

Bluem oxygen technology

Protection for natural teeth and implants. Accelerating wound healing, implant integration and bone regeneration in a safe, effective and non-invasive approach.

- Works instantaneously
- Effective on all micro organisms
- No resistance developed
- No side effects
- No toxic ingredients
- Quick and easy to apply
- Simple concept



Wound healing

Wound healing requires a variety of cells to increase their metabolic activity, resulting in a high oxygen demand.¹ Oxygen at the wound site has been shown to promote wound healing by stimulating several processes, including;

- Neovascularization²
- Collagen production^{3,4,5}
- Phagocytosis (engulfing of microorganisms, cells, or debris by macrophages or neutrophils)^{6,7}
- Neutrophil-mediated oxidative microbial killing⁷
- Degradation of necrotic wound tissue⁸

Lack of sufficient oxygen (hypoxia) has been associated with pain in the wound area, with the prevalence of hypoxia being more pronounced in patients who are smokers and diabetics. These populations demonstrate slower wound healing and increased risk of wound healing complications compared to healthy patients.^{9,10,11}

Bluem mechanism of action

Bluem is using a mechanism to deliver active oxygen (H₂O₂) in a controlled manner directly to the treatment site. In contact with saline Sodium perborate is converted into sodium borate and H₂O₂. In low concentrations of 0.003%- 0.015%, hydrogen peroxide has a disinfectant⁸ action, and occurs, together with the antibacterial ROS (reactive oxygen species) during the respiratory burst of neutrophils in normal wound fluid^{12,13} and has a chemotactic effect on leucocytes¹⁴. The concentrations of hydrogen peroxide in the products used are not comparable to the high concentrations (1.5 – 3%) of hydrogen peroxide used in medicine as a disinfectant. It is known that the production of free radicals then causes damage to the wound.^{19,15} Research has shown that the continuous presence of a low concentration of hydrogen peroxide kills pathogenic bacteria much more effectively than a one-off high concentration¹⁶ and that fibroblasts are not damaged by this.¹⁷

1. Eisenbud DE. Oxygen in Wound Healing. Clin Plastic Surg 39 2012: 293-310
2. Hopf HW, Gibson JJ, Angeles EP et al. Hyperoxia and angiogenesis. Wound Repair Regen 2005; 13:558-64
3. Niinikoski J. Effect of oxygen supply on wound healing and formation of experimental granulation tissue. Acta Physiol Scand Suppl. 1969;334:1-72.
4. Hunt TK, Pai MP. The effect of varying ambient oxygen tensions on wound metabolism and collagen synthesis. Surg Gynecol Obstet. 1972;135(4): 561-567.
5. Hsu RW, Hsu WH, Tai CL, Lee KF. Effect of hyperbaric oxygen therapy on patellar tendinopathy in a rabbit model. J Trauma. 2004;57(5):1060-1064
6. Hohn DC, MacKay RD, Halliday B, Hunt TK. The effect of O₂ Surg Forum. 1976; 27(62):18-20.
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9. Silverstein, P. "Smoking and wound healing. Am. J. Med., 1992;93 (Suppl 1A):22S-24S.
10. Carrico TJ, Mehrhof AI, Cohen IK. "Biology of wound healing." Surg Clinics of North America. 1984;64(94):721-733.
11. Cruse PJE, Foord R. "A prospective study of 23,649 surgical wounds." Arch Surg. 1973;107:2006-210.
12. Sashwati R, Savita K, Kishore N, Thomas K. Dermal wound healing is subject to redox control. Mol Ther 2006; 13: 211-220 2.
13. Fife CE, Buyukcakir C, Otto GH et al. The predictive value of transcutaneous oxygen tension measurement in diabetic lower extremity ulcers treated with hyperbaric oxygen therapy: a retrospective analysis of 1,144 patients. Wound Repair Regen 2002; 10:198-207
14. Cho M, Hunt TK, Hussain MZ. Hydrogen peroxide stimulates macrophage vascular endothelial growth factor release. Am J Physiol Heart Circ Physiol 2001; 280: H2357-H2363
15. Sen CK. Wound healing essentials: let there be oxygen. Wound Repair Regen 2009; 17:1-18
16. Saissy JM, Guignard B, Pats B et al. Pulmonary edema after hydrogen peroxide irrigation of a war wound Intens Care Med 1995; 21:287-288
17. Pruitt KM, Reiter B. Biochemistry of peroxidase system: antimicrobial effects in the lactoperoxidase system. New York 1985: 143
18. Hyslop PA, Hinshaw DB, Scraufstatter IU et al. Hydrogen peroxide as a potent bacteriostatic antibiotic: implications for host defence. Free radical Biology and Medicin 1995; 19:31-7
19. Sashwati R, Savita K, Kishore N, Thomas K. Dermal wound healing is subject to redox control. Mol Ther 2006; 13: 211-2

Accelerated tissue remodeling: Sodium Perborate²¹ & Honey²²

Application of Bluem (oral gel) to injured tissues accelerates wound healing. Tissue oxygenation at peri-implantitis sites was significantly decreased ($p < 0.05$) when compared with that at healthy sites.²⁰

20. On site noninvasive assessment of peri-implant inflammation by optical spectroscopy. J Periodontal Res. 2011 Jun;46(3):382-8
21. Nascent oxygen from sodium perborate in oral disinfection and hygiene Odontoiatr Rev Iberoam Med Boca. 1950;7(83):617-50.
22. Honey: An immunomodulator in wound healing Wound Rep Reg (2014) 22 187–192

Plaque control: Sodium Perborate^{23,24} Honey²⁵ and Xylitol^{27,28}

Oxygen molecules (O_2) can penetrate much deeper into the biofilm to kill the anaerobic bacteria than the Chlorhexidine ($C_{22}H_{30}Cl_2N_{10}$) molecule

Oxygen molecule (O_2) can penetrate much deeper into the perimucosal seal around the implant.

23. Effect of an oxygenating agent on oral bacteria in vitro and on dental plaque composition in healthy young adults Frontiers in Cellular and Infection Microbiology July 2014, Volume 4
24. The effect of chemotherapeutic agents on titanium-adherent biofilms. Clin. Oral Implants Res. 22, 1227–1234
25. Effect of honey in preventing gingivitis and dental caries in patients undergoing orthodontic treatment The Saudi Dental Journal (2014) 26, 108–114
26. A Comparative Evaluation of the Antibacterial Efficacy of Honey In Vitro and Antiplaque Efficacy Preliminary Results J Periodontol • September 2012
27. Xylitol inhibits inflammatory cytokine expression induced by lipopolysaccharide from Porphyromonas gingivalis. Clin Diagn Lab Immunol. 2005 Nov; 12(11):1285-91.
28. Effect of xylitol on an in vitro model of oral biofilm. Oral Health Prev Dent. 2008;6(4):337-41.

Bone growth accelerator: Lactoferrin^{29,30}

Lactoferrin potently stimulates the proliferation and differentiation of primary osteoblasts

29. Lactoferrin – A Novel Bone Growth Factor Clin Med Res. 2005 May; 3(2): 93–101.
30. Lactoferrin promotes bone growth Biometals. 2004 Jun;17(3):331-5.

Fluoride-free:

All Bluem products are Fluoride-free. Fluoride impairs the corrosion^{31,32,33,34} resistance of the titanium implants. Due to the corrosion microscopic particles of titanium can be found in the surrounding tissue, which may have a negative impact on the devices, as this can potentially be pro-inflammatory.

31. The effect of fluoride ions on the corrosion behaviour of Ti metal, and Ti6-Al-7Nb and Ti-6Al-4V alloys in artificial saliva. Acta Chim Slov. 2013;60(3): 543-55.
32. Effect of Fluoride Concentration and pH on Corrosion Behavior of Titanium for Dental Use. J DENT RES 1999 78: 1568
33. The role of fluoride on the process of titanium corrosion in oral cavity. Biometals (2012) 25:859–862
34. Biomedical Implants: Corrosion and its Prevention - A Review Recent Patents on Corrosion Science, 2010, 2, 40-54

Relative Dentin Abrasion (RDA < 30)

Bluem toothpaste has a neutral pH value and contains no scouring ingredients. No damage can therefore be caused to the surfaces of teeth or implants.

35. The measurement in vitro of dentine abrasion by toothpastes. Int Dent J. 2007 Oct;57(5):314-8.

Dare to be different.



www.bluemcare.com

Treatment indications:

Acute wound healing after implant placement, Gingivitis³⁷, Periodontitis³⁶, Peri-implant mucositis, Peri-implantitis³⁶, Pericoronitis, Oral Ulcers.

36. Adjunctive topical Reactive Oxygen Species (ROS) in periodontitis and peri-implantitis – a pilot study
37. Application of toothpaste and mouthwash "BLUEM" in complex hygienic oral care for patients with coronary heart disease Stomatologija (Mosk). 2014;93(3):18-20
38. Optimization of hygienic oral care in patients with dental implants based on use of toothpaste and mouthwash "Bluem" Stomatologija (Mosk). 2014
39. Use of oral hygiene products containing active oxygen in patients with pemphigus vulgaris Stomatologija (Mosk). 2014

Different concentrations of slow oxygen release

- Bluem toothpaste 75ml +/- 20 mg/l O_2
- Bluem mouthwash 500ml +/- 20 mg/l O_2
- Bluem oral spray 15 ml +/- 20 mg/l O_2
- Bluem oral gel 15 ml > 100mg/l O_2