HYBENX® Products Bibliography

Endodontics

R. PACE, L. DINASSO, A. NIZZARDO, L. TAURO, G. PAGAVINO, AND V. GIULLANI; Department of Endodontics, University of Florence, Florence, Italy; Department of biostatistics, University of Milan, Milan, Italy
THE EFFECTS OF A NEW DECONTAMINANT SOLUTION ON ROOT CANAL BLEEDING DURING ENDODONTIC TREATMENT: A RANDOMIZED CONTROLLED STUDY

Alberto Antonelli, Luca Giovannini, Ilaria Baccani, Valentina Guiliani, Ricardo Pace and Gian Maria Rosssolini. University of Florence and Careggi University Hospital
In Vitro Antimicrobial Activity of the Decontaminant HybenX® Compared to Chlorhexidine and Sodium Hypochlorite against Common Bacterial and Yeast Pathogens

Riccardo Pace, Luca Di Nasso, Lucia Tauro, Andrea Nizzardo, Gabriella Pagavino Valentina Giuliani, Department of Clinical and Experimental Medicine, University of Florence, Florence, Italy
Analysis of dentinal erosion and removing smear layer of different irrigation protocols: an in vitro study

Riccardo Pace 1, Fabio Morecchiato 2 , Luca Giovannini 2 , Luca Di Nasso 1,2, Valentina Giuliani 1,2 , Debora Franceschi 1,2 , Gabriella Pagavino 2, Gian Maria Rossolini 2,3 and Alberto Antonelli 2,3,*
In Vitro Alteration by Dentine and Protein of the Antimicrobial Activity of Two Endodontic Irrigants: HybenX® and Sodium Hypochlorite

Abud-Blanco, K, L Bustos-Blanco, E Covo-Morales, and L C Fang-Mercado.
Antimicrobial activity of sulfonated phenolics components in the root canal system. Systematic review. **Rev CSV**. **7**(2): 53-60. 2015.

Rohrer, MD, HS Prasad, and E Savord.
A Histological Assessment of a HYBENX® Oral Tissue Decontaminant in Vital Pulp Therapy in Dogs. J. Biol. Regul. Homeost. Agents. Apr-Jun: 30(2 Suppl 1): 189-97. 2016.

> The authors demonstrate that vital pulp exposures, treated with **HYBENX® Oral Tissue Decontaminant**, demonstrated significant improvements in new dentin formation and tooth vitality when compared to the conventional standard of care.

General Dentistry

Ioannidis, AB, B Stawarczyk, B Sener, T Attin, and PR Schmidlin.
Influence of dentin and enamel pretreatment with acidic sulfur compounds on adhesive performance**. Clin. Oral Invest**. **17**(8): 1885-92. 2013.

> Authors concluded that **HYBENX® Oral Tissue Decontaminant** did not have a deleterious etching effect on enamel or dentin. Enamel still requires conventional etching procedures for bonding resins. Bonding to dentin was enhanced by pre-exposure to the **HYBENX®** Solution.

Argüello, Claudia.
A better way to remove the disease-causing Periodontal and Peri-implant Oral Biofilm**.** Dental Tribune **3**(9): 10-13. 2014. *(Translated from the*

original Spanish text).
Author summarizes the history, etiology, and health ramifications of oral biofilm. She explains the **HYBENX® Oral Tissue Decontaminant** technology and recommends that the product be used adjunctively by the dental clinician to treat periodontal disease and peri-implantitis.

Nardi, GM, S Sabatini, F Scarano, and M Petruzzi.
Effectiveness of a new chemical agent for topical use in the treatment of a patient with aphthous major ulcers. Poster Presentation at the National Congress of the Faculty of Dentistry, University of Rome, April 18-20. 2013. (*Translated from the original Italian text).*

Authors concluded that immediately after treatment with **HYBENX® Oral Tissue Decontaminant**, patients were symptom free and experienced complete healing of the ulcer surface.

Periodontology

Bracke, JW, M Basara, E Savord, A Dunaway, MJ Watkins.
Pilot Evaluation of a Simple Adjunctive Method for Improved Removal of Oral Biofilm during Conventional Scaling and Root Planing Therapy. J. Biological Regulators and Homeostatic Agents. Vol. 29, no. 3 (S1): 6-9. 2015.

Authors describe a simple adjunctive topical method for removing biofilm from tissue surfaces at the molecular level using **HYBENX® Oral Tissue Decontaminant** solution. Bacterial DNA pyrosequencing and inflammatory mediator immunoassays were used as surrogates for assessing cleaning efficacy.

Isola, G, G Matarese, RC Williams, VI Siciliano, A Alibrandi, G Cordasco, and L Ramaglia.
***The effects of a desiccant agent in the treatment of chronic periodontitis: a randomized controlled clinical trial*. J Clin Oral Invest 17 June** (doi:10.1007/s00784-017-2154-7). 2017.

Authors conclude that SRP plus the desiccant (**HYBENX® Oral Tissue Decontaminant**) resulted in a greater reduction in clinical, microbial and inflammatory mediators compared to SRP alone and demonstrated a significant approach to control the levels of certain periodontal pathogens and inflammatory mediators in patients with CP.

****Independent Review of the above Isola Paper:** Brignardello-Petersen, R. *A Desiccant **Agent as an Adjuvant to Scaling and Root Planing Improves Clinical Parameters in Patients with Chronic Periodontitis and Good Prognosis up to 1 Year after Treatment***. JADA June 17, 2017.

Author agreed with the validity of the controls used in the above RCT and indicated that the product showed merit up to the one-year follow up data point.

Lauritano, D, G Ambra, and F Carinci.
***The Efficacy of HYBENX® Oral Tissue Decontaminant for Periodontal Disease Treatment: A Case Series Study*. International Journal of Advances in Case Reports**; 2(7): 405-408. 2015.

Authors evaluated periodontal pockets in 11 patients using bacterial DNA analysis before and after HYBENX treatment. They observed a statistically significant reduction in red complex microorganisms at 15 days post treatment. They conclude that 1) HYBENX is an effective adjunct to eradicate bacterial loading in the pockets of patients affected by periodontitis and 2) HYBENX is an efficacious medical device for use in the management of moderate to severe chronic periodontitis.

Nardi, GM, S Sabatini, and FR Grassi. *Effectiveness of a chemical decontaminant (**HYBENX® Oral Tissue Decontaminant**) in the reduction of bleeding at hypersensitivity and in improving patient comfort.* Poster Presentation at the National Congress of the Faculty of Dentistry, University of Rome, April 18-20. 2013. *(Translated from the original Italian text).*

Authors concluded that bleeding on probing and dentinal hypersensitivity were improved in the treated cohort. Periodontal probing depth and plaque indices were also improved but did not reach statistical significance under the conditions evaluated. Patients preferred the treatment protocol versus the control (no decontamination treatment).

Nardi, GM, S Sabatini, D Lauritano, C Denisi, and FR Grassi. *Management of biofilm control in an elderly patient suffering from rheumatoid arthritis: a case report*. International Journal of Immunopathology and Pharmacology **26**(4): 973-6. 2013.

Authors concluded that the use of **HYBENX® Oral Tissue Decontaminant,** as an adjunct during remediation of periodontal disease, greatly facilitated ease of cleaning and patient comfort.

Lombardo, G, A Pardo, A Fiorino, G Corrocher, and G Urbani. *Full-mouth ultrasonic debridement in associazione a HYBENX nell'approccio iniziale al trattamento della parodontite cronica. (Full-mouth ultrasonic debridement in association with **HYBENX® Oral Tissue Decontaminant** as an initial approach to the treatment of chronic periodontitis)*. Quintessence International (Periodontology) **28**(3): 5-14. 2012.

36 patients with 393 periodontal defects were treated with full-mouth ultrasonic debridement either with, or without **HYBENX®** Solution as an adjunctive therapy. At 3 months followup, the **HYBENX** cohort was significantly improved over control. In particular, BOP in deep pockets (PPD> 7 mm) was reduced from 89 to 41% versus 90 to 63% in the control group (p = 0.0168). Authors concluded that **HYBENX® Oral Tissue Decontaminant** is a valuable aid to the initial treatment of chronic periodontitis.

Lombardo, GA, C Signoretto, G Corrocher, A Pardo, J Pighi, A Rovera, F Caccuri, and PF Nocini. *A topical desiccant agent in association with the ultrasonic debridement in the initial treatment of chronic periodontitis: a clinical and microbiological study*. New Microbiology **38**(3): 393-407. 2015.

In this randomized, split-mouth, single-blind prospective clinical study, the authors observed significant improvements in clinical outcomes at three months post-treatment in patients treated with adjunctive **HYBENX® Oral Tissue Decontaminant** therapy when compared to patients treated only by ultrasonic debridement. In particular, a significant reduction in the levels of anaerobic microflora and gingival inflammation was noted.

O'Hehir, TE. *A clinical practice observation of the effects of **HYBENX® Oral Tissue Decontaminant** plus instrumentation on non-responding periodontal sites by dental hygienists in the European Union*. Hygiene and Prevention: Profile in Oral Health, October: 122. Dentaltown.com. 2011.

Pilot clinical trial evaluation of patients in England, Scotland, and Italy using **HYBENX® Oral Tissue Decontaminant** as an adjuvant in scaling and root planning. Author concluded that this treatment reduced pocket depth in 10 of 13 patients with non-responding pockets greater than 5mm at the six-week follow-up analysis.

Pini-Prato G, C Magnani, and R Rotundo. *Treatment of Acute Periodontal Abscesses using the Biofilm Decontamination Approach. A Case Report Study*. Int J Periodontics Restorative Dent. 36(1): 55-63. 2016.

Authors conclude that the biofilm decontamination approach using **HYBENX® Oral Tissue Decontaminant** seems to be a very promising technique for the treatment of acute periodontal abscesses without using systemic or local antibiotics.

Sahni K, Khashai F, Forghany A, Krasieva T, and P Wilder-Smith. *Exploring Mechanisms of Biofilm Removal*. Dentistry 6(4): 371. 2016.

Authors demonstrate the removal of biofilm from extracted teeth using **HYBENX® Oral Tissue Decontaminant**.

Peri-implantitis

Lavere, E, Z Rifkin, L Mikulski, and S Andreana. *Antimicrobial Effects of a Root Canal Cleanser in Treating Contaminated Implants*. Ex Vivo Study. IADR Poster Session. Boston. 2012.

Authors concluded that the use of **HYBENX® Oral Tissue Decontaminant** "can serve as a beneficial form of treatment against peri-implantitis and subsequent infected implant defects not only due to its efficacy in halting bacterial growth, but as well as its non-invasive capabilities during application".

Lombardo G, C Signoretto, A Pardo, G Corrocher, J Pighi, A Signoriello, and Nocini PF. *Topical Desiccant Agent in Association with Manual Debridement in the Initial Treatment of Peri-implant Mucositis: A Clinical Prospective Study*. EuroPerio9, Amsterdam, Poster. June 20-23, 2018.

Authors compared the effectiveness of the use of **HYBENX® Oral Tissue Decontaminant** ("HOTD") vs. Chlorhexidine ("CHX") in reducing peri-implant mucositic inflammation. They concluded that HOTD was superior in reducing PPD but that CHX was superior in reducing the level of anaerobes.

Lombardo G, G Corrocher, A Rovera, J Pighi, M Marincola, J Lehrberg, and PF Nocini. *Decontamination Using a Desiccant with Air Powder Abrasion Followed by Biphasic Calcium Sulfate Grafting: a New Treatment for Peri-Implantitis.* Case Reports in Dentistry. 2015.

The authors noted after two-year follow up that the use of **HYBENX® Oral Tissue Decontaminant** and air powder abrasives, followed by bone defect grafting, represents a viable option in the treatment of peri-implantitis.

Lopez MA, M Andreasi Bassi, L Confalone, F Silvestre, and C Arcuri. *The Treatment of Peri-Implant Diseases: A New Approach Using HYBENX® as a Decontaminant for Implant Surface and Oral Tissues*. ORAL & Implantology 9(3):106-114. 2016.

Authors conclude that the use of **HYBENX** significantly reduced: 1) the need for invasive surgery, 2) bacterial load, 3) patient discomfort, 4) healing time, and, 5) the need for antibiotics, yielding a clear clinical improvement in both mucositis and severe peri-implantitis.

Mancini EA and GP Pini Prato. *Procedimiento de decontaminación del biofilm para el tratamiento del absceso periodontal agudo y la periimplantitis. [TRANS: The biofilm decontamination approach for treatment of periodontal abscess and peri-implantitis]*. Rev Asoc Odontol Argent 104(2): 79-85. 2016.

Authors conclude that the biofilm decontamination approach, using **HYBENX® Oral Tissue Decontaminant**, is a very promising technique for the treatment of acute periodontal abscess and peri-implantitis without the use of systemic or local antibiotics.

Pini-Prato G, C Magnani, and R Rotundo*. Nonsurgical Treatment of Peri-implantitis Using the Biofilm Decontamination Approach: A Case Report Study*. Int J Periodontics and Restorative Dent. 36(3): 383-391. 2016.

Authors conclude that the biofilm decontamination approach using **HYBENX® Oral Tissue Decontaminant** seems to be a very promising technique for the treatment of peri-implantitis in a short-term evaluation without using systemic or local antibiotics.

Reif-Bankmann, Sabine. *Long-term success of implant restorations through professional therapy concepts*. J. Dental Hygiene **1**: 14-18. 2013.

Author concludes that successful hygienic intervention in mucositis associated with peri-implantitis requires the use of an adjunctive debridement material such as **HYBENX® Oral Tissue Decontaminant** in combination with standard manual or mechanical debridement procedures.

Solakoglu, Önder. *Treatment of peri-implantitis - a protocol for clinical success*. Zahn Prax **14**(6): 306-315. 2011. (*Translated from the original German text*).

Author indicates that the most critical step in the successful surgical restoration of severe peri-implantitis is effective decontamination of the implant surfaces with a material such as **HYBENX® Oral Tissue Decontaminant** to completely remove biofilm.

Oral Aphthous Ulcers

Lauritano, D, M Petruzzi, GM Nardi, F Carinci, G. Minervini, D Di Stasio, and A Lucchese. *Single Application of a Dessicating Agent in the Treatment of Recurrent Aphthous Stomatitis*. J. Biological Regulators & Homeostatic Agents Vol. 29, no. 3 (S1): 59-66. 2015.

Nardi, GM, FR Grassi, D Lauritano, and M Petruzzi. *An Alternative Approach for the Treatment of Major Aphthosis: Case Report*. J. Interdiscipl. Med Dent Sci **2**(5): 3pp. 2014.

Authors conclude that **Oralmedic® Barrier Solution** was safe and effective for the treatment of severe recurrent oral ulcers using weekly topical applications for four weeks.

Porter, SR, K Al-Johahni, S Fedele, and DR Moles. *Randomized controlled trial of the efficacy of **HYBENX® Oral Tissue Decontaminant** in the symptomatic treatment of recurrent aphthous stomatitis.* J. Oral Disease **15**(2): 155-61. 2009.

Treatment of oral ulcers with **HYBENX®** Solution safely, effectively, and more quickly, reduced the painful symptoms of RAS when compared to the leading alternative treatment.

Veterinary Periodontology

Klima, Larry J Et al. *Use of **HYBENX® Oral Tissue Decontaminant** as a topical treatment in gingivoplasty in a boxer dog: a case study.* (Unpublished internal report, EPIEN Medical Inc.).

Authors found **HYBENX®** Solution dramatically reduced bleeding during surgery and enhanced patient management.

Other Unpublished Data:

Costerton, JW and C Shaudinn. *Studies on the effect of **HYBENX® Oral Tissue Decontaminant** on Biofilm in the PerioChip and Root Canal models, as well as freshly extracted human teeth*. 2007.

Authors observed complete obliteration of mature biofilm after a two-minute exposure confirmed by live/dead staining confocal and electron microscopy.

Huber, BJ, DVM**,** Diplomate, American Board of Veterinary Practioners. American Hospital of Rowlett & Diagnostic Center, Rowlett, TX. *Testimonial, Internal Report, EPIEN Medical Inc.* 2013.

*We are routinely obtaining better outcomes using **HYBENX®** Products in dental cleaning procedures for improved pain management and hemostasis and removal of inflamed mucosal tissue in stomatitis patients.*

Klima, LJ, DVM**,** Diplomate American Veterinary Dental College. Comprehensive Oral Care and Maxillofacial Surgery Clinic, Ft. Collins, CO. *Testimonial, Internal Report, EPIEN Medical Inc*. 2013.

*We are routinely using **HYBENX®** Solution for treatment of periodontal pockets, furcational defects, stomatitis and mucositis lesions, gingivoplasty, and general patient case management*.

Nielsen, David, DVM**.** Veterinary Dentist. Animal Medical Centers of California and South Dakota. *Testimonial: Internal Report, EPIEN Medical Inc.* 2013.

*We are routinely using **HYBENX®** Solution for cleaning, root canal cleansing, severe periodontitis, and in feline aggressive stomatitis.*

Davis, SC, D Chagui, Y Rivas, and E Gonzalez. *Pilot Study Report: Evaluation of the Effect of Antimicrobial Agents on the Proliferation of Acinetobacter baumannii, Pseudomonas aeruginosa, and Methicillin Resistant Staphylococcus aureus in Deep Partial Thickness Wounds using a Porcine Model*. (University of Miami Miller School of Medicine Contracted research, *Internal Report, EPIEN Medical Inc*). 2006.

***HYBENX®** Test Solutions exhibited strong antimicrobial activity in this preliminary pigskin infection model assessment.*

Berman, B, OA Perez, S Konda, and J K Patel. Antifungal Effect of **HYBENX®** Solution in an In-vitro Model of Fungal Infection. (University of Miami Miller School of Medicine Contracted Research. *Internal Report, EPIEN Medical Inc*). 2007.

HYBENX® Solution demonstrated antifungal activity in a human skin model system (Apligraf®).

US Customer NOTICE: HYBENX® Product is cleared in the US on a 510(k) HYBENX® Root Canal Cleanser for use on the interior surfaces of the tooth root canal. As such, it is deemed safe and effective on internal nerve, bone, and dentinal structures. The EU has approved the product more broadly as a Class I Medical Device for unrestricted oral cleansing applications. EPIEN Medical does not promote the product for those broader applications in the US. However, the authors above deem HYBENX to be safe for use on all oral surfaces per the published applications.

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