The Science Behind Sonicare
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**Philips Sonicare has redefined personal oral hygiene once again**

When we decide to launch a new edition of the clinical proof brochure, the document in your hands, you know we must have a significant reason to do so. Launching two new products and introducing breakthrough technology that’s likely to change our perspective on interdental cleaning are indeed significant accomplishments.

The clinical and scientific research portfolio summarized in this document provides objective and relevant information about our products, and insights into the way we work. Our clinical credibility and commitment to providing patients and dental professionals with the most advanced solutions for home oral healthcare have resulted in global recognition and professional recommendation of Philips Sonicare products. True innovation at Philips Sonicare follows a simple paradigm that integrates the latest scientific knowledge with an in-depth understanding of today’s oral healthcare needs. Adhering to these principles frequently results in solutions and technologies that are ahead of their time, and subsequently lead the industry.

The original Sonicare technology was exactly that type of industry-leading innovation — it defined a new standard for power toothbrushes. Recently, Sonicare For Kids established a unique solution for the specific oral healthcare needs of children. Now the new Sonicare DiamondClean takes our ambition to the next level with the best clinical performance of any Sonicare to date, thanks to its unique brush head and ergonomic handle design.

The requirements for our latest innovation, the entirely new Philips Sonicare AirFloss, could not be matched by existing concepts — we had to invent them. The result is a unique device that impresses equally with its convenience of use and its clinical efficacy, which could not exist without the unprecedented AirFloss microburst technology invented by Philips engineers.

When you read the following pages, I hope you will agree with me that Sonicare DiamondClean and AirFloss represent a significant next step toward even better, more intuitive solutions for daily oral hygiene — exactly what Philips Sonicare is all about.
Stain Removal

in vivo study

Evaluation of stain removal by Philips Sonicare DiamondClean power toothbrush and manual toothbrushes


Objective
To evaluate the reduction of naturally occurring tooth stain for Philips Sonicare DiamondClean and manual toothbrushes over two weeks of product use.

Methodology
A randomized, multicenter, examiner-blinded, parallel, two-stage group, sequential-design study was conducted in a population of 179 healthy adults (124 females, 55 males) aged 18-65 years (mean age: 40) who had naturally occurring tooth stain on the buccal surface of the anterior teeth. The subject population included smokers and consumers of coffee, tea and red wine. The subjects were screened and consented at Visit 1 for qualification to enroll in the study. Subjects were instructed to abstain from smoking, eating or drinking fluids other than water for two hours prior to clinical visits and presented to the clinic within three to six hours of their last toothbrushing encounter. At Visit 2 (day 7 to day 1), stain was re-evaluated to confirm eligibility and participants were randomized either to the Sonicare DiamondClean power toothbrush or to the ADA reference manual toothbrush. Subjects were instructed on product usage and brushed at home twice daily using Crest Cool Mint Gel dentifrice. At Visit 3 (day 7) and Visit 4 (day 14), subjects returned to the clinic for safety and stain evaluations. Stain was assessed by using Modified Lobene Stain Index (MLSI).

Results
All 179 subjects completed the study. Sonicare DiamondClean power toothbrush removed significantly more surface stain than a manual toothbrush. The mean baseline overall MLSI score for Sonicare DiamondClean was 0.55 and 0.56 for a manual toothbrush. The mean percent reduction in MLSI for Sonicare DiamondClean following one and two weeks of use was 20% and 33% respectively (p<0.0001 at each time point). The Sonicare DiamondClean power toothbrush was significantly superior to a manual toothbrush, reducing surface stain by 137% following one week of product use and by 67% following two weeks (p<0.01/week 1; p<0.01/week 2). Both products were safe for use.

Conclusion
Sonicare DiamondClean power toothbrush effectively removed extrinsic tooth stain within one and two weeks of use, and it was significantly superior to a manual toothbrush at both time points.
% Stain Removal

Week 1

Week 2

Sonicare DiamondClean
Manual Toothbrush

20% 8% 33% 19%
Stain Removal

*in vivo study*

**Evaluation of tooth shade change following stain induction and Sonicare FlexCare use**


**Objective**

To evaluate the efficacy of the Sonicare FlexCare to remove induced extrinsic tooth stains.

**Methodology**

Twenty healthy adults aged 19-53 years participated in a forced-stain model study to assess the ability of the Sonicare FlexCare to mechanically remove extrinsically induced stain. The stain inducing slurry consisted of 0.12% chlorhexidine, double-strength instant tea, instant coffee and grape juice concentrate used over a period of three weeks. Subjects were known stain formers and included coffee, tea, tobacco and red-wine users. Tooth shade was assessed on at least 3 buccal surfaces of the anterior dentition. The evaluation of tooth shade and color change was assessed using the X-Rite ShadeVision® device, a digital imaging analysis tool. Vitapan® Classical shades were derived on the system, as were changes in color parameters using the CIE color equation, \( \Delta E = (\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2)^{1/2} \). Following the period of stain induction, subjects were dispensed a Sonicare FlexCare for use over a 6-week period, with safety and efficacy intervals assessed at two, three, and six weeks post product use. A low abrasive dentifrice was used throughout the study.

**Results**

Sonicare FlexCare was proven to significantly reduce stain over a period of two, three and six weeks (p<0.0001). Vitapan Classical shade improvements of at least two shades were seen at all time points. \( \Delta E \) values greater than 3.5 were also observed at these intervals (p<0.0001).

**Conclusion**

Sonicare FlexCare was shown to be effective in removing commonly observed extrinsic stain-forming pigments from tooth surfaces. An improvement of two Vitapan Classical shades was seen following two, three and six weeks product use.