

# The need for objective, evidence-based efficacy testing of oral rinses

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*Porphyromonas gingivalis*, *Treponema denticola*, and *Tannerella forsythia* from the red complex gang bellowed to the bartender, “Pour us some crevicular fluid.”

“Not so fast,” countered *Prevotella intermedia* and *Fusobacterium nucleatum* from the archrival orange complex gang. “We’re doing real antiseptic rinse shots here, and you can bet your biofilm that we’ll be the last bugs standing.” And so, the testing began.

Our “periodontal bacteria in a bar story” is a light-hearted introduction to a serious subject—the need for objective, evidence-based efficacy testing of oral rinses against periodontal bacteria *in the presence of saliva*. Because at-home oral hygiene care is so important in maintaining periodontal health, and oral rinsing is a key component of that critical care, we need the most current and relevant data to support our treatment and product recommendations.

Although many rinse manufacturers want us to believe otherwise, claims of antiseptic rinse efficacy based solely on laboratory testing *in the absence of fresh, human, whole saliva* are not sufficiently valid. The salivary proteins in fresh, human, whole saliva effectively neutralize most oral rinses, rendering them ineffective or poorly effective.<sup>1</sup> As we will see, when efficacy testing of oral rinses is conducted in the presence of fresh, human, whole saliva, there can be “many, many

Antiseptic rinse	Log reduction at 30 seconds	
	<i>Fusobacterium nucleatum</i>	<i>Prevotella intermedia</i>
ioRinse Ultra	6.0 complete inactivation	6.0 complete inactivation
Chlorhexidine gluconate 0.12%	4.8 28x less effective	3.3 730x less effective
Cetylpyridinium chloride 0.07%	0.2 820,000x less effective	5.3 7x less effective
Chlorine dioxide	0.71 361,000x less effective	3.9 190x less effective
Povidone iodine 10%	1.8 28,000x less effective	1.3 73,000x less effective
Hydrogen peroxide	0.4 640,000x less effective	0.52 532,000x less effective
Stabilized chlorine dioxide	0.04 964,000x less effective	0 no biocidal activity

Note: All testing conducted in the presence of fresh, human, whole saliva at Prime Analytics Laboratory, Concord, California

bugs left standing.” Let’s see which oral rinses are effective in saliva, which would truly benefit your patients, and which would not.

## The efficacy testing results

Biocidal efficacy testing of six frequently used professional rinses was conducted at Prime Analytical Laboratories in Concord, California. A newly developed proprietary rinse, ioRinse Ultra (ioTech International), was also included to evaluate the efficacy of its unique, patented formulation. Table 1 describes the results of that testing.

The efficacy of each tested rinse is reported by its log reduction of the targeted bacteria—a 1 log reduction = a 10

times reduction, a 2 log reduction = a 100 times reduction, a 3 log reduction = a 1,000 times reduction, and so on.

So, in comparing different log reductions, even a small change can represent an enormous difference in effectiveness. For example, ioRinse Ultra completely inactivated *Prevotella intermedia* to below detectable limits with a 6.0 log reduction. Chlorhexidine gluconate obtained a 3.3 log reduction of the same microbe under identical test conditions. It doesn’t seem like much of a difference, a 6.0 log reduction versus a 3.3 log reduction, as the difference is only 2.7 logs. *But that 2.7 log reduction difference represents a 700 times difference in biocidal efficacy.*

The test rinses are shown in

descending order of effectiveness. ioRinse Ultra, in attaining 6 log reductions of each of the tested bacteria, was completely successful in reducing those bacteria to below detectable limits. All the other rinses were significantly less effective. The table also shows how much less effective the other rinses were compared to ioRinse Ultra.

Also notice that some of the more popular antiseptic rinses tested had little to no biocidal efficacy. All the reported testing occurred in the presence of fresh, human, whole saliva. Salivary proteins can and do neutralize many oral rinses. So, if biocidal efficacy test results are to be useful indicators of actual intraoral biocidal activity, the testing should be conducted in the presence of fresh, whole, human saliva. (R. Christensen, TRAC Research, personal communication, April 2021).

Because ioRinse Ultra was the only rinse found to be fully effective in the testing described in Table 1, it was subjected to additional, independent testing at Nelson Laboratories in Boz-

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eman, Montana, to further validate its efficacy. The testing was conducted at 30-second exposure time in the presence of fresh, human, whole saliva. The two bacteria tested were different than those tested and shown in Table 1 but

were also periodontopathic (*Porphyromonas gingivalis* and *Tannerella forsythia*). In this further testing, ioRinse Ultra was successful in reducing both bacteria to below the limits of detection within 30 seconds in the presence of saliva.

Daily, at-home use of an antimicrobial mouthrinse by patients has become increasingly important in helping to control periodontal disease. Many key opinion leaders consider it a critical component of comprehensive periodontal care. For example, in a landmark article published in *JADA* titled, “Antimicrobial mouth rinse and the management of periodontal diseases,” the author, Professor Ira Lamster (previous dean of Columbia University Dental School), emphasized the critical role played by daily at-home rinsing with an antiseptic rinse in managing periodontal disease.<sup>2</sup>

The director of the ADA Seal of Acceptance program points out that, “Antimicrobial mouthwashes have been shown in clinical studies to prevent the gum disease, gingivitis.”<sup>3</sup> Indeed, two randomized, controlled, evaluator-blinded, six-month studies of more than 600 patients showed that twice daily antiseptic rinsing was 34% more effective than daily flossing in reducing interproximal gingivitis, and more than 10 times more effective in reducing interproximal plaque.<sup>4</sup> A separate, randomized, controlled study of 160 patients conducted at four dental schools over six months concluded that twice-daily rinsing resulted in significantly higher anti-plaque and anti-gingivitis effects compared to daily flossing.<sup>5</sup> We routinely advocate for daily flossing. But the evidence suggests that daily, at-home rinsing may be even more important.

Chlorhexidine gluconate performed better than several of the other tested rinses, but since it is indicated for short-term use only, it is not a candidate for long-term, at-home rinsing.<sup>6</sup>

We know that daily at-home care is as important or more important than in-office treatment because

inflammation occurs daily. We have a responsibility to educate and advise our patients. Advising them to use a daily, at-home antiseptic rinse to help control gum disease is critical to maintaining periodontal health. We know that saliva neutralizes many antiseptic rinses, preventing them from working well. We now know which rinses work well in the presence of saliva and can be expected to work well in the mouth. **RDH**

## REFERENCES

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