*Short Communication*

# Efficacy of High-Level Microwave Disinfection of Dental Gypsum Casts: The Effects of Number and Weight of Casts

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The aim of this study was to determine if the bactericidal effect of microwaving gypsum casts is maintained at maximum capacity of the oven (16 casts). Batches of 8 and 16 gypsum casts made from in vivo impressions were divided in half. One half of each cast was microwaved at 900 W for 5 minutes. The remaining halves were left untreated. When assessed for bacteriological growth, the median cfu/mL of the untreated casts was between 105 and 106, while the microwaved casts showed a cfu/mL of 0, indicating that microwaving as described will disinfect gypsum casts even at maximum capacity of the oven. *Int J Prosthodont 2007;20:463–464.*

It has been shown that cross-contamination in prosthetic practice can be prevented by microwave irradiating gypsum casts for 5 minutes at 900 W.[1] This high-level disinfection method is an alternative to chemical disinfection of impressions, which may be problematic for some impression materials[2] and potentially harmful to humans and the environment.[3] In a previous study by the same authors,[1] only 4 casts were microwave irradiated at once. In this study, the number of casts was incrementally increased to the practical capacity of the oven. The hypothesis was that the bactericidal effect of the treatment would be maintained.

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## Materials and Methods

Maxillary and mandibular irreversible hydrocolloid impressions were made in 2 batches of 4 and 8 subjects, respectively. The impressions were poured in type III gypsum. The casts were cut transversely with a knife before the gypsum had fully set to facilitate subsequent division, and then removed from the impression after approximately 30 minutes. One half of each cast was microwave irradiated in a household Samsung microwave oven type ck 99s set at 900 W for 2.5 minutes, then immediately turned over and microwave irradiated for another 2.5 minutes to irradiate all sides. The remaining halves were left untreated and served as controls.

All casts were incubated aerobically in Bacto tryptic soy broth (TSB) (Difco) at 37°C for 6 hours. Three appropriately diluted TSB aliquots were prepared from each culture. Inoculated plates, 3 for each dilution, were incubated aerobically at 37°C for 18 hours and assessed for bacterial growth by counting colony-forming units per mL (cfu/mL) of the culture. The results of the 2 casts for each subject were pooled. For further details, see Berg et al.[1]

**Table 1** Results (cfu/mL) of Microwave Irradiation Experiments

| Cast/subject | Untreated | Microwave irradiated |
|---|---|---|
| 8 casts (215 g) | | |
| 1 | $8.3 \times 10^5$ | $4.3 \times 10^3$ |
| 2 | $1.3 \times 10^6$ | 0 |
| 3 | $2.4 \times 10^5$ | 0 |
| 4 | $1.6 \times 10^7$ | 0 |
| Median | $1.1 \times 10^6$ | 0 |
| 16 casts (546 g) | | |
| 5 | $3.0 \times 10^5$ | 0 |
| 6 | $7.5 \times 10^4$ | 0 |
| 7 | $7.8 \times 10^5$ | 0 |
| 8 | $7.1 \times 10^5$ | $0.8 \times 10^1$ |
| 9 | $1.4 \times 10^6$ | $0.9 \times 10^1$ |
| 10 | $5.0 \times 10^5$ | 0 |
| 11 | $8.6 \times 10^5$ | 0 |
| 12 | $4.3 \times 10^5$ | 0 |
| Median | $6.1 \times 10^5$ | 0 |

## Results

Table 1 shows that the median cfu/mL count of the first batch of 8 untreated casts from 4 subjects was $1.1 \times 10^6$. The median cfu/mL count for the second batch of 16 untreated casts from 8 subjects was $6.1 \times 10^5$. Both batches of microwave irradiated casts showed median counts of 0 cfu/mL. Subject 1 showed a mean cfu/mL count of the 2 casts of $4.3 \times 10^3$. However, only 1 of the 2 casts from this subject showed bacterial growth. Furthermore, the bacteria in question were G+ bacilli, which are normally found in the environment and probably contaminated the culture. With this exception, the ≥ 5-log reduction in cfu/mL count as a result of microwave irradiation satisfies the European Standard EN 1040 requirements for chemical disinfection.[4]

The 16 halves of the casts microwave irradiated at once (batch 2) had a total weight of about 550 g. This represents approximately the maximum space available inside the oven. Even so, the bactericidal effect of the treatment was maintained, thus confirming the hypothesis. No adverse effects (eg, surface defects) on the casts could be observed macroscopically after microwave irradiation, nor does this treatment affect dimensional stability.[5]

## Conclusions

Five minutes in a Samsung microwave oven at 900 W achieves high-level disinfection of gypsum casts, even at maximum capacity of the oven. The method is inexpensive, fast, and practical. Other ovens must be tested for bactericidal effect.

## References


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*Literature Abstract*

**An eight-year follow-up to a randomized clinical trial of aftercare and cost-analysis with three types of mandibular implant-retained overdentures**


This report compares the cost analysis for 3 different retentive designs for mandibular implant-retained dentures. One hundred ten individuals were randomly assigned 1 of 3 types of implant-retained overdenture, and were evaluated with respect to aftercare and costs. The 3 designs studied were implant-retained overdenture on 2 implants with ball attachments, on 2 implants with a single Dolder bar, and on 4 implants with a triple bar. The follow-up time was 8 years, with only 7 dropouts. No significant differences (Kruskal-Wallis test) were observed for direct costs of aftercare ($P = .94$). The initial costs constituted 71% 78% of the total costs and were significantly higher in the group with a bar on 4 implants, compared with the group with a bar on 2 implants and the group with ball attachments on 2 implants ($P = .018$). This study shows that the 3 designs studied cost the same in terms of aftercare and maintenance.



**Stoker GT, Wismeijer D, van Waas MA.** *J Dent Res* 2007;86:276–280. **References:** 26. **Reprints:** Dr G.T.Stoker. Free University, Department of Oral Function, Academic Centre for Dentistry Amsterdam, Dental School, Amsterdam, The Netherlands. E-mail: geertstoker@wxs.nl—*Tapan N. Koticha, National University of Singapore Faculty of Dentistry, Singapore*