

# In Vitro Inhibition of *Streptococcus mutans* by Denture Adhesives

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## ABSTRACT

**Objective:** To evaluate the *in vitro* antimicrobial hostility of two denture adhesive formulations against *Streptococcus mutans*. **Methods:** A kill kinetic assay was used to evaluate the antimicrobial efficacies of Fixodent® Complete and Fixodent Fresh against *Streptococcus mutans*. Mutans streptococci were selected as the target organism for this study because they are among the predominant cultivable microflora of denture plaque. A 24-hour-old culture of *Streptococcus mutans* was exposed for 6 hours to the denture adhesive products and at the desired sampling times, an aliquot of the streptococcal culture was diluted into a neutralizing broth. The dilutions were subsequently plated onto Tryptic Soy Agar and incubated in a 10% CO<sub>2</sub> atmosphere, at 35°C for a period of 48 hours. The viable organisms on the agar plates were enumerated using a laser counter and the log reductions in Colony-Forming Units/CFUs (with respect to a negative control) at 6 hours were calculated for both products tested. **Results:** The average log reduction in CFUs after a 6-hour exposure to the products showed robust hostility with a 1.25 log reduction for Fixodent Fresh and > 4.03 log reduction for the Fixodent Complete formulation. **Conclusions:** While both denture adhesive formulations demonstrated good antimicrobial activity, the kill kinetic data strongly support the conclusion that Fixodent Complete is more hostile than Fixodent Fresh in terms of germ kill against *Streptococcus mutans*. The use of a denture adhesive may lead to an improvement in oral hygiene for denture patients by reducing or preventing denture plaque.

## INTRODUCTION

Unlike most oral care products, denture adhesives are physically present in the oral cavity for several hours every day – this makes them an ideal sustained release reservoir for other oral care agents. One such agent is zinc which is well known for its antimicrobial properties, and is already present in the denture adhesive as a cross-linking agent to promote adhesion. This *in vitro* antimicrobial study was designed to determine the antimicrobial activity of two denture adhesive products.

## PURPOSE

This study was designed to determine the antimicrobial activity of Fixodent Fresh and Fixodent Complete denture adhesives toward *Streptococcus mutans*, a bacteria commonly associated with denture plaque.

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## MATERIALS AND METHODS

**Test Products:** Fixodent Fresh and Fixodent Complete

**Test Organism:** *Streptococcus mutans* ATCC 35668

### Method:

1. *Streptococcus mutans* ATCC 35668 was inoculated into Tryptic Soy Broth and incubated overnight at 35°C in 10% CO<sub>2</sub>.
2. The denture adhesives were weighed directly into sterile flasks in triplicate; 9 ml of peptone water was added to each flask containing the denture adhesive. A flask containing 9 ml peptone water and no denture adhesive was maintained as the negative control; 1 ml of the *Streptococcus mutans* broth culture was transferred into each of the flasks. This gave a 1:10 dilution of the test organism.
3. All the flasks were incubated and a 1 ml sample was taken after 6 hours from each flask; 1:100 and 1:1000 dilutions of the sample were prepared in neutralizing broth and plated onto 150 mm TSA plates using a spiral plater; All plates were incubated for 48 hours in 10% CO<sub>2</sub> and read using a laser counter.

**Statistics:** *p*-values obtained from 2-sided Exact Wilcoxon Rank Sum test. N = 3.

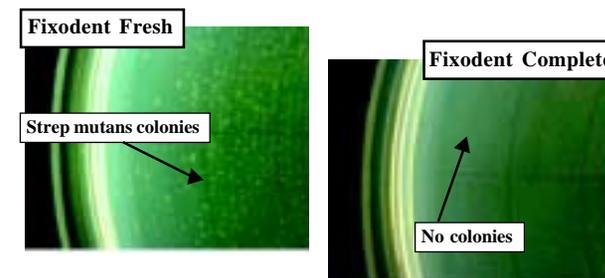
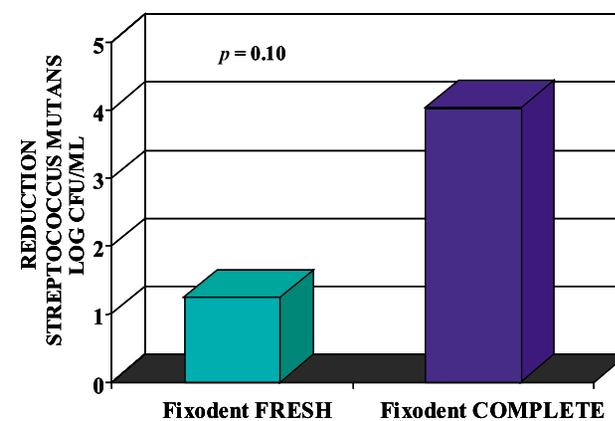
## RESULTS

1. Both test products exhibited anti-microbial activity toward *Streptococcus mutans*:
  - Fixodent Fresh exhibited a 1.25 mean log reduction
  - Fixodent Complete exhibited a > 4.03 mean log reduction Vs. the negative control
2. Fixodent Complete was superior to Fixodent Fresh in antimicrobial activity toward *Streptococcus mutans*.

Both results were statistically significant at *p* = 0.10

## DATA

### Mean Log Reduction



## CONCLUSION

While both denture adhesives demonstrated good antimicrobial activity, Fixodent Complete was more hostile than Fixodent Fresh toward *Streptococcus mutans*. This may lead to a reduction in denture plaque and result in improved oral hygiene.

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