods:

Initial water samples were aseptically collected from five dental units fitted with self-contained bottle systems in order to assess microbial levels prior to experimental treatment. Samples were diluted 1/100 in sterile water. Cultures were then prepared in duplicate from the diluted specimens by placing 0.2 mL on plates containing R2A media, followed by incubation at 25°C for 7 days. This medium was used to assess heterotrophic bacterial concentrations. **DP365B** cartridges were subsequently installed in the five study units; these were located in two separate dental practices. Water processed through the cartridges was subsequently collected every two weeks for one year and processed in the same manner as described above for analysis.

Results:

Prior to experimental treatment, high microbial counts were found in all of the waterline systems. Calculated microbial levels were determined to be >32-100 times the recommended CDC 500 cfu/mL bacterial concentration (Table 1). However, soon after installation of the **DP365B** iodine-releasing cartridges, the decline in waterborne bacterial presence was observed to be dramatic. In contrast to the high levels of bacteria detected at the beginning of the investigation, all five self-contained waterline systems were found to be negative for microbial growth within four weeks after the installation of the **DP365B** cartridges (Table 2). Representative bacterial cultures before and after treatment of dental water are also shown in Figures 1a and 1b.

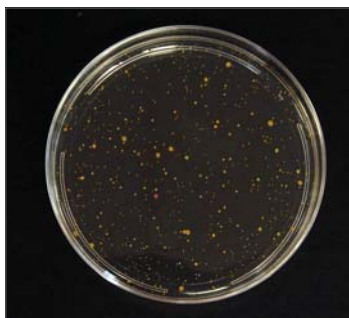


Figure 1a: Culture of 1/500 dental water prior to experiment treatment.

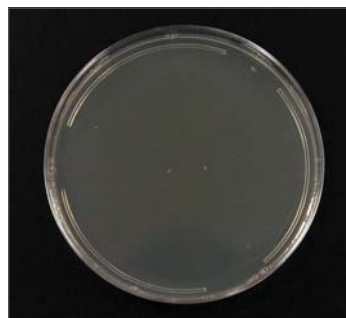


Figure 1b: Culture of undiluted sample after prolonged exposure to **DP365B** cartridge-treated water. Note the absence of any bacterial growth.

It must be noted here that at week 16 of the investigation treatment was stopped on unit #5, and the cartridge removed. This was done at the request of the dental practitioner as a result of patient complaints of the water taste. Water sampling and testing of the unit continued without the cartridge, and, it was found that demonstrable bacterial concentrations rose sharply and were shown to be >500 cfu/mL two weeks after the removal of the **DP365B** cartridge. The levels remained high through subsequent analysis until a new **DP365B** cartridge was installed into this unit 20 weeks later. Resultant water testing (week #36) indicated that bacterial concentrations in the waterlines decreased once again. The remaining four treated units with self-contained water systems maintained low bacterial levels until completion of the 365 day study.

Table 1. Microbial concentrations of dental waterlines prior to treatment (cfu/mL)

Water System	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
<i>Bottle</i>	18,000	136,000	37,000	16,000	80,000

Table 2. Microbial concentrations of bottle waterline systems when treated with *DP365B* cartridges. (cfu/mL)

Weeks	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
2	0	>500	>500	>500	0
4	0	0	>500	>500	0
6	0	0	0	0	0
8	0	0	0	0	0
10	0	0	0	0	0
12	0	0	0	0	0
14	1	0	0	0	0
16	0	0	0	0	--
18	0	0	0	0	>500
20	0	0	0	0	>500
22	0	0	0	0	>500
24	0	0	0	0	>500
26	0	0	0	0	>500
28	0	0	0	0	>500
30	0	0	0	0	>500
32	0	0	0	0	>500
34	0	0	0	0	>500
36	0	0	0	0	0
38	0	0	0	0	0
40	0	0	0	0	0
42	0	0	0	0	0
44	0	0	0	0	0
46	0	0	0	0	0
48	0	0	0	0	0
50	0	0	0	0	0
52	0	0	0	0	0

Discussion and Summary:

The most important finding from the present investigation was that *DP365B* cartridges containing iodine were able to successfully reduce and achieve control of waterborne bacteria in dental waterlines for a one-year test interval. Detectable microbial concentrations in units fitted with a self-contained bottle system and the *DP365B* cartridges were rapid. In most units bacterial concentrations fell below 500 cfu/mL by four weeks of exposure to iodinated water.

Dental personal also provided a number of positive comments regarding the implementation and use of the iodine-based system. Most feedback centered on the ease of use and lack of needed maintenance and attention during the study. It is important to note that at the end of the investigation period, the practices voluntarily ordered and re-installed new *DP365B* cartridges.