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IN VITRO HYDROGEN PEROXIDE RELEASE KINETICS OF TWO BLEACHING PRODUCTS

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INTRODUCTION & OBJECTIVES

Currently, the aesthetic corresponds to one of the major concerns of society and, in Dentistry, the public demand for aesthetic procedures has considerably increased[1,2].
The at-home bleaching technique is considered to be an efficient and safe method to whiten teeth[3,4].
The chosen products for this study were recently introduced and therefore require independent *in vitro* and *in vivo* studies to evaluate them.
This study aimed 1) to determine the initial HP content of two at-home bleaching products and 2) to assess the *in vitro* HP release kinetics of these products.

MATERIALS & METHODS

The samples were divided into two groups: Group DW PH9,5% and Group DW PC38%, matching the products DayWhite ACP 9,5% (lot # 1119206) and DayWhite ACP 38% (lot # 11031103) (Discus Dental, USA). Each product was titrated for its HP content using a Cerium sulfate-based titration technique.

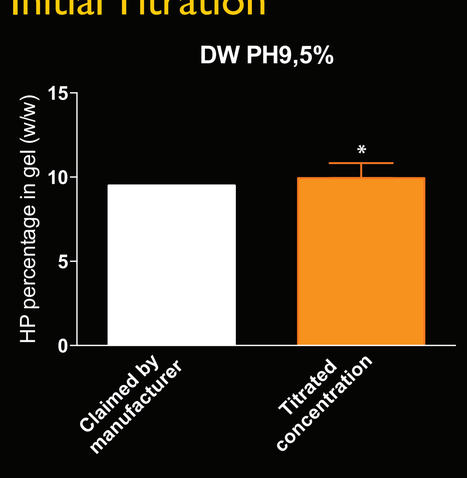
Using a peroxidase-based colorimetric method, samples were analyzed, after being applied according to the manufacturer's instructions and over twice the manufacturer's recommended application times by a previously described method [5] (n=13- 20). The results are indicated as mean ± 95% Confidence Interval for mean of the percentage of HP present in the whitening product (w/w) and as milligrams of HP. To test variables time, percentage and milligrams of HP release, Pearson correlation analysis was used, Paired Student t-test or ANOVA, as appropriate. A significance level of P<0,05 was used for statistical comparisons.

Table I - Group caracteristics

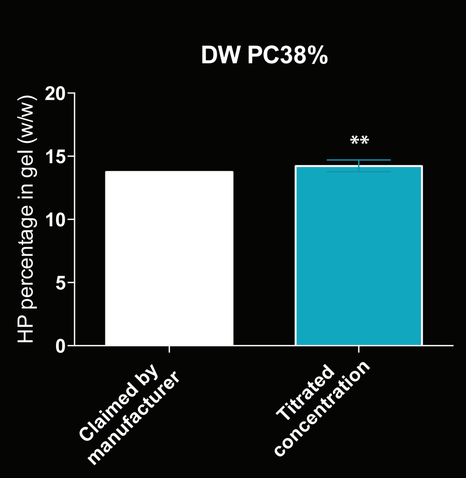
	DayWhite ACP 9,5%	DayWhite ACP 38%
Manufacturer	Discus Dental LLC, Culver City, USA	
Groups	Group1 (DW PH9,5%)	Group2 (DW PC38%)
Lot #	1119206	11031103
Active principles	HP	CP
% of active principle	9,5%	38%
HP concentration	9,5%	13,756%
Application time	2x30min/day 2 weeks at-home	2x15min/day 2 weeks at-home

RESULTS

Initial Titration

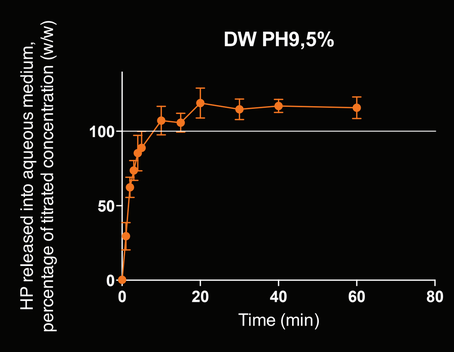


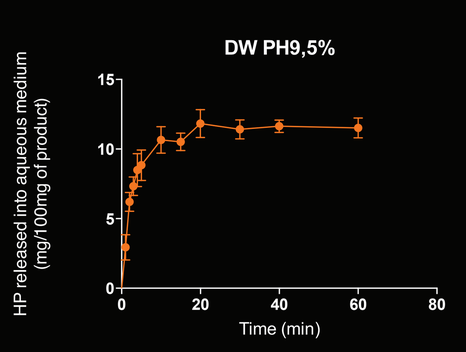
Graph 1 - Titration for HP content of Group1 (DW PH9,5%). This results correspond to the mean (9,947) ± 95%CI]9,94;10,83[, n=6. The HP content is higher than the one claimed by manufacturer, with statistically significant difference (P<0,05).



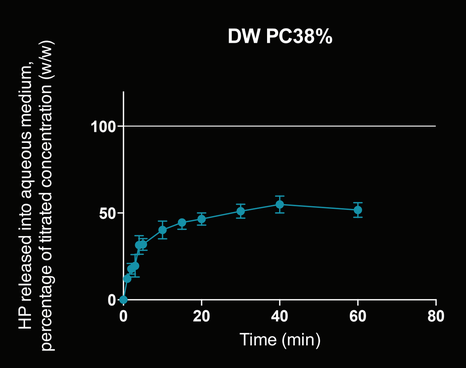
Graph 2 - Titration for HP content of Group2 (DW PC38%). This results correspond to the mean (14,221) ± 95%CI]13,78;14,71[, n=6. The HP content is higher than the one claimed by manufacturer, with statistically very significant difference (P<0,001).

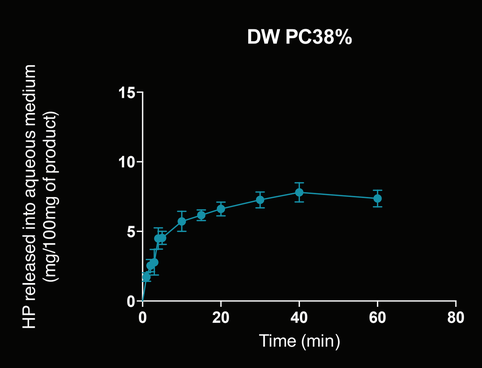
In vitro HP release kinetics





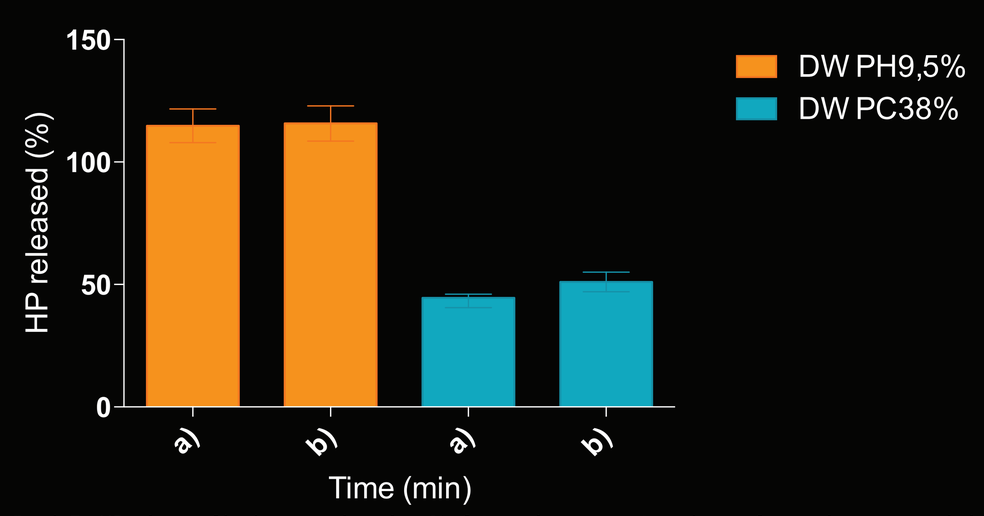
Graphs 3 and 4 - HP release of Group1 (DW PH9,5%) into aqueous medium. In graph 3, the values are percentage of titrated concentration (w/w) and in graph 4 they are mg/100mg of product. The product releases half of its HP content in 2 minutes. At 15 minutes (half of manufacturer's recommended application time), the product already released all the HP content. Results are indicated as mean ± 95%CI for n=13-20.





Graphs 5 and 6 - HP release of Group2 (DW PC38%) into aqueous medium. In graph 5, the values are percentage of titrated concentration (w/w) and in graph 6 they are mg/100mg of product. At manufacturer's recommended application time (15 minutes), the product releases half of its HP content. At 40 minutes and 60 minutes, the release of HP was not yet complete. Results are indicated as mean ± 95%CI for n=13-20.

HP release based on % of titrated concentration



Graph 7 - HP release of both groups, based on % of titrated concentration: a) manufacturer's recommended time; b) twice the time claimed by manufacturer. In Group1 (DW PH9,5%) there were no statistically significant differences between a) and b) (30 and 60 minutes). Group2 (DW PC38%) showed statistically significant differences between a) and b) (15 and 30 minutes). Results are indicated as mean ± 95%CI: DW PH9,5% - 30': IC95%(μ)=]107,91;121,64[; 60': IC95%(μ)=]108,60;122,99[; DW PC38% - 15': IC95%(μ)=]40,60;46,03[; 30': IC95%(μ)=]47,10; 51,10[, n=13-20.

SUMMARY

• The bleaching product's titrated concentration values were higher than the ones claimed by manufacturer, with significant differences in both products (P<0,05). That differences may be due to an attempt by manufacturers to offset the recognized instability of bleaching agents, particularly HP, which easily degrades during storage, losing bleaching potential.

• These products reveal a similar *in vitro* HP release kinetics.

• At the respective recommended manufacturer's time, DW PH9,5% released about 115% of its content (11,42mg of HP) and DW PC38% released only about 45% of its content (6,17mg of HP). This results may be related to the difference in viscosities among the two products or the difference in active principle composition itself, since CP dissociates into urea and the urea slows the release of HP.

CONCLUSIONS

Both products contain higher concentrations of HP than the ones claimed by manufacturer. At the manufacturer's time only DW PH9,5% released all HP amount. More studies of HP release kinetics *in vivo* for these two products are needed.

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